
# AVS 63RD International Symposium & Exhibition

**NOVEMBER 6-11, 2016 ■ MUSIC CITY CENTER, NASHVILLE, TENNESSEE**

# Technical & Exhibitor Program


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**EXHIBIT HOURS:**

| | |
|---|---|
| *Tuesday, November 8:* | *10:00 a.m. - 5:00 p.m.* |
| *Wednesday, November 9:* | *10:00 a.m. - 4:30 p.m.* |
| *Thursday, November 10:* | *10:00 a.m. - 2:30 p.m.* |

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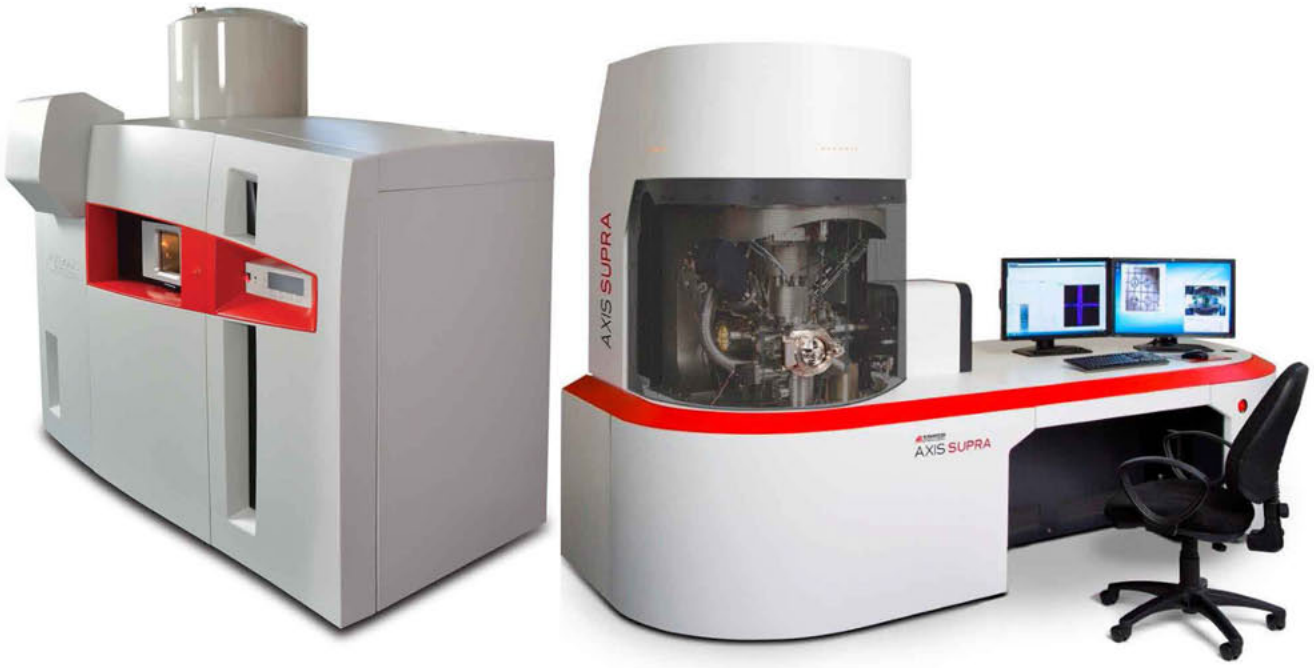


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# Greetings

On behalf of the AVS community, we welcome you to Nashville, Tennessee for AVS 63. We hope you have a productive and exciting week filled with new insights and networking opportunities.

We are pleased to have **Dr. Heike Riel**, IBM Fellow and Director of the Physical Sciences Department at **IBM Research,** present the Symposium Plenary Lecture on **"Integrated Semiconductor Nanowires for Nanoelectronics."** Dr. Riel's lecture will span the range from fundamental scientific principles associated with epitaxial growth and doping of nanowire heterostructures and novel device concepts to the technological challenges for future device applications. Thus her lecture connects to researchers across the AVS spectrum, from those doing basic research in academia to those conducting applied research in an industrial setting.

Throughout the week the technical program will typically run 14-15 parallel oral sessions during the day, complemented by lively poster sessions on Tuesday and Thursday evenings. Focus Topics that will be featured during the week include 2D Materials; Actinides and Rare Earths; Fundamental Discoveries in Heterogeneous Catalysis; Advanced Ion Microscopy; In situ and Operando Spectroscopy and Microscopy for Catalysts, Surfaces, and Materials; Novel Trends in Synchrotron and FEL-Based Analysis; Plasma Processing for Biomedical Applications; Scanning Probe Microscopy; Spectroscopic Ellipsometry; and Tribology. These topics will complement our traditional strong core on fundamental surface science and interfacial phenomena, applied surface science, surface engineering, micro- and nano-electronics, nanometer–scale science and technology, manufacturing science and technology, thin films, plasma science and technology, micro- and nano-electromechanical systems, electronic and photonic materials, biomaterials, and vacuum science and technology.

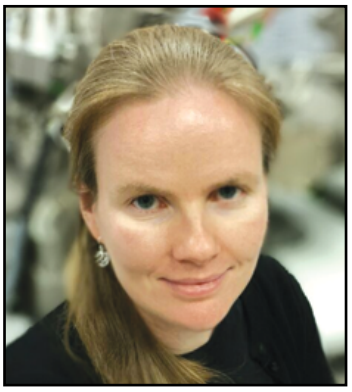
In addition to the Focus Topics and core Division/Group sessions, the technical program will include other special features. For example, the Advanced Ion Microscopy Focus Topic will hold a session "10 Years of GFIS Microscopy" to celebrate the 10$^{th}$ anniversary of the helium ion microscope. The Surface Science Division will sponsor an all-invited session, "Celebrating a Life in Surface Science: A Symposium in Honor of John T. Yates, Jr." Many sessions will feature cutting-edge research driven by applications with high industrial relevance: e.g., "Multiple Technique Approaches for Real-World Industrial Problem Solving" in the Applied Surface Science Division, Advanced Manufacturing and other sessions in the Manufacturing Science & Technology Group, "New Materials and Devices for Emerging Memory Technologies" in the Electronic Materials & Photonics Division, "Nanodiamonds, Thin Films and Electronics" in the Nanometer-scale Science and Technology Division, "Nanoscale Wear: Applications to Nanometrology and Manufacturing" in the Tribology Focus Topic, "Vacuum Measurement, Calibration, Primary and Industry Standards" in the Vacuum Science & Technology Division, and many others.

In conjunction with the technical program, there will be an extensive equipment and product exhibition, where the latest technology that enables cutting edge research will be displayed. And don't forget to take advantage of the many networking, professional development and recruitment events, which are hallmarks of AVS Symposia.

Thank you for making time to participate in AVS 63. We also want to extend special thanks to all the dedicated volunteers who put in countless hours to create the technical program and to the exceptional AVS Staff who worked long hours to assemble a world-class program and exhibition.

***See you in Music City!***

Lisa M. Porter
2016 Program Chair
*Carnegie Mellon University*



Amy V. Walker
2016 Program Vice-Chair
*University of Texas at Dallas*

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## SYMPOSIUM

Music City Center
201 5th Ave S
Nashville, TN 37203

## HQ HOTEL

Renaissance Nashville
611 Commerce Street
Nashville, TN 37203

## AVS NATIONAL OFFICE

125 Maiden Lane, 15th Floor
New York, NY 10038
212-248-0200 FAX: 212-248-0245
avsnyc@avs.org www.avs.org

## SYMPOSIUM REGISTRATION HOURS

| | | | |
|---|---|---|---|
| Sun. | 2:00 p.m. to 6:00 p.m. | Wed. | 7:30 a.m. to 5:00 p.m. |
| Mon. | 7:30 a.m. to 5:00 p.m. | Thurs. | 7:30 a.m. to 5:00 p.m. |
| Tues. | 7:00 a.m. to 5:00 p.m. | Fri. | 7:30 a.m. to 10:00 a.m. |

## SHORT COURSE REGISTRATION HOURS

| | | | |
|---|---|---|---|
| Sun. | 2:00 p.m. to 6:00 p.m. | Wed. | 7:30 a.m. to 5:00 p.m. |
| Mon. | 7:30 a.m. to 5:00 p.m. | Thurs. | 7:30 a.m. to 5:00 p.m. |
| Tues | 7:00 a.m. to 5:00 p.m. | Fri. | 7:30 a.m. to 10:00 a.m. |

## SYMPOSIUM REGISTRATION FEES

| | Pre-registration (Pre-Paid) | Registration (On-Site) |
|---|---|---|
| Member*** | $665.00 | $805.00 |
| Non-Member** | $790.00 | $955.00 |
| Student Member*** * | $220.00 | $270.00 |
| Student Non-Member** * | $260.00 | $315.00 |
| Early Career Member*** * | $335.00 | $405.00 |
| Early Career Non-Member** * | $400.00 | $485.00 |
| Technical Specialist Member | $315.00 | $385.00 |
| Technical Specialist Non-Mem | $360.00 | $435.00 |
| One Day | $385.00 | $480.00 |
| Two Day | $690.00 | $860.00 |
| Exhibits Only | Free | FREE |

**Pre-registration deadline: October 17, 2016**
AVS tax ID Number: 04-2392373

*A bonafide full-time university student must present student I.D. Part-time students don't qualify for a student rate. If your highest degree is within 5 years you may register as an Early Career.

**Non-member registration inludes a complimentary 2017 AVS membership— report to the AVS Booth

***Full Week, Student, Early Career & Technical Specialist member registration fee INCLUDES your 2017 membership renewal dues. For more information report to the AVS Booth.

## EXHIBIT HOURS

| | |
|---|---|
| Tuesday, November 8 | 10:00 a.m. to 5:00 p.m. |
| Wednesday, November 9 | 10:00 a.m. to 4:30 p.m. |
| Thursday, November 10 | 10:00 a.m. to 2:30 p.m. |

## OFFICE LOCATIONS

| | |
|---|---|
| Symposium Registration | Hall CD Concourse |
| Short Course Registration | Hall CD Concourse |
| Staff Offfice/Press | 210 |
| AVS Store | Exhibit Hall Booth 645 |
| Career Center | Exhibit Hall Booth 138 |
| Publications Booth | Exhibit Hall Booth 430 |
| Presenters Preview | 106A |

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# AVS 63 Technical Program at a Glance

| Room /Time | 101A | 101B | 101C | 101D | 102A | 102B | 103A | 103B |
|---|---|---|---|---|---|---|---|---|
| SuA | BP-SuA: Biomaterials Plenary | | | | | | | |
| MoM | BI+AS-MoM: Biomolecules and Cells at Interfaces | AS-MoM: QSA: New Ways to Perform Old Tricks | MI+2D+AC-MoM: Chir. Mag/Mag & Spin Orbit Eff at Inter & Surf: Rec Exp. & Theo. Adv | NS-MoM: Nanopatterning & Nanofabrication + 3D | EM+NS+PS+SS+ TF-MoM: Growth & Devices Tech. of Group III-Nitrides | EM-MoM: Advances in Photonics | MS-MoM: Manufacturing for Next-Generation Energy Solutions | 2D+MI+SA-MoM: 2D Matls Char. including Microscopy and Spectroscopy |
| MoA | PB+BI+PS-MoA: Plasma Processing of Biomaterials | AS+BI-MoA: Pract Surf. Anal I: Adv Bio Surf Anal/Imag Bey. 'Show & Tell' | MI+2D+AC-MoA: Mag & Spin Orbit Effects at Inter & Surf: Rec Exper & Theo Adv. | NS-MoA: Nanophotonics, Plasmonics, and Energy | EM-MoA: Surface & Inter. Challenges in Wide Bandgap Materials | TF+PS+SE-MoA: Plasma-based Deposition Techniques and Film | MS-MoA: Advanced Mfg: Systems, Devices, and Materials | 2D+MI-MoA: Dopants, Defects and Interfaces in 2D Materials |
| TuM | PB+BI+PS-TuM: Plasma Proc. of Bio/Biomimetic Surfaces | AS+AC-TuM: Pract Surf Anal II: Micro, Nano, Atom Probe, & All Things 'Small' | SE+NS+TF+TR-TuM: Nanostructured Thin Films and Coatings | NS-TuM: Nanodiam., TF & Elect/ Health & Env. Impact of Nanotechnology | EM+MN-TuM: New Materials & Dev/ for TFETs, Spin., & Extended CMOS | TF+SA+MI-TuM: Thin Films for Synchrotron and Magnetism Applications | MS+AS-TuM: Characterization and Processing for IC Manufacturing | 2D+MI-TuM: Novel 2D Materials |
| TuL | | | | | | | | |
| TuA | BI+AS+SA-TuA: Biophys. & Char of Biological & Biomat Surfaces | AS+SS-TuA: Data Analytics in Surface Science and Nanoscience | SE+MS+TF-TuA: Innov in PVD, CVD, Atmos. Press. Plasma & Other Surf. Tech | NS-TuA: Nanoscale Imaging and Characterization | EM+MI+MN-TuA: New Materials & Dev. for Emerg. Memory Technologies | MI-TuA: Magnetic Phenomena in Organic Systems | MS-TuA: Working with National Labs and User Facilities | 2D-TuA: Novel Quantum Phenomena in 2D Materials |
| TuP | | | | | | | | |
| WeM | BI+MI-WeM: Biosensors and Diagnostics | AS+SS-WeM: Applications where Surface Analysis is Your Only Hope | SE+TR-WeM: Protective Coatings for Tribol Apps in Surf. Eng. | VT-WeM: Vac Tech – History & Innov/ Transfer & Manipulation | EM+NS-WeM: Nanoparticles for Electronics and Photonics | MN-WeM: Multiscale Phen. & Emerging Tech. in Micro- & Nano-Systems | HC+SS-WeM: Bridging Gaps in Heterogeneously -catalyzed Reactions | 2D+TF-WeM: 2D Materials: Growth and Fabrication |
| WeL | | | | | | | | |
| WeA | TR+AS+NS+SS-WeA: Nano Wear: Apps to Nanomet. & Manufacturing | AS-WeA: Mult. Tech Approaches for Real-World Industrial Problem Solving | IS+HC-WeA: Ambient Press. XPS Studies of Surf. & Chem of Catalysts | SE+2D+EM-WeA: Multifunctional Thin Films and Coatings | EM+NS+SP+SS-WeA: Nano Imag of Mtls & Comp Semi based Nano, Surf, & Int | MN+NS-WeA: Optomechanics, Photonics, and Quantum Nanosystems | HC+NS+SS-WeA: Nano Surface Structures in Hetero Catalyzed Reactions | 2D+NS-WeA: Nanostructures incl. Heterostruct made of 2D Materials |
| ThM | BI+AS+SA-ThM: Synth. & Proc of Biomat/Bio Inspired Mtls | AS+SS-ThM: Depth Profiling, Buried Interfaces, and 3D Analyses | IS-ThM: In-situ & Oper Spect. & Micros w/ Infrared Absorp Spect. | | EM+AC+SS+TF-ThM: Radiation Det. Materials & Devices | MN+BI-ThM: 'Fantastic Voy.'– the New Micro/ Nano/Bio Syst. Frontiers | HC+SS-ThM: Dynamics of Gas-surface Interactions in Hetero Catalysis | 2D+MI-ThM: Prop of 2D Matls incl. Elect, Mag, Opt, Mech, Therm Properties |
| ThA | TR+BI+SE+TF-ThA: Materials Tribology | AS-ThA: Adv. for Comp. Sample Prep. Strategies & Complex Systems | IS-ThA: Ambient Press. Photoelec Spect & Scanning Probe Techs. | NS+BI-ThA: App. Nanoscale Micro Techs/ Biomat Inter – New Advances | EM+SS+TF-ThA: Materials and Interfaces for Energy Storage | MN+2D+NS-ThA: Focused Session on Atomic Layer Nanomechanics and 2D MEMS | HC+SS-ThA: Adv. in Theor Models & Simul of Hetero-catalyzed Reactions | 2D-ThA: Surface Chem, Function, Bio and Sensor Apps of 2D Materials |
| ThP | | | | | | | | |
| FrM | | | IS-FrM: In situ Characterization of Nanomaterials | | EM-FrM: Late Breaking News on Elect. Materials & Devices | MN+MS-FrM: Rad. Effect in Emerg Micro/ Nano Struct, Dev., & Systems | | 2D+NS-FrM: 2D Materials: Device Physics and Applications |

# AVS 63 Technical Program at a Glance

| 103C | 104A | 104B | 104C | 104D | 104E | 105A | Hall C | Hall D |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | | |
| SA+AS+MI-MoM Adv in Hi-Res Imaging Tech/ Push the Limits w/ X-Ray Spect. | SP+AS+MI+NS+SS-MoM: Advances in Scanning Probe Microscopy | PS-MoM: Advanced FEOL/Gate Etching | VT-MoM: Vac Measure, Calib., Primary & Industry Standards | PS+SE-MoM: Atmospheric Pressure Plasma Processing | SS+AS+HC-MoM: Mech Insights on Surf. React in Catal. & at Novel | TF-MoM: ALD Precursors and Surface Reactions | | |
| SA+AS-MoA: Front of Photo w/ Synch & XFEL Rad./Adv in Hi-Res. Imaging | SP+2D+AS+NS+SS-MoA: Probing Top. States & Supercond. | PS-MoA: Advanced BEOL/ Interconnect Etching | VT-MoA: Gas Dynamics, Simulation and Partial Pressure Analysis | PS+AS+SS-MoA: Plasma Surface Interactions | SS+AS+HC-MoA: Metals, Alloys, and Oxides: Reactivity and Catalysis | TF+EM-MoA: ALD for Energy Conversion and Storage | | |
| SA+2D+AC+AS+TF-TuM: Apps of Syn-based Tech to 2D Mtls/Com Func Mtls & Het | SP+AS+MI+NS+SS-TuM: Probing Chem Reactions at the Nanoscale | PS-TuM: Plasma Diagnostics, Sensors and Control | VT-TuM: Vacuum Pumping and Material Outgassing | SS1+AS+HC+NS-TuM: Surf Dyn, Non-Adiab, & Theo & Mod of Surf &Int Phen | SS2+AS+HC+NS-TuM: Nanostruct: Growth, React., & Catalysis | TF-TuM: Advanced CVD and ALD Processing, ALD Manufacturing | EW-TuM: Exhibitor Technology Spotlight Session | |
| | | | | | | | EW-TuL: Exhibitor Technology Spotlight Session | |
| SA+AS+BI+MI-TuA: Syn & XFEL Adv for Bio Sys/ Syn Rad at Front of Dev Tech | SP+AS+MI+NS+SS-TuA: Probing Spin-Dependent Phenomena | PS+2D-TuA: Plasma Proc for Nanomaterials and 2D Materials | VT-TuA: Accelerator and Large Vacuum Systems | SS+HC-TuA: Photocatalysis and Photochemistry at Surfaces | SS+AS-TuA: Structure and Characterization of Oxides | TF-TuA: Thin Film Photovoltaics | | |
| | | | | | | | | Poster Sessions AC, AS, BI, MI, MS, NS, SA, SE, SS, VT |
| AC+MI-WeM: Mag., Complex, & Supercond. in the AC & RE/AC & RE Theory | SP+SS+TF-WeM: Probing Electronic Properties | PS-WeM: Plasma Sources & Novel Mech for Generating Plasmas | PS+TF-WeM: Atomic Layer Etching | SS+2D-WeM: Synth, Charact, & Surf Sci. of Novel Matls & Interfaces | SS+AS-WeM: Envir Interfaces, Ambient Surf, & In-Operando Studies | TF+MI+NS-WeM: ALD and Nanostructures | EW-WeM: Exhibitor Technology Spotlight Session | |
| | | | | | | | EW-WeL: Exhibitor Technology Spotlight Session | |
| AC+MI-WeA: AC & RE Theory/ Nuc. Power, Waste Remed & Applications | HI-WeA: 10 Years of GFIS Microscopy | PS+TF-WeA: Plasma Deposition and Plasma Assisted ALD | PS-WeA: Atomic Layer Etching and Low Damage Processing | SS+AS+EM-WeA: Semiconductor Surfaces and Interfaces | TF+MI-WeA: Thin Films for Magnetic and Optical Applications | TF+EM+MI-WeA: Thin Films for Microelectronics | | |
| AC+AS+SA-ThM: Chemistry and Physics of the Actinides and Rare Earths | HI+NS-ThM: Fundamentals of Ion Beam Microscopy | PS2-ThM: Plasma Processing of Challenging Materials | PS1-ThM: Modeling of Plasmas and Plasma-Surface Interactions | SS-ThM: Chirality and Enantioselect on Surfaces; Ionic Liquid Interfaces | TF1-ThM: Control and Modeling of Thin Film Growth and Film | TF2-ThM: Area-selective Deposition and Sequential Infiltration | | |
| SS+AS-ThA: Celeb. a Life in SS: A Symp in Honor of JOHN T. YATES, JR. | HI+MI+NS-ThA: Ion Beam Based Imaging and Nanofabrication | PS-ThA: Plasma Chemistry and Plasma Surface Interactions | EL+AS+BI+EM+TF-ThA: Optical Char of Nanostruct & Metamaterials | | TF+BI-ThA: Thin Films for Bio-related Applications | TF-ThA: Self-assembled Monolayers and Organic/Inorganic Interface | | |
| | | | | | | | | Poster Sessions 2D, EL, EM, HI, IS, MN, PS, TF, TR |
| | | | EL+AS+EM+MI+TF-FrM: Spec Ellip: Novel Apps & Theor. Approaches | | SS+HC-FrM: Deposition and Analysis of Complex Interfaces | TF-FrM: CVD, ALD and Film Characterization | | |

# DIVISION, GROUP, & FOCUS TOPIC CHAIRS & CHAMPIONS

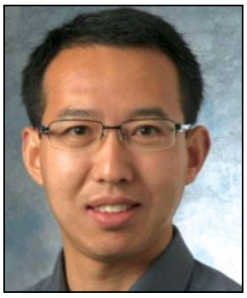
**Michael Stueber**
***Advanced Surface Engineering (SE)***

**Chris Szakal**
***Applied Surface Science (AS)***

**Stephanie Alllen**
***Biomaterial Interfaces & Biomater Plenary (BI/BP)***

**Nikolaus Dietz**
***Electronic Materials & Processing (EM)***

**Hendrik Ohldag**
***Magnetic Interfaces & Nanostructures (MI)***



**Philip Feng**
***MEMS/NEMS***

**Bridget Rogers**
***Manufacturing Science & Technology (MS)***

**Leonidas Ocola**
***Nanometer-Scale Science & Technology (NS)***

**Sumit Agarwal**
***Plasma Science & Technology (PS)***

**Bruce Kay**
***Surface Science (SS)***

**Mariadriana Creatore**
***Thin Films (TF)***

**Yulin Li**
***Vacuum Technology (VT)***

# DIVISION, GROUP, & FOCUS TOPIC CHAIRS & CHAMPIONS

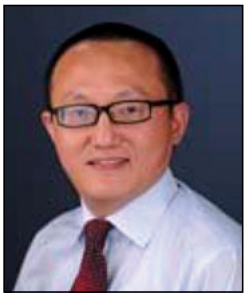
**Ivan Oleynik**
***2D Materials***

**Daniel Gunlycke**
***2D Materials***

**David Shuh**
***Actinides and Rare Earths (AC)***

**Dan Killelea**
***Fundamental Discoveries in Heterogeneous Catalysis (HC)***

**Gregor Hlawacek**
***Advanced Ion Microscopy (HI)***



**Franklin Tao**
***In situ Spectroscopy and Microscopy (IS)***

**Olivier Renault**
***Novel Trends in Synchrotron and FEL-Based Anaylsis (SA)***

**Satoshi Hamaguchi**
***Plasma Processing for Biomedical Applications (PB)***

**An-Ping Li**
***Scanning Probe Microscopy (SP)***

**Tino Hofmann**
***Spectroscopic Ellipsometry (EL)***

**Michael Chandross**
***Tribology (TR)***

**David Schall**
***Tribology (TR)***

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Carnegie Mellon University

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Angela Klink, AVS Program Editor/Member Services Administrator

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Co-Chair: Oleynik, Ivan, University of South Florida
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Borunda, Mario, Oklahoma State University
Brown, Keith, Boston University
Cha, Judy, Yale University
De Llano, Manuel, Univ. Nacional Autonoma de Mexico
Donath, Markus, Muenster University, Germany
Evoy, Stephane, University of Alberta
Guisinger, Nathan, Argonne National Laboratory
Li, An-Ping, Oak Ridge National Lab.
Mueller, Thomas, Vienna Univ. of Technology, Austria
Naguib, Michael, Oak Ridge National Lab.
Perriot, Romain, Los Alamos National Laboratory
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Soukiassian, Patrick, CEA, France
Sutter, Peter, Univ. of Nebraska - Lincoln
van der Zande, Arend, University of Illinois at Urbana Champaign
Wang, Max Zenghui, Case Western Reserve Univ.
Yazev, Oleg, Ecole Polytechnique Fédérale de Lausanne (EPFL)
Ye, Peide, Purdue University
Yin, Xiaobo, Univ. of Colorado Boulder

**Actinides and Rare Earths**
Chair: Shuh, David, Lawrence Berkeley National Lab.
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Denecke, Melissa, University of Manchester, UK
Durakiewicz, Tomasz, Los Alamos National Lab.
Geeson, David, AWE, UK
Havela, Ladislav, Charles University, Prague, Czech Republic
Landa, Alexander I., Lawrence Livermore Natl. Lab.
Ohldag, Hendrik, SLAC National Accelerator Lab.
Petit, Leon, Daresbury Laboratory, UK
Renault, Olivier, Univ. Grenoble Alpes/CEA, LETI, MINATEC Campus, France
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Tereshina, Evgeniya, Institute of Physics ASCR, Czech Republic

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Co-Chair: Livengood, Richard, Intel Corporation
Gölzhäuser, Armin, Bielefeld University, Germany
Ogawa, Shinichi, AIST, Japan

**Advanced Surface Engineering**
Chair: Stueber, Michael, Karlsruhe Institute of Technology, Germany
Barankova, Hana, Uppsala Univ., Sweden
Franz, Robert, Montanuniversität Leoben, Austria
Klemberg-Sapieha, Jolanta, Ecole Polytechnique de Montreal, Canada
Voevodin, Andrey, University of North Texas

**Applied Surface Science**
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Fenton, Jeffrey, Medtronic
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Herrera-Gomez, Alberto, CINVESTAV-Queretaro, Mexico
Kay, Bruce D., Pacific Northwest National Lab.
Ohlhausen, Tony, Sandia National Laboratory
Pacholski, Michaeleen, The Dow Chemical Company
Pylypenko, Svitlana, Colorado School of Mines
Reinke, Petra, University of Virginia
Shuh, David, Lawrence Berkeley National Lab.
Smentkowski, Vincent, General Electric Global Research Center
Tyler, Bonnie, National Physical Lab. (NPL), UK
Ventrice, Jr., Carl, SUNY Polytechnic Institute

**Biomaterial Interfaces**
Chair: Allen, Stephanie, Univ. of Nottingham, UK
Baio, Joe, Oregon State University
Chi, Eva, University of New Mexico
Graham, Daniel, University of Washington
Landry, Markita, University of California at Berkeley
Leggett, Graham, University of Sheffield, UK
Rosenhahn, Axel, Ruhr-Univ. Bochum, Germany
Valtiner, Markus, Max-Planck Institut für Eisenforschung GmbH, Germany
Weidner, Tobias, Max Planck Institute for Polymer Research, Mainz, Germany

**Biomaterials Plenary Session**
Chair: Allen, Stephanie, Univ. of Nottingham, UK
Baio, Joe, Oregon State University
Chi, Eva, University of New Mexico
Graham, Daniel, University of Washington
Leggett, Graham, Univ. of Sheffield, UK
Rosenhahn, Axel, Ruhr-Univ. Bochum, Germany
Valtiner, Markus, Max-Planck Institut für Eisenforschung GmbH, Germany
Weidner, Tobias, Max Planck Institute for Polymer Research, Mainz, Germany

**Electronic Materials and Photonics**
Co-Chair: Dietz, Nikolaus, Georgia State University
Co-Chair: King, Sean, Intel Corporation
Abate, Yohannes, Georgia State University
Antonelli, Andy, Nanometrics
Baxter, Jason, Drexel University
Baykara, Mehmet, Bilkent University
Conley, Jr., John F., Oregon State University
Filler, Michael, Georgia Institute of Technology
Gupta, Shalini, Northrop Grumman ES
Hilton, Jessica, Mantis Deposition
Hoffmann, Axel, Argonne National Lab.
Kummel, Andrew C., Univ. of Calif. at San Diego
Mohney, Suzanne, Penn State University
Myers-Ward, Rachael, U.S. Naval Research Lab.
Okyay, Ali, Bilkent University, Turkey
Tischler, Joseph, Naval Research Lab.
Tsai, Wilman, Intel Corporation
Wu, Wei, University of Southern California

**Fundamental Discoveries in Heterogeneous Catalysis**
Chair: Killelea, Dan, Loyola Univ. Chicago
Baber, Ashleigh, James Madison University
Chen, Donna, Univ. of South Carolina
Gross, Elad, Hebrew University of Jerusalem, Israel
Jackson, Bret, University of Massachusetts - Amherst
Kay, Bruce D., Pacific Northwest National Lab.
Kimmel, Greg, Pacific Northwest National Lab.
Utz, Arthur, Tufts University

**In-Situ and Operando Spectroscopy and Microscopy for Catalysts, Surfaces, & Materials**
Chair: Tao, Franklin (Feng), University of Kansas
Co-Chair: Frenkel, Anatoly, Yeshiva University
Co-Chair: Yang, Judith, University of Pittsburgh
Co-Chair: Yu, Xiao-Ying, Pacific Northwest National Laboratory
Nonnenmann, Stephen, University of Massachusetts – Amherst

**Magnetic Interfaces and Nanostructures**
Chair: Ohldag, Hendrik, SLAC National Accelerator Laboratory
Bagus, Paul, University of North Texas
Donath, Markus, Muenster University, Germany
Enders, Axel, Univ. of Nebraska - Lincoln
Fischer, Peter, Lawrence Berkeley National Laboratory
Hoffmann, Axel, Argonne National Laboratory
Holcomb, Mikel, West Virginia University
Lauter, Valeria, Oak Ridge National Laboratory
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Oleynik, Ivan, University of South Florida
Skuza, Jonathan, Norfolk State University
Sun, Dezheng, Stanford University
Szulczewski, Greg, University of Alabama

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Ohlhausen, Tony, Sandia National Lab.
Rubloff, Gary, University of Maryland, College Park
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Svedberg, Erik B., The National Academies

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Ghodssi, Reza, University of Maryland, College Park
Gousev, Evgeni, Qualcomm MEMS Technologies, Inc.
Hiebert, W.K., University of Alberta and The National Institute for Nanotechnology, Canada
Ilic, Robert, National Institute of Standards and Technology (NIST)
Kotru, Sushma, University of Alabama
Krylov, Slava, Tel Aviv University, Israel
Maboudian, Roya, Univ. of California at Berkeley
Metzler, Meredith, Cornell University
Ng, Tse Nga (Tina), PARC (Palo Alto Research Center), a Xerox Company
Sumant, Anirudha, Argonne National Laboratory
Thundat, Thomas, University of Alberta and The National Institute for Nanotechnology, Canada
Tian, Wei-Cheng, National Taiwan University, Taiwan, Republic of China
Zorman, Christian, Case Western Reserve University

**Nanometer-scale Science and Technology**
Chair: Ocola, Leonidas, Argonne National Lab.
Co-Chair: Evoy, Stephane, University of Alberta
Abate, Yohannes, Georgia State University
Arnault, Jean-Charles, Cea – List, France
Baxter, Jason, Drexel University
Baykara, Mehmet, Bilkent University

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Hiebert, Wayne, University of Alberta and The National Institute for Nanotechnology, Canada
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Ilic, Robert, National Institute of Standards and Technology
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Olhausen, Tony, Sandia National Laboratory
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Willey, Trevor, Lawrence Livermore National Lab.
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Burnham, Nancy, Worcester Polytechnic Institute
Donath, Markus, Muenster University, Germany
Kahng, Se-Jong, Korea University

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Mullins, David, Oak Ridge National Laboratory
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Tysoe, Wilfred, University of Wisconsin-Milwaukee
Utz, Arthur, Tufts University

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Akyildiz, Halil, North Carolina State University
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Cavanagh, Andrew, University of Colorado, Boulder
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Martinez, Ted, SLAC National Accelerator Lab.
Peacock, Neil
Ricker, Jacob, National Institute of Standards and Technology (NIST)
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Wang, Lily, Los Alamos National Laboratory

**Exhibitor Technology Spotlight**
Chair: DeGennaro, Jeannette, AVS

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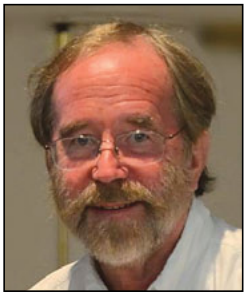

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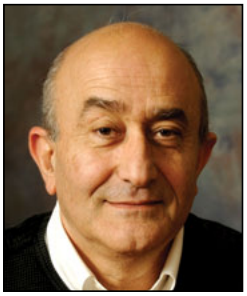

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*NY Office*

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*NY Office*

**Teddy Bhabikhan**
*Web Content Coordinator*
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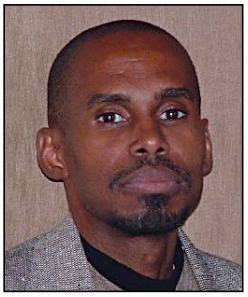

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*NY Office*

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*IT Systems/Web Administrator – NY Office*

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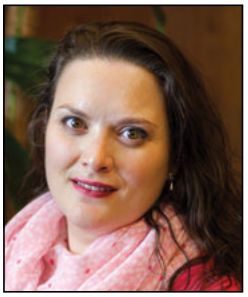
**Estella Stansbury**
*Editorial Assistant*
*NC Office*

**Tonya Yandle**
SSS *Editorial Assistant*
*NC Office*



**Jennifer Schreiner**
Biointer*phases*
*Editorial Assistant – NC Office*

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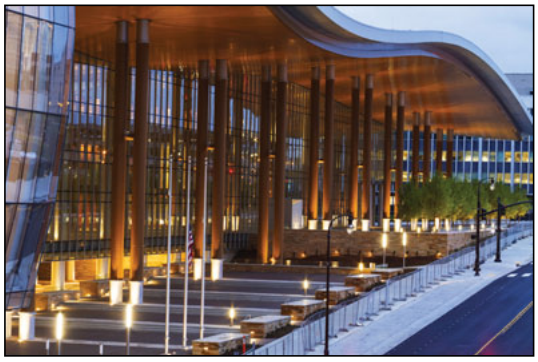

## AVS 63 Mobile App!

The AVS 63 App allows all Symposium registrants to: review the technical program and abstracts, plus exhibition, meetings/special events, and other travel and logistical details, create a personal schedule, send messages to other event attendees, capture and upload event photos, receive daily event notifications, access the AVS publications and technical libraries and more!

Simply download the app at: http://avs63.quickmobile.mobi/

Your username is your email address and your password is AVS63

Please contact AVS63app@avs.org should you need any assistance using the App

## Stay Connected Year Around on Social Media

Did you know that AVS has several social media pages? We encourage you to expand your network and share your experiences or check regularly to stay abreast of the latest AVS activities and benefits—read the latest trending articles or learn more about AVS publications. Use #AVS63 in your Tweets this week to share your favorite parts of the meeting or to further scientific discussions. Links to the AVS social media pages can be found on the AVS 63 Mobile app or here are the links:

Twitter: @AVS_Members – @JVSTAB – @biointerphases
Facebook: www.facebook.com/AVS-143182759040976/
Linked in: https://www.linkedin.com/groups/1309457

## EXCITING 2016 EVENTS

### *Welcome Mixer for Attendees & Exhibitors*

The Welcome Mixer will take place on Monday, November 7, from 6:30 p.m.–8:00 p.m. The Mixer is a casual gathering where attendees and exhibitors can enjoy some refreshments and spend time together prior to the opening of the Exhibit Hall. First time Symposium attendees - please watch for a special email invite pertaining to this event!

### *AVS Membership Booth and Store – Booth 645*

Official AVS logo items including polos, graphic tees, the ever popular "No Vacuum" shirt, as well as other merchandise will be available for purchase throughout the week. Learn about the advantages and benefits of AVS membership and find out how to get more involved in AVS events and activities.

### *AVS Career Center – Booth 138*

Looking for a position or seeking qualified candidates for a job opening? If so, please register at the AVS Career Center located in the Exhibit Hall.

### *AVS Publications – Booth 430*

Come meet with the AVS journal editors, find out how to submit a manuscript and learn about exciting developments in all AVS journals.

### *Surface Science Spectra Data Browser – Booth 431*

***Announcing a unique new online spectral productivity tool!***

AIP Publishing and AVS are proud to preview at the Symposium the first release of the **Surface Science Spectra Data Browser**, a data analysis and visualization tool for the peer-reviewed and unique datasets contained in the AVS journal ***Surface Science Spectra***. **Surface Science Spectra Data Browser** delivers a rich set of discovery, analytical, comparison, exporting, importing and sharing features to support exploration of the journal's 25 years of experimental output from the primary labs and researchers worldwide – and contains over 4000 XPS, UPS and AES spectra from more than 900 different materials. The new tool has been developed with global leaders in the surface science community in both university and industry contexts to meet the needs of physicists, chemists, biochemists, and mechanical engineers. Come to Booth #431 in the Exhibit Hall to see the **Surface Science Spectra Data Browser** in action!

### *Art Zone – Booth 727*

See the entries into the 2016 art contest and vote for your favorites. Winners will take home cash prizes! To enter the contest, stop by the Staff Office (Room 210) for further information.

### *Exhibit Hall Refreshment Breaks*

Visit the Exhibit Hall during the morning and afternoon technical session breaks. There will always be something special being offered in the Hall.

### *Complimentary Lunches in the Exhibit Hall*

Full week attendees who pay for a full week registration (Full, Student, Early Career, Technical Specialist and Exhibitors) will receive three free lunch vouchers redeemable on Tuesday, Wednesday, and Thursday for lunch concessions located in the Exhibit Hall. Stop by the Exhibit Hall between 12:20–2:20 p.m. to grab a bite to eat and network with exhibitors and fellow colleagues. Come to the Exhibit Finale on Thursday for your free lunch!

### *AVS Raffle Zone – Booth 745*

Be sure to enter your raffle tickets to participate in the daily raffles being held Tuesday-Thursday in the Exhibit Hall Raffle Zone! Thanks to our generous sponsors we have some really exciting prizes this year!

### *Ask The Experts – Booth 544*

***Sponsored by MKS Instruments,SAES Getters and Kimball Physics***

The AVS Vacuum Technology Division is pleased to host Ask the Experts during the AVS 63 exhibit. Bring us your problems with vacuum system specifications, troubleshooting, process control, contamination and we will help you solve them.

### *Students and Early Career Members*

The Professional Leadership is sponsoring some special events/ sessions. Please see the mobile app for further information.

### *Free Caricature– Booth 245*

***Sponsored by Shimadzu***

Visit Booth 301 in the Exhibit Hall to get your ticket validated for a free caricature!

## Internet Access E-mail Pavilion – *Booth 122*

Check your e-mail, confirm your flights, print your boarding passes.

## Symposium Registration Cancellation Policy

All cancellations must be sent in writing to Yvonne Towse by **October 17, 2016** (yvonne@avs.org) for a full refund less $100 or $50 for Students/Early Career/Technical Specialist/One Day cancellation fee. After that date AVS will only issue credits for AVS 63 with a valid reason. No refunds or credits for no shows. Please note that all refunds will be processed within 30 days following the meeting.

## Terms & Conditions

- You will be charged for all registrations received.
- $20 fee will be charged for all returned checks.
- No Purchase Orders will be accepted.
- All registration fees are NON-TRANSFERABLE.
- Children must be accompanied by a parent or a guardian during exhibit hours. Under no circumstances are children under the age of 12 (including infants and toddlers) permitted on the exhibit floor.

## Symposium Lost Badge Policy

We will be imposing a $20 fee for a replacement badge so please remember to bring your badge and keep it in a safe place throughout the week.

**YOU MUST HAVE YOUR BADGE AND BADGE HOLDER TO GAIN ADMISSION TO THE TECHNICAL SESSIONS AND EXHIBITION.**

## AVS Membership Renewal Feature

The 2017 membership renewal dues will be included within the symposium registration fees for all Full, Student, Early Career, and Technical Specialist members. No further action will be required and 2017 membership will take effect on January 1, 2017. Any questions, see Angela Klink at the AVS Store (Booth 645) or via email (angela@avs.org).

## Manuscript Publication Information

***Journal of Vacuum Science & Technology A & B***

**Biointer*phases***

Authors are invited to submit an article to *JVST A*, *JVST B* or Biointer*phases* on the topic of their presentation/poster given at the AVS International Symposium. Articles can be submitted anytime between the abstract submission deadline and the special issue deadline of **January 15, 2017.** Y**ou can choose either *JVST A, JVST B* or Biointer*phases* depending on the topic.** Online, you will have an opportunity to tell us that your paper is a part of the special issue by choosing **"AVS 63 Special Issue."** You can find easy to use templates and instructions for authors at http://scitation.aip.org/content/avs/journal/jvstb/info/authors, http://scitation.aip.org/content/avs/journal/jvstb/info/authors, http://scitation.aip.org/content/avs/journal/bip/info/authors.

For more information, stop by the AVS Publications Booth 430 in the Exhibit Hall during the week of the Symposium or contact:

Nancy Schultheis
AVS Publications Office
51 Kilmayne Drive, Suite 104
Cary, NC 27511
Phone: 919-361-2787
Email: publications@avs.org

## Complimentary AVS Membership Offer

If you have paid the Full, Student, Early Career, or Technical nonmember registration fee, you will receive a complimentary AVS electronic membership for 2017. For more information, stop by AVS Booth 827 in the Exhibit Hall during the week of the Symposium or contact Angela Klink (angela@avs.org).

## Recording/Photo Policy

- Recording of Presentations is Strictly Prohibited. No individual or entity—including a presenting author—may electronically record or broadcast any portion of the AVS Meeting without prior written consent of AVS. Unauthorized recording (audio, video, still photography, etc.) of presentations during sessions, posters, workshops, etcetera, without the express written consent of AVS and individual authors is strictly prohibited. Press representatives must receive a Press Pass and photo/recording permission from AVS.

  AVS reserves the rights to any approved audio and video production of presentations at all AVS events.

- Attendees or exhibitors are encouraged to network and enjoy the meeting experience. As such, capturing memories of casual meeting activities and networking is permitted with the permission of those being prominently photographed. Photographing formal meeting presentations, posters, or displays is forbidden without permission of AVS and the presenter.

  Those who do not comply with the AVS photo policy may be asked to leave the premises.

### *Videos and Photo for AVS Use*

AVS Meeting attendance implies your consent to be photographed, filmed and/or otherwise recorded for use on the AVS website or news publications. Please note that no technical presentations will be recorded without prior consent of AVS and the authors.

# GENERAL INFORMATION

## Additional Notes for Presenters

AVS will provide Windows 7 laptop computers running MS Office 2010, screens, microphones, and projectors in all session rooms, in addition to switchboxes set for HDMI for those who bring their own computers. We encourage you to use the system and to test your presentation on our equipment in our Presenter's Preview Room 106A prior to your talk. Please allow ample time for this; preferably the day before you are scheduled to present – not immediately before your talk. If you are using the AVS-provided computer, please load your presentation on to this computer at least five minutes prior to the start of the session or during a session break. The Preview Room will be open on Sunday, for those of you with Sunday afternoon or Monday presentations. In deference to all our presenters, it is important that personal computer/projector compatibility issues be worked out well in advance of your presentation. Please note that PowerPoint is the recommended presentation software and the preferred format is (16:9). The projector is expected to be compatible with both PCs and MACs; however, please bring a copy of your presentation on a flash drive as a back-up.

## Code of Conduct for AVS Meetings

Code of Conduct for AVS Meetings It is the policy of the American Vacuum Society (AVS) that all participants, including attendees, vendors, AVS staff, volunteers, and all other stakeholders at AVS meetings will conduct themselves in a professional manner that is welcoming to all participants and free from any form of discrimination, harassment, or retaliation.

Participants will treat each other with respect and consideration to create a collegial, inclusive, and professional environment at AVS Meetings. Creating a supportive environment to enable scientific disclosure at AVS meetings is the responsibility of all participants. Participants will avoid any inappropriate actions or statements based on individual characteristics such as age, race, ethnicity, sexual orientation, gender identity, gender expression, marital status, nationality, political affiliation, ability status, educational background, or any other characteristic protected by law. Disruptive or harassing behavior of any kind will not be tolerated. Harassment includes but is not limited to inappropriate or intimidating behavior and language, unwelcome jokes or comments, unwanted touching or attention, offensive images, photography without permission (see recording and photo policy), and stalking.

Violations of this code of conduct policy should be reported to the AVS Managing Director or Events Manager. Sanctions may range from verbal warning, to ejection from the meeting without refund, to notifying appropriate authorities. Retaliation for complaints of inappropriate conduct will not be tolerated. If a participant observes inappropriate comments or actions and personal intervention seems appropriate and safe, they should be considerate of all parties before intervening.

## Hotel Reservations

***Reservations*** *(Opens: July 6, 2016; Closes: October 12, 2016))*

| Hotel | Room Rates | Parking |
|---|---|---|
| Renaissance Nashville<br>611 Commerce Street.<br>Nashville, TN 37203 | Single/Double: $219 | Parking:<br>$35 Valet<br>$12 Offsite self-parking |
| Courtyard Nashville Downtown<br>170 Fourth Ave North<br>Nasvhille, TN 37219 | Single/Double: $195 | Parking:<br>$28 Valet |
| Hampton Inn and Suites<br>Nashville Downtwon<br>310 4th Avenue South<br>Nashville, TN 37201 | Single/Double: $209 | Parking:<br>$24 Valet<br>$20 Self-parking |

## Reservation Cancellation for Attendees

Reservations can be cancelled without penalty up to 72 hours prior to the day of arrival. Failure to arrive on your confirmed arrival date will result in one night's room & tax charged to the credit card provided and your entire reservation will be cancelled. A credit card is required to guarantee your reservation. Cancellations can be made via the website or via e-mail, avs@experient-inc.com until 11:00 pm EST on October 12, 2016. Please wait to contact the hotel directly after October 14, 2016, for all cancellations and changes. The hotel may not have record of your reservation if you call prior to October 14, 2016.

## Reservation Cancellation for Exhibitors

Due to hotel stipulations, a minimum number of blocked rooms must be utilized by the AVS; therefore, the FINAL day to cancel your reservation without penalty is 5:00 p.m. EST on September 1, 2016. Reservations cancelled AFTER 5:00 p.m. EST on September 1, 2016, will be assessed a cancellation fee equal to one night's room and tax per reservation. NOTE: The reservation cancellation fee is in addition to any hotel charges you may incur. If you cancel directly with the hotel, you will still be charged the cancellation fee. You are also subject to your individual hotel's cancellation policy. Hotel requires cancellation of 72 hours prior to the day of arrival. Failure to arrive on your confirmed arrival date will result in one night's room and tax charged by the hotel to the credit card provided and your entire reservation will be cancelled.

A credit card is required to guarantee your reservation. Changes to your reservation can be made via the website or via e-mail, avs@experient-inc.com until 11:00 pm EST on October 12, 2016. Please contact the hotel directly after October 14, 2016, for all cancellations and changes. Please do not call the hotel prior to October 14, 2016, as the hotel may not have record of your reservation.

# FLASH NETWORKING SESSIONS

## *VACUUM TECHNOLOGY DIVISION, Monday, November 7, 2016, 3:40-4:00 pm, Room 104C*

| | |
|---|---|
| **3:40 pm** | **VT-TuP1** Smart Measurement and Diagnostics Module for Dry Vacuum Pumps, **WAN-SUP CHEUNG**, K. BAIK, J.Y. LIM, KRISS, Republic of Korea |
| **3:44 pm** | **VT-TuP2** Vacuum System of Positron Damping Ring for SuperKEKB, **KYO SHIBATA**, Y. SUETSUGU, T. ISHIBASHI, M. SHIRAI, S. TERUI, K. KANAZAWA, H. HISAMATSU, KEK, Japan |
| **3:48 pm** | **VT-TuP3** Testing Pump Speed & Thermal Loading of Titanium Arc-Gettered High Speed (~2,000 $m^3/s$ for $H_2$) Cryoboxes, **ERNESTO BARRAZA-VALDEZ**, Tri Alpha Energy |
| **3:52 pm** | **VT-TuP4** Formation and Characterization of Hydrogenated Amorphous Silicon (a-Si:H) Thin Films Deposited by ECR-CVD with Different RF Powers, **HUGO ALVAREZ**, A.R. SANTOS, J.G. FO, F.H. CIOLDIN, J.A. DINIZ, Universidade Estadual de Campinas, Brazil |
| **3:56 pm** | **VT-TuP5** Hydrogen Measurement Using a Thermal Desorption Spectrometer, **JONGYEON LIM**, Korea Research Institute of Standards and Science, Republic of Korea; K.D. KIM, S.M. JOO, C.H. LIM, Y.D. JOH, Infinity Vacuum Technology, Republic of Korea |
| **6:30 pm** | **TUESDAY, NOVEMBER 8TH: VACUUM TECHNOLOGY POSTER SESSION, EXHIBIT HALL D** |

## *BIOMATERIAL INTERFACES DIVISION, Tuesday, November 8, 2016, 6:00 pm, Room 101A*

| | |
|---|---|
| **6:00 pm** | **BI+PB-TuP1** Quantitative Quartz Crystal Microbalance Measurements across Transients Produced by Switching Fluid Properties, V. Mugnaini, **DMITRI PETROVYKH**, International Iberian Nanotechnology Laboratory, Portugal |
| **6:03 pm** | **BI+PB-TuP2** Quantitative Sensing of Pancreatic Enzymes using Gelatin, **GEORGE BANIS**, University of Maryland, College Park; L. Beardslee, Walter Reed National Military Medical Center; R. Ghodssi, University of Maryland, College Park |
| **6:06 pm** | **BI+PB-TuP3** Evaluation of Printed Cell Viability, Proliferation, and Insulin Production on Various Alginate-Gelatin Hydrogels, **LUIS SOLIS**, J. Rincon, A. Varela- Ramirez, R. Aguilera, T. Boland, University of Texas at El Paso |
| **6:09 pm** | **BI+PB-TuP4** Synchrotron Radiation Studies of the Bonding and X-Ray Induced Reactions of Bacteriorhodopsin Adsorbed on Gold, **RICHARD ROSENBERG**, Argonne National Laboratory; D. Mishra, R. Naaman, Weizmann Institute of Science, Israel |
| **6:12 pm** | **BI+PB-TuP6** Developments of Non-Stick Surfaces for Medical Devices: Beneficial Effects of Thin Film Metallic Glass Coating, G.H. Jiang, C.C. Yu, C.L. Li, Y. Tanatsugu, **JINN P. CHU**, National Taiwan University of Science and Technology, Taiwan, Republic of China; M.J. Chen, S.H. Chang, Mackay Memorial Hospital Tamsui Campus, Taiwan, Republic of China |
| **6:15 pm** | **BI+PB-TuP7** Polyurethane Degradation by Wild Type and Hydrolase Deficient Pseudomonas protegens Pf-5 Unsaturated Biofilms, **DANIEL BARLOW**, US Naval Research Laboratory; LJ. Nadeau, C.S. Hung, Air Force Research Laboratory; J.C. Biffinger, US Naval Research Laboratory; A.L. Crouch, Air Force Research Laboratory; J.N. Russell, US Naval Research Laboratory; W.J. Crookes-Goodson, Air Force Research Laboratory |
| **6:18 pm** | **BI+PB-TuP8** Laser Irradiation of Mg Alloys: Reduced Kinetics and Enhanced Biocompatibility, M.A. Melia, **DAVID FLORIAN**, W. Steuer, J.R. Scully, J.M. Fitz-Gerald, University of Virginia |
| **6:30 pm** | **BIOMATERIAL INTERFACES POSTER SESSION, EXHIBIT HALL D** |

## *THIN FILM DIVISION, Thursday, November 10, 2016, 5:40 pm, Room 104E*

| | |
|---|---|
| **5:41 pm** | **TF-ThP8** Growth of Graphene on Cu Foil and Ni/Cu Surface by Pulsed Laser Deposition at Reduced Temperatures, **MOHAMED HAFEZ**, A. ABD ELHAMID, National Institute of Laser Enhanced Sciences, Cairo University, Egypt; A. ABOULFOTOUH, Cairo University, Egypt; I. AZZOUZ, National Institute of Laser Enhanced Sciences, Cairo University, Egypt |
| **5:45 pm** | **TF-ThP19** Low Energy Ion Scattering (LEIS) Analysis of ALD Deposited GaSb Films on $SiO_2$, **THOMAS GREHL**, P. BRÜNER, ION-TOF GmbH, Germany; R. TER VEEN, M. FARTMANN, Tascon GmbH, Germany; T. BLOMBERG, M. TUOMINEN, ASM Microchemistry Ltd., Finland |
| **5:49 pm** | **TF-ThP29** Solution Deposition of Pentacene Thin Films for Solar Cells and Organic Electronics, **MICHAEL LEE**, R. MENDOZA, R.T. RODRIGUEZ, B.F. KUNZLER, Northern Arizona University |
| **5:53 pm** | **TF-ThP17** Low Temperature Deposition of nc-Silicon Thin Films using $SiH_4/H_2$ mixture, **MONIRUZZAMAN SYED**, Lemoyne Owen College; TONG. GOH, University of Malaya, Malaysia; N.F.F.B. NAZARUDIN, University of Malaya, Kuala Lumpur; A. JAHANGIR, University of Memphis; Y. HAMADA, Lemoyne Owen College; A.M. ALI, King Khalid University, Saudi Arabia |
| **5:57 pm** | **TF-ThP7** Internal Charge Transfer at the MBE-Grown Complex Oxide Interface, **PENG XU**, University of Minnesota; T.C. DROUBAY, Pacific Northwest National Laboratory; J.S. JEONG, K.A. MKHOYAN, University of Minnesota; P.V. SUSHKO, S.A. CHAMBERS, Pacific Northwest National Laboratory; B. JALAN, University of Minnesota |
| **6:01 pm** | **TF-ThP26** Synergetic Effect of Nitrogen and Fluorine on the Total Dose Radiation Hardness of the Buried Oxide Layer in SOI Wafers, **ZHONGSHAN ZHENG**, Institute of Microelectronics of Chinese Academy of Sciences, China |
| **6:05 pm** | **TF-ThP9** Preparation of a Transparent Conductive Multilayer Consists of $MoO_3$/Ag/$MoO_3$ and its Application in OLEDs, **MIDORI KAWAMURA**, T. CHIBA, T. KIBA, Y. ABE, K.H. KIM, Kitami Institute of Technology, Japan |
| **6:09 pm** | **TF-ThP32** Modification of the Vacuum-ultraviolet Absorption Spectrum during Plasma Exposure of Low-k Dielectrics: A Time-dependent Density Functional Theory Analysis, **HA NGUYEN**, F.A. CHOUDHURY, J.L. SHOHET, University of Wisconsin – Madison |
| **6:13 pm** | **TF-ThP33** High Moisture-Barrier Films using Roll-to-Roll-Plasma CVD grown $SiO_x$ on Room-Temperature ALD treated PEN Substrates, **NOBUYUKI KAWAKAMI**, N. JIKO, T. OKIMOTO, Kobe Steel, Ltd., Japan; K. KANOMATA, F. HIROSE, Yamagata University, Japan |
| **6:17 pm** | **TF-ThP44** Water Cooled Low Temperature Evaporation (LTE) Source for Thin Film Organic Semiconducting Materials, **SALAHUD DIN**, Kurt J. Lesker Company, UK |
| **6:21 pm** | **TF-ThP46** Development of TiN/VN ALD Nanolaminates for Astronomy Applications, **FRANK GREER**, L. BAKER, P. DAY, B. EOM, H. LEDUC, Jet Propulsion Laboratory/California Institute of Technology |
| **6:25 pm** | **THIN FILM DIVISION POSTER SESSION, EXHIBIT HALL D** |

# AVS DIVERSITY & INCLUSION BREAKFAST

## *Tuesday, November 8, 7:00–9:00 AM*
## *Renaissance Nashville Hotel, Belmont H*

This Event is open to ALL Symposium attendees. The registration fee is $25 and may be purchased with your Symposium registration. Pre-Registration is required; there will be no Onsite Registration available for this event.

### "The Industrial Scientist's Guide to Riches, Fame, and Fortune or at Least a Raise"

Network with your colleagues at the 2nd Annual AVS Diversity and Inclusion Breakfast and join in a lively conversation with our diverse panel of experts as we discuss the management of your career as an industrial scientist, engineer or technician. This segment of our Society is of such great importance that we want to ensure its health and vitality. Much of the impact of scientific research nowadays is seen in its commercialization. The human side of this equation is to stimulate an environment that is as healthy for the workforce, you, as it is for the commercial venture. The discussion will be beneficial for the seasoned vet taking the plunge from the laboratory to sales all the way to the newly minted graduate trying to figure out the right work-life satisfaction balance. The experiences of the panel participants span the spectrums from startup to global conglomerates, and from sales to corporate laboratory management, and includes the perspectives of under-represented minorities and women. All are welcome to attend. Bring your questions and share your insights.

Panelists include:

**Anna Belu**
Senior Principal Scientist, Medtronic

**Baratunde Cola**
Assoc. Professor at Georgia Tech; CEO, Carbice

**Catherine Labelle**
Senior Manager – Technology Research, GLOBALFOUNDRIES

**David Surman**
AVS President; President, Kratos Analytical

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Pacific Rim Symposium on Surfaces, Coatings & Interfaces

## December 11-15, 2016, Kohala Coast, Hawaii

### Hapuna Beach Prince Hotel

This conference is being organized by AVS (United States) with a Steering Committee composed of representatives from Australia, Canada, China, Japan, Korea, Mexico, New Zealand, Singapore, and Taiwan. Symposium attendees will interact during morning and evening sessions that will include plenary, invited, and contributed presentations. We will have morning and evening technical sessions with the afternoons free for other activities and discussions.

The Plenary Lecture will be presented by Dr. Christian Kisielowski, Principle Investigator and Staff Scientist at the Molecular Foundry, Lawrence Berkeley National Laboratory on "Detecting the Invisible with Electron Beams: The Hidden Secrets of Nanocrystals, Interfaces and Surfaces at Atomic Resolution."

**Biomaterial Surfaces & Interfaces**
**Energy Harvesting & Storage**
**Nanomaterials**
**Thin Films**

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**The AVS Technical Library provides members with complimentary online access to technical and educational resources in the fields related to materials, processing, and interfaces:**

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Tuesday-Thursday in the Exhibit Hall to learn more about the Technical Library portal

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*"Presentations on Demand provides the ability to view talks I could not attend at the symposium, it also allows me to go back and capture details I missed. Colleagues who were not able to attend the symposium are viewing the presentations at their convenience!"*
–Vincent S. Smentkowski, General Electric GRC

*"As a Professor, I find this a great way to share cutting edge research on a variety of topics with both students and colleagues on the fly. Given the use of electronic classrooms today, this has been a seamless partnership to a live lecture experience. The quality of the talks and the ability to tailor your selection, when you want to view it is a great feature."*
–James Fitz-Gerald, Univ. of Virginia

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# CAREER CENTER and JOB FAIR

**Looking for qualified candidates to interview and fill positions?**

**Looking for an employer who needs your skills and qualifications?**


**Check out the AVS Career Center and Job Fair**
**Exhibit Hall – Booth #138**

| | | | |
|---|---|---|---|
| Sunday | Nov. 6 | 2:00 p.m. – 6:00 p.m. | Career Center Registration Area (Submit Job Openings/Résumés) |
| Monday | Nov. 7 | 7:30 a.m. – 5:00 p.m. | Career Center Registration Area (Submit Job Openings/Résumés) |
| Tuesday | Nov. 8 | 10:00 a.m. – 5:00 p.m. | Exhibit Hall, Booth #138 – Job Fair Open |
| Wednesday | Nov. 9 | 10:00 a.m. – 4:30 p.m. | Exhibit Hall, Booth #138 – Job Fair Open |
| Thursday | Nov. 10 | 10:00 a.m. – 2:30 p.m. | Exhibit Hall, Booth #138 – Job Fair Open |
| Thursday | Nov. 11 | 2:30 p.m. – 5 :00 p.m. | Career Center Registration Area |

| **EMPLOYERS** | | **JOB SEEKERS** |
|---|---|---|
| Post Job Openings | ↔ | Submit Résumé/CV |
| Review Résumés | ↔ | Review Job Openings |
| Interview Onsite | ↔ | Interview Onsite |

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# AVS 63 National Short Course Program

**Music City Center**
**Nashville, TN**
**November 7-10, 2016**

**Vacuum Equipment and Technology ~ Materials Characterization**
**Materials Processing**

## Short Course Rates

1 day – Regular $575 / Student $100
2 days – Regular $850 / Student $200
4 days – Regular $1,495 / Student $400

Courses that include a supplemental textbook – add $100

Onsite short course registration – add $50 per course (Regular) / $25 per course (Student)

## Short Course Times

8:30 a.m. – 5:00 p.m.

## Short Course Registration Hours

Short Course Registration Counter

| Day | Date | Time |
|---|---|---|
| Sunday | November 6 | 2:00 p.m. to 6:00 p.m. |
| Monday | November 7 | 7:30 a.m. to 5:00 p.m. |
| Tuesday | November 8 | 7:00 a.m. to 5:00 p.m. |
| Wednesday | November 9 | 7:30 a.m. to 5:00 p.m. |
| Thursday | November 10 | 7:30 a.m. to 5:00 p.m. |

**AVS Short Course Schedule**
**(Courses offered Spring and Fall; 2017 schedule TBD)**
http://www.avs.org/education-outreach/short-courses/short-courses-schedule

**AVS Onsite Short Course Training**
http://www.avs.org/Education-Outreach/Short-Courses/Onsite-Short-Courses

**AVS Courses by Request**
http://www.avs.org/Education-Outreach/Short-Courses/Short-Courses-by-Request

# SPECIAL SESSIONS/WORKSHOPS

## *Biomaterial Interfaces Division Plenary Session and Reception*

**Sunday, November 6, 2016, 3:00–6:00 p.m., Room 101A, Music City Center**

The Biomaterials Interfaces program kicks off with the now traditional Biomaterials Plenary Session. This year we are pleased to have presentations from three eminent scientists who have made significant contributions to our field. Kerstin Blank has made important developments in the field of mechano(bio)chemistry, which investigates the influence of force on the structure and function of molecules and materials. Through the development of novel force sensors, she is providing advances in biosensor design and also our understanding of complex biomimetic environments. David Needham has made significant contributions to our understanding of a broad swathe of interfacial phenomena, impacting in areas encompassing colloid science, materials (protein and polymer) engineering and drug-delivery. Dennis Discher has made key advances in areas spanning molecular/cell biology and physics, to polymer nano-engineering. These advances have in particular significantly improved our understanding of stem cell behavior and their involvement in disease. The session will close with the opportunity for further discussions at our traditional industry sponsored Plenary Reception.

## *Thin Film Division/Harper Award TED-Talk Competition (Invite Only)*

**Monday, November 7, 2016, 7:30 p.m., Room 105A, Music City Center**

This special session is strictly for students who are authors on an abstract presented in a TFD sponsored or TFD-co-sponsored session. Hor d'ouvres will be provided.

The four finalists are Melissa Beebe, College of William & Mary Collen Leng, Georgia Institute of Technology, Alberto Perrotta, Eindhoven University of Technology, The Netherlands, and Yanhao Yu, University of Wisconsin-Madison.

The four finalists for the Harper Award will present their work along the lines of a TED-talk, with 15 minutes to make their presentation. These talks will be judged and critiqued in real time for both their content as well as presentation quality and originality by a judging panel of TFD members in the role of execs and potential employers. Following the talks, the Harper Award winner for the best overall presentation will be announced.

## *Electronic Materials and Photonics Division Industrial Forum*

The Electronic Materials and Photonics Division (EMPD) will host an industrial forum for those interested in learning about career opportunities in the semiconductor industry. These talks are aimed at introducing graduate students and post-doctoral researchers to some of the technical hurdles that the industry faces. Following the talks, there will be a question and answer period as well as informal discussions with the presenters. Dr. Gary McGuire will moderate the forum.

## *"Careers at Lam Research"*

**Tuesday, November 8, 2016, 6:45 p.m., Room 102A, Music City Center**

Sponsored by Lam Research Corporation

This Forum will provide an open dialogue between an industrial liaison and young scientists and engineers. Dr. Adrien LaVoie will describe Lam Research Corporation, its technical thrusts as well as challenges, its products, future directions, and career opportunities.

Dr. Adrien LaVoie is Director of Technology for the Dielectric Atomic Layer Deposition Business Unit at Lam Research Corporation in Tualatin, Oregon. Prior to joining Lam Research, his research focused on transition metal ALD within the Components Research department at Intel Corporation. He holds a Ph.D. in synthetic organometallic chemistry from Yale University with postdoctoral research at Stanford University.

# SPECIAL SESSIONS/WORKSHOPS

## *ASTM-E42/ASSD Joint Workshop: "Frontiers of Surface Analysis"*

***1) Inherently Nano: Surface Analysis Challenges and Opportunities in the Development of Nano-Science***

***2) The Rate Debate: Current State of Gas Cluster Source Use in Srface Analysis***

**Tuesday, November 8, 2016, 8:00 p.m., Belmont 2-3, Renaissance Nashville Hotel**

***Moderator:*** **Tony Ohlhausen**

***Speakers:*** **Don Baer, Pacific Northwest National Lab, Rasmus Havelund, National Physical Lab**

The surface analysis techniques in the AVS community are intrinsically nano in nature, at least from the analysis in one dimensional direction. While some of these techniques lack a nano lateral resolution, their use in characterization of nano-structured surfaces is paramount to the development of a wide array of technological materials. Also inherent to the nano materials analysis world is a need for advanced sample handling protocols, often not previously necessary for bulk materials. We will discuss the surface implications of nano materials analysis, and recent developments in standardization of these methods and protocols.

Over the last several years, the surface analysis community has gained a new tool for the characterization of materials, the gas cluster ion source. These new sources have enabled depth profiling of organic and soft materials, something that was not previously possible, opening up a new world of analysis. Their expanded use brings with it a new parameter space of possible beam property combinations, whose use is often determined by the ability to etch a given material. Understanding the various attributes necessary for use on materials systems will be critical for these new sources to provide useful information. The current state of their use in materials analysis will be discussed.

## *Surface Science Morton M. Traum Presentation*

**Thursday, November 10, 2016, 12:20 p.m., Room 104D, Music City Center**

The Tuesday Evening Poster Session features presentations by the Mort Traum Student Award Finalists. The Morton M. Traum Surface Science Student Award will be presented for the best student poster presented in the poster session sponsored or jointly sponsored by the Surface Science (SS) Division at the AVS International Symposia. The 2016 Winner will be announced in the Traum Student Award Ceremony.

## *"Celebrating a Life in Surface Science: A Symposium in Honor of JOHN T. YATES, JR."*

**Thursday, November 10, 2016, 2:00 pm, Room 103C, Music City Center**

This special symposium celebrates the life and career of John T. Yates, Jr., Professor of Chemistry at the University of Virginia, member of the US National Academy of Sciences, and a pioneer of modern surface science. Throughout his career, his research was in the fields of surface chemistry and physics, including interests in the structure and spectroscopy of surface species, the dynamics of surface processes, and the development of new methods for research in surface chemistry. He is especially known for his work on desorption induced by electronic transitions (DIET), and as a co-developer of ESDIAD, electron stimulated desorption ion angular distribution. John was an exceptional scientist and gifted communicator, with a knack for making complex problems seem simple after he studied them in depth and communicated his results so beautifully, typically with his own meticulously hand-drawn diagrams. He published more than 750 scientific papers on surface chemistry and physics, and is among the 100 most-cited chemists in the world. His professional accomplishments have been recognized by many prestigious awards and honors, including the U.S. Department of Commerce's Gold Medal; Kendall Award for Colloid or Surface Chemistry of the American Chemical Society; the AVS Medard Welch Award; Fellow of the American Vacuum Society; Member of the National Academy of Sciences; Arthur W. Adamson Award for Distinguished Service in the Advancement of Surface Chemistry of the ACS); Peter Debye Award in Physical Chemistry of the ACS; Theodore Madey Award of the AVS; and the Gerhard Ertl Lecturer Award for Surface Chemistry and Catalysis. The symposium is comprised of former students, postdocs and colleagues who address the breath of his career through their work and his influence on them.

# PROFESSIONAL LEADERSHIP

***AVS attendees welcome at all Professional Leadership Committee sponsored events. Admission is free to all events.***

## Sunday, November 6, 2016 (Open to AVS attendees)

| | |
|---|---|
| 2:00 pm-6:00 pm | Career Center (Registration Area): submit resumes and job postings |
| 5:00 pm-6:30 pm | Improving Work-Life Satisfaction (102A Convention Center) |

## Monday, November 7, 2016 (Open to AVS attendees)

| | |
|---|---|
| 7:30 am-5:00 pm | Career Center (Registration Area): submit resumes and job postings |
| 12:15 pm-1:45 pm | Welcome to AVS! (102A Convention Center) |

## Tuesday, November 8, 2016 (Open to AVS attendees)

| | |
|---|---|
| 10:00 am-5:00 pm | Career Center (Exhibit Hall--Booth #138): **Job Fair Open** |
| 12:30 pm-2:00 pm | Job Information Forum & Lunch (102A Convention Center) |

## Wednesday, November 9, 2016 (Open to AVS attendees)

| | |
|---|---|
| 10:00 am-4:30 pm | Career Center (Exhibit Hall--Booth #138): **Job Fair Open** |
| 12:30 pm-2:00 pm | Federal Funding Town Hall & Lunch (102A Convention Center) |

## Thursday, November 10, 2016 (Open to AVS attendees)

| | |
|---|---|
| 10:00 am-5:00 pm | Career Center (Exhibit Hall--Booth #138 10:00-2:30—**Job Fair Open**, Registration Area 2:30-5:00—Job Fair Closed) |

## AVS-63 Career Center & Job Fair

The AVS Professional Leadership Committee will be hosting the AVS Career Center, ***open to all attendees***, for the purpose of connecting job seekers with potential employers. The goal is to facilitate contact and networking during the Conference. In addition, there will be a **Job Fair** Tuesday through Thursday.

**Employers seeking qualified candidates** can register for the Job Fair, provide job postings, purchase electronic resume files, and conduct onsite interviews. **Job seekers** can submit a resume, meet, and interview with potential employers. To take advantage of this service, please visit the following website for more information and submission deadlines.

**AVS Onsite Career Center: http://www.avs.org/Symposium/Career-Center**

## Improving Work-Life Satisfaction

***No additional cost is required; however, we do ask you to register for this event.***


Organizer: **Micky Holcomb, West Virginia University**
Sponsor: AVS Professional Leadership Committee

Students, faculty, administrators, industrial and government personnel (or staff) will all come across times when they struggle with maintaining a happy work-life balance. This workshop will go over some tips and strategies for improving your own work-life satisfaction. The workshop leader is a funded tenure-track faculty member, mother of two young children and coach for the National Center for Faculty Development and Diversity.

This program was originally developed by the Association for Women in Science (AWIS) through a grant from the Elsevier Foundation.

## Welcome to AVS! – A Brief Introduction to YOUR New Professional Society

**Lunch is provided for all AVS attendees!**


Organizer: **Charles Eddy, Naval Research Laboratory**
Sponsor: AVS Professional Leadership Committee

***Wonder about the Mission and Vision of AVS?***
***Want to know how to get involved?***
***Would you like to hear from AVS members and leaders?***

Then, come learn about the benefits and opportunities of YOUR newest Professional Society!

- This "Welcome to AVS!" event will introduce you to the mission, vision and organization of AVS as well as highlight its major activities –
    - Publishing (Editor-in Chief Eray Aydil),
    - Symposia and Conferences (Chair Chip Eddy),
    - Education (Chair John Lannon),
    - Membership (Chair Dave Surman), and
    - Professional Development (Chair Susan Burkett).
- Come hear about the benefits now available to you as an AVS member – both at the meeting this week and throughout the whole year!
- Meet with key leaders in AVS and find out how you can get involved!

**Welcome! We're really glad you're here and we want you to stay!**

## Job Information Forum & Lunch


**Lunch is provided for all AVS attendees!**

Organizer/Moderator: **Jeffrey Fenton, Medtronic**
Sponsor: AVS Professional Leadership Committee

*Panelists come from various sectors to share their career paths and will give attendees advice as well as comment on opportunities for professional development, promotion, etc.*

*Invited Speakers Include:*
**Michaeleen Pacholski**, Research Scientist, Dow Chemical
**Marlon Walker,** Research Chemist, Material Measurement Laboratory, NIST
**Alison Baski,** Dean of College of Science, Cal Poly Pomona

## Federal Funding Town Hall

**Lunch is provided for all AVS attendees!**

Organizer/Moderator: **Sean Jones, National Science Foundation, Jeffrey Fenton, Medtronic**
Sponsor: AVS Professional Leadership Committee

This year's Town Hall **focuses on translating basic and applied research into the market place**. Come hear about the I-Corps, SBIR/STTR, and PFI-Accelerating Innovation Research programs – featuring successful awardees. This is an event you will not want to miss!

*Invited Speakers Include:*
**Dr. Ben Schrag**, Program Director, Division of Industrial Innovation & Partnerships, SBIR/STTR Program, National Science Foundation
**Dr. Perena Gouma**, SUNY at Stony Brook, Nanogrid Tech/Electrospun Nanotechnologies
**Byron Smith**, Vanderbilt University, EndoInSight, Inc.
**Dr. Mehmet Sarikaya**, University of Washington, Seattle Biomemetics Sciences, Inc.
**Dr. Michael Goldfarb**, Vanderbilt University, Nexmatic LLC
**Dr. Mehdi Yazdanpanah**, Nauga Needles

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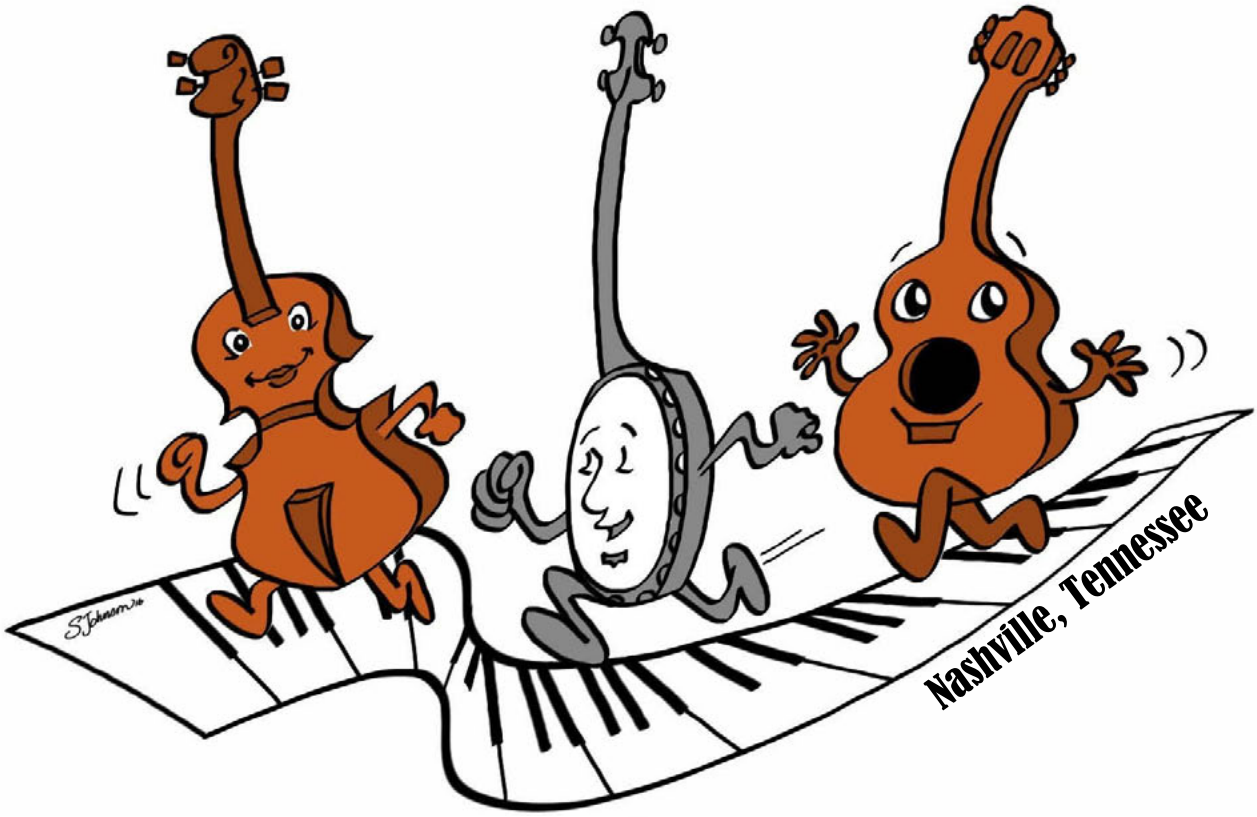
# AVS 36th Annual 5k Run

## Wednesday, November 9th

# 2016




**When:** Wed., November 9, 2016, 6:30 a.m.

**Registration:** $30 entry fee includes run t-shirt, race number, map of the course, and awards. Stop by the Run Registration Booth in the Music City Center by Tuesday, November 8th to register and/or pick up your materials and schedule.

**Details and Awards:** This year's course is an “out and back” on a paved path along the Cumberland River within walking distance of the Music City Center. The awards ceremony will be held at the Run Registration area on Wednesday at noon.

Don’t forget to put together a team to compete in our **CORPORATE RACE and DIVISIONS AND GROUPS RACE.**

Each team representing a corporate entity (university, unemployed, research organization, manufacturer, etc.) or Division/Group must have three team members to qualify. Times are handicapped by age and sex.

To enter your team, please e-mail your roster, team name, and affiliation to the Run Director before noon on Tuesday, November 8—make sure each team member has registered for the run.

**Run Director:**
Bridget Rogers, bridget_rogers@avs.org

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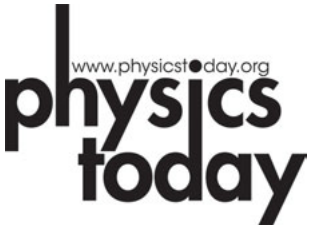





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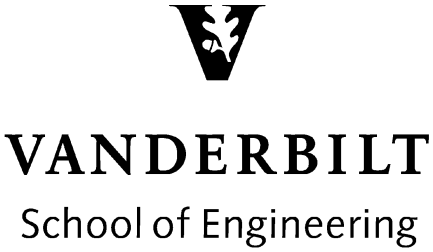






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1970 Erwin W. Mueller
1971 Gottfried K. Wehner
1972 Kenneth C.D. Hickman
1973 Lawrence A. Harris
1974 Homer D. Hagstrum
1975 Paul A. Redhead
1976 Leslie Holland
1977 Charles B. Duke
1978 Georg H. Hass
1979 Gert Ehrlich
1981 Harrison E. Farnsworth
1983 H.H. Wieder
1984 William S. Spicer
1985 Theodore E. Madey
1986 Harald Ibach
1987 Mark J. Cardillo
1988 Peter Sigmund
1989 Robert Gomer
1990 Jerry M. Woodall
1991 Max Lagally
1992 Ernst Bauer
1993 George Comsa
1994 John Yates, Jr.
1995 Gerhard Ertl
1996 Peter J. Feibelman
1997 Phaedon Avouris
1998 David E. Aspnes
1999 John H. Weaver
2000 D. Phillip Woodruff
2001 E. Ward Plummer
2002 Buddy Ratner
2003 Matthias Scheffler
2004 Rudolf M. Tromp
2005 Charles S. Fadley
2006 John C. Hemminger
2007 Jerry Tersoff
2008 Miquel Salmeron
2009 Robert J. Hamers
2010 Mark J. Kushner
2011 Wilson Ho
2012 Yves Chabal
2013 Chris G. Van de Walle
2014 Patricia A. Thiel
2015 Charles T. Campbell
2016 Maki Kawai

## GAEDE-LANGMUIR AWARDEES

1978 Pierre V. Auger
1980 Daniel Alpert
1982 Alfred H. Sommer
1984 Alfred Benninghoven
1986 Rointan F. Bunshah
1988 Alfred Y. Cho
1988 John R. Arthur, Jr.
1990 Francois M. d'Heurle
1992 Russell D. Young
1994 Robert J. Celotta
1994 Daniel T. Pierce
1996 Gerald J. Lapeyre
1998 Paul D. Palmberg
2000 Gary W. Rubloff
2002 Cristoforo Benvenuti
2004 Kunio Takayanagi
2006 Leonard J. Brillson
2008 Daniel Auerbach
2010 Gerald Lucovsky
2012 Dietrich Menzel
2014 Hans-Joachim Freund
2016 Paul S. Bagus

## ALBERT NERKEN AWARDEES

1985 John L. Vossen
1986 Donald J. Santeler
1987 Marsbed Hablanian
1988 Stanley L. Milora
1989 Charles D. Wagner
1989 Martin P. Seah
1990 J. Peter Hobson
1991 Harold R. Kaufman
1992 Paolo della Porta
1993 John O'Hanlon
1994 Hajime Ishimaru
1995 Donald Mattox
1996 William R. Wheeler
1997 John C. Helmer
1998 Peter J. Clarke
1999 Paul Holloway
2000 John T. Grant
2001 Cedric Powell
2002 David J. Harra
2003 Peter B. Barna
2004 Johan K. Fremerey
2005 Christopher R. Brundle
2006 Siegfried Hofmann
2007 Richard J. Colton
2008 Seizo Morita
2009 Donald R. Baer
2010 Fan Ren
2011 John E. Rowe
2012 Sven Tougaard
2013 Howard A. Padmore
2014 Gary E. McGuire
2014 Olga A. Shenderova

## JOHN A. THORNTON MEMORIAL AWARDEES AND LECTURES

1989 Eric Kay
1990 Maurice Francombe
1991 Joseph E. Greene
1992 Thomas R. Anthony
1993 John W. Coburn
1993 Harold F. Winters
1994 David Hoffman
1995 Jan-Eric Sundgren
1997 James M.E. Harper
1999 Timothy Coutts
2001 Samuel D. Bader
2003 William D. Sproul
2005 Stan Veprek
2007 Stephen J. Pearton
2009 Frances A. Houle
2011 Vincent M. Donnelly
2013 Ivan Petrov
2015 Alfred Grill

## PETER MARK AWARDEES

1980 Christopher R. Brundle
1981 Lawrence L. Kazmerski
1982 Charles M. Magee
1983 D. James Chadi
1984 Barbara J. Garrison
1985 Franz J. Himpsel
1986 Richard A. Gottscho
1987 Raymond T. Tung
1988 Jerry D. Tersoff
1989 Randall M. Feenstra
1990 Stephen M. Rossnagel
1991 William J. Kaiser
1993 Robert Hamers
1994 Marjorie Olmstead
1995 Emily Carter
1996 Brian E. Bent
1997 Brian Swartzentruber
1998 David G. Cahill
1999 Eray S. Aydil
2000 Stacey F. Bent
2001 Eli Rotenberg
2002 Rachel S. Goldman
2003 Charles H. Ahn
2004 Kathryn W. Guarini
2005 Jane P. Chang
2006 Mark C. Hersam
2007 W.M.M. Kessels
2008 Sergei Kalinin
2009 Beatriz Roldan Cuenya
2010 Arutiun Ehiasarian
2011 Mohan Sankaran
2012 E. Charles H. Sykes
2013 Daniel Gunlycke
2014 Joshua Zide
2015 Petro Maksymovych

# AVS AWARD WINNERS

## HONORARY MEMBERSHIP

1959 Rudy A. Koehler
1963 Benjamin B. Dayton
1981 Leonard C. Beavis
1981 N. Rey Whetten
1982 Charles B. Duke
1984 J. Roger Young
1985 Kai Siegbahn
1986 Manfred S. Kaminsky
1988 Jack H. Singleton
1991 John W. Coburn
1991 J. Lyn Provo
1992 Marsbed Hablanian
1996 Howard Patton
1997 Paul Holloway
1997 William D. Westwood
1999 Donna Bakale Sherwin
1999 James S. Murday
2000 Lawrence L. Kazmerski
2001 Robert Willis
2003 H. Frederick Dylla
2003 Gary E. McGuire
2004 Arthur O. Fuente, Jr.
2004 J.W. Rogers, Jr.
2005 Gerald Lucovsky
2006 Alvin Czanderna
2007 Paula J. Grunthaner
2008 Eric Kay
2009 Rudolf Ludeke
2009 William D. Sproul
2011 Robert A. Childs
2012 Cedric Powell
2013 David Castner
2013 Stephen M. Rossnagel
2014 John N. Russell, Jr.

## JOHN L. VOSSEN MEMORIAL AWARDEES

1997 Robert Shaner
1998 Hasan Fakhruddin
1999 Chris Ann Slye
2000 Charles J. Miltenberger
2001 Paul Lulai
2002 Toni L. Evans
2004 Jacqueline G. Kane

## GEORGE T. HANYO AWARDEES

1997 Mark Engelhard
1998 David A. Lubelski
1999 Robert A. Childs
2001 John E. Bultman
2003 Ernest A. Sammann
2004 Richard E. Muller
2006 Jeffrey D. Kelley
2010 Arthur W. Ellis
2011 Jonathan Koch
2012 Percy Zahl
2013 Steven R. Blankenship
2014 Ewald E. Chaban
2015 Marc D. Landry
2016 Stanley B. Christman

## DOROTHY M. AND EARL S. HOFFMAN AWARDEES

2003 Kenneth Bratland (Univ. of Illinois at Urbana-Champaign)
2004 Michael Filler (Stanford University)
2005 Michael Zellner (University of Delaware)
2006 Xingyi Deng (Harvard University)
2007 Thomas Mullen (Pennsylvania State University)
2008 Gregory Rutter (Georgia Institute of Technology)
2009 Juan Carlos Rodriguez-Reyes (University of Delaware)
2010 Esther Amstad (ETH Zurich, Switzerland)
2011 Kangkang Wang(Ohio University)
2012 Davide Sangiovanni (Linkoping University)
2013 Zhu Liang (University of Illinois at Chicago)
2014 Jingjing Qiu (University of Florida)
2015 Jiayu Wan (University of Maryland, College Park)

## NELLIE YEOH WHETTEN AWARDEES

1990 Jani C. Ingram (University of Arizona)
1991 Lucia Markert (University of Illinois)
1992 Hope Michelson (IBM Almaden Research Center)
1993 Laura Tedder (University of California, San Diego)
1994 Monica Katiyar (University of Illinois)
1995 Cynthia Kelchner (Iowa State University)
1996 Tracey E. Caldwell (University of California, Davis)
1997 Catherine Labelle (Massachusetts Institute of Technology)
1998 Jennifer S. Hovis (University of Wisconsin)
1999 Nerissa Taylor (University of Illinois)
2000 Jennifer E. Gerbi (University of Illinois)
2001 Tanhong Cai (Iowa State University)
2002 Lyudmila Goncharova (Rutgers University)
2003 Meredith L. Anderson (Carnegie Mellon University)
2004 Wensha Yang (University of Wisconsin, Madison)
2005 Natalia Farkas (University of Akron)
2006 Jessica Hilton (University of Minnesota)
2007 Andrea Munro (University of Washington)
2008 Brittany Nelson-Cheeseman (University of California, Berkeley)
2009 Sarah Bishop (University of California, San Diego)
2010 Xiaoyu Wang (University of Wisconsin, Madison)
2011 Sondra Hellstrom (Stanford University)
2012 Nour Nijem (University of Texas, Dallas)
2013 Indira Seshadri (Rensselaer Polytechnic Institute)
2014 Jiechang Hou (University of Pennsylvania)
2015 Leeya Engel (Tel Aviv University)

## AVS RUSSELL AND SIGURD VARIAN AWARDEES

1983 J.S. Villarubia (Cornell University)
1984 Kenneth T.Y. Kung (MIT)
1985 Anne L. Testoni (Northwestern University)
1986 Jingguang G. Chen (University of Pittsburgh)
1987 Joanne R. Levine (Northwestern University)
1988 Christopher E. Aumann (University of Wisconsin)
1989 Brian S. Swartzentruber (University of Wisconsin)
1990 Guangquan Lu (University of California, San Diego)
1991 Michael Flatte (University of California, Santa Barbara)
1992 Rex Ramsier (University of Pittsburgh)
1993 Daniel Kelly (University of California, Santa Barbara)
1994 Britt Turkot (University of Illinois)
1995 Robert Carpick (University of California, Berkeley)
1996 Kevin Robbie (University of Alberta)
1997 Kimberly S. Turner (Cornell University)
1998 John S. Lewis, III (University of Florida)
1999 Sanjit Singh Dang (University of Illinois, Chicago)
2000 Michelle L. Steen (Colorado State University)
2001 Jianwei Dong (University of Minnesota)
2002 Wei Tan (University of Illinois)
2003 John R. Kitchin (University of Delaware)
2004 Vassil Antonov (Univ. of Illinois at Urbana-Champaign)
2005 Liam Pingree (Northwestern University)
2006 Gregory Ten Eyck (Rensselaer Polytechnic Institute)
2007 H. Lee Mosbacker (Ohio State University)
2008 Erik Wallen (Linkoping University)
2009 Sudhakar Shet (New Jersey Institute of Technology/NREL)
2010 Christine Tan (Cornell University)
2011 David A. Siegel (University of California, Berkeley)
2012 April Jewell (Tufts University)
2013 Jason Kawasaki (University of California, Santa Barbara)
2014 Deep Jariwala Northwestern University
2015 Andrada-Oana Mandru Ohio University


AVS
Awards Ceremony & Reception
AVS 63rd Annual Awards Ceremony
Wednesday, November 9, 2016
Celebrate with AVS awardees in the
Davidson Ballroom of the Nashville Music City Center
at 6:30 p.m.

# AVS AWARDS

## AWARDS CEREMONY & RECEPTION

The AVS Awards Ceremony will be held on Wednesday, November 9, 2016, at 6:30 p.m. in the Davidson Ballroom within the Music City Center to be followed immediately by an Awards Reception. This year, AVS honors the following awardees:

Maki Kawai, Medard W. Welch Award

Paul S. Bagus, Gaede-Langmuir Award

Stanley B. Christman, George T. Hanyo Award

The newly elected AVS Fellows

The 2016 AVS National Student Award Finalists

## MEDARD W. WELCH AWARD

The Medard W. Welch Award was established in 1969 to commemorate the pioneering efforts of M.W. Welch in founding and supporting AVS. It is presented to recognize and encourage outstanding research in the fields of interest to AVS. The award consists of a cash award, a medal, a plaque, and an honorary lectureship at a regular session of the International Symposium.

### MAKI KAWAI

"Medard W. Welch Award Lecture –
"Action Spectroscopy: Characterizing Molecules at Surfaces and its Dynamics,

*Monday, 9:40 am, Room 104A*

**Maki Kawai,** Institute for Molecular Science and University of Tokyo, "for elucidation of the role of vibrational dynamics in single-molecule reactions at surfaces"

Maki Kawai is the Director General of the Institute for Molecular Science at Okazaki, Japan. She is also a Professor at University of Tokyo. She has coauthored over 300 publications on surface science, physical chemistry, catalysis and materials science. She received Surface Science Society of Japan award (2005), Chemical Society of Japan award (2008), 2015 IUPAC Distinguished women in Chemistry and Chemical Engineering, and 2015 Gerhard Ertl Lecture Award.

In addition to her fundamental scientific research, she is a widely-respected leader in scientific management. This activity, involving science in the USA, Germany, United Kingdom, and Japan has made her a highly valued member of the international scientific community, culminating with her former position as the RIKEN Executive Director in charge of research affairs. She is a member of the Science Council of Japan, and currently serving as an Executive Board Member representing Section III: Physical Sciences and Engineering. She is and has always been a highly respected member of the international community, serving as chair of the Surface Science Division, IUVSTA (International Union for Vacuum Science, Techniques, and Applications; 2001–2004), board member of the Institute of Physics, London, UK (2002–2004), as well as member of the Scientific Advisory Board at the Fritz Haber Institute of the Max Planck Society since 2010. She was elected an APS (American Physical Society) fellow in 2010.

Prof. Kawai has also played an important role in the Japanese government's planning of its science & technology policy, contributing to the drafting of a model plan for intellectual property strategy (2003–2007), and for new system for education as a member of Prime Minister Abe's Education Rebuilding Implementation Council (2013–2015).

Maki Kawai received her BS in Chemistry at the University of Tokyo in 1975 and her PhD there in 1980 under the guidance of Prof. Kenzi Tamaru. She then did postdoctoral research for 5 years in several places including RIKEN, the University of Tokyo, Osaka Industrial Research Institute, Ministry of International Trade and Industry (MITI) and at Osaka Gas Co. in Japan. These experiences of working in various places, university, governmental and private research institutes was especially important for Kawai to establish her direction of research in fundamental sciences.

Before becoming the chief scientist at RIKEN to direct Surface Chemistry Lab. in 1991, she worked at RIKEN (1985–1988) and served as TKD professor at Tokyo Institute of Technology (1988–1991). And from 2004, she is Professor at the University of Tokyo.

Maki Kawai is well known in her study on single-molecule chemistry, where spectroscopy of ultimate spatial resolution is performed. Of the most, single molecule vibrational spectroscopy utilizing inelastic tunneling process and extracting vibrational spectra from action of molecules (Action Spectroscopy) using STM stands to be unique. Interplay between the localized spin at adsorbed molecule and electrons at the Fermi sea of metal substrates is one of the recent topics of her group where Zeeman splitting or the Kondo resonance are resolved in sub-atomic resolution in space.

## GAEDE-LANGMUIR AWARD

The Gaede-Langmuir Award was established in 1977 by an endowing grant from Dr. Kenneth C.D. Hickman. It is presented to recognize and encourage outstanding discoveries and inventions in the sciences and technologies of interest to AVS. The award is conferred biennially as a suitable candidate may be identified. It consists of a cash award, a commemorative plaque stating the nature of the award, and an honorary lectureship at a regular session of the International Symposium.

### PAUL S. BAGUS

"Gaede Langmuir Award Lecture –
"Multiplets and More
for Core-Level Spectra"

*Wednesday, 11:00 am, Room 103C*

**Paul S. Bagus**, University of North Texas, "for seminal contributions to understanding photoelectron spectra of solid surfaces and molecules adsorbed thereupon"

Paul Bagus received his Ph.D. in 1965 at the University of Chicago under Prof. C. J. J. Roothaan in the Laboratory of Molecular Structure and Spectra, LMSS, directed by Profs. R. S. Mulliken and Roothaan. The LMSS was one of the major centers for the early development and applications of *ab initio* Quantum Chemistry and Paul Bagus was a major contributor to these efforts. His thesis work on the ionization of closed shell atoms showed, for the first time, that ab initio wavefunction methods could be successfully applied to the core-level excitations measured in X-Ray Photoemission Spectroscopy, XPS. This was followed by demonstrations of the importance of many body effects for the XPS of open shell systems and of the localization of core-holes. Based on this XPS work, he was named an APS Fellow in 1975. Starting in 1968, he spent several years at the IBM Research Laboratories in San Jose where he continued his efforts on the development of rigorous theoretical methods and he began his study of surface processes. This effort was, in large measure, inspired by the outstanding Surface Science program at IBM San

Jose. Several of his post-doctoral visitors at IBM now hold significant academic positions. He left IBM in 1993, was a visitor at several institutions, primarily in Europe, and is now a Research Professor in the Chemistry Department at the University of North Texas. He has over 350 publications and his work is highly cited.

Paul Bagus' theoretical research has focused on topics in two separate but closely related scientific areas: (1) chemistry of surfaces with particular emphasis on the bonding between adsorbates and surfaces and (2) core level ionization and excitation. Essentially all of his research has involved using computations to determine the electronic structure of atoms, molecules, and condensed systems. He has demonstrated that clusters containing a few to many atoms can be successfully used as models of bulk and surface processes since they permit a focus on local aspects of atomic and molecular interactions. An important objective of his research has been to understand the physical and chemical reasons for observed properties. Contributing to this understanding is a role of theory that is easily as important as predicting values for these properties in close agreement with experiment. In order to reach this objective, He has pioneered in the development of programs that can be used to analyze the computed wavefunctions and to decompose the properties resulting from a chemical interaction into contributions from different physical and chemical mechanisms. A recurring theme of his efforts has been interaction and collaboration with experimentalists since this both guides his research efforts and helps to insure that they have a direct impact. These collaborations began during his tenure at IBM and were enhanced with continuing collaborations after his Humboldt Senior Scientist Award, originally made in 1979 with later extensions. In particular, at present, he maintains strong collaborations at the Fritz-Haber Institute, FHI, in Berlin and the Pacific Northwest National Laboratory, PNNL, in Richland, WA.

## GEORGE T. HANYO AWARD

The George T. Hanyo Award was established in 1996 by the Kurt J. Lesker Company in the memory of George T. Hanyo, a highly skilled, longtime employee of the company. The award is presented to recognize outstanding performance in technical support of research or development in areas of interest to AVS. It recognizes valuable contributions made by persons outside normal professional circles. Typical nominees should have received mention in the "Acknowledgments" sections of the published papers but, with the possible exception of papers describing new apparatus or procedures, would rarely have been authors or co-authors. The award consists of a cash award and a plaque setting forth the reasons for the award.

## STANLEY B. CHRISTMAN

**Stanley B. Christman,** Hickory Hill Designs, "for outstanding technical support on a variety of projects at Bell Labs"

Stanley Christman from Bell Laboratories, Murray Hill, Surface Physics Dept was responsible for equipment purchase, design, data taking, and maintenance. Design activities involved electronics, electrical, instrument to computer interfacing, software, vacuum, and mechanical.

After graduation in 1957 from Schuylkill Valley HS, Leesport, Berks Co., Pa., Stan completed a BS in Physics at Penn State Univ. He first encountered vacuum technology at his first job as an Operating Engineer of the Princeton-Pennsylvania 3Bev Proton Accelerator in 1962. When he arrived, there was a claim that there was a beam for a short time. The machine was eventually producing beam around the clock with Stan leading one of the operating crews. The maintenance and improvement of the RF Cavity Accelerating System was also his direct responsibility. This was the time when Quarks were yet to be discovered. This accelerator became obsolete in 7 years, as other higher energy accelerators came on line. While working at Princeton, Stan completed an MA in Physics at The College of NJ, where he developed an NMR facility for the college. His thesis project resulted in the first published NMR spectra of some new Nematic Liquid Crystal compounds.

In 1970, Stan joined Bell Labs Surface Physics department to became part of a team that was to develop a UV and x-ray photoemission experimental capability. This was the time when vacuum experimental work was transitioning from all glass chambers to stainless steel chambers, with the then new conflat flanges. A few chambers were built that allowed the sample to be rotated to allow the sample to be examined by UV, AES, LEED, HEED, and MBE. All chambers had custom computer controlled Residual Gas Analyzers.

Single and Double Cylindrical Mirror Analyzers were utilized to detect the photo-emitted electrons. Channel Plate Detectors were utilized to collect angle-resolved data. Chambers were taken to accelerators that produced more intense UV light (synchrotron radiation) than was possible in the home lab.

In 1982 he became part of a team to establish an infrared internal reflection diagnostic technique at Bell Labs. to do studies of semiconductor surfaces in a vacuum environment. This led to the design and construction of a number of vacuum stations with IR windows and optics to focus the beam in and out of the polished sample plate beveled edges. These chambers also had Residual Gas Analyzer, LEED, and Auger optics. A unique Vacuum FTIR System was designed that had the IR source to detector completely in a vacuum environment, thus eliminating the bothersome spectral lines of water and carbon dioxide. The external IR detectors required low noise preamplifiers to be designed. Since many experiments were performed at low temperatures, he developed a Proportional Flow Liquid Nitrogen Control System to minimize turbulence and the quantity of nitrogen required to keep a reservoir full. A 4 point ohmic heating system was developed to uniformly heat the semiconductor plates. Many custom electronic and software solutions were provided.

Stan and Sandy operate a small farm in NJ that produces trees, eggs, honey, and firewood. They enjoy hiking, camping, folk dancing, and classical music. Amateur Radio (W2GCU–E) is a longstanding hobby for Stan. He regularly visits students and faculty at Rutgers U. as a Visiting Courtesy Appointee in the Physics Department. Since retiring from Bell Labs. in 2002, he has been designing custom instruments and solving laboratory instrumentation problems, as a consultant, for research groups at various universities, national labs, and Bell Labs.

# AVS GRADUATE STUDENT AWARDS

### 2016 NATIONAL STUDENT AWARD FINALISTS

There are five (5) top-level named Graduate Student Awards and three (3) Graduate Research Awards, described below. The recipients of these awards are determined after a general competition with all the graduate research applicants and a presentation to the Awards Committee at the International Symposium.

The finalists are:

*Swetha Barkam, University of Central Florida*
*Grant Langlois, University of Chicago*
*Hyosun Lee, Korea Advanced Institute of Science and Technology (KAIST)*
*Andrew Mannix, Northwestern University*
*Takat Rawal, University of Central Florida*
*Kasra Sardashti, University of California, San Diego*
*Debalaya Sarker, Indian Institue of Technology Delhi, India*
*Thomas Winkler, University of Maryland, College Park*

### RUSSELL AND SIGURD VARIAN AWARD

The Russell and Sigurd Varian Award was established in 1982 to commemorate the pioneering work of Russell and Sigurd Varian. It is presented to recognize and encourage excellence in graduate studies in the sciences and technologies of interest to AVS. The award is supported by Varian, Inc. It consists of a cash award, a certificate, and reimbursed travel support to attend the International Symposium.

### NELLIE YEOH WHETTEN AWARD

The Nellie Yeoh Whetten Award was established in 1989, in the spirit of Nellie Yeoh Whetten, to recognize and encourage excellence by women in graduate studies in the sciences and technologies of interest to AVS. A fund to support the award was established by Timothy J. Whetten, friends and family of Nellie Yeoh Whetten, and AVS. The award consists of a cash award, a certificate, and reimbursed travel support to attend the International Symposium.

### DOROTHY M. AND EARL S. HOFFMAN AWARD

The Dorothy M. and Earl S. Hoffman Award was established in 2002 to recognize and encourage excellence in graduate studies in the sciences and technologies of interest to AVS. It is funded by a bequest from Dorothy M. Hoffman, who was president of AVS in 1974 and held other positions of responsibility in the Society. The award consists of a cash award, a certificate, and reimbursed travel support to attend the International Symposium.

### DOROTHY M. AND EARL S. HOFFMAN SCHOLARSHIPS

The Dorothy M. and Earl S. Hoffman Scholarships were established in 2002 to recognize and encourage excellence in graduate studies in the sciences and technologies of interest to AVS. They are funded by a bequest from Dorothy M. Hoffman. The scholarships consist of a cash award, a certificate, and reimbursed travel support to attend the International Symposium.

### GRADUATE RESEARCH AWARDS

The Graduate Research Awards were established in 1984 to recognize and encourage excellence in graduate studies in the sciences and technologies of interest to AVS. Each consists of a cash award, a certificate, and reimbursed travel support to attend the International Symposium.

# AVS FELLOWS

The membership level designated "Fellow of the Society" was established in 1993 to recognize members who have made sustained and outstanding scientific and technical contributions in areas of interest to AVS. These contributions can be in research, engineering, technical advancement, academic education or managerial leadership. This is a prestigious membership level to which members are elected. AVS Fellows receive a certificate.

### 2016 AVS FELLOWS

*Susan Burkett, The University of Alabama*
*Charles T. Campbell, University of Washington*
*Matthew J. Goeckner, The University of Texas at Dallas*
*Alberto Herrera-Gomez, CINVESTAV-Unidad Querétaro*
*Gregory Kimmel, Pacific Northwest National Laboratory*
*Yue Kuo, Texas A&M University*
*Rosa A. Lukaszew, The College of William and Mary*
*Manos Mavrikakis, University of Wisconsin-Madison*
*Sally McArthur, Swinburne University of Technology, Australia*
*Anders Mikkelsen, Lund University, Sweden*
*Talat Rahman, University of Central Florida*
*Steven J. Sibener, The University of Chicago*
*Arthur Utz, Tufts University*
*Peter L.G. Ventzek, Tokyo Electron America Inc.*
*Jason F. Weaver, University of Florida*

# DIVISION AWARDS

## Morton M. Traum Surface Science Division Student Award

The Surface Science Student Award was initiated in 1981. Morton M. Traum, then chair of the Surface Science Division, was the prime motivator in establishing the award. After Mort's untimely death on 1 December 1982, the Executive Committee of the Surface Science Division renamed the award in his memory. The Morton M. Traum Surface Science Division Student Award is presented annually for the best student paper based on work leading to a Ph.D thesis. The papers are judged on technical content and quality of presentation.

The 2016 winner will be announced in the Traum Student Award Ceremony, to be held on Thursday, November 10th at 12:30 p.m. in Room 104D of the Music City Center.

**Past Winners:**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 1981 | Eric Stuve | 1990 | Benjamin Wiegand | 1999 | Jongin Hahn | 2008 | Jeibin Sun |
| 1982 | Steven Gates | 1991 | David Peale | 2000 | Anders Carlsson | 2009 | Qing Hua |
| 1983 | Ann Smith | 1992 | Chaochin Su | 2001 | Jeppe Vang Lauritsen | 2010 | Heather Tierney |
| 1984 | Hans Gossman | 1993 | Anna Swan | 2002 | Seth B. Darling | 2011 | David Siegel |
| 1985 | Duane Outka | 1994 | Bert M. Müller | 2003 | Marcel A. Wall | 2012 | April Jewell |
| 1986 | Greg Sitz | 1995 | Frank Zimmermann | 2004 | Emrah Ozensoy | 2013 | Xiaofeng Feng |
| 1987 | Michael Henderson | 1996 | Joseph Carpinelli | 2005 | Jan Haubrich | 2014 | Feng Zhang |
| 1988 | Jeff Hanson | 1997 | Barry Stipe | 2006 | Petro Maksymovych | 2015 | Holly Walen |
| 1989 | Yunong (Neal) Yang | 1998 | Alexander Bogicevic | 2007 | Bogdan Diaconescu | | |

## John Coburn and Harold Winters Student Award in Plasma Science and Technology

In 1994, the Plasma Science and Technology Division established the Coburn and Winters Award in honor of John Coburn and Harold Winters. Coburn and Winters have made pioneering contributions to the field of plasma science, especially in plasma processing and plasma-surface interactions. Their work has provided inspiration for countless students entering the field of plasma science and enhanced the experiences of students by both example and mentorship. The Coburn-Winters Award winner winner will be announced on Thursday, November 10th during the afternoon break.

**Past Winners:**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 1994 | Bruce Kellerman | 2000 | Siva Kanakasabapathy | 2006 | Lin Xu | 2012 | Joe Lee |
| 1995 | Not Given | 2001 | Nicholas Fuller | 2007 | Joydeep Guha | 2013 | Rohan Chaukulkar |
| 1996 | Jane Chang | 2002 | Lin Sha | 2008 | Emile Despiau-Pujo | 2014 | Bastien Bruneau |
| 1997 | Mikhail Malyshev | 2003 | Jan Benedikt | 2009 | Yang Yang | 2014 | Paul Rumbach |
| 1998 | Catherine Labelle | 2004 | Jun Belen | 2010 | Bhavin Jariwala | 2015 | Hu Li |
| 1999 | Erwin Kessels | 2005 | Joseph Végh | 2011 | Harald B. Profijt | | |

## Leo M. Falicov Student Award

The Leo M. Falicov Student Award has been established in memory of Prof. Leo M. Falicov to recognize outstanding research performed by a graduate student in areas of interest to the Magnetic Interfaces and Nanostructures Division. Finalists will be selected on the basis of abstract submission, and will each receive an award upon attending the AVS 63rd International Symposium and Exhibition and presenting their paper in an oral session. The Best Student Paper Award winner will be selected on the basis of the oral presentation, considering quality of research and clarity of presentation.

**Past Winners:**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 1999 | W.H. Rippard | 2004 | Maria Torija | 2008 | Zhuhua Cai | 2013 | Jason Kawasaki |
| 2000 | R.D. Portugal | 2005 | Jessica Hilton | 2009 | Wei Han | 2013 | Kaida Yang |
| 2001 | D.B. Schultz | 2006 | Randy Dumas | 2010 | Kangkang Wang | 2014 | Henry Wortelen |
| 2002 | E.L. Biizdaca | 2007 | David Wisbey | 2011 | Juan Colon-Santana | 2015 | Andrada-Oana Mandru |
| 2003 | Tiffany Kaspar | 2007 | John Strachan | 2012 | Chloe Baldasseroni | | |

# DIVISION AWARDS

## Paul H. Holloway Young Investigator Award

The Thin Film Division is pleased to announce Neil Dasgupta, University of Michigan as the 2016 awardee of the Paul H. Holloway Young Investigator Award. Dr. Dasgupta has been given the award for his pioneering contributions to the fields atomic layer deposition and related theoretical and experimental work in thin film science and technology.

This award is named after Prof. Paul H. Holloway of the University of Florida who has a distinguished and continuing career of scholarship and service to AVS. The nominee is a young scientist or engineer who has contributed outstanding theoretical and experimental work in an area important to the Thin Film Division of AVS. The nominee's Ph.D. or equivalent degree must have been earned less than 7 years prior to January 1 of the award year. The award consists of a cash prize, a certificate citing the accomplishments of the recipient, and an honorary lecture at one of the TFD oral sessions at the International Symposium.

**Past Winners:**

2009 Suneel Kodambaka, UCLA
2010 O. Martin Ntwaaborwa, Univ. of the Free State, South Africa
2011 Sumit Agarwal, Colorado School of Mines
2012 Franklin Tao, University of Notre Dame
2013 Per Eklund, Linköping University
2014 Andrea Illiberi, Dutch Inst for Applied Scientifc Res (TNO)
2015 Cunjian Yu, University of Houston

## Nanometer-scale Science and Technology Division Awards Competition for Graduate Students and Postdocs

The Nanometer-scale Science and Technology Division (NSTD) Graduate Student and Postdoctoral Awards bring recognition to outstanding work by early-career scientists giving oral presentations in NSTD sessions at AVS International Symposia. In addition to presenting their work in the standard NSTD sessions, finalists also make brief presentations at the NSTD Awards Competition. This public special event is held at noon on Wednesday of the symposium in the same room as the standard NSTD sessions. The winners will be selected based on the quality of the talk, the responses to questions, and the level of the research. Winners in the graduate student and postdoctoral categories are announced at the close of the competition.

**Graduate Student Award Winners:**

2002 Jeremy Steinshinder
2003 Cheol-Soo Yang
2004 Qiguang Li
2005 Kiu-Yuen Tse
2006 Tracie Colburn
2006 Dirk Weber
2007 Jacob Palmer
2008 Qing Hua Wang, Northwestern University
2009 Mehmet Baykara, Yale University
2010 Farzad Behafarid, Univ Central Florida
2011 Justice Alaboson, Northwestern University
2012 David Reid, University of Central Florida
2013 Cédric Barroo, Université Libre de Bruxelles
2014 Deep Jariwala, Northwestern University
2015 Wei Bao, University of California, Berkeley

## Nanotechnology Recognition Award

The Nanotechnology Recognition Award recognizes members of NSTD for outstanding scientific and technical contributions in the science of nanometer-scale structures, technology transfer involving nanometer-scale structures, and/or the promotion and dissemination of knowledge and development in these areas. The Award will be presented before the recipient's talk at the AVS International Symposium. The 2016 Awardee is Ricardo Garcia, Professor of Nanoscience and Nanotechnology Instituto de Ciencia de Materiales de Madrid, CSIC

**Past Winners:**

2001 Nancy Burnham, Worcester Polytechnic Inst.
2004 Harold Craighead, Cornell University
2009 Joseph Stroscio, NIST
2010 Roland Wiesendanger, Univ of Hamburg
2011 Phaedon Avouris, IBM Yorktown Heights
2012 Fleming Besenbacher, Aarhus University
2013 Joseph Lyding, University of Illinois
2014 Dawn A. Bonnell, University of Pennsylvania
2015 Meyya Meyyapan, NASA Ames Research Center

# EXHIBIT HALL EVENTS

AVS is a Society unique for its multidisciplinary coverage of science and technology. Our International Symposium and Exhibition attracts exhibitors and attendees from a variety of industries that use controlled environments, including thin films, surface science, biomaterials interfaces, materials research, electronic materials and processing, magnetic interfaces, nanoscience and nanotechnology, vacuum coatings and manufacturing science and technology.

AVS has incorporated several session breaks into each exhibit day so that attendees have ample time to visit the exhibits. Many exciting activities are scheduled in the exhibit hall including Exhibitor Technology Spotlight sessions on Tuesday and Wednesday (during session breaks), free morning coffee, lunch, afternoon refreshments and 150 exhibitors waiting to show off their technology and services to you !

**Entrance to the Exhibits is free and open to the public**

### Exhibit Schedule - November 8 - 10, 2016

| | | |
|---|---|---|
| Nov. 8 | Tuesday | 10am - 5:00pm |
| Nov. 9 | Wednesday | 10am - 4:30pm |
| Nov. 10 | Thursday | 10am - 2:30pm |

**Symposium Dates: November 6 - 11, 2016**

## EXHIBIT FINALE

**THURSDAY 12:20 PM - 2:20PM**

### EVENTS:

**•Free Lunch for everyone !**

**•Art Zone Contest Prize Winners**

**•Raffle Drawings**

**•Grand Prize Raffle Drawing**

**• Foosball Championship**

**•Caricatures**


## EXHIBIT HALL

### ATTRACTIONS & SPECIAL EVENTS

**Ask The Experts - Vacuum Technology**

**AVS Career Center**

**Exhibitor Technology Spotlight Sessions**

**AVS Membership & Education Booth**

**AVS Store: Gifts & Souvenirs**

**Free Morning Coffee & Lunch**

**Free Afternoon Refreshments**

**Art Zone Display & Competition**

**Daily Raffle Drawings**

**Internet Access**

**Caricatures**

**Foosball Tournament**

**Complete Symposium Details at:**
**www.avs.org**
AVS • 125 Maiden Lane • 15th Floor
New York, NY 10038 • (212)248-0200

# EXHIBITING COMPANIES

**Bold listings reflect our Sponsors and Corporate Members**

| Booth | Company |
|---|---|
| 441 | A&N Corporation |
| 316 | Accurion GmbH |
| 719 | Ace Glass, Inc. |
| 700 | AdValue Technology |
| **538** | **Agilent Technologies, Vacuum Products Division** |
| **433** | **AIP Publishing** |
| **109** | **AJA International, Inc.** |
| **436** | **American Institute of Physics** |
| 708 | Amuneal Mfg Corporation |
| 119 | Anderson Dahlen Vacuum/ Applied Vacuum Tech |
| **119** | **Applied Vacuum Technology, LLC.** |
| **322** | **Asylum Research an Oxford Instruments Company** |
| 104 | Atlas Technologies |
| 314 | Avantes, Inc. |
| 544 | AVS - ASK THE EXPERTS Vacuum Technology Division |
| 727 | AVS ART ZONE & CONTEST |
| 138 | AVS CAREER CENTER |
| 122 | AVS E-MAIL PAVILION |
| 800 | AVS Exhibitor Technology Sessions |
| 422 | AVS Foosball Tournament |
| 644 | AVS Future Sites |
| 430 | AVS Publications |
| 745 | AVS RAFFLE ZONE |
| 245 | AVS SPECIAL EVENTS BOOTH |
| 645 | AVS STORE & MEMBERSHIP |
| 431 | AVS Surface Science Spectra Data Browser |
| **418** | **BellowsTech, LLC** |
| 327 | Blue Wave Semiconductors, Inc. |
| 337 | Brooks Automation |
| **315** | **CeramTec North America** |
| 716 | Clark Industries Inc. |
| 704 | ColdQuanta, Inc. |
| 702 | CONAX TECHNOLOGIES |
| 519 | COSMOTEC, Inc. |
| 411 | CRC Press/Taylor & Francis Group |
| 506 | CS Clean Solutions, Inc. |
| **511** | **Denton Vacuum LLC** |
| **507** | **Duniway Stockroom Corp.** |
| 516 | Eagle Instrument Services |
| 414 | Ebara Technologies |
| 426 | Edwards Vacuum |
| 701 | Electron Microscopy Sciences |
| 717 | Evey Vacuum Service, LLC / Lixin Vacuum |
| 341 | Extrel |

| Booth | Company |
|---|---|
| 508 | Ferrotec (USA) Corporation |
| 408 | Filmetrics |
| **424** | **Gamma Vacuum** |
| 513 | Geib Refining Corp |
| 409 | Gencoa |
| 606 | Glas-Col, LLC |
| 214 | HeatWave Labs Inc. |
| **412** | **Heidelberg Instruments, Inc.** |
| 429 | Heraeus Noblelight America LLC |
| 417 | Hiden Analytical, Inc. |
| **624** | **Hine Automation** |
| 528 | Horiba Scientific |
| 311 | Huntington Mechanical Labs |
| **215** | **HVA, LLC** |
| **438** | **Impedans Ltd.** |
| 522 | INFICON |
| 525 | Inland Vacuum Industries, Inc. |
| 216 | InstruTech, Inc. |
| 236 | Intel Corporation |
| 415 | International Ceramic Engineering |
| 331 | Intlvac Thin Film |
| **217** | **ION-TOF USA** |
| 517 | IOP Publishing, Inc. |
| 307 | J.A. Woollam Co., Inc. |
| 218 | Kashiyama-USA Inc. |
| **100** | **Kimball Physics Inc.** |
| **301** | **Kratos Analytical** |
| 510 | Kruss USA |
| **201** | **Kurt J. Lesker Company** |
| 118 | Kyungwon Tech Co., Ltd. |
| 446 | LDS Vacuum Products, Inc. |
| 622 | Leybold USA Inc. |
| 207 | MANTIS Deposition, Inc. |
| 623 | McAllister Technical Services, Inc. |
| 208 | MDC Vacuum Products, LLC |
| 333 | MeiVac, Inc. |
| 615 | Micro Photonics |
| 137 | Micron Technology, Inc. |
| **445** | **MKS Instruments** |
| 605 | Modion Vacuum (J.B. Anderson & Son, Inc.) |
| 410 | MPF Products Inc |
| 313 | NiCoForm, Inc. |
| 102 | NIST/CNST |
| 407 | Nonsequitur Technologies |
| **618** | **Nor-Cal Products, Inc.** |
| 705 | NSI |
| 607 | OCI Vacuum Microengineering, Inc. |
| 530 | Omley Industries, Inc. |
| 120 | Osaka Vacuum USA, Inc. |

| Booth | Company |
|---|---|
| 324 | Oxford Instruments |
| 108 | Park Systems, Inc. |
| **406** | **Pfeiffer Vacuum Technology, Inc.** |
| **523** | **PHPK Technologies** |
| **101** | **Physical Electronics** |
| **144** | **Physics Today Exhibitor Lounge** |
| 616 | Phytron, Inc. |
| 718 | Picosun Oy |
| **328** | **Plasmaterials, Inc.** |
| 212 | Precision Ceramics USA, Inc. |
| 640 | Precision Plus Vacuum Parts |
| 318 | Prevac sp. z o.o. |
| **423** | **R.D. Mathis Company** |
| **222** | **RBD Instruments, Inc.** |
| 306 | Refining Systems |
| 111 | Renishaw, Inc. |
| **617** | **RF VII Inc.** |
| **501** | **RHK Technology Inc.** |
| 722 | Ricor USA, Inc. |
| 524 | Rocky Mountain Vacuum Tech., Inc. |
| **541** | **SAES Group** |
| 723 | Scienta Omicron, Inc. |
| **518** | **Scientific Instrument Services, Inc.** |
| 310 | Scientific Instruments, Inc. |
| **628** | **Semicore Equipment, Inc.** |
| 439 | Semilab SDI LLC |
| 301 | Shimadzu Industrial Equipment |
| **301** | **Shimadzu Scientific Instruments** |
| 207 | Sigma Surface Science GmbH |
| **224** | **Solid Sealing Technology, Inc.** |
| **317** | **SPECS Surface Nano Analysis, Inc.** |
| **601** | **SPI Supplies** |
| **229** | **Staib Instruments** |
| **514** | **Super Conductor Materials** |
| 231 | Surface Analysis Consulting |
| **211** | **Synergy Systems Corporation** |
| 233 | T&C Power Conversion, Inc. |
| 515 | TDK-Lambda Americas |
| 226 | Tech-X Corporation |
| 114 | Telemark |
| 223 | Thermo Fisher Scientific |
| 308 | Trillium US, Inc. |
| **323** | **UC Components** |
| 201 | UHV Design Ltd. |
| 603 | Ultratech/Cambridge NanoTech |
| 703 | United Mineral and Chemical Corp. |
| **529** | **Vacuum Research Corporation** |
| **201** | **VAT** |
| 609 | Yugyokuen Ceramics Co., Ltd. |
| 213 | Zeon Chemicals L.P. |



***This listing includes particpants as of September 2016***

# EXHIBITOR TECHNOLOGY SPOTLIGHT SESSIONS

**Stage Area of Exhibit Hall • Music City Convention Center**

20-minute interactive presentations scheduled during the technical session breaks in the Stage Area of the exhibit hall. Gain insight to the latest products and services offered by the exhibitors that benefit everyone including technicians, engineers and scientists as well as fellow manufacturers.

## Free Admission

### TUESDAY, November 6

**10:20am** **CS Clean Systems, Inc.**
Toxic, Flammable and Corrosive Waste Gas Treatment. Protect your Employees and Environment
**Presenter:** D.K. Prasad

**12:40pm** **SPECS Surface Nano Analysis GmbH**
Spin-resolved Momentum Microscopy
**Presenter:** Thomas Stempel Pereira

**1:00pm** **PREVAC Sp z o.o.**
The New Generation of the Hemispherical Energy Analyser in the Novel Surface Science Research
**Presenter:** Lukasz Walczak

**1:20pm** **Kratos Analytical**
Latest Developments in XPS and Related Methods from Kratos Analytical
**Presenter:** Chris Blomfield

**1:40pm** **Physical Electronics**
What's New from Physical Electronics
**Presenter:** Scott Bryan


### WEDNESDAY, November 7

**10:20am** **Ion-Tof**
From Surface Spectrometry to 3D Analysis - Latest Trends and Instrumentation for TOF-SIMS
**Presenter:** Nathan Havercroft

**12:40am** **MDC**
Ceramic-To-Metal Joint Design in Demanding and Harsh Environmental Applications
**Presenter:** Jim Moore

**1:00pm** **Kruss USA**
Why Test Inks Cannot Tell the Full Truth About Surface Free Energy
**Presenter:** Mr. Mark A. McCarthy

**1:20pm** **Gencoa Limited, UK**
A Vacuum Species Sensor using Remote Plasma Emission Spectroscopy for Direct Monitoring of Vacuum Processes
**Presenter:** Joseph Brindley

**1:40pm** **Renishaw**
Raman Imaging of Samples with Complex surface Topographies Using Renishaw's inVia Qontor
**Presenter:** Tim Prusnick

**2:00pm** **NSI**
Ampoules and Bubblers 101
**Presenter:** William Kimmerle

# ASK THE EXPERTS !!!!!!

## Troubleshooting Mysteries? Contamination Problems?
## System Configuration Questions? Just want to make your vacuum better?

| What's the best gauge for the 10-11 Torr Range? | How do I detect a Virtual Leak? | What is my RGA telling me? | How do I control / eliminate water? |
|---|---|---|---|

**Problems with troubleshooting, process control, contamination or just want to bounce an idea off other people in the vacuum field? Maybe all our years of experience, successes and failures can help point you in the right direction or spark an idea! An unbiased, open forum with the desire to solve vacuum related issues. Come chat with us at Booth 544. Who are we?? We are volunteers of the AVS Vacuum Technology Division and our goal is to help you solve problems and understand the intricacies of vacuum technology.**

**PUT US TO THE TEST !**

Whether you're new to vacuum technology or have 30 years of experience, stop by the Ask the Experts booth to discuss your vacuum concerns... or maybe you can even provide us with some new tips and suggestions!!

During your visit, receive a free telescoping, magnetic flashlight. *While they last !*

## Ask the Experts!... Exhibit Hall Booth #544

Sponsored by Kimball Physics, SAES Getters & MKS Instruments
Hosted by the AVS Vacuum Technology Division

saes getters

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mks

Archives and online discussion forum year round at www.avs.org/forum.aspx

Exhibit Hall • Booth 544

# AVS 63RD International Symposium & Exhibition

Nashville, Tennessee

# Tuesday Evening Poster Session

**Tuesday, November 8, 6:30 p.m. to 8:30 p.m.**
**Music City Center, Hall D**

A very special event has been arranged at the Tuesday Evening Poster Session.

## Enjoy Food, Drinks, and Great Science!

This special event is hosted by AVS and generously sponsored by MKS.

## Don't miss this special event!

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# SYMPOSIUM PLENARY LECTURE

## *"Integrated Semiconductor Nanowires for Nanoelectronics"*

## *Monday, November 7, 2016, 5:30 p.m., Davidson Ballroom A*
## *Music City Center*

***Heike Riel, IBM Fellow***
***Director Physical Sciences, IBM Research***

Heike Riel is IBM Fellow and the Director of the Physical Sciences Department at IBM Research focused on advancing the frontiers of information technology through the physical sciences and responsible for IBM's worldwide physical sciences research strategy. Her research interests include nanoscale materials and novel device concepts for applications in electronics, optoelectronics, and cognitive computing.

During her career at IBM she had seminal contributions in the science & technology of nanoscale electronics, the exploration and development of semiconducting nanowires for applications in future electronic devices, molecular electronics for future nanoscale switches and memory applications and organic light emitting devices for display applications.

For her outstanding scientific contributions Riel was elected by Technology Review, MIT's Magazine of Innovation, to the TR100, the annual list of the world's 100 Top Young Innovators in September 2003 and she received the 2005 Applied Physics Award of the Swiss Physical Society. In June 2012 Riel received the award in the category "Technical or Scientific Innovation" which was awarded by the Swiss Association of Women in Engineering (SVIN) on the occasion of their 20th anniversary. In 2013 she was offered a Humboldt Professorship and in 2015 she was elected Member of the Swiss Academy of Engineering Sciences and elected Member of the Leopoldina, the German National Academy of Sciences.

Riel studied physics at the Friedrich-Alexander University of Erlangen-Nuremberg (Germany) and received a PhD from the University of Bayreuth (Germany). She joined IBM in 1998 as a PhD student, and became a Research Staff Member in 2003. From 2008 to 2014 she has been leading the Nanoscale Electronics Group and then the Materials Integration and Nanoscale Devices group. In 2013 she became IBM Fellow and Member of the IBM Academy of Technology. She has authored more than 110 publications and filed more than 60 patents.

# TECHNICAL PROGRAM

Once again our technical program is second to none, providing cutting-edge content over a very broad range of diverse yet complementary topics. Brief summaries of each program theme are provided below. Symposium presenters represent the best and brightest from academia, industry, & government research labs around the world. The end result is a program that consists of over 125 oral sessions, more than 1,200 talks, over 250 invited speakers and two evenings of poster sessions. Start filling your week's schedule with must-see, career enhancing sessions.

## EXHIBITS

This year's exhibition showcases equipment and instrumentation needed to perform cutting edge research presented in our technical program. Visit the exhibit hall to speak to experts representing the very best in components, systems, instrumentation, services and consumables. The exhibit hall will be open Tuesday through Thursday, November 8-10. There are many attractions in the exhibit hall, including Technology Spotlight Sessions, Career Center, Vacuum Technology Division's "Ask The Experts", the AVS Membership & Store, E-Mail Pavilion, Photo Booth, Free Caricatures, Art Zone/Contest, Free morning coffee, refreshments, lunches, daily raffles and much more!

## SHORT COURSES

The Music City Center will be the site for the short course program where courses on a variety of topics will be offered. These courses will run concurrently with the AVS Symposium.

## *TECHNICAL PROGRAM*

### ADVANCED SURFACE ENGINEERING

The program of the Advanced Surface Engineering Division (SE) addresses important topics and new emerging developments in thin film materials, their synthesis and characterization, and their applications in surface engineering. Both fundamental scientific and application-oriented contributions are included. The four oral sessions plus one poster session, all co-sponsored by other AVS Divisions and Focus Topics, intend to offer a well balanced mix of huge diversity of all aspects related with thin film materials science and technology, modelling and simulation, plasma processes, novel deposition and surface modification and functionalization methods, thin film analysis and characterization, and technical applications in areas of interest to the Advanced Surface Engineering Division. The sessions particularly address the design, synthesis and utilization of protective coatings for tribological applications in surface engineering; the structure and properties of advanced nanostructured thin films and coatings; innovations in physical vapor deposition, chemical vapor deposition, atmospheric pressure plasma and other deposition and surface modification techniques. Special multifunctional thin films, coatings and surfaces are addressed as well. Presentations on novel thin film and coating materials, their design and growth, simulation and modelling, their synthesis and use, on plasma physics and process description, on their characterization and properties evaluation methods are solicited. Invited lectures review and highlight the state-of-the-art and latest findings in various topics. Academics, scientists, technicians and especially young students and PhD students from various disciplines and all over the world will contribute to a technical program of great interest, diversity and strength in the field of surface science, technology and engineering.

### APPLIED SURFACE SCIENCE

The Applied Surface Science Division (ASSD) provides a forum for research in the preparation, modification, characterization, and utilization of surfaces in practical applications. Areas of interest range from nanoscience, polymers, and semiconductor processing to forensic science and biotechnology. The Division has long been the premier gathering place for the global surface analysis community, with historical concentrations in techniques such as SIMS and XPS/Auger spectroscopies, including presentations representing a mixture of cutting-edge applications and the fundamentals supporting the measurement science. The Division is constantly striving to provide a forum for current and mature interests (with sessions such as Quantitative Surface Analysis and Practical Surface Analysis) while identifying key areas for future development. For AVS-63, the ASSD welcomes the Atom Probe Tomography Focus Topic into ASSD, providing a quickly developing research and application area to complement the core Division strengths and provide future growth. Additionally, the session Multiple Technique Approaches for Real-World Industrial Problem Solving represents a devoted effort to recognize the need of sharing appropriate information among those trying to meet ever-changing surface analysis demands. We welcome the submissions from all areas of applied surface science, and hope that the topics offered by ASSD will result in a comprehensive mixture of currently relevant research. As a strongly characterization-centered division, ASSD is contributing to Focus Topics in Actinides and Rare Earths (AC), In Situ Spectroscopy and Microscopy (IS), Scanning Probe Microscopy (SP), Novel Trends in Synchrotron and XFEL-Based Analysis (SA), and Spectroscopic Ellipsometry (EL).

### BIOMATERIAL INTERFACES

The Biomaterials Interfaces Division will be running a series of sessions to provide an interdisciplinary forum for the presentation and discussion of fundamental aspects of bio-interface science and engineering. The need to increase our understanding of the interactions between biomolecules and surfaces, the behavior of complex macromolecular systems at materials interfaces, and interactions between biomolecules, is being driven by the rapid growth in biomedical research and the role these applications play in the fields of biology, biotechnology, diagnostics, dentistry and medicine. The BI program brings together recent advances made in materials science and molecular biology with sophisticated surface and interface analysis methods and theoretical and modeling approaches to biological systems. The oral presentation sessions include the following areas of interest: Biomolecules, Cells and Organisms at Surfaces (including proteins at surfaces, blood-contacting materials, bioadhesion, cell-material interactions, biofilms, biofouling, bioadhesion, tissue engineering, and artificial organs); Biophysics and Characterisation of Biological and Biomaterials Surfaces (including biological membranes, forces, recognition, spectroscopy, imaging/microscopy, characterization in fluids, quantification, and chemometrics); Biosensors and Diagnostics (including microfluidics, point-of-care devices, and electrochemistry); and Synthesis and Processing of biomaterials and biologically inspired materials. On Tuesday evening we will also feature FLASH Oral Presentations, with an accompanying Networking Session involving associated traditional poster presentations. Prizes will be awarded for the best FLASH Presentations.

### BIOMATERIAL PLENARY SESSION AND RECEPTION

The Biomaterials Interfaces program kicks off with the now traditional Biomaterials Plenary Session. This year we are pleased to have presentations from three eminent scientists who have made significant contributions to our field. Kerstin Blank has made important developments in the field of mechano(bio)chemistry, which investigates the influence of force on the structure and function of molecules and materials. Through the development of novel force sensors, she is providing advances in biosensor design and also our understanding of

complex biomimetic environments. David Needham has made significant contributions to our understanding of a broad swathe of interfacial phenomena, impacting in areas encompassing colloid science, materials (protein and polymer) engineering and drug-delivery. Dennis Discher has made key advances in areas spanning molecular/cell biology and physics, to polymer nano-engineering. These advances have in particular significantly improved our understanding of stem cell behavior and their involvement in disease. The session will close with the opportunity for further discussions at our traditional industry sponsored Plenary Reception.

## ELECTRONIC MATERIALS AND PHOTONICS

The Electronic Materials and Photonics Division (EMPD) encompasses the science and engineering of materials and interfaces that advance device technology. For AVS 63, EMPD will sponsor 70 oral sessions containing over 85 talks, a panel discussion, and a poster session on materials synthesis, devices, fabrication, and characterization. Researchers from around the world will present their work on a diverse spectrum of devices and technologies for advanced logic, ultra-dense memory, solar, optoelectronic, high power/frequency/temperature, and light management applications. The symposium topics span from electronic- / optoelectronic- / magnetic-/ and photonic properties from the macro- down to the nano-scale, from nano-composites, 2D-materials, surfaces and interface engineering and their defect analysis. Advanced processing techniques will be presented for the growth of newly emerging materials and their properties analysis. Sessions are devoted to rectenna solar devices, MIM diodes, III-N nitrides and other wide band gap semiconductors, and nanoparticle-based electronic and photonics with newly developed nano-scale characterization techniques. Traditionally, EMPD has maintained an excellent list of distinguished invited speakers. This year, we will host well over 28 invited speakers. Among them are: Joshua Caldwell (NRL), Yoshio Nishi (Stanford), Christian Kisielowski (LBNL), Jacob Leach (Kyma Techn.), Ronny Kirste, (Adroit Materials), Saptarshi Das (Argonne), Nancy Dudney (Oak Ridge), Alan Seabaugh, (Notre Dame), James Schuck (The Molecular Foundry, LBNL), and James Tour (Rice).

EMPD will host an industrial forum for those interested in learning about career opportunities in the semiconductor industry. These talks are aimed at introducing graduate students and postdoctoral researchers to some of the technical hurdles that the industry faces, moderated by Gary McGuire.

## MAGNETIC INTERFACES AND NANOSTRUCTURES

This years' MIND program will cover a wide area of topics ranging from chiral magnetism over magnetism and spin orbit effects at interfaces to magnetism in organic system. The focus of the program is to cover areas of magnetism that are fascinating from a fundamental point of view but which carry significance for future applications. The program will start on Monday morning with a series of four talks addressing magnetic structures with chiral symmetry. Such structures are induced by interface interactions and the presenters will describe the possibility to create, manipulate and employ features like e.g. skyrmions for future applications. The remainder of the presentations on Monday is dedicated to magnetism and spin orbit effects at interfaces, including novel state of the art experimental methods to characterize magnetic interfaces. Spintronic applications depend on materials, in which the spin degeneracy of electron states is lifted. This situation can, for example, be caused by magnetic exchange or spin-orbit interaction. The latter is observed in Rashba systems and topological insulators. The invited talks of this afternoon session focus on the theoretical description of electronic structure in spintronic materials as well as the peculiar correlation between superconductivity and interface properties in high Tc materials. The contributed talks cover experimental results obtained with a variety of techniques able to resolve the spin character of the electron states: scanning tunneling spectroscopy, angle-resolved photoemission and inverse photoemission as well as momentum. The Tuesday afternoon session is a joint session between Magnetic Interfaces and Nanaostructure (MIND) as well as Electronic Materials (EM). The session will consist of invited and contributed talks dedicated to new magnetic materials based on organic compounds and state of the art device concepts for quantum computing and low power electronics. The areas of organic magnetism as well as single spin manipulation are closely related to new concepts for information processing and storage, which is why we believe that this session should be attractive to a diverse audience interested in these fields.

## MANUFACTURING SCIENCE AND TECHNOLOGY

MSTG sessions present research topics related to the science and technology of manufacturing. Our sessions include presentations in the areas of battery and other clean energy manufacturing issues, photonics manufacturing, metrology and other additive manufacturing challenges, as well as processing and characterization challenges for IC manufacturing. We have an excellent line up of invited and contributed talks as well as contributed posters. We have a diverse program with presenters representing industry, manufacturing institutes, academia, and government labs.

## MEMS AND NEMS

The MEMS and NEMS Technology Group (MN) program will highlight recent advances in the broad areas of micro/nanoelectromechanical systems (MEMS/NEMS), especially latest fundamental studies of novel materials, processes, devices, and emerging functions and applications of MEMS/NEMS, in various areas including manufacturing, energy, communication, and healthcare. The ability to manipulate and engineer mechanical structures in various emerging low-dimensional materials creates intriguing possibilities of integrating these devices with existing fluidic, electronic and optical on-chip networks. This year's sessions will cover such areas that are thematically related to multiscale phenomena and emerging materials and technologies for new devices and systems that interact with real world or promise for critical applications, along with advanced fabrication, characterization, integration and packaging of MEMS/NEMS. The program continues to embrace latest progresses in optical MEMS/NEMS, micro/nanophotonics, optomechanics, quantum MEMS/NEMS, resonant systems, CMOS-MEMS, mesoscopic dynamics and dissipation processes, inertial sensors, chemical sensors and lab-on-chip analytical microsystems, harsh-environment transducers, parametric and nonlinear MEMS/NEMS, and MEMS/NEMS-enabled energy technologies, etc. It also aims to capture some of the latest advances in soft materials, flexible and implantable MEMS/NEMS for biosensing, bio-inspired microsystems, wearable and wireless healthcare. The AVS63 MN program also highlights focus sessions to feature latest advances at the frontiers of the fusion of micro/nano/biosystems, radiation effects in MEMS/NEMS and emerging devices, and atomic layer 2D NEMS.

## NANOMETER-SCALE SCIENCE AND TECHNOLOGY

The Nanometer-scale Science and Technology Division (NSTD) at AVS explores the science and technology that emerges when material is shrunk to the nanoscale. Nanoscience and Nanotechnology have become pervasive throughout the scientific community as can be attested by the multiple sessions addressing their different aspects at the AVS Symposium.

At the NSTD sessions researchers from around the globe will present their work on topics such as nanoscale devices and quantum systems, exploiting nanomaterials for applications in photonics, plasmonics, catalysis, surface chemistry, sensors, biomechanics, imaging, and energy, including nanoscale characterization and spectroscopy. This year the program will highlight the following:

(a) The convergence of nanoscience and quantum systems through a joint session with the MEMS/NEMS division; (b) Nanoscience and energy with sessions in solar cells and plasmonics; (c) 3D two-photon nanoscale fabrication among other advances in nanofabrication; (d) Nanoscale characterization with sessions in imaging and optical spectroscopy; (e) Applications of material control in different environments at the nanoscale with nanodiamonds and thin film applications; (f) The Impact of Nanoscience on Health and the Environment which is a relatively new area we believe is important to address at the AVS.

## PLASMA SCIENCE AND TECHNOLOGY

The 2016 Plasma Science and Technology Division (PSTD) highlights state-of-the-art advances in plasma research, ranging from fundamental studies of plasma physics and chemistry to applications for semiconductor fabrication, 2D materials and nanomaterials enablement, and plasmas for energy applications. The core program includes thirteen oral sessions and a poster session, as well as additional joint sessions with the "Applied Surface Science", "Electronic Materials" and "Thin Films" divisions as well as "2D" and "Plasmas Processing for Biomedical Applications" focus topics.

The week begins with sessions on "Atmospheric Pressure Plasma Processing" and "Advanced FEOL/Gate Etching" addressing state of the art plasma processing in atmospheric pressure environments as well as leading-edge plasma etch technology at the forefront of the semiconductor industry. Succeeding sessions on "Advanced BEOL/Interconnect Etching" and "Plasma-Surface Interactions" continue to explore latest results pertaining to the semiconductor industry. To encompass recent developments aiming to enable atomic scale precision, this year we feature sessions on "Atomic Layer Etching", "Atomic Layer Etching and Low Damage Processing", and "Plasma Deposition and Plasma-assisted Atomic Layer Deposition". Recent development in plasma etching beyond the traditional silicon-based materials will be featured in the session on "Plasma Processing of Challenging Materials". Fundamental scientific issues and various new and exciting results are also reported in traditional fields of plasma science and technology in sessions "Plasma Diagnostics, Sensors, and Control," "Modeling of Plasmas and Plasma-Surface Interactions", "Plasma Chemistry and Plasma-Surface Interactions", and "Plasma Sources and Novel Mechanisms for Generating Plasmas." Modern applications of plasma technologies, such as processing of semiconductor nanocrystals, graphene, 2-D materials, and other novel materials will be addressed in the session "Plasma Processing for Nanomaterials and 2D Materials", co-sponsored with 2D Focus Topic. The Poster session of the PSTD, which is scheduled on Thursday evening, provides an ideal venue for in-depth discussion on all topics above.

The Plasma Prize invited lecture, entitled "Nonthermal Plasma Synthesis of Nanocrystal Materials" will be delivered by 2015 winner Dr. Uwe Kortshagen, in the "Plasma Processing for Nanomaterials and 2D Materials" session on Tuesday afternoon. Nonthermal plasmas have emerged as a viable approach to nanocrystal synthesis. This talk will discuss the fundamentals of plasma synthesis of nanocrystals. It will then highlight some of the exciting optical and electronic properties of these nanomaterials and discuss potential applications in luminescent applications and thin film synthesis.

The 2016 Plasma Prize winner will be announced at the PSTD Business Meeting in Room 104B at 6:20 PM on Tuesday, immediately following the afternoon sessions. There are multiple finalists for the 2016 Coburn and Winters Student Award, who present throughout the week (see program for specific times). The winner is scheduled to be announced in the Coburn and Winters Student Award ceremony in Room 104B at 12:20 PM on Thursday.

## SURFACE SCIENCE

The program of the Surface Science Division provides a forum for cutting-edge research that involves solid surfaces and interfaces. Phenomena that take place at the gas-solid and liquid-solid interfaces are prominent within the Division programs. Technical sessions address atomistic, structural, electronic and chemical phenomena at surfaces and interfaces, their impact on materials properties, and their implication for technology and environmental processes. Surface Chemistry is an important divisional theme, encompassing the kinetics and dynamics of surface chemical events from adsorption and reaction to catalysis. Film and nanostructure growth is another key theme, explored from a fundamental perspective, through the development of new growth and processing methods for materials preparation. Surface chemical modification and photon-driven chemistry at surfaces are important concentrations. Lively sessions are devoted to the surface science of metallic, semiconductor, oxide and organic surfaces that support unique chemical activity and electronic properties. Surface science applications in high-impact areas — particularly energy science, microelectronics, nanotechnology, and environmental science — are highlighted in the program. This Division's overarching goal is to provide the atomistic insights on solid surfaces and interfaces needed to advance our understanding of materials systems and benefit society.

This year's surface science sessions are listed below. Several of the sessions are co-sponsored with other Divisions, Groups, and Focus Topics and should be of broad interest to attendees. Monday and Tuesday's SS sessions complement Wednesday and Thursday's Fundamental Discoveries in Heterogeneous Catalysis Focus Topic (HC) sessions. The HC Focus Topic is new for 2016. Tuesday's poster session also features the five finalists for the Morton M. Traum Surface Science Division Student Award.

In addition to the exciting oral and poster sessions covering a broad range of scientific topics there will be a special memorial session on Thursday afternoon "Celebrating a Life in Surface Science: A Symposium in Honor of JOHN T. YATES, JR." The symposium is comprised of former students, postdocs and colleagues who address the breath of his monumental career through their work and his influence on them.

## THIN FILM

The Thin Film The Thin Film Division hosts 14 core oral sessions where outstanding invited speakers will address the state-of-the art in the areas of (ultra-)thin film science and technology.

The sessions focusing on atomic layer deposition (ALD) will cover fundamental topics such as ALD surface reactions, as well as advancements in ALD processing and manufacturing. Furthermore, applications where ALD is presently being adopted, such as energy conversion and storage, as well as recent developments of ALD and nanostructures will be presented. We are excited to have sessions focusing on thin film deposition, control and modelling of thin film growth, area-selective deposition and sequential infiltration synthesis. Furthermore, self-assembled monolayers and organic/inorganic interface engineering are also addressed. Finally, our sessions cover also the applications of thin films in photovoltaics, microelectronics, optical and magnetic, synchrotron and biomedical applications.

We offer to poster presenters the possibility to present a 2-3 minute oral synopsis and introduction to their posters. For the third year, we will host a student-only session to introduce the James Harper Award candidates: the student finalists will present their work in the form of TED talks. This is an excellent opportunity for graduate and undergraduate students in the Thin Film area to get together informally for

discussion. Finally, the Thin Film Division will hand two other awards, namely the Paul Holloway Young Investigator award and the Thin Film Technologist award.

## VACUUM TECHNOLOGY

The Vacuum Technology Division (VTD) provides a forum for research in achieving, maintaining, analyzing, and measuring vacuum across a wide range of pressures and applications. The 2016 VT oral program topics include four traditional core sessions: (1) Vacuum Measurement, Calibration and Primary and Industry Standards, (2) Gas Dynamics, Simulation and Partial Pressure Analysis, (3) Vacuum Pumping and Material Outgassing, (4) Accelerator and Large Vacuum Systems. Additionally, we present a special session in Vacuum Technology: History, Innovation, Education, and Transport (VT5), with speakers covering topics from the developments leading to modern vacuum systems to cutting edge tools and applications of vacuum. The VT Poster session Tuesday evening features the VT Student Poster Competition, with a $500 first place award, where students of any discipline are invited to share their innovative solutions to vacuum equipment challenges. Student presenter awards will also be given for the best presentations by students in the VT sessions.

We are pleased to announce the third annual VT Early Career Award winner, Sam Posen of Fermi National Accelerator Laboratory, who will speak in the Accelerator and Large Vacuum System session.

During the symposium, we will host the annual VTD Business Meeting at 3:20pm Monday (November 7, 2016) in Room 104C. The VTD chair will highlight the activities conducted by the VTD over the past year, and solicit input for planning future technical programs. We encourage all AVS members interested in the VTD technical program to join us in this important interaction between the VTD executive committee and the membership.

VTD will again host the "Ask the Experts" booth, located in the exhibit area, where experienced vacuum scientists, engineers and technicians strive to answer perplexing vacuum technology questions.

# *FOCUS TOPICS*

## 2D MATERIALS

The 2D Materials (2D) focus topic is a crosscutting AVS-wide interdisciplinary forum for discussion of fundamental science and novel applications of emerging 2D materials. Our program, spanning the entire week, offers a diverse set of 9 oral sessions complemented by a poster session, which are co-sponsored by several AVS Divisions and Focus Topics. The comprehensive review of state of the art will be presented in 18 invited talks and 58 contributed papers discussing world-wide efforts in exploring the fundamental properties of emerging 2D materials, their growth, fabrication and characterization; mechanical, thermal, electronic, magnetic, and optical properties, emergent 2D materials, dopants, defects and heterostructures of 2D materials, surface chemistry, functionalization and sensor applications. The important themes of 2D FT highlighted in the invited talks are computational design of 2D materials and heterostructures, dopants and defects in 2D materials, 2D materials devices for nanoelectronics and sensor applications, novel quantum phenomena in 2D materials.

## ACTINIDES AND RARE EARTHS

Actinides and rare earths exhibit many unique and diverse physical, chemical and magnetic properties, due in large part to the complexity of their 5f and 4f electronic structure. This set of Special Topic Sessions focuses on the chemistry, physics and materials science of lanthanide and actinide materials, driven by 4f and 5f electronic structure. Particular emphasis will be placed upon the 4f/5f magnetic structure, surface science and thin film properties and their applications to energy-related issues. For the actinides, fundamental actinide science and its role in resolving technical challenges posed by actinide materials will be stressed, particularly with regard to energy applications, including energy generation, novel nuclear fuels and structural materials, waste remediation and waste disposal. Both basic and applied experimental approaches, including synchrotron radiation-based and neutron-based investigations, as well as theoretical and computational simulations, are to be part of the special sessions. Of particular importance are the issues connected to potential renaissance in nuclear energy, including fuel synthesis, oxidation, corrosion, intermixing, stability in extreme environments, prediction of properties via bench-marked simulations, separation science, environmental impact and disposal of waste products. Shared sessions are held with Applied Surface Science (AS), Magnetic Interfaces (MI), and Synchrotron Radiation (SA).

## ADVANCED ION MICROSCOPY

2016 is the 10th anniversary of the commercial introduction of the Helium Ion Microscope (HIM). This year's program is special as it will of course celebrate the jubilee and at the same time broaden the scope of the topic to include other emerging focused ion beam technologies. We will have a special 10 year anniversary session which Bill Ward and John Notte will open. The focus topic name change from Helium Ion Microscopy to Advanced Ion Microscopy is related partly to the addition of new GFIS gases such as neon and nitrogen, and partly due to the inclusion of new source concepts and analytical possibilities. These new ion beam based microscopy and nanoengineering techniques have in common that they often can outperform classical alternatives such the scanning electron microscope or gallium based focus ion beams. The focus topic thus invites and attracts researchers working with gas field ion sources (GFIS) and other advanced charged particle source concepts used for ion beam microscopy, ion beam based analytics at the nano-scale, and focused ion beam based nano-machining. In addition to invited talks from Bill Ward and John Notte, the Advanced Ion Microscopy focus topic will also feature talks covering alternative source concepts and current applications of ion beam milling and imaging at the nanoscale. The lineup of speakers shows that we will continue a tradition from previous years: uniting researchers from around the globe that develop and/or use advanced focused ion beam techniques in their daily work. New developments making use of alternative source concepts, extension in terms of analytic power as well as state-of-the-art applications will be presented. Consequently a large interdisciplinary audience from various fields such as biology, catalysis, 2D-materials, thin films, nuclear materials and technology as well as the semiconductor industry will be attracted.

## FUNDAMENTAL DISCOVERIES IN HETEROGENEOUS CATALYSIS

The "Fundamental Discoveries in Heterogeneous Catalysis" (HC) focus topic highlights recent advances in the understanding of the atomic and molecular basis for heterogeneously catalyzed reactions on solid surfaces. This will be the first time the HC focus topic has been organized, and is co-sponsored with the Surface Science (SS) division. Session topics include theoretical models, nanoscale structures, gas-surface dynamics, and novel studies of active surfaces. Co-sponsored topical sessions include ambient pressure studies of catalytic surfaces (with the IS Focus Topic) and oxide surfaces (with Surface Science Division). The symposium will highlight connections among theoretical and experimental approaches with the goal of revealing key details of the fundamental chemistry and physics underlying heterogeneous catalysis. Of particular interest are developments in chemical understanding, atomic-level details, and predictive models of reactions catalyzed by metal surfaces.

## IN-SITU AND OPERANDO SPECTROSCOPY AND MICROSCOPY FOR CATALYSTS, SURFACES, & AND MATERIALS

Exploration of material structure and chemistry under real conditions using different spectroscopic and microscopic techniques is critical for correlating material structure and chemistry to functions they perform toward scalable and predicative materials, catalysis, and energy storage. This focused symposium presents current capabilities of in situ characterization techniques, new structure and chemistry revealed with these in situ tools, and progress in new microscopic and spectroscopic techniques. Topics of particular interest include: Ambient pressure X-ray photoelectron spectroscopy studies and chemistry of catalysts; In situ studies of nanomaterials; In situ and operando studies using infrared absorption spectroscopy.

## NOVEL TRENDS IN SYNCHROTRON AND FEL-BASED ANALYSIS

The purpose of this topical session is to provide a forum for communicating and sharing the most recent achievements in characterization of all types of matter using synchrotron or Free Electron Laser (FEL) radiation from IR to hard X-rays thanks to the advancements in all experimental methods based on interaction of light with matter. These include imaging techniques employing photon scattering, transmission and emission as well as cutting-edge spectroscopic methods highlighting in particular exciting areas such as resonant inelastic X-ray scattering. The four oral sub-sessions will focus on research fields where the methodology developments have led to important breakthroughs, shedding light on the exotic properties of complex functional materials relevant to device technology, such as correlated and 2D-materials, innovative oxide heterostructures and thin films, and on the structure and functions of the constituents in biological systems.

## PLASMA PROCESSING FOR BIOMEDICAL APPLICATIONS

Plasma processing is an ideal way to either create new or modify existing material surfaces for use in various applications, including medicine. In the Focus Topic "Plasma Processing for Biomedical Applications (PB) Focus Topic," plasma processing of biomaterials, pharmaceuticals, and living organisms, including human bodies, for biomedical and therapeutic applications is discussed. There are two major topical categories in this Focus Topic. One is concerned with plasma synthesis or modification of biomaterials, including chemical substances such as pharmaceuticals, and the other is concerned with the use of plasmas as direct therapeutics, including treating infected tissue, wound healing, and cancer treatment, among many others. The former covers the chemistry of biomaterial surfaces and biological molecules, biointerfaces, and efficacy of medical devices that are made or modified via plasma processes. The latter covers a field known as plasma medicine, in which biological reactions in living organisms triggered by plasma generated chemically reactive species are discussed. Latest interests in these categories include plasma polymerization and surface modification to increase biocompatibility of materials, plasma processes to create antimicrobial surfaces, biomimetic materials, 3D cell scaffolds, etc., plasma-liquid interaction, plasma-enhanced chemical reactions in liquid, and plasma-cell or tissue interaction. All sessions are co-sponsored by Biointerfaces (BI) and Plasma Science and Technology (PS).

## SCANNING PROBE MICROSCOPY

The scanning probe microscopy (SPM) field has provided a family of techniques that have revolutionized our understanding of nanoscale interfacial phenomena. Now comprised of more than 20 different types of microscopy, the field has provided advanced tools that are able to image, manipulate and interrogate the functionality of surface features to the level of individual molecules and atoms. Such tools underpin the research activities encompassed by many AVS divisions. This focus topic will provide a forum for the discussion of the latest advances and novel applications made in the SPM field. Areas of particular interest include approaches to improve imaging capability, the acquisition of probe-sample interaction data, and the novel and emerging applications in physical and chemical functional imaging. These interests are reflected through invited and contributed presentations in 5 key areas, namely: (1) Advances in Scanning Probe Microscopy, (2) Probing Topological States and Superconductivity, (3) Probing Chemical Reactions at the Nanoscale, (4) Probing Spin-Dependent Phenomena, (5) Probing Electronic Properties. The highlighted speakers include Maki Kawai and Wilson Ho, the 2016 and the 2011 Medard W. Welch Award winners.

## SPECTROSCOPIC ELLIPSOMETRY

The Spectroscopic Ellipsometry Focus Topic is a cross-cutting symposium which integrates themes ranging from classical material science and thin film characterization to physical and chemical processes at biomaterial interfaces and nanometer scale science. Supported by invited presentations of pioneering researchers in the field of Spectroscopic Ellipsometry we host three oral sessions dedicated to areas most dynamic development but also incorporate traditional application areas. The first session will focus on the use of Spectroscopic Ellipsometry for the characterization of Nanostructures and Metamaterials. This session emphasizes trending topics like Mueller matrix decomposition and optical critical dimension analysis techniques. In the second session we will host presentations on novel experimental and theoretical approaches including for instance Mueller matrix imaging ellipsometry, QCMD-SE, or THz ellipsometry. The third session is dedicated to the classical research topics of ellipsometry as for instance optical coatings and inorganic thin films characterization and will also include the investigation of biological materials and interfaces. A highlight of the symposium will be our student award which will be selected based on the quality of the research and its presentation and the discussion during the Symposium. Past recipients of the award and rules for entering the competition can be found at http://www.avs.org/Awards-Recognition/Focus-Topic-Awards/Spectroscopic-Ellipsometry-Focus-Topic

## TRIBOLOGY

The 2016 Tribology Focus Topic will feature sessions on nanoscale wear with applications in nano-metrology and nano-manufacturing, molecular origins of friction, lubricants and coatings, and friction in biological systems. Sessions are jointly sponsored by the Applied Surface Science (ASSD) Division, Thin Films (TF), Nanometer-scale Science and Technology (NSTD), and Biointerfaces (BI). Our focus is on linking of nanoscale information (either simulations or experiments, but preferably both) to macroscale observations. Presentations will carry a materials focus in areas such as thin film deposition, solid lubricants, nanocomposites designed for tribological function, self-healing interfaces, wear-resistant polymers, and biomaterials. Contributions will consider advances in in-situ, molecularly specific, spatially resolved approaches to the quantitative characterization of tribological interfaces as well as accounts of numerical computation and molecular modeling of tribological materials and biomaterials. In addition to the four oral sessions, we will have a poster session, which will provide an opportunity for personal exchange and discussion of results with colleagues.

# SESSION OVERVIEW

**Symposium Plenary Lecture**

Mon. 5:15 p.m. Davidson Ballroom A
"Integrated Semiconductor Nanowires for Nanoelectronics"
Dr. Heike Riel - IBM Fellow, Director Physical Sciences, IBM Research

**Advanced Surface Engineering**

| | | | |
|---|---|---|---|
| Tue. | AM | Room 101C | Nanostructured Thin Films and Coatings |
| Tue. | PM | Room 101C | Innovations in PVD, CVD, Atmospheric Pressure Plasma and Other Surface Technologies |
| Tue. | PM | Room Hall D | Advanced Surface Engineering Poster Session |
| Wed. | AM | Room 101C | Protective Coatings for Tribological Applications in Surface Engineering |
| Wed. | PM | Room 101D | Multifunctional Thin Films and Coatings |

**Applied Surface Science**

| | | | |
|---|---|---|---|
| Mon. | AM | Room 101B | Quantitative Surface Analysis: New Ways to Perform Old Tricks |
| Mon. | PM | Room 101B | Practical Surface Analysis I: Advancing Biological Surface Analysis/Imaging Beyond 'Show and Tell' |
| Tue. | AM | Room 101B | Practical Surface Analysis II: Microanalysis, Nanoanalysis, Atom Probe, and All Things 'Small' |
| Tue. | PM | Room 101B | Data Analytics in Surface Science and Nanoscience |
| Tue. | PM | Room Hall D | Applied Surface Science Division Poster Session |
| Wed. | AM | Room 101B | Applications where Surface Analysis is Your Only Hope |
| Wed. | PM | Room 101B | Multiple Technique Approaches for Real-World Industrial Problem Solving |
| Thu. | AM | Room 101B | Depth Profiling, Buried Interfaces, and 3D Analyses |
| Thu. | PM | Room 101B | Advances for Complicated Sample Preparation Strategies |

**Biomaterial Interfaces**

| | | | |
|---|---|---|---|
| Mon. | AM | Room 101A | Biomolecules and Cells at Interfaces |
| Tue. | PM | Room 101A | Biophysics and Characterization of Biological and Biomaterial Surfaces |
| Tue. | PM | Room Hall D | Biomaterial Interfaces Poster Session (preceded by Oral Flash Presentations) |
| Wed. | AM | Room 101A | Biosensors and Diagnostics |
| Thu. | AM | Room 101A | Synthesis and Processing of Biomaterials/Biologically Inspired Materials |

**Biomaterials Plenary Session**

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|---|---|---|---|
| Sun. | PM | Room 101A | Biomaterials Plenary Session |

**Electronic Materials and Photonics**

| | | | |
|---|---|---|---|
| Mon. | AM | Room 102A | Growth and Devices Technology of Group III-Nitrides |
| Mon. | AM | Room 102B | Advances in Photonics |
| Mon. | PM | Room 102A | Surface and Interface Challenges in Wide Bandgap Materials |
| Tue. | AM | Room 102A | New Materials and Devices for TFETs, Spintronics, and Extended CMOS |
| Tue. | PM | Room 102A | New Materials and Devices for Emerging Memory Technologies |
| Wed. | AM | Room 102A | Nanoparticles for Electronics and Photonics |
| Wed. | PM | Room 102A | Nanoscale Imaging of Metals and Compound Semiconductor based Nanostructures, Surfaces and Interfaces |
| Thu. | AM | Room 102A | Radiation Detection Materials and Devices |
| Thu. | PM | Room 102A | Materials and Interfaces for Energy Storage |
| Thu. | PM | Room Hall D | EMPD Poster Session |
| Fri. | AM | Room 102A | Late Breaking News on Electronic Materials and Devices |

**Magnetic Interfaces and Nanostructures**

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|---|---|---|---|
| Mon. | AM | Room 101C | Chiral Magnetism (8:20–10:20 am)/ Magnetism and Spin Orbit Effects at Interfaces and Surfaces: Recent Experimental and Theoretical Advances (10:40 am–12:00 pm) |
| Mon. | PM | Room 101C | Magnetism and Spin Orbit effects at Interfaces and Surfaces: Recent Experimental and Theoretical Advances |
| Tue. | PM | Room 102B | Magnetic Phenomena in Organic Systems |
| Tue. | PM | Room Hall D | MIND Poster Session |

**Manufacturing Science and Technology**

| | | | |
|---|---|---|---|
| Mon. | AM | Room 103A | Manufacturing for Next-Generation Energy Solutions |
| Mon. | PM | Room 103A | Advanced Manufacturing: Systems, Devices, and Materials |
| Tue. | AM | Room 103A | Characterization and Processing for IC Manufacturing |
| Tue. | PM | Room 103A | Working with National Labs and User Facilities |
| Tue. | PM | Room Hall D | Aspects of Manufacturing Science and Technology Poster Session |

**MEMS and NEMS**

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|---|---|---|---|
| Wed. | AM | Room 102B | Multiscale Phenomena & Emerging Technologies in Micro- and Nano-Systems |
| Wed. | PM | Room 102B | Optomechanics, Photonics, and Quantum Nanosystems |
| Thu. | AM | Room 102B | 'Fantastic Voyage' – the New Micro/ Nano/Bio Systems Frontiers |
| Thu. | PM | Room 102B | Focused Session on Atomic Layer Nanomechanics and 2D MEMS |
| Thu. | PM | Room Hall D | MEMS/NEMS Poster Session |
| Fri. | AM | Room 102B | Radiation Effect in Emerging Micro/Nano Structures, Devices, and Systems |

**Nanometer-scale Science and Technology**

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|---|---|---|---|
| Mon. | AM | Room 101D | Nanopatterning and Nanofabrication + 3D |
| Mon. | PM | Room 101D | Nanophotonics, Plasmonics, and Energy |
| Tue. | AM | Room 101D | (Nanodiamonds, Thin Films and Electronics (8:20–10:00 am) / Health and environmental impact of nanotechnology (11:00 am–12:20 pm) |
| Tue. | PM | Room 101D | Nanoscale Imaging and Characterization |
| Tue. | PM | Room Hall D | Nanometer-scale Science & Technology Poster Session |

**Plasma Science and Technology**

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|---|---|---|---|
| Mon. | AM | Room 104D | Atmospheric Pressure Plasma Processing |
| Mon. | AM | Room 104B | Advanced FEOL/Gate Etching |
| Mon. | PM | Room 104D | Plasma Surface Interactions |
| Mon. | PM | Room 104B | Advanced BEOL/Interconnect Etching |
| Tue. | AM | Room 104B | Plasma Diagnostics, Sensors and Control |

# SESSION OVERVIEW

| | | | |
|---|---|---|---|
| Tue. | PM | Room 104B | Plasma Processing for Nanomaterials and 2D Materials |
| Wed. | AM | Room 104C | Atomic Layer Etching |
| Wed. | AM | Room 104B | Plasma Sources and Novel Mechanisms for Generating Plasmas |
| Wed. | PM | Room 104B | Plasma Deposition and Plasma Assisted ALD |
| Wed. | PM | Room 104C | Atomic Layer Etching and Low Damage Processing |
| Thu. | AM | Room 104C | Modeling of Plasmas and Plasma-Surface Interactions |
| Thu. | AM | Room 104B | Plasma Processing of Challenging Materials |
| Thu. | PM | Room 104B | Plasma Chemistry and Plasma Surface Interactions |
| Thu. | PM | Room Hall D | Plasma Science and Technology Division Poster Session |

**Surface Science**

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|---|---|---|---|
| Mon. | AM | Room 104E | Mechanistic Insights on Surface Reactions in Catalysis and at Novel Interfaces |
| Mon. | PM | Room 104E | Metals, Alloys, and Oxides: Reactivity and Catalysis |
| Tue. | AM | Room 104D | Surface Dynamics, Non-Adiabaticity, and Theory and Modeling of Surface and Interfacial Phenomena |
| Tue. | AM | Room 104E | Nanostructures: Growth, Reactivity, and Catalysis |
| Tue. | PM | Room 104E | Structure and Characterization of Oxides |
| Tue. | PM | Room 104D | Photocatalysis and Photochemistry at Surfaces |
| Tue. | PM | Room Hall D | Surface Science Poster Session |
| Wed. | AM | Room 104D | Synthesis, Characterization, and Surface Science of Novel Materials and Interfaces |
| Wed. | AM | Room 104E | Environmental Interfaces, Ambient Surfaces, and In-Operando Studies |
| Wed. | PM | Room 104D | Semiconductor Surfaces and Interfaces |
| Thu. | AM | Room 104D | Chirality and Enantioselectivity on Surfaces; Ionic Liquid Interfaces |
| Thu. | PM | Room 103C | Celebrating a Life in Surface Science: A Symposium in Honor of JOHN T. YATES, JR. |

**Thin Film**

| | | | |
|---|---|---|---|
| Mon. | AM | Room 105A | ALD Precursors and Surface Reactions |
| Mon. | PM | Room 105A | ALD for Energy Conversion and Storage |
| Mon. | PM | Room 102B | Plasma-based Deposition Techniques and Film Characterization |
| Tue. | AM | Room 102B | Thin Films for Synchrotron Applications |
| Tue. | AM | Room 105A | Advanced CVD and ALD Processing, ALD Manufacturing and Spatial-ALD |
| Tue. | PM | Room 105A | Thin Film Photovoltaics |
| Wed. | AM | Room 105A | ALD and Nanostructures |
| Wed. | PM | Room 105A | Thin Films for Microelectronics |
| Wed. | PM | Room 104E | Thin Films for Magnetic and Optical Applications |
| Thu. | AM | Room 104E | Control and Modeling of Thin Film Growth and Film Characterization |
| Thu. | AM | Room 105A | Area-selective Deposition and Sequential Infiltration Synthesis |
| Thu. | PM | Room 104E | Thin Films for Bio-related Applications |
| Thu. | PM | Room 105A | Self-assembled Monolayers and Organic/Inorganic Interface Engineering |
| Thu. | PM | Room Hall D | Thin Films Poster Session |
| Fri. | AM | Room 105A | CVD, ALD and Film Characterization |

**Vacuum Technology**

| | | | |
|---|---|---|---|
| Mon. | AM | Room 104C | Vacuum Measurement, Calibration, Primary and Industry Standards |
| Mon. | PM | Room 104C | Gas Dynamics, Simulation and Partial Pressure Analysis |
| Tue. | AM | Room 104C | Vacuum Pumping and Material Outgassing |
| Tue. | PM | Room 104C | Accelerator and Large Vacuum Systems |
| Tue. | PM | Room Hall D | VT Poster Session (and Student Poster Competition) |
| Wed. | AM | Room 101D | Vacuum Technology – History and Innovation (8:20 –10:00 am)/Transfer and Manipulation (11:00 am–12:20 pm) |

**Exhibitor Technology Spotlight**

| | | | |
|---|---|---|---|
| Tue. | AM | Exhibit Hall 1 | Exhibitor Technology Spotlight Session |
| Tue. | PM | Exhibit Hall 1 | Exhibitor Technology Spotlight Session |
| Wed. | AM | Exhibit Hall 1 | Exhibitor Technology Spotlight Session |
| Wed. | PM | Exhibit Hall 1 | Exhibitor Technology Spotlight Session |

**2D Materials Focus Topic**

| | | | |
|---|---|---|---|
| Mon. | AM | Room 103B | 2D Materials Characterization including Microscopy and Spectroscopy |
| Mon. | PM | Room 103B | Dopants, Defects and Interfaces in 2D Materials |
| Tue. | AM | Room 103B | Novel 2D Materials |
| Tue. | PM | Room 103B | Novel Quantum Phenomena in 2D Materials |
| Wed. | AM | Room 103B | 2D Materials: Growth and Fabrication |
| Wed. | PM | Room 103B | Nanostructures including Heterostructures made of 2D Materials |
| Thu. | AM | Room 103B | Properties of 2D Materials including Electronic, Magnetic, Optical, Mechanical, Thermal Properties |
| Thu. | PM | Room 103B | Surface Chemistry, Functionalization, Bio and Sensor Applications of 2D Materials |
| Thu. | PM | Room Hall D | 2D Materials Poster Session |
| Fri. | AM | Room 103B | 2D Materials: Device Physics and Applications |

**Actinides and Rare Earths Focus Topic**

| | | | |
|---|---|---|---|
| Tue. | PM | Room Hall D | Chemistry and Physics of the Actinides and Rare Earths Poster Session |
| Wed. | AM | Room 103C | Magnetism, Complexity, and Superconductivity in the Actinides and Rare Earths (8:00–11:00 am)/Actinide and Rare Earth Theory (11:00 am–12:20 pm) |
| Wed. | PM | Room 103C | Actinide and Rare Earth Theory (2:20–3:40 pm)/Nuclear Power, Waste Remediation and Applications (4:20–6:20 pm) |
| Thu. | AM | Room 103C | Chemistry and Physics of the Actinides and Rare Earths |

**Advanced Ion Microscopy Focus Topic**

| | | | |
|---|---|---|---|
| Wed. | PM | Room 104A | 10 Years of GFIS Microscopy |
| Thu. | AM | Room 104A | Fundamentals of Ion Beam Microscopy |
| Thu. | PM | Room 104A | Ion Beam Based Imaging and Nanofabrication |

| | | | |
|---|---|---|---|
| Thu. | PM | Room Hall D | Aspects of Advanced Ion Microscopy Poster Session |

**Fundamental Discoveries in Heterogeneous Catalysis Focus Topic**

| | | | |
|---|---|---|---|
| Wed. | AM | Room 103A | Bridging Gaps in Heterogeneously-catalyzed Reactions |
| Wed. | PM | Room 103A | Nanoscale Surface Structures in Heterogeneously Catalyzed Reactions |
| Thu. | AM | Room 103A | Dynamics of Gas-surface Interactions in Heterogeneous Catalysis |
| Thu. | PM | Room 103A | Advances in Theoretical Models and Simulations of Heterogeneously-catalyzed Reactions |

**In-Situ and Operando Spectroscopy and Microscopy for Catalysts, Surfaces, & Materials Focus Topic**

| | | | |
|---|---|---|---|
| Wed. | PM | Room 101C | Ambient Pressure XPS Studies of Surface and Chemistry of Catalysts |
| Thu. | AM | Room 101C | In-situ and Operando Spectroscopy and Microscopy with Infrared Absorption Spectroscopy |
| Thu. | PM | Room 101C | Ambient Pressure Photoelectron Spectroscopy and Scanning Probe Techniques |
| Thu. | PM | Room Hall D | In-Situ and Operando Spectroscopy and Microscopy for Catalysts, Surfaces, & Materials Poster Session |
| Fri. | AM | Room 101C | In situ Characterization of Nanomaterials |

**Novel Trends in Synchrotron and FEL-Based Analysis Focus Topic**

| | | | |
|---|---|---|---|
| Mon. | AM | Room 103C | Advances in High-Resolution Imaging Techniques (8:20–10:20 am)/Pushing the Limits with X-Ray Spectroscopy (10:40 am–12:00 pm) |
| Mon. | PM | Room 103C | Frontiers of Photoemission with Synchrotron and XFEL Radiation/Advances in High-resolution Imaging Techniques |
| Tue. | AM | Room 103C | Applications of Synchrotron-based Techniques to 2D Materials (8:00–10:00 am)/Complex Functional Materials and Heterostructures (11:00 am–12:20 pm) |
| Tue. | PM | Room 103C | Synchrotron and XFEL Advances for Biological Systems (2:20–3:40 pm)/ Synchrotron Radiation at the Frontiers of Device Technology (4:20–6:20 pm) |
| Tue. | PM | Room Hall D | Novel Trends in Synchrotron and FEL-Based Analysis Poster Session |

**Plasma Processing for Biomedical Applications Focus Topic**

| | | | |
|---|---|---|---|
| Mon. | PM | Room 101A | Plasma Processing of Biomaterials |
| Tue. | AM | Room 101A | Plasma Processing of Biological/Biomimetic Surfaces |

**Scanning Probe Microscopy Focus Topic**

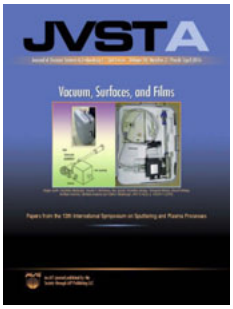
| | | | |
|---|---|---|---|
| Mon. | AM | Room 104A | Advances in Scanning Probe Microscopy |
| Mon. | PM | Room 104A | Probing Topological States And Superconductivity |
| Tue. | AM | Room 104A | Probing Chemical Reactions at the Nanoscale |
| Tue. | PM | Room 104A | Probing Spin-Dependent Phenomena |
| Tue. | PM | Room Hall D | Scanning Probe Microscopy Poster Session |
| Wed. | AM | Room 104A | Probing Electronic Properties |

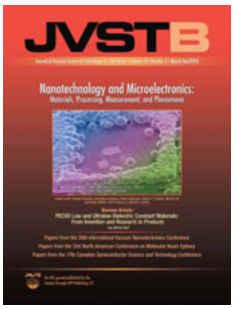
**Spectroscopic Ellipsometry Focus Topic**

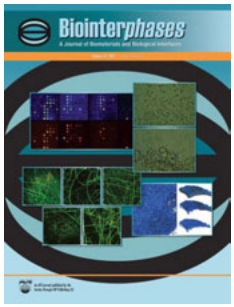
| | | | |
|---|---|---|---|
| Thu. | PM | Room 104C | Optical Characterization of Nanostructures and Metamaterials (2:20–3:40 pm)/Application of Spectroscopic Ellipsometry for the Characterization of Thin Films (4:00–6:00 pm) and Biological Materials Interfaces |
| Thu. | PM | Room Hall D | Spectroscopic Ellipsometry Poster Session |
| Fri. | AM | Room 104C | Spectroscopic Ellipsometry: Novel Applications and Theoretical Approaches |

**Tribology Focus Topic**

| | | | |
|---|---|---|---|
| Wed. | PM | Room 101A | Nanoscale Wear: Applications to Nanometrology and Manufacturing |
| Thu. | PM | Room 101A | Materials Tribology |
| Thu. | PM | Room Hall D | Tribology Poster Session |


# Call for Research Articles

## AVS 63 Special and In Focus Issues

## *JVST A - JVST B* - Biointerphases

**Research articles are being solicited based on presentations made at the AVS 63rd International Symposium and Exhibition for publication in Special and In Focus AVS 63 sections appearing in each of the journals' June 2017 issues.**

You can submit your articles/letters based on your talk at the AVS 63rd International Symposium at any time before the **deadline, January 15, 2017**. Online, you will have an opportunity to tell us that your paper is a part of the special issue by choosing **"Special/In Focus Issue on AVS 63."**

Papers will be reviewed using the same criteria as regular journal articles and must meet the journal standards for both technical content and written English. To be published in one of these journals, the manuscript must::

(1) present original findings, conclusions or analysis that have not been published previously
(2) be free of errors and ambiguities,
(3) support conclusions with data and analysis,
(4) written clearly, and
(5) have high impact in its field.

Depending on topic, please submit your manuscripts using the journals' online manuscript submission sites at either http://jvsta.peerx-press.org, http://jvstb.peerx-press.org or http://biointerphases.peerx-press.org.

In preparing your article, you should follow the instructions for contributors, which can be found on each journal site on the "Author" tab. Authors are encouraged to use the Article Template files available on the sites above.

**Manuscript Deadline:**
January 15, 2017

**Manuscript Details & Submission:**
www.jvsta.org
www.jvstb.org
www.biointerphases.org

# JVSTA

## *Journal of Vacuum Science & Technology A*

- **Surfaces**
- **Films**
- **Vacuum**


**www.jvsta.org**

Understanding interfaces and surfaces at a fundamental level and using this understanding to advance the state-of-the-art in various technological applications defines the scope of the *Journal of Vacuum Science and Technology A*. This journal is devoted to publishing reports of original research, letters, and review articles.

## Website Features Editor's Picks, Most Cited, and Most Read

*Topics include but are not limited to:*

- Applied and fundamental surface science
- Atomic layer deposition
- Electronic and photonic materials and their processing
- Magnetic thin films and interfaces
- Materials and thin films for energy conversion and storage
- Photovoltaics including thin-film solar cells and organic and hybrid solar cells
- Plasma science and technology including plasma surface interactions, plasma diagnostics plasma deposition and etching and applications of plasmas to micro- and nanoelectronics
- Surface Engineering
- Thin film deposition, etching, properties and characterization
- Transmission electron microscopy including in *situ* methods
- Tribology
- Vacuum science and technology

JVST A January/February Annual Special Issue Features

- Atomic Layer Deposition
- Atomic Layer Etching

Editor-in-Chief: Eray S. Aydil, University of Minnesota

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# JVSTB

## *Journal of Vacuum Science & Technology B*

- **Nanotechnology**
- **Microelectronics**
- **Processing, Measurement, Phenomena**


**www.jvstb.org**

The *Journal of Vacuum Science and Technology B* is devoted to publishing reports of original research, letters, and review articles on microelectronics and nanometer structures and devices. The emphasis is on processing, measurement and phenomena associated with micrometer and nanometer structures and devices. Processing may include vacuum processing, plasma processing and microlithography among others, while measurement refers to a wide range of materials and device characterization methods for understanding the physics and chemistry of submicron and nanometer structures and devices.

### Website Features Editor's Picks, Most Cited, and Most Read

*Topics include but are not limited to:*

- Compound semiconductor electronics and optoelectronics
- Devices for energy conversion and storage
- Dielectrics in micro- and nanoelectronics
- Graphene, carbon nanotubes and fullerenes: materials & devices
- Group IV semiconductor microelectronics
- Lithography
- Microelectromechanical and nanoelectromechanical systems and devices (MEMS & NEMS)
- Nanometer science and technology
- Nanostructured materials and devices including nanowires, nanoparticles and quantum dots,
- Organic and molecular electronics
- Photovoltaics based on nanostructured materials, dye-sensitized and other excitonic solar cells
- Plasmonics
- Spintronics and magnetic devices
- Vacuum nanoelectronics

Editor-in-Chief: Eray S. Aydil, University of Minnesota

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# Biointerphases

## A Journal of Biomaterials and Biological Interfaces


- Quantitative Data on Biological and Soft Matter Interfaces
- Experiments, Modeling, Theory and Applications
- Only journal in this subject area
- Open Access option

**www.biointerphases.org**

Biointer*phases* is an interdisciplinary, international journal with excellence in scientific peer-review. It features all aspects of quantitative soft matter interfaces: chemistry, physics, engineering, theory and modeling. Topics covered include interface spectroscopy, *in vivo* and *in vitro* mechanisms, interface modeling, adhesion phenomena, protein-surface interactions, biomembranes on a chip, cell-surface interactions, biosensors/biodiagnostics, bio-surface modification, the nano-bio interface, biotribology/biorheology, molecular recognition, cell patterning for function, polyelectrolyte surfaces, and ambient diagnostic methods. In addition to regular submissions, the journal features In Focus sections examining specific topics and edited by experts in the field.

Recent and Upcoming In Focus Collections

- Bio Surface Analysis
- Plasma Medicine
- Ions and Solvation at Biointerfaces
- Blood-Biomaterial Interactions
- Nanoparticle Interfaces
- Protein Structure at Biointerfaces

Editor: Dr. Anna Belu, Medtronic

*"Biointerphases is an excellent information source for research in the field of cell adhesion and mechanics with growing importance."*
*— Dr. Joachim Spatz, MPI Intelligent Systems & University of Heidelberg*

*"The themed issues of Biointerphases provide valuable, in-depth accounts of the current state of research in specific topic areas of biointerface science."*
*— Dr. Stefan Zauscher, Duke University*

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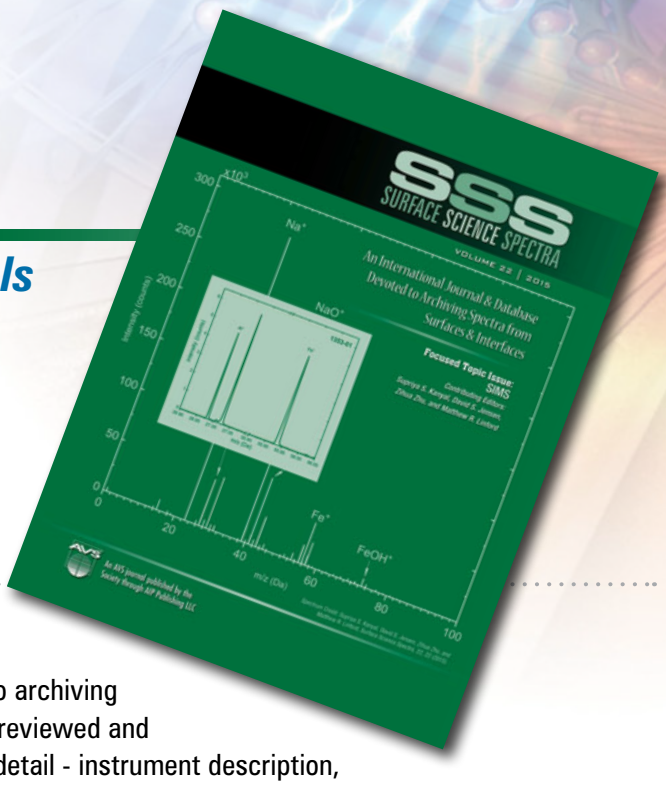
# SSS
## SURFACE SCIENCE SPECTRA




## *Journal and Database for Individuals or Analytical Laboratories*

- **Reference Spectra**
- **Spectra from Technological Materials**
- **Comparison Spectra from Well-Defined Materials**

**http://avspublications.org/sss**

*Surface Science Spectra* is an international journal devoted to archiving spectra from surfaces and interfaces. Data records are peer-reviewed and technically edited. Spectral descriptions include much more detail - instrument description, calibration, and raw spectral data - than traditional journals. *SSS* offers XPS, Auger, UPS, SIMS, EELS/HREELS and Spectroscopic Ellipsometry spectra from a wide range of materials.

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Editors: James E. Castle, University of Surrey and Richard T. Haasch, University of Illinois

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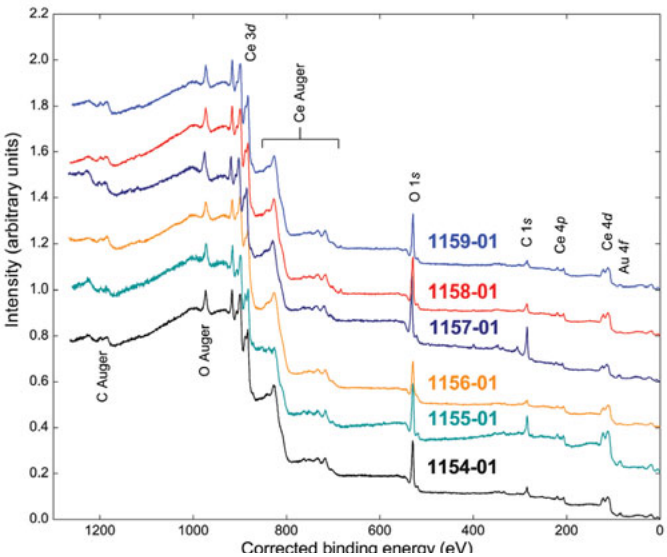
*— Dr. Davide Barreca, U. Padova*

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# 44th ICMCTF

**International Conference on Metallurgical Coatings and Thin Films**

**Town & Country Hotel & Convention Center**
**April 24 - 28, 2017 - San Diego, CA USA**
**http://www2.avs.org/conferences/icmctf/**

Sponsored by the AVS Advanced Surface Engineering Division • http://www2.avs.org/conferences/icmctf/

## 44th ICMCTF (2017) Conference Overview

The ICMCTF is the premier international conference in the field of thin-film deposition, characterization and advanced surface engineering promoting global exchange of ideas and information among scientists, technologists and manufacturers. The conference includes more than 60 high-profile invited speakers across fourteen symposia along with focused topic sessions, short courses, equipment exhibition and social networking events.

## Technical Symposia

- **A** Coatings for use at High Temperatures
- **B** Hard Coatings and Vapor Deposition Technologies
- **C** Fundamentals and Technology of Multifunctional Materials and Devices
- **D** Coatings for Biomedical and Healthcare Applications
- **E** Tribology & Mechanical Behavior of Coatings & Engineered Surfaces
- **F** New Horizons in Coatings and Thin Films
- **G** Surface Engineering - Applied Research and Industrial Applications coordinated with SVC
- **H** Advanced Characterization Techniques for Coatings and Thin Films

## Topical Symposia

- **TS1** Biointerfaces
- **TS2** Thermal Spray Technologies and Coatings
- **TS3** Self-healing Materials

## Important Dates - Mark Your Calendar:

| | |
|---|---|
| **Abstract Submission:** | **October 1, 2016** |
| **Awards Nomination:** | **October 1, 2016** |
| **Discounted Early Registration:** | **March 24, 2017** |
| ***Presenting Authors must register by March 24, 2017 to remain in the Technical Program Book*** | |
| **Manuscript Submission:** | **April 1, 2017** |

**http://www2.avs.org/conferences/icmctf/**

## Plenary Lecture

April 24, 8am, Town & Country Room
"Grain Boundary Alloying: The Key Ingredient for Commercializable Nanocrystalline Coatings"

**Chris Schuh**
Massachusetts Institute of Technology
Cambridge, MA USA

## Exhibition Keynote Lecture

April 25, 11am, Town & Country Room
"Success and Failure in the Commercialization of CVD Diamond"

**Chris Engdahl**
Vice-President Technology
Crystallume
Santa Clara, CA USA

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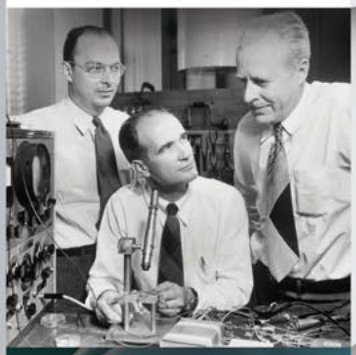

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American Institute of Physics

# TECHCON 2017

## 60TH ANNUAL TECHNICAL CONFERENCE

RHODE ISLAND CONVENTION CENTER | PROVIDENCE, RHODE ISLAND | April 29-May 4, 2017

# PLAN TODAY TO ATTEND

THE GO-TO SHOW FOR THE VACUUM COATING INDUSTRY.

## Technical Sessions

**FEATURING THE SYMPOSIUM ON COATINGS FOR HEALTHCARE, BIOMETRIC MONITORING, AND BIO-INTERFACES**

**TRADITIONAL SESSIONS:**

- WebTech Roll-to-Roll Coatings for High-End Applications
- Coatings for Energy Conversion and Related Processes
- Protective, Tribological and Decorative Coatings
- Emerging Technologies
- High Power Impulse Magnetron Sputtering (HIPIMS)
- Optical Coatings
- Plasma Processing
- Large Area Coatings
- Coatings and Processes for Biomedical and Environmental Applications
- Fundamentals of Interface Design: Organized with ICMCTF (AVS/ASED)
- HEURÉKA! Post-Deadline Recent Developments
- Technical Poster Presentations

## Important Dates

**MAY 1 - 4:**
TECHNICAL PROGRAM

**APRIL 29 - MAY 4:**
EDUCATION PROGRAM

**MAY 2 - 3:**
EQUIPMENT EXHIBITION

**MAY 1 - 4:**
INTERACTIVE NETWORKING

FOR MORE INFORMATION CONTACT:

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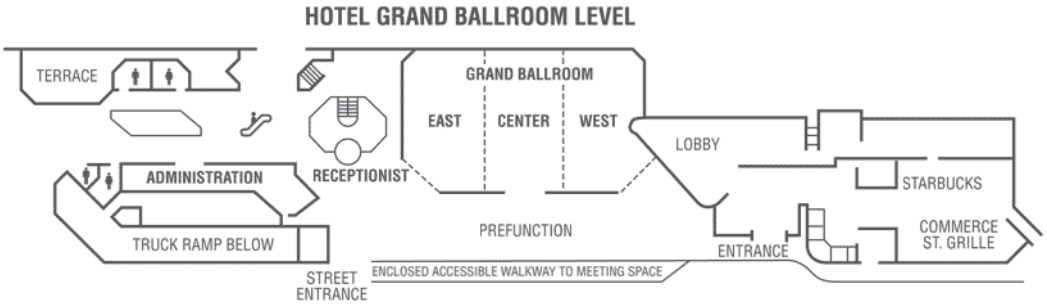
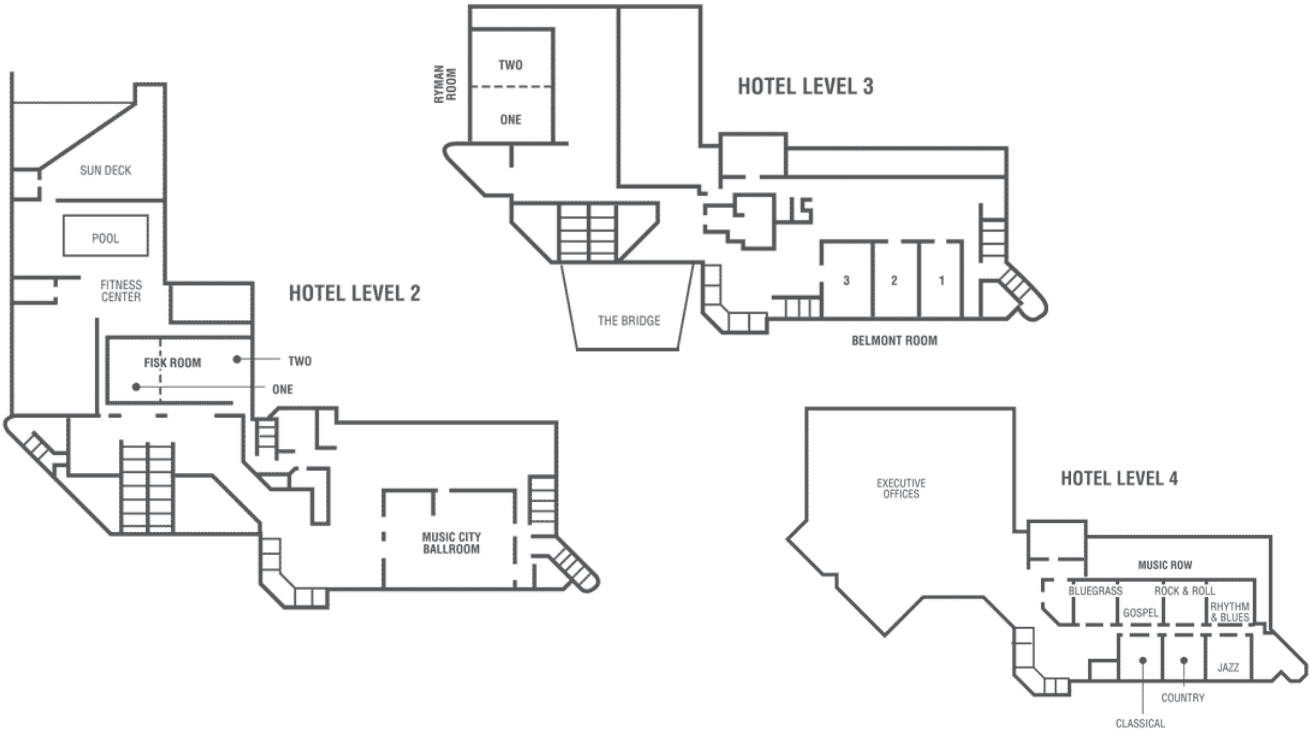
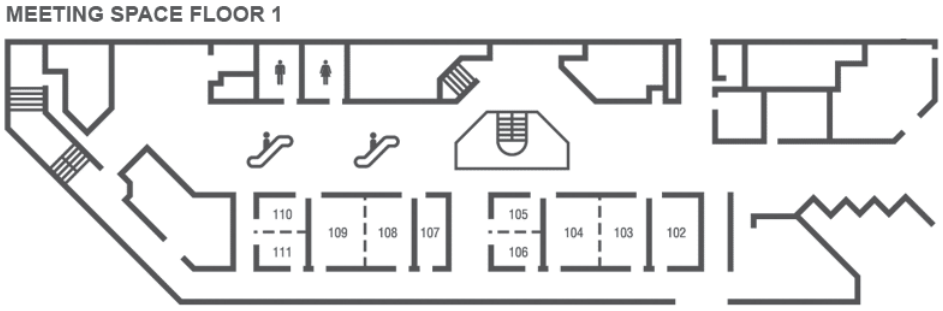
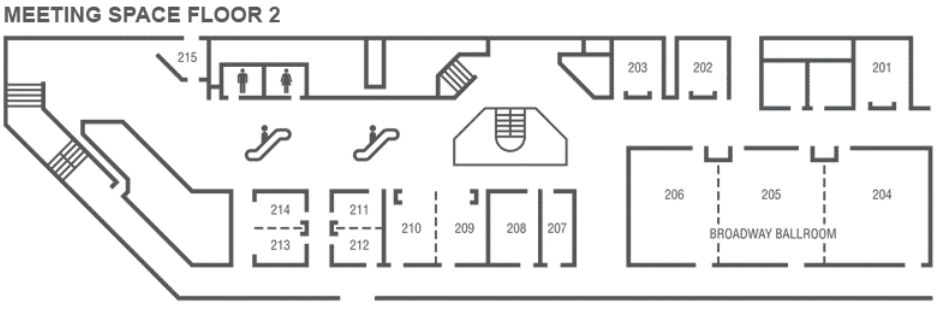
# RENAISSANCE NASHVILLE HOTEL



# MEETINGS AND SPECIAL EVENTS

**SATURDAY, NOVEMBER 5, 2016**

| | | |
|---|---|---|
| 2:00 p.m. | Educational Materials and Outreach Committee Meeting | Jazz (H) |
| 6:30 p.m. | Education Committee Dinner | Commerce Street Grille (H) |

**SUNDAY, NOVEMBER 6, 2016**

| | | |
|---|---|---|
| 7:30 a.m. | Sixteenth Topical Conference on Quantitative Surface Analysis (QSA16): "Keys to Successful Quantitative Surface Analysis with XPS" | 101B (CC) |
| 8:30 a.m. | AVS Board of Directors' Meeting | Ryman (H) |
| 12:30 p.m. | AVS Board of Directors' Lunch | Belmont 3 (H) |
| 3:00 p.m. | Biomaterials Plenary Session and Reception | 101A (CC) |
| 3:00 p.m. | *JVST* Associate Editors' Meeting | Rock & Roll (H) |
| 5:00 p.m. | Professional Development: Improving Work-Life Satisfaction Workshop | 102A (CC) |
| 6:00 p.m. | ASTM E-42 Business Meeting | Belmont 2-3 (H) |
| 6:00 p.m. | Science Educators' Workshop Teachers' Reception | Fisk 1 (H) |
| 6:00 p.m. | Vacuum Technology Division Executive Committee Meeting and Dinner | Classical (H) |
| 7:00 p.m. | ASTM E-42 Workshop: "QSA Summary and Discussion of Implications in ASTM E-42 Standards" | Belmont 2-3 (H) |
| 7:00 p.m. | International Dignitaries & Chapter Chairs Reception (Invitation Only) | Fisk 2 (H) |
| 7:00 p.m. | Short Course Executive Committee Meeting and Dinner | Country (H) |

**MONDAY, NOVEMBER 7, 2016**

| | | |
|---|---|---|
| 7:00 a.m. | Professional Leadership Committee Meeting and Breakfast | Commerce Street Grille (H) |
| 8:00 a.m. | Science Educators' Workshop | Ryman (H) |
| 9:40 a.m. | Medard W. Welch Award Lecture: "Action Spectroscopy: Characterizing Molecules at Surfaces and its Dynamics," Maki Kawai, Institute for Molecular Science, Japan | 104A (CC) |
| 12:00 p.m. | Science Educators' Workshop Lunch | Belmont 3 (H) |
| 12:05 p.m. | Biomaterial Interfaces Division Business Meeting | 101A (CC) |
| 12:15 p.m. | 2017 AVS Program Committee Meeting and Lunch | 108 (CC) |
| 12:15 p.m. | Professional Development: "Welcome to AVS Workshop" | 102A (CC) |
| 12:15 p.m. | Recommended Practices Committee Meeting and Lunch | Jazz (H) |
| 3:20 p.m. | Vacuum Technology Division Business Meeting | 104C (CC) |
| 4:00 p.m. | Publications Committee Meeting | Boardroom 5th Ave. (CC) |
| 5:30 p.m. | Plenary Lecture: Heike Riel - IBM Fellow, Director Physical Sciences, IBM Research, "Integrated Semiconductor Nanowires for Nanoelectronics" | Davidson Ballroom A (CC) |
| 6:30 p.m. | Welcome Mixer | Davidson Ballroom BC (CC) |
| 6:30 p.m. | Biointer*phases* Reception (Invitation Only) | TBD (Offsite) |
| 7:00 p.m. | Applied Surface Science Division Executive Committee Meeting and Dinner | Rock & Roll (H) |
| 7:30 p.m. | Publications Committee Meeting and Dinner (Invitation Only) | TBD (Offsite) |
| 7:30 p.m. | Manufacturing Science and Technology Group Committee Meeting and Dinner | Bluegrass (H) |
| 7:30 p.m. | Thin Film Division/Harper Award TED-Talk Competition (Invitation Only) | 105A (CC) |
| *8:30 a.m.-5:00 p.m.* | *Short Course Program* | *Various Rooms (CC)* |

**TUESDAY, NOVEMBER 8, 2016**

| | | |
|---|---|---|
| 7:00 a.m. | Diversity and Inclusion Breakfast: "The Industrial Scientist's Guide to Riches, Fame, and Fortune or at least a Raise" | Belmont (H) |
| 7:30 a.m. | Awards Committee Meeting and Lunch | Classical (H) |
| 8:00 a.m. | Science Educators' Workshop | Ryman (H) |
| 10:00 a.m. | Session Coffee Break | Hall C (CC) |
| 12:00 p.m. | Science Educators' Workshop Lunch | Belmont 3 (H) |
| 12:20 p.m. | Exhibit Hall Lunch | Hall C (CC) |
| 12:30 p.m. | Chapters, Divisions, and Groups Meeting and Lunch (Invitation Only) | 108 (CC) |
| 12:30 p.m. | Professional Development: Job Information Forum and Lunch | 102A (CC) |
| 3:00 p.m. | Marketing Communications Committee Meeting | Boardroom 5th Ave. (CC) |
| 3:40 p.m. | Session Refreshment Break | Hall C (CC) |
| 6:05 p.m. | Magnetic Interfaces and Nanostructures Division Business Meeting | 102B (CC) |
| 6:25 p.m. | Electronic Materials and Photonics Division Business Meeting | 102A(CC) |
| 6:25 p.m. | Nanometer-scale Science and Technology Division Business Meeting | 101D (CC) |
| 6:25 p.m. | Plasma Science and Technology Division Business Meeting and 2016 Plasma Prize Award Announcement | 104B (CC) |
| 6:25 p.m. | Surface Science Division Business Meeting | 104E (CC) |
| 6:25 p.m. | Thin Film Division Business Meeting | 105A (CC) |
| 6:30 p.m. | Poster Session and Refreshments (Sponsored by MKS) | Hall D (CC) |
| 6:45 p.m. | Electronic Materials and Photonics Division Forum: "Careers at LAM Research" | 102A (CC) |
| 7:00 p.m. | Magnetic Interfaces and Nanostructures Division Executive Committee Meeting and Dinner | Rhythm & Blues (H) |

CC = Music City Center
H = Renaissance Nashville Hotel

= New Attendee Networking Events

# MEETINGS AND SPECIAL EVENTS

| | | |
|---|---|---|
| 7:00 p.m. | MEMS and NEMS Technical Group Executive Committee Meeting and Dinner | Classical (H) |
| 7:30 p.m. | Applied Surface Science Division Business Meeting | Belmont 2-3 (H) |
| 7:30 p.m. | Nanometer-scale Science and Technology Division Executive Committee Meeting and Dinner | Fisk 2 (H) |
| 7:30 p.m. | Plasma Science and Technology Division Executive Committee Meeting and Dinner | Fisk 1 (H) |
| 7:30 p.m. | Surface Science Division Executive Committee Meeting and Dinner | Rock & Roll (H) |
| 7:30 p.m. | Thin Film Division Executive Committee Meeting and Dinner | Ryman (H) |
| 7:45 p.m. | Biomaterial Interfaces Division Executive Committee Meeting and Dinner | Bluegrass (H) |
| 7:45 p.m. | Electronic Materials and Photonics Division Executive Committee Meeting and Dinner | Jazz (H) |
| 8:00 p.m. | ASTM E-42 and Applied Surface Science Division Joint Workshop: "Frontiers of Surface Analysis" | Belmont 2-3 (H) |
| *8:30 a.m.-5:00 p.m.* | *Short Course Program* | *Various Rooms (CC)* |
| *10:00 a.m.-5:00 p.m.* | *Equipment Exhibition* | *Hall C (CC)* |

**WEDNESDAY, NOVEMBER 9, 2016**

| | | |
|---|---|---|
| 6:15 a.m. | 36th Annual AVS Run (Register at Run Booth before Wednesday in the Convention Center) | TBD |
| 7:30 a.m. | Diversity Committee Meeting and Breakfast | Commerce Street Grille (H) |
| 10:00 a.m. | Session Coffee Break | Hall C (CC) |
| 11:00 a.m. | Gaede Langmuir Award Lecture: "Multiplets and More for Core-Level Spectra, " Paul Bagus, University of North Texas | 103C (CC) |
| 12:10 p.m. | PSTD Coburn and Winters Adjudication Session (Closed Session) | 104B (CC) |
| 12:20 p.m. | Exhibit Hall Lunch | Hall C (CC) |
| 12:30 p.m. | Governance Committee Meeting and Lunch | Commerce Street Grille (H) |
| 12:30 p.m. | Nanometer-scale Science and Technology Division Graduate Student Award Competition | 102B (CC) |
| 12:30 p.m. | PacSurf Committee Meeting and Lunch | Boardroom 5th Ave. (CC) |
| 12:30 p.m. | Professional Development: Federal Funding Town Hall and Lunch | 102A (CC) |
| 3:30 p.m. | History Committee Meeting | Classical (H) |
| 3:40 p.m. | Session Refreshment Break | Hall C (CC) |
| 6:30 p.m. | AVS Awards Ceremony and Reception | Davidson Ballroom (CC) |
| *8:30 a.m.-5:00 p.m.* | *Short Course Program* | *Various Rooms (CC)* |
| *10:00 a.m.-4:30 p.m.* | *Equipment Exhibition* | *Hall C (CC)* |

**THURSDAY, NOVEMBER 10, 2016**

| | | |
|---|---|---|
| 7:30 a.m. | Membership Committee Meeting and Breakfast | Commerce Street Grille (H) |
| 8:00 a.m. | Advanced Surface Engineering Division Business Meeting | Ryman (H) |
| 8:15 a.m. | Advanced Surface Engineering Division Executive Committee Meeting (Lunch Offsite) | Ryman (H) |
| 10:00 a.m. | Session Coffee Break | Hall C (CC) |
| 12:20 p.m. | Exhibit Hall Lunch/Finale | Hall C (CC) |
| 12:20 p.m. | Plasma Science and Technology Division Coburn and Winters Award Ceremony | 104B (CC) |
| 12:20 p.m. | Surface Science Division Mort Traum Awards Ceremony | 104D (CC) |
| 12:30 p.m. | 2017 AVS Program Committee Chairs' Meeting and Lunch | 108 (CC) |
| 12:30 p.m. | AVS Business Meeting | Boardroom 5th Ave. (CC) |
| 2:20 p.m. | "Celebrating a Life in Surface Science: A Symposium in Honor of John T. Yates, Jr." | 103C (CC) |
| 6:00 p.m. | Poster Session and Refreshments | Hall D (CC) |
| 6:30 p.m. | 2016/2017 Program Committee Reception and Dinner | Belmont (H) |
| 7:00 p.m. | *Surface Science Spectra* Editorial Board Dinner | Music City Ballroom (H) |
| *8:30 a.m.-5:00 p.m.* | *Short Course Program* | *Various Rooms (CC)* |
| *10:00 a.m.-2:30 p.m.* | *Equipment Exhibition* | *Hall C (CC)* |

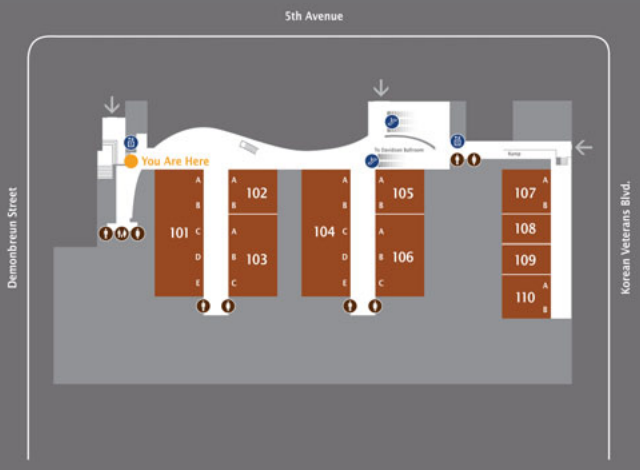
CC = Music City Center
H = Renaissance Nashville Hotel



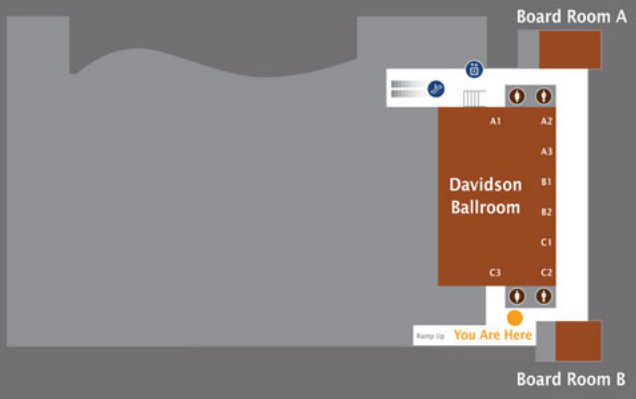
= New Attendee Networking Events

# MUSIC CITY CENTER

## LEVEL 1




## LEVEL 1M

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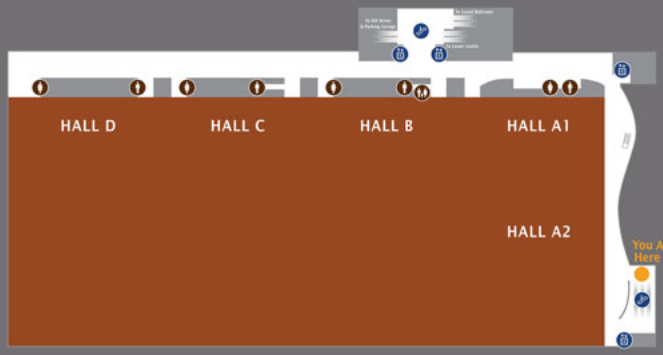
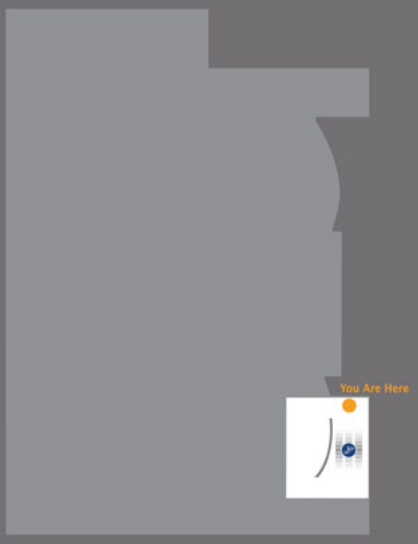



## LEVEL 2


## LEVEL 3M




Men's Restroom  Women's Restroom  Family Restroom  Elevator  Escalator

# Program Key

## SYMPOSIUM TOPICS

**2D** **2D MATERIALS FOCUS TOPIC**
**AC** **ACTINIDES AND RARE EARTHS FOCUS TOPIC**
**AS** **APPLIED SURFACE SCIENCE**
**BI** **BIOMATERIAL INTERFACES**
**BP** **BIOMATERIALS PLENARY SESSION**
**EL** **SPECTROSCOPIC ELLIPSOMETRY FOCUS TOPIC**
**EM** **ELECTRONIC MATERIALS AND PHOTONICS**
**EW** **EXHIBITOR TECHNOLOGY SPOTLIGHT**
**HC** **FUNDAMENTAL DISCOVERIES IN HETEROGENEOUS CATALYSIS FOCUS TOPIC**
**HI** **ADVANCED ION MICROSCOPY FOCUS TOPIC**
**IS** **IN-SITU AND OPERANDO SPECTROSCOPY AND MICROSCOPY FOR CATALYSTS, SURFACES, & MATERIALS FOCUS TOPIC**
**MI** **MAGNETIC INTERFACES AND NANOSTRUCTURES**
**MN** **MEMS AND NEMS**
**MS** **MANUFACTURING SCIENCE AND TECHNOLOGY**
**NS** **NANOMETER-SCALE SCIENCE AND TECHNOLOGY**
**PB** **PLASMA PROCESSING FOR BIOMEDICAL APPLICATIONS FOCUS TOPIC**
**PS** **PLASMA SCIENCE AND TECHNOLOGY**
**SA** **NOVEL TRENDS IN SYNCHROTRON AND FEL-BASED ANALYSIS FOCUS TOPIC**
**SE** **ADVANCED SURFACE ENGINEERING**
**SP** **SCANNING PROBE MICROSCOPY FOCUS TOPIC**
**SS** **SURFACE SCIENCE**
**TF** **THIN FILM**
**TR** **TRIBOLOGY FOCUS TOPIC**
**VT** **VACUUM TECHNOLOGY**

## KEY TO SESSION/ABSTRACT NUMBERS

Sessions sponsored by multiple topics are labeled with all acronyms (e.g. **AC+EM+SS**), then a number to indicate simultaneous sessions sponsored by the same topic(s) (e.g. SS**1**, SS**2**), then a dash followed by the first two characters of the day of the week:

**Mo**nday, **Tu**esday, **We**dnesday, **Th**ursday, **Fr**iday,
then a single letter for **M**orning, **A**fternoon, **E**vening, **P**oster,
and finally a number indicating the starting time slot for the abstracts.
Example: SS1-MoM9 (Surface Science, Monday morning, 11:00 am).

# AVS 63 Technical Program at a Glance

| Room /Time | 101A | 101B | 101C | 101D | 102A | 102B | 103A | 103B |
|---|---|---|---|---|---|---|---|---|
| SuA | BP-SuA: Biomaterials Plenary | | | | | | | |
| MoM | BI+AS-MoM: Biomolecules and Cells at Interfaces | AS-MoM: QSA: New Ways to Perform Old Tricks | MI+2D+AC-MoM: Chir. Mag/Mag & Spin Orbit Eff at Inter & Surf: Rec Exp. & Theo. Adv | NS-MoM: Nanopatterning & Nanofabrication + 3D | EM+NS+PS+SS+ TF-MoM: Growth & Devices Tech. of Group III-Nitrides | EM-MoM: Advances in Photonics | MS-MoM: Manufacturing for Next-Generation Energy Solutions | 2D+MI+SA-MoM: 2D Matls Char. including Microscopy and Spectroscopy |
| MoA | PB+BI+PS-MoA: Plasma Processing of Biomaterials | AS+BI-MoA: Pract Surf. Anal I: Adv Bio Surf Anal/Imag Bey. 'Show & Tell' | MI+2D+AC-MoA: Mag & Spin Orbit Effects at Inter & Surf: Rec Exper & Theo Adv. | NS-MoA: Nanophotonics, Plasmonics, and Energy | EM-MoA: Surface & Inter. Challenges in Wide Bandgap Materials | TF+PS+SE-MoA: Plasma-based Deposition Techniques and Film | MS-MoA: Advanced Mfg: Systems, Devices, and Materials | 2D+MI-MoA: Dopants, Defects and Interfaces in 2D Materials |
| TuM | PB+BI+PS-TuM: Plasma Proc. of Bio/Biomimetic Surfaces | AS+AC-TuM: Pract Surf Anal II: Micro, Nano, Atom Probe, & All Things 'Small' | SE+NS+TF+TR-TuM: Nanostructured Thin Films and Coatings | NS-TuM: Nanodiam., TF & Elect/ Health & Env. Impact of Nanotechnology | EM+MN-TuM: New Materials & Dev/ for TFETs, Spin., & Extended CMOS | TF+SA+MI-TuM: Thin Films for Synchrotron and Magnetism Applications | MS+AS-TuM: Characterization and Processing for IC Manufacturing | 2D+MI-TuM: Novel 2D Materials |
| TuL | | | | | | | | |
| TuA | BI+AS+SA-TuA: Biophys. & Char of Biological & Biomat Surfaces | AS+SS-TuA: Data Analytics in Surface Science and Nanoscience | SE+MS+TF-TuA: Innov in PVD, CVD, Atmos. Press. Plasma & Other Surf. Tech | NS-TuA: Nanoscale Imaging and Characterization | EM+MI+MN-TuA: New Materials & Dev. for Emerg. Memory Technologies | MI-TuA: Magnetic Phenomena in Organic Systems | MS-TuA: Working with National Labs and User Facilities | 2D-TuA: Novel Quantum Phenomena in 2D Materials |
| TuP | | | | | | | | |
| WeM | BI+MI-WeM: Biosensors and Diagnostics | AS+SS-WeM: Applications where Surface Analysis is Your Only Hope | SE+TR-WeM: Protective Coatings for Tribol Apps in Surf. Eng. | VT-WeM: Vac Tech – History & Innov/ Transfer & Manipulation | EM+NS-WeM: Nanoparticles for Electronics and Photonics | MN-WeM: Multiscale Phen. & Emerging Tech. in Micro- & Nano-Systems | HC+SS-WeM: Bridging Gaps in Heterogeneously -catalyzed Reactions | 2D+TF-WeM: 2D Materials: Growth and Fabrication |
| WeL | | | | | | | | |
| WeA | TR+AS+NS+SS-WeA: Nano Wear: Apps to Nanomet. & Manufacturing | AS-WeA: Mult. Tech Approaches for Real-World Industrial Problem Solving | IS+HC-WeA: Ambient Press. XPS Studies of Surf. & Chem of Catalysts | SE+2D+EM-WeA: Multifunctional Thin Films and Coatings | EM+NS+SP+SS-WeA: Nano Imag of Mtls & Comp Semi based Nano, Surf, & Int | MN+NS-WeA: Optomechanics, Photonics, and Quantum Nanosystems | HC+NS+SS-WeA: Nano Surface Structures in Hetero Catalyzed Reactions | 2D+NS-WeA: Nanostructures incl. Heterostruct made of 2D Materials |
| ThM | BI+AS+SA-ThM: Synth. & Proc of Biomat/Bio Inspired Mtls | AS+SS-ThM: Depth Profiling, Buried Interfaces, and 3D Analyses | IS-ThM: In-situ & Oper Spect. & Micros w/ Infrared Absorp Spect. | | EM+AC+SS+TF-ThM: Radiation Det. Materials & Devices | MN+BI-ThM: 'Fantastic Voy.'– the New Micro/ Nano/Bio Syst. Frontiers | HC+SS-ThM: Dynamics of Gas-surface Interactions in Hetero Catalysis | 2D+MI-ThM: Prop of 2D Matls incl. Elect, Mag, Opt, Mech, Therm Properties |
| ThA | TR+BI+SE+TF-ThA: Materials Tribology | AS-ThA: Adv. for Comp. Sample Prep. Strategies & Complex Systems | IS-ThA: Ambient Press. Photoelec Spect & Scanning Probe Techs. | NS+BI-ThA: App. Nanoscale Micro Techs/ Biomat Inter – New Advances | EM+SS+TF-ThA: Materials and Interfaces for Energy Storage | MN+2D+NS-ThA: Focused Session on Atomic Layer Nanomechanics and 2D MEMS | HC+SS-ThA: Adv. in Theor Models & Simul of Hetero-catalyzed Reactions | 2D-ThA: Surface Chem, Function, Bio and Sensor Apps of 2D Materials |
| ThP | | | | | | | | |
| FrM | | | IS-FrM: In situ Characterization of Nanomaterials | | EM-FrM: Late Breaking News on Elect. Materials & Devices | MN+MS-FrM: Rad. Effect in Emerg Micro/ Nano Struct, Dev., & Systems | | 2D+NS-FrM: 2D Materials: Device Physics and Applications |

# AVS 63 Technical Program at a Glance

| 103C | 104A | 104B | 104C | 104D | 104E | 105A | Hall C | Hall D |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | | |
| SA+AS+MI-MoM Adv in Hi-Res Imaging Tech/ Push the Limits w/ X-Ray Spect. | SP+AS+MI+NS+SS-MoM: Advances in Scanning Probe Microscopy | PS-MoM: Advanced FEOL/Gate Etching | VT-MoM: Vac Measure, Calib., Primary & Industry Standards | PS+SE-MoM: Atmospheric Pressure Plasma Processing | SS+AS+HC-MoM: Mech Insights on Surf. React in Catal. & at Novel | TF-MoM: ALD Precursors and Surface Reactions | | |
| SA+AS-MoA: Front of Photo w/ Synch & XFEL Rad./Adv in Hi-Res. Imaging | SP+2D+AS+NS+SS-MoA: Probing Top. States & Supercond. | PS-MoA: Advanced BEOL/ Interconnect Etching | VT-MoA: Gas Dynamics, Simulation and Partial Pressure Analysis | PS+AS+SS-MoA: Plasma Surface Interactions | SS+AS+HC-MoA: Metals, Alloys, and Oxides: Reactivity and Catalysis | TF+EM-MoA: ALD for Energy Conversion and Storage | | |
| SA+2D+AC+AS+TF-TuM: Apps of Syn-based Tech to 2D Mtls/Com Func Mtls & Het | SP+AS+MI+NS+SS-TuM: Probing Chem Reactions at the Nanoscale | PS-TuM: Plasma Diagnostics, Sensors and Control | VT-TuM: Vacuum Pumping and Material Outgassing | SS1+AS+HC+NS-TuM: Surf Dyn, Non-Adiab, & Theo & Mod of Surf &Int Phen | SS2+AS+HC+NS-TuM: Nanostruct: Growth, React., & Catalysis | TF-TuM: Advanced CVD and ALD Processing, ALD Manufacturing | EW-TuM: Exhibitor Technology Spotlight Session | |
| | | | | | | | EW-TuL: Exhibitor Technology Spotlight Session | |
| SA+AS+BI+MI-TuA: Syn & XFEL Adv for Bio Sys/ Syn Rad at Front of Dev Tech | SP+AS+MI+NS+SS-TuA: Probing Spin-Dependent Phenomena | PS+2D-TuA: Plasma Proc for Nanomaterials and 2D Materials | VT-TuA: Accelerator and Large Vacuum Systems | SS+HC-TuA: Photocatalysis and Photochemistry at Surfaces | SS+AS-TuA: Structure and Characterization of Oxides | TF-TuA: Thin Film Photovoltaics | | |
| | | | | | | | | Poster Sessions AC, AS, BI, MI, MS, NS, SA, SE, SS, VT |
| AC+MI-WeM: Mag., Complex, & Supercond. in the AC & RE/AC & RE Theory | SP+SS+TF-WeM: Probing Electronic Properties | PS-WeM: Plasma Sources & Novel Mech for Generating Plasmas | PS+TF-WeM: Atomic Layer Etching | SS+2D-WeM: Synth, Charact, & Surf Sci. of Novel Matls & Interfaces | SS+AS-WeM: Envir Interfaces, Ambient Surf, & In-Operando Studies | TF+MI+NS-WeM: ALD and Nanostructures | EW-WeM: Exhibitor Technology Spotlight Session | |
| | | | | | | | EW-WeL: Exhibitor Technology Spotlight Session | |
| AC+MI-WeA: AC & RE Theory/ Nuc. Power, Waste Remed & Applications | HI-WeA: 10 Years of GFIS Microscopy | PS+TF-WeA: Plasma Deposition and Plasma Assisted ALD | PS-WeA: Atomic Layer Etching and Low Damage Processing | SS+AS+EM-WeA: Semiconductor Surfaces and Interfaces | TF+MI-WeA: Thin Films for Magnetic and Optical Applications | TF+EM+MI-WeA: Thin Films for Microelectronics | | |
| AC+AS+SA-ThM: Chemistry and Physics of the Actinides and Rare Earths | HI+NS-ThM: Fundamentals of Ion Beam Microscopy | PS2-ThM: Plasma Processing of Challenging Materials | PS1-ThM: Modeling of Plasmas and Plasma-Surface Interactions | SS-ThM: Chirality and Enantioselect on Surfaces; Ionic Liquid Interfaces | TF1-ThM: Control and Modeling of Thin Film Growth and Film | TF2-ThM: Area-selective Deposition and Sequential Infiltration | | |
| SS+AS-ThA: Celeb. a Life in SS: A Symp in Honor of JOHN T. YATES, JR. | HI+MI+NS-ThA: Ion Beam Based Imaging and Nanofabrication | PS-ThA: Plasma Chemistry and Plasma Surface Interactions | EL+AS+BI+EM+TF-ThA: Optical Char of Nanostruct & Metamaterials | | TF+BI-ThA: Thin Films for Bio-related Applications | TF-ThA: Self-assembled Monolayers and Organic/Inorganic Interface | | |
| | | | | | | | | Poster Sessions 2D, EL, EM, HI, IS, MN, PS, TF, TR |
| | | | EL+AS+EM+MI+TF-FrM: Spec Ellip: Novel Apps & Theor. Approaches | | SS+HC-FrM: Deposition and Analysis of Complex Interfaces | TF-FrM: CVD, ALD and Film Characterization | | |

# Anticipated Schedule Sunday, November 06, 2016

## Anticipated Schedule Sunday Lunch, November 6

When _____

Where _____

With _____

## Anticipated Schedule Sunday Afternoon, November 6

1:00 PM _____

1:20 PM _____

1:40 PM _____

2:00 PM _____

2:20 PM _____

2:40 PM _____

3:00 PM _____

3:20 PM _____

3:40 PM _____

4:00 PM _____

4:20 PM _____

# Special Events Sunday

| | |
|---|---|
| 7:30 AM | Sixteenth Topical Conference on QSA (QSA-16)/101B |
| 8:30 AM | AVS Board of Directors' Meeting/Ryman, Renaissance Nashville |
| 3:00 PM | *JVST* Associate Editors' Meeting/Rock & Roll, Renaissance Nashville (by invitation) |
| 5:00 PM | Professional Development Workshop: "Improving Work-Life Satisfaction"/102A |
| 6:00 PM | ASTM E-42 Business Meeting/Belmont 2-3, Renaissance Nashville |
| 6:00 PM | Science Educators' Workshop Teachers' Reception/Fisk 1, Renaissance Nashville (by invitation) |
| 6:00 PM | Vacuum Technology Division Executive Committee Meeting & Dinner/Classical, Renaissance Nashville (by invitation) |
| 7:00 PM | ASTM E-42 Workshop: "QSA Summary and Discussion of Implications in ASTM E42 Standards"/ Belmont 2-3, Renaissance Nashville |
| 7:00 PM | International Dignitaries & Chapter Chairs Reception/Fisk 2, Renaissance Nashville (by invitation) |
| 7:00 PM | Short Course Executive Committee Meeting/Country, Renaissance Nashville (by invitation) |

**Biomaterials Plenary Session**
**Room 101A - Session BP-SuA**
**Biomaterials Plenary**
**Moderator:** Stephanie Allen, The University of Nottingham, UK

| | | |
|---|---|---|
| 3:00pm | **INVITED: BP-SuA1** Common Principles in Synthetic Mechanophores and Mechanoresponsive Biomolecules, ***Kerstin Blank,*** Max Planck Institute of Colloids and Interfaces, Germany | |
| 3:20pm | Invited talk continues. | |
| 3:40pm | **INVITED: BP-SuA3** Formation of Stacked Lipid Lamellae and Development of Myelin-like Structures Is Promoted by a Surfactant Protein B Analog: A Micropipette Study of Lung Surfactants at Microscopic interfaces, ***David Needham,*** Duke University; *E. Parra, K. Konoshita,* University Southern Denmark, Denmark | |
| 4:00pm | Invited talk continues. | |
| 4:20pm | **INVITED: BP-SuA5** Stem Cell Biophysics: From 3D Tissue Analyses to Gels of Controlled Flexibility, Heterogeneity, and Thickness, ***Dennis Discher,*** University of Pennsylvania | |
| 4:40pm | Invited talk continues. | |
| 5:00pm | | |
| 5:20pm | | |
| 5:40pm | | |

# Anticipated Schedule Monday, November 07, 2016

## Anticipated Schedule Monday Morning, November 7

8:20 AM _____

8:40 AM _____

9:00 AM _____

9:20 AM _____

9:40 AM _____

10:00 AM _____

10:20 AM _____

10:40 AM _____

11:00 AM _____

11:20 AM _____

11:40 AM _____

12:00 PM _____

## Anticipated Schedule Monday Lunch, November 7

When _____

Where _____

With _____

## Anticipated Schedule Monday Afternoon, November 7

1:00 PM _____

1:20 PM _____

1:40 PM _____

2:00 PM _____

2:20 PM _____

2:40 PM _____

3:00 PM _____

3:20 PM _____

3:40 PM _____

4:00 PM _____

4:20 PM _____

4:40 PM _____

5:00 PM _____

# Special Events Monday

| | |
|---|---|
| 7:00 AM | Professional Leadership Committee Meeting & Breakfast/Commerce Street Grille, Renaissance Nashville (by invitation) |
| 8:00 AM | Science Educators' Workshop/Ryman, Renaissance Nashville (by invitation) |
| 12:05 PM | BID Business Meeting/101A |
| 12:15 PM | 2017 AVS Program Committee Meeting and Lunch/108 (by invitation) |
| 12:15 PM | Professional Development: "Welcome to AVS Workshop"/102A |
| 12:15 PM | Recommended Practices Committee Meeting & Lunch/Jazz, Renaissance Nashville (by invitation) |
| 3:20 PM | VTD Business Meeting/104C |
| 4:00 PM | Publications Committee Meeting/Boardroom 5th Avenue, Music City Center (by invitation) |
| 5:30 PM | Plenary Lecture: Heike Riel, IBM Fellow, Director Physical Sciences IBM Research, "Integrated Semiconductor Nanowires for Nanoelectronics"/Davidson Ballroom A, Music City Center |
| 6:30 PM | Biointerphases Reception/Offsite (by invitation) |
| 6:30 PM | Welcome Mixer/Davidson Ballroom BC, Music City Center |
| 7:00 PM | ASSD Executive Committee Meeting & Dinner/Rock & Roll, Renaissance Nashville (by invitation) |
| 7:30 PM | MSTG Executive Committee Meeting and Dinner/Bluegrass, Renaissance Nashville (by invitation) |
| 7:30 PM | Publications Committee Meeting & Dinner/Offsite (by invitation) |
| 7:30 PM | Thin Film Division/Harper Award TED-Talk Competition/105A (by invitation) |

## Short Courses Monday

| | |
|---|---|
| 8:30 AM | A Comprehensive Course on Surface Analysis and Depth Profiling by X-ray Photoelectron Spectrscopy (XPS or ESCA), Auger Electron Spectroscopy (AES), Focused Ion Beam Analysis (FIB) and Secondary Ion Mass Spectrometry (SIMS) (2 days) |
| 8:30 AM | Fundamentals of Vacuum Technology |
| 8:30 AM | Sputter Deposition |
| 8:30 AM | UHV Design and Practices |
| 8:30 AM | X-ray Photoelectron Spectroscopy (XPS or ESCA) & Auger Electron Spectroscopy (AES) (Day 1 of Comprehensive SA Course) |

LOCATION: All AVS Short Courses will be held at Music City Center

COURSE HOURS: All AVS Short Courses Hours: 8:30 a.m.–5:00 p.m. — with 1.5 hour break for Lunch (Lunch not included)

| | **2D Materials Focus Topic**<br>**Room 103B - Session 2D+MI+SA-MoM**<br>**2D Materials Characterization including Microscopy and Spectroscopy**<br>**Moderator:** Matthias Batzill, University of South Florida | **Applied Surface Science**<br>**Room 101B - Session AS-MoM**<br>**Quantitative Surface Analysis: New Ways to Perform Old Tricks**<br>**Moderators:** Tony Ohlhausen, Sandia National Laboratory, Carl Ventrice, Jr., SUNY Polytechnic Institute |
|---|---|---|
| 8:20am | **2D+MI+SA-MoM1** Scanning Tunneling Microscopy and Spectroscopy of Air Exposure Effects on Molecular Beam Epitaxy Grown $WSe_2$ Monolayers and Bilayers, *J.H. Park,* Univeristy of California, San Diego*; S. Vishwanath,* Cornell University*; X. Liu,* University of Notre Dame*; H. Zhou,* Cornell University*; S.M. Eichfeld,* Pennsylvania State University*; S.K. Fullerton-Shirey,* University of Pittsburgh*; J.A. Robinson,* Pennsylvania State University*; R. Feenstra,* Carnegie Mellon University*; J. Furdyna,* University of Notre Dame*; D. Jena, H.G. Xing,* Cornell University*; **Andrew Kummel**,* University of California, San Diego | **INVITED: AS-MoM1** Quantitative Analysis of Dendrimer-Encapsulated Nanoparticles*, P. Bhattacharya,* University of Dayton Research Institute*; M.H. Engelhard, L. Kovarik, L. Estevez,* Pacific Northwest National Laboratory*; Y.-C. Wang,* University of Washington*; D.R. Baer,* Pacific Northwest National Laboratory*; D.G. Castner,* University of Washington*; **Daniel Gaspar**,* Pacific Northwest National Laboratory |
| 8:40am | **2D+MI+SA-MoM2** Tuning the Trion Photoluminescence Polarization in Monolayer $WS_2$, ***Aubrey Hanbicki**, K.M. McCreary, M. Currie,* Naval Research Laboratory*; G. Kioseoglou,* University of Crete*; C.S. Hellberg, A.L. Friedman, B.T. Jonker,* Naval Research Laboratory | Invited talk continues. |
| 9:00am | **INVITED: 2D+MI+SA-MoM3** Quantum Hall Effect in Graphene Visualized through Scanning Tunneling Microscopy and Spectroscopy*, **Adina Luican-Mayer**,* University of Ottawa, Canada | **AS-MoM3** Developing a Straightforward Method to Calculate Shell Thicknesses for Core-Shell-Shell Nanoparticles from XPS Data*, **David Cant**,* National Physical Laboratory, UK*; Y.C. Wang, D.G. Castner,* University of Washington*; A.G. Shard,* National Physical Laboratory, UK |
| 9:20am | Invited talk continues. | **AS-MoM4** Double-Lorentzian Asymmetric Line-shape as a Practical Tool for Peak-fitting Multiplet Structures in XPS Data*, **Alberto Herrera-Gomez**, D. Cabrera-German,* CINVESTAV-Queretaro, Mexico*; J.A. Huerta-Ruelas,* CICATA-Unidad Queretaro, Mexico*; M. Bravo-Sanchez,* IPICYT, Mexico |
| 9:40am | **2D+MI+SA-MoM5** Enhancing the Electrical Conductivity of VUV-reduced Graphene Oxide by Multilayered Stacking*, **Yudi Tu**, T. Utsunomiya, T. Ichii, H. Sugimura,* Kyoto University, Japan | **AS-MoM5** Quantitative Evaluation of the Carbon Hybridization State by Near Edge X-Ray Absorption Fine Structure Spectroscopy*, **Filippo Mangolini**,* University of Leeds, United Kingdom of Great Britain and Northern Ireland*; J.B. McClimon, R.W. Carpick,* University of Pennsylvania |
| 10:00am | **2D+MI+SA-MoM6** Silicene-like Reconstruction via Surface Relaxation of Hexagonal-$MoSi_2$ Crystallites*, **Cameron Volders**, P. Reinke, G. Ramalingam, E. Monzami,* University of Virginia | **AS-MoM6** Simultaneous XPS-UPS Depth Profiling of Thin Films*, **Jon Treacy**, C. Deeks, P. Mack, T.S. Nunney,* Thermo Fisher Scientific, UK |
| 10:20am | **BREAK** | **BREAK** |
| 10:40am | **INVITED: 2D+MI+SA-MoM8** Electron Dynamics in Two-Dimensional Materials*, **Philip Hofmann**,* Aarhus University, Denmark | |
| 11:00am | Invited talk continues. | **AS-MoM9** Quantification of the Layer Thickness of Thin Organic Layers by Secondary Ion Mass Spectrometry Depth Profiling*, M.P. Seah, **Rasmus Havelund**, I.S. Gilmore,* National Physical Laboratory, UK |
| 11:20am | **2D+MI+SA-MoM10** Novel Characterization Techniques for 2D Materials: Visualizing Inherent and External Defects*, **Rudresh Ghosh**, S.K. Banerjee, D. Akinwande,* University of Texas at Austin | **AS-MoM10** Spectromicroscopy and Vector Analysis of Carbon Materials*, **Adam Roberts**,* Kratos Analytical Limited, UK*; N. Fairley,* Casa Software Ltd, UK*; J.D.P. Counsell, C.J. Blomfield,* Kratos Analytical Limited, UK |
| 11:40am | **2D+MI+SA-MoM11** Anomalous Dynamical Behavior of Freestanding Graphene*, **Paul Thibado**, M. Ackerman, P. Kumar, S. Singh,* University of Arkansas*; M. Neek-Amal, F. Peeters,* University of Antwerp, Belgium | **AS-MoM11** Angular Broadening in Core Electron Spectroscopy*, H. Cohen,* Weizmann Institute of Science, Israel*; **Alon Givon**,* Tel Aviv University, Israel |

| | **Biomaterial Interfaces**<br>**Room 101A - Session BI+AS-MoM**<br>**Biomolecules and Cells at Interfaces**<br>**Moderator:** Joe Baio, Oregon State University | **Electronic Materials and Photonics**<br>**Room 102A - Session EM+NS+PS+SS+TF-MoM**<br>**Growth and Devices Technology of Group III-Nitrides**<br>**Moderators:** Nikolaus Dietz, Georgia State University, Shalini Gupta, Northrop Grumman ES, Ali Okyay, Bilkent University, National Nanotechnology Research Center (UNAM), Turkey |
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| 8:20am | **BI+AS-MoM1** Probing the Selectivity of Antimicrobial Peptides to Cell Membranes by Sum Frequency Generation Spectroscopy, ***Thaddeus Golbek,*** Oregon State University*; J. Franz,* Department of Molecular Spectroscopy, Max Planck Institute for Polymer Research, Mainz, Germany*; J.E. Fowler, K.F. Schilke,* Oregon State University*; T. Weidner,* Department of Molecular Spectroscopy, Max Planck Institute for Polymer Research, Mainz, Germany*; J.E. Baio,* Oregon State University | **INVITED: EM+NS+PS+SS+TF-MoM1** Development of AlGaN based UV Laser Diodes, ***Ronny Kirste,*** Adroit Materials*; B. Sakar, A. Franke,* NCSU*; J. Tweedie,* Adroit Materials*; Z. Bryan, I. Bryan,* NCSU*; S. Mita,* Adroit Materials*; R. Collazo, Z. Sitar,* NCSU |
| 8:40am | **BI+AS-MoM2** Bacterial Adhesion to Immobilized Liquid Layers under Dynamic Conditions, ***Caitlin Howell,*** University of Maine*; Y. Kovalenko, I. Sotiri,* Harvard University*; J. Overton,* University of Maine*; J. Aizenberg,* Harvard University | Invited talk continues. |
| 9:00am | **INVITED: BI+AS-MoM3** Nitric Oxide Materials—An Approach to Creating More Hemocompatible Medical Device Coatings, ***Hitesh Handa,*** University of Georgia | **INVITED: EM+NS+PS+SS+TF-MoM3** Low-Temperature PA-ALD Growth Technology for Group III-Nitride Nano-heterostructures and their (Opto)Electronic Device Applications, ***Necmi Biyikli,*** *A. Haider, S. Kizir, P. Deminskyi, M. Yilmaz, S. Bolat, A. Celebioglu, A.K. Okyay, T. Uyar,* Bilkent University, Turkey*; F. Buyukserin, S. Altuntas,* TOBB University of Economics and Technology, Turkey*; I. Yilmaz, K. Khaled,* Turgut Ozal University, Turkey |
| 9:20am | Invited talk continues. | Invited talk continues. |
| 9:40am | **BI+AS-MoM5** Why do Bacteria Stick to Some Surfaces and Not Others? Characterisation of the Behaviour of Motile Bacteria at and Above the Surface of Materials, *A.L. Hook, A. Carabelli, N.A. Russell, P. Williams,* ***Morgan Alexander,*** The University of Nottingham, UK | **EM+NS+PS+SS+TF-MoM5** Structural Qualities of GaN Grown on AlN Buffer Layer by MEPA-MOCVD, ***Daniel Seidlitz****, I. Senevirathna, A. Fali, Y. Abate, N. Dietz,* Georgia State University*; A. Hoffmann,* Technical University Berlin, Germany |
| 10:00am | **BI+AS-MoM6** Probing Adhesion of Marine Biofilm Formers by Microfluidics*, K. Nolte,* Ruhr-University Bochum, Germany*; M. Alles, M.P. Arpa-Sancet, C. Christophis,* University of Heidelberg, Germany*;* ***Axel Rosenhahn,*** Ruhr-University Bochum, Germany | **EM+NS+PS+SS+TF-MoM6** Optical and Electrical Characteristics of Gamma-ray Irradiated AlGaN/GaN Heterostructures, ***MinPrasad Khanal****, B. Ozden, K. Kim, S. Uprety, V. Mirkhani, L. Shen, K. Yapabandara, A.C. Ahyi, M. Park,* Auburn University |
| 10:20am | **BREAK** | **BREAK** |
| 10:40am | **BI+AS-MoM8** Protein Control of Materials Nucleation Probed by Sum Frequency Generation, ***Tobias Weidner,*** Max Planck Institute for Polymer Research, Mainz, Germany | **INVITED: EM+NS+PS+SS+TF-MoM8** Seeded Regrowth for Production of AlN and GaN Substrates by HVPE, ***Jacob Leach****, K. Udwary, G. Dodson, K. Gentry, P. Quayle, T. Schneider, H. Splawn, K. Evans,* Kyma Technologies, Inc. |
| 11:00am | **BI+AS-MoM9** Piezoelectric Polymer Nanostructured Surfaces for Controlled Drug Release, ***Carcia Carson****, H.J. Sung,* Vanderbilt University*; R. Mu,* Fisk University | Invited talk continues. |
| 11:20am | **INVITED: BI+AS-MoM10** Regulation of Cell Surface Access and Mechanics at the Interface, ***Jennifer Curtis****, P. Chang, W. Wei, L.T. McLane,* Georgia Institute of Technology*; J. Scrimgeour,* Clarkson University | |
| 11:40am | Invited talk continues. | |
| 12:05 pm | **BID BUSINESS MEETING** | |

| | **Electronic Materials and Photonics**<br>**Room 102B - Session EM-MoM**<br>**Advances in Photonics**<br>**Moderators:** Michael Filler, Georgia Institute of Technology, Daniel Wasserman, University of Texas at Austin | **Magnetic Interfaces and Nanostructures**<br>**Room 101C - Session MI+2D+AC-MoM**<br>**Chiral Magnetism (8:20-10:20 am)/Magnetism and Spin Orbit Effects at Interfaces and Surfaces: Recent Experimental and Theoretical Advances (10:40 am - 12:00 pm)**<br>**Moderators:** Markus Donath, Westfälische Wilhelms-Universität Münster, Germany,<br>Hendrik Ohldag, SLAC National Accelerator Laboratory |
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| 8:20am | **INVITED: EM-MoM1** Optical Materials for Far-IR Reststrahlen Optics, ***Daniel Wasserman,*** University of Texas at Austin | **INVITED: MI+2D+AC-MoM1** Manipulation of Magnetic Skyrmions with STM, ***Kirsten von Bergmann,*** University of Hamburg, Germany |
| 8:40am | Invited talk continues. | Invited talk continues. |
| 9:00am | **INVITED: EM-MoM3** Mid-IR to THz Nanophotonics: Realizing Alternative Polaritonic Materials, ***Joshua Caldwell,*** US Naval Research Laboratory | **MI+2D+AC-MoM3** Skyrmion Hall Effect, *W. Jiang,* Argonne National Laboratory; *X. Zhang,* The University of Hong Kong, Hong Kong Special Administrative Region of China; *G. Yu,* University of California Los Angeles; *M.B. Jungfleisch, J.E. Pearson, O. Heinonen,* Argonne National Laboratory; *K.L. Wang,* University of California Los Angeles; *Y. Zhou,* The University of Hong Kong, Hong Kong Special Administrative Region of China; *S.G.E. te Velthuis,* ***Axel Hoffmann,*** Argonne National Laboratory |
| 9:20am | Invited talk continues. | **MI+2D+AC-MoM4** Microscopic Magnetic Structures in Dy/Y Superlattices Measured by Polarized Neutron Reflectometry with Off-specular Scattering, ***Gary Mankey,*** *J. Yu, P. LeClair,* University of Alabama; *R. Fishman, J.L. Robertson, H. Ambaye, V. Lauter, H. Lauter,* Oak Ridge National Laboratory |
| 9:40am | **EM-MoM5** Time-Resolved Optical Studies on Reflection and Transmission of Niobium Dioxide Thin Films, ***Melissa Beebe****, College of William and Mary; *J.M. Klopf,* Helmholtz-Zentrum Dresden-Rossendorf, Germany; *D. Lahneman, Z. Xing, M.M. Qazilbash,* College of William and Mary; *Y. Wang, S. Kittiwatanakul, J. Lu, S.A. Wolf,* University of Virginia; *R.A. Lukaszew,* College of William and Mary | **INVITED: MI+2D+AC-MoM5** Chirality Effects in Rare Earth based Thin Films and Multilayers, ***Dieter Lott,*** Helmholtz Zentrum Geesthacht, Germany; *K. Chen,* Universität Köln, Germany; *V. Tarnavich,* Petersburg Nuclear Physics Institute, Russian Federation |
| 10:00am | **EM-MoM6** Fabrication of Nanosphere-Based Disordered Coatings for Radiative Cooling under Direct Sunlight, ***Sarun Atiganyanun,*** *S.E. Han, S.M. Han,* University of New Mexico | Invited talk continues. |
| 10:20am | **BREAK** | **BREAK** |
| 10:40am | **EM-MoM8** Symmetry-Breaking Nanostructures for Light Trapping in Thin Crystalline Silicon Solar Cells, ***Seok Jun Han,*** *S. Ghosh, O.K. Abudayyeh, B.R. Hoard, E.C. Culler, J.E. Bonilla, S.M. Han, S.E. Han,* University of New Mexico | **INVITED: MI+2D+AC-MoM8** Is the High Tc Superconductivity in Cuprates an Interface Problem?, ***Qi-Kun Xue,*** Tsinghua University, China |
| 11:00am | **EM-MoM9** Non-thermal Plasma Synthesis of *In Situ* Graphene Shells on Silicon Carbide Nanoparticles, ***Devin Coleman,*** *L. Mangolini,* University of California - Riverside | Invited talk continues. |
| 11:20am | **EM-MoM10** Size and Structure Dependence of Electronic Transport Properties at Nanosized Interfaces, ***Dawn Bonnell,*** *J. Hou,* The University of Pennsylvania | **MI+2D+AC-MoM10** How to do Depth-Dependent Measurements on Magnetic or Magnetoelectric Thin Films, ***Mikel Holcomb,*** *R. Trappen, J. Zhou, C-Y. Huang, G. Cabrera,* West Virginia University; *S. Dong,* Southeast University; *Y-H. Chu,* National Chiao Tung University, Taiwan |
| 11:40am | **EM-MoM11** Metal Nanoparticles formed in Organic Molecular Crystals: HR-TEM and HR-PES Characterisation, ***Olga Molodtsova,*** DESY, Hamburg, Germany; *I.M. Aristova,* ISSP RAS, Chernogolovka, Russia; *S.V. Babenkov,* DESY, Hamburg, Germany; *V.Y. Aristov,* ISSP RAS, Chernogolovka, Russia | **MI+2D+AC-MoM11** Nano-Pico-Mikro - Dynamic Soft X-ray Microscopy of Magnetic Materials with High Sensitivity, ***Hendrik Ohldag,*** SLAC National Accelerator Laboratory |

* **TFD James Harper Award Finalist**

| | **Manufacturing Science and Technology**<br>**Room 103A - Session MS-MoM**<br>**Manufacturing for Next-Generation Energy Solutions**<br>**Moderator:** Erik B. Svedberg, The National Academies | **Nanometer-scale Science and Technology**<br>**Room 101D - Session NS-MoM**<br>**Nanopatterning and Nanofabrication + 3D**<br>**Moderators:** Keith Brown, Boston University,<br>Indira Seshadri, IBM Research Division, Albany, NY |
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| 8:20am | | **NS-MoM1** Fabrication and Characterization of Carbon Nanotube-Based Electronic Devices, ***Zhigang Xiao****, S. Budak, A. Kassu, X. Crutcher, T. Strong, J. Johnson, R. Hammond, J. Gray, A. Reynolds, R. Moten,* Alabama A&M University |
| 8:40am | | **NS-MoM2** Multi-Material Two Photon and Direct Write Lithography for Photonics, Phononics and Mechanics, ***Steven Kooi****,* Massachusetts Institute of Technology |
| 9:00am | **INVITED: MS-MoM3** Manufacturing Challenges in Batteries: Lessons from Current Technology for Future Energy Storage Developments, ***Yet-Ming Chiang****,* MIT | **INVITED: NS-MoM3** Applications of 2-photo 3D Stereolithography to Aerial Microrobots and Air-Microfluidics, ***Igor Paprotny****,* University of Illinois at Chicago |
| 9:20am | Invited talk continues. | Invited talk continues. |
| 9:40am | **MS-MoM5** Efficient Manufacturing of Nano-structured Lithium Sulfide for Next Generation Batteries, *X. Li, Y. Yang,* ***Colin Wolden****,* Colorado School of Mines | **NS-MoM5** Elucidating Proximity Effects during Direct-Write Synthesis of Complex 3D Nanostructures, ***Brett Lewis****,* University of Tennessee*; J.D. Fowlkes,* Oak Ridge National Lab*; R. Winkler,* Graz Centre for Electron Microscopy, Austria*; H. Plank,* Graz University of Technology, Austria*; P.D. Rack,* University of Tennessee |
| 10:00am | **MS-MoM6** Anode Protection for Advanced Energy Storage Systems *via* Atomic Layer Deposition, ***Chuan-Fu Lin****, M. Noked,* Institute for System Research, University of Maryland*; A.C. Kozen,* Naval Research Laboratory*; A.J. Pearse,* University of Maryland, College Park*; K. Gregorczyk,* Institute for System Research, University of Maryland*; S.B. Lee,* University of Maryland College Park*; G. Rubloff,* Institute for System Research, University of Maryland | **NS-MoM6** Surface Textures with Asymmetric Wetting and Optical Properties Enabled by Two-Photon Direct Laser Writing, ***Nick Lavrik****,* Oak Ridge National Laboratory*; C. McKown,* UT/ORNL Bredesen Center |
| 10:20am | **BREAK** | **BREAK** |
| 10:40am | **MS-MoM8** Controlling Nanomaterial Assembly to Improve Material Performance in Energy Storage Electrodes using Electrophoretic Deposition, ***Landon Oakes****, R.E. Carter, A.P. Cohn, C.L. Pint,* Vanderbilt University | **NS-MoM8** New 3D Structuring Process, by Ion Implantation and Selective Wet Etching, ***Lamia Nouri****, N.P. Posseme, S.L. LANDIS, F.G. GAILLARD, F.M. MILESI,* CEA, LETI, MINATEC Campus, France |
| 11:00am | **MS-MoM9** 3D Architectures for Thin Film Batteries – from Science to Manufacturing, ***Gary Rubloff****, C. Liu, E. Hitz, S.B. Lee,* University of Maryland College Park*; K. Gregorczyk,* University of Maryland, College Park | **NS-MoM9** Design and Realization of 3D Printed AFM Probes, *N. Alsharif, A. Burkatovsky, C. Lissandrello, A.E. White,* ***Keith Brown****,* Boston University |
| 11:20am | **INVITED: MS-MoM10** Advanced Manufacturing R&D for Clean Energy in the US Department of Energy, ***Mark Johnson****,* Advanced Manufacturing Office, U.S. Department of Energy | **NS-MoM10** Evaluating the Reproducibility of Atomically Precise Dopant Structures, *J. Koepke, D. Scrymgeour, R.J. Simonson, M. Marshall,* Sandia National Laboratories*; J. Owen,* Zyvex Labs*; D. Ward, R. Muller, M. Carroll, S. Misra,* ***Ezra Bussmann****,* Sandia National Laboratories |
| 11:40am | Invited talk continues. | |

| | **Plasma Science and Technology**<br>**Room 104D - Session PS+SE-MoM**<br>**Atmospheric Pressure Plasma Processing**<br>**Moderator:**<br>Lorenzo Mangolini, University of California Riverside | **Plasma Science and Technology**<br>**Room 104B - Session PS-MoM**<br>**Advanced FEOL/Gate Etching**<br>**Moderator:** Ankur Agarwal, Applied Materials, Inc. |
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| 8:20am | | **PS-MoM1** Novel Etch Strategies for Sidewall Image Transfer, ***Sonam Sherpa****, P. Chan, A. Ranjan,* Tokyo Electron Ltd. |
| 8:40am | | **PS-MoM2** Enhancing Fin Retention in Low-K Spacer Etch Processes Using a Highly Selective Etch Chemistry, *N.P. Marchack,* IBM Research Division, T.J. Watson Research Center*; E. Miller,* IBM Research at Albany Nanotech*; R.L. Bruce, H. Miyazoe, E.M. Sikorski,* ***Sebastian Engelmann****, E.A. Joseph,* IBM Research Division, T.J. Watson Research Center*; S. Kanakasabapathy,* IBM Research at Albany Nanotech |
| 9:00am | **PS+SE-MoM3** Fundamental Characterization of a Low Frequency, Ambient Air, Plasma Jet Discharge, ***Vladimir Milosavljevic****,* Dublin Institute of Technology, Ireland*; L. Scally, J. Lalor, P.J. Cullen,* Dublin Institute of Technology | **PS-MoM3** Effect of the Amount of Hydrogen During SiN etching on Etching Properties, ***Nobuyuki Kuboi****, H. Minari, M. Fukasawa, Y. Zaizen, J. Komachi, T. Kawamura, T. Tatsumi,* Sony Corporation, Japan |
| 9:20am | **PS+SE-MoM4** $CO_2$ Splitting by Dielectric Barrier Discharge at Atmospheric Pressure: Understanding the Influence of Electrical Regimes and Electrical Configurations, ***Alp Ozkan****, T. Dufour,* Université Libre de Bruxelles, Belgium*; A. Bogaerts,* University of Antwerp, Research group PLASMANT, Belgium*; F. Reniers,* Université Libre de Bruxelles, Belgium | **PS-MoM4** Dual Channel Si/SiGe Fin patterning for 10nm Node and Beyond, ***Fee Li Lie****, E. Miller, P. Xu, S. Sieg, M. Sankarapandian,* IBM Research*; S. Schmitz, P. Friddle,* Lam Research Corporation*; G. Karve, J. Strane,* IBM Research*; K.Y. Lim, K. Akarvardar, M.G. Sung,* GLOBALFOUNDRIES, Inc.*; S. Kanakabasapathy,* IBM Research |
| 9:40am | **PS+SE-MoM5** Effect of Structural Variations of the Monomer on the Fast Synthesis of Highly Oxygenated Coatings in an Argon DBD, ***Jérémy Mertens****, F. Reniers,* Université Libre de Bruxelles, Belgium | **INVITED: PS-MoM5** Computational Patterning and Process Emulation: Linchpins to Enable Continued Scaling through Design Technology Co-optimization for Advanced Nodes, ***Derren Dunn****,* IBM Corporation |
| 10:00am | **PS+SE-MoM6** Quantitative Study of Plasma Electrochemical Reduction of Aqueous Metal Salts*, S. Ghosh, A. Aube, R. O'Toole, R. Hawtof,* ***R.Mohan Sankaran****,* Case Western Reserve University | Invited talk continues. |
| 10:20am | **BREAK** | **BREAK** |
| 10:40am | **PS+SE-MoM8** LDPE Modified by an Ar/$H_2O$ Dielectric Barrier Discharge: Correlation between Texturization, Wettability and Grafting of Oxygen, ***Stéphanie Collette****,* Université Libre de Bruxelles, Belgium*; P. Viville,* Université de Mons, Belgium*; F. Reniers,* Université Libre de Bruxelles, Belgium | **PS-MoM8** Overcoming Challenges of sub-10NM FinFET Gate Etching in Halogenated Plasmas., ***Sergey Voronin****,* TEL Technology Center, America, LLC*; J.R. Sporre, S. Kanakasabapathy,* International Business Machines – Research Division*; A. Ranjan,* TEL Technology Center, America, LLC |
| 11:00am | **PS+SE-MoM9** Particle-free Fabrication of Stretchable, Electrically Conductive Features by Atmospheric-Pressure Plasma Reduction of Metal-Ion-Containing Polymer Films, ***Souvik Ghosh***[*]*, P.X.-L. Feng, C.A. Zorman, R.M. Sankaran,* Case Western Reserve University | **PS-MoM9** Gate Etch Challenges Introduced by FinFET Gate Pitch Scaling, ***John Sporre****,* IBM Research Division*; X. Liu,* IBM Research Division, T.J. Watson Research Center*; S. Seo,* IBM Research Division*; C. Prindle,* GLOBALFOUNDRIES, Inc.*; P. Montanini,* IBM Research Division*; R. Xie,* GLOBALFOUNDRIES, Inc.*; M. Sankarapandian, S. Mehta, M. Breton, S. McDermott, S. Kanakasabapathy,* IBM Research Division*; B. Haran,* IBM Research |
| 11:20am | **PS+SE-MoM10** Plasma Polymerised 4-vinyl Pyridine Films with High Charge Density Synthesised in Atmospheric Roll-to-Roll System, ***Hindrik de Vries****,* FOM institute DIFFER, Netherlands*; W. van Baak, S.A. Starostin,* FUJIFILM Manufacturing Europe B.V., Netherlands*; M.C.M. van de Sanden,* FOM institute DIFFER, Netherlands | **PS-MoM10** Hybrid Fin reveal for tight Fin Pitch Technologies, ***Peng Xu****,* IBM Research Division*; P. Wang,* Lam Research Corporation*; T. Devarajan,* IBM Research Division*; B. Nagabhirava, A. Basavalingappa,* Lam Research Corporation*; F.L. Lie, J. Strane, M. Sankarapandian, S. Mehta, R. Conti,* IBM Research Division*; M. Goss,* LAM Research Corporation*; D. Canaperi, D. Guo, S. Kanakasabapathy,* IBM Research Division |
| 11:40am | **PS+SE-MoM11** Plasma-Surface Interactions in Atmospheric Pressure Plasmas: *In Situ* Measurements of Local Excitations in Thin Films, ***Scott Walton****,* Naval Research Laboratory*; B.M. Foley,* University of Virginia*; D.R. Boris, E.D. Gillman, S.C. Hernández,* Naval Research Laboratory*; A. Giri,* University of Virginia*; Tz.B. Petrova, G.M. Petrov,* Naval Research Laboratory*; P.E. Hopkins,* University of Virginia | **PS-MoM11** Damage Free Plasma Etching Processes for the Patterning of InGaAs fin for the sub-10nm Technological Node, ***Maxime Bizouerne****, E. Pargon,* LTM, Univ. Grenoble Alpes, CEA-LETI, France*; P. Burtin,* CEA, LETI, MINATEC Campus, France*; C. Petit-Etienne, E. Latu-Romain, S. Labau, M. Martin,* LTM, Univ. Grenoble Alpes, CEA-LETI, France |

[*] **Coburn & Winters Student Award Finalist**

| | **Novel Trends in Synchrotron and FEL-Based Analysis Focus Topic**<br>**Room 103C - Session SA+AS+MI-MoM**<br>**Advances in High-Resolution Imaging Techniques (8:20-10:20 am)/Pushing the Limits with X-Ray Spectroscopy (10:40 am-12:00 pm)**<br>**Moderators:** Maya Kiskinova, Elettra-Sincrotrone Trieste, Italy, Claus Michael Schneider, Forschungszentrum Juelich GmbH | **Scanning Probe Microscopy Focus Topic**<br>**Room 104A - Session SP+AS+MI+NS+SS-MoM**<br>**Advances in Scanning Probe Microscopy**<br>**Moderators:**<br>Saban Hus, Oak Ridge National Laboratory,<br>Chanmin Su, Bruker Nano |
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| 8:20am | **INVITED: SA+AS+MI-MoM1** Molecular Coherent Imaging using X-ray FEL Pulses, ***Henry Chapman,*** DESY, Hamburg, Germany | **SP+AS+MI+NS+SS-MoM1** Ultrafast Imaging of Polarization Switching in Ferroelectrics via Complete Information Acquisition in SPM, ***Suhas Somnath,*** *A. Belianinov, S.V. Kalinin, S. Jesse,* Oak Ridge National Laboratory |
| 8:40am | Invited talk continues. | **SP+AS+MI+NS+SS-MoM2** Development of Synchrotron X-ray Scanning Tunneling Microscopy, ***Nozomi Shirato,*** Center for Nanoscale Materials at Argonne National Laboratory*; H. Chang,* Ohio University*; M. Cummings,* Advanced Photon Source at Argonne National Laboratory*; S.W. Hla,* Center for Nanoscale Materials at Argonne National Laboratory*; V. Rose,* Advanced Photon Source at Argonne National Laboratory |
| 9:00am | **INVITED: SA+AS+MI-MoM3** Applications of Novel Hard X-ray Nanoprobe in Nanoscience, ***Gema Martinez-Criado,*** Madrid Materials Science Instititute, CSIC, Spain | **SP+AS+MI+NS+SS-MoM3** Development and Integration of a Universal SPM head: Design Criteria and Challenges, *B. Guenther,* Sigma Surface Science GmbH, Germany*; J. Hilton,* Mantis Deposition*; A. Feltz,* Sigma Surface Science GmbH*;* ***Andreas Bettac,*** Sigma Surface Science GmbH, Germany |
| 9:20am | Invited talk continues. | **SP+AS+MI+NS+SS-MoM4** How Soft Is a Protein? Stress-Strain Curve of Antibody Pentamers with 5 pN and 50 pm Resolutions, ***Alma Perrino**,*** Instituto de Ciencia de Materiales de Madrid, CSIC, c/ Sor Juana Ines de la Cruz 3, 28049 Madrid, Spain*; R. Garcia,* Instituto de Ciencia de Materiales de Madrid, CSIC,, Spain |
| 9:40am | **INVITED: SA+AS+MI-MoM5** Operando Study of Energy Materials with Synchrotron X-ray Imaging Techniques, ***Jiajun Wang,*** Brookhaven National Laboratory | **INVITED: SP+AS+MI+NS+SS-MoM5** AVS Medard W. Welch Award Talk: Action Spectroscopy: Characterizing Molecules at Surfaces and its Dynamics, ***Maki Kawai†,*** Institute for Molecular Science, Japan*; Y. Kim,* RIKEN Surface and Interface Science Laboratory, Wako, Saitama, Japan*; K. Motobayashi,* Nagoya Institute of Technology, Japan*; H. Ueba,* Toyama University, Japan |
| 10:00am | Invited talk continues. | Invited talk continues. |
| 10:20am | **BREAK** | **BREAK** |
| 10:40am | **INVITED: SA+AS+MI-MoM8** Extreme X-ray Flux to Probe Picosecond Dynamics, ***Alfred Baron,*** RIKEN SPring-8, Japan | **INVITED: SP+AS+MI+NS+SS-MoM8** Near-Field Spectroscopy and Imaging of Single Nanoparticles, ***Yohannes Abate,*** *D. Seidlitz, A. Fali, S. Gamage, V.E. Babicheva, V.S. Yakovlev, M.I. Stockman,* Georgia State University*; R. Collazo, D. Alden,* North Carolina State University*; N. Deitz,* Georgia State University |
| 11:00am | Invited talk continues. | Invited talk continues. |
| 11:20am | **INVITED: SA+AS+MI-MoM10** Beating Complexity through Selectivity: Anti-Stokes Resonant Inelastic X-ray Scattering for Excited State Dynamics, ***Alexander Föhlisch,*** University of Potsdam, Germany | **SP+AS+MI+NS+SS-MoM10** Atomically-resolved Three-dimensional Structures of Electrolyte Aqueous Solutions near a Solid Surface, ***Daniel Martin-Jimenez,*** *E. Chacon,* Instituto de Ciencia de Materiales de Madrid, CSIC, Spain*; P. Tarazona,* IFIMAC Condensed Matter Physics Center, UAM, Spain*; R. Garcia,* Instituto de Ciencia de Materiales de Madrid, CSIC, Spain |
| 11:40am | Invited talk continues. | **SP+AS+MI+NS+SS-MoM11** Super-resolution Optical and Chemical Imaging of Organic Thin Films using Tip-enhanced Near-Field Optical Microscopy, *A.L. Heilman, R. Hermann,* ***Michael Gordon,*** University of California at Santa Barbara |

*** NSTD Student Award Finalist**

**† Medard W. Welch Award Winner**

| | **Surface Science**<br>**Room 104E - Session SS+AS+HC-MoM**<br>**Mechanistic Insights on Surface Reactions in Catalysis and at Novel Interfaces**<br>**Moderator:** Bruce D. Kay, Pacific Northwest National Laboratory | **Thin Film**<br>**Room 105A - Session TF-MoM**<br>**ALD Precursors and Surface Reactions**<br>**Moderators:** Robert Grubbs, Micron Technology, Erwin Kessels, Eindhoven University of Technology, Netherlands |
|---|---|---|
| 8:20am | **SS+AS+HC-MoM1** Study of Metal-Organic Complexation at Metal and Metal Oxide Surfaces by HREELS, ***Miao Wang***, *C. Williams, S.L. Tait,* Indiana University | **INVITED: TF-MoM1** New Heteroleptic Precursors Enabling Industrial Scale ALD of Next Generation Metal Oxides and Metal Films, ***Nicolas Blasco***, Air Liquide, France |
| 8:40am | **SS+AS+HC-MoM2** Studies of Single-site Catalysts on Powdered Oxide Support through Redox Assembly, ***Linxiao Chen***, *J.P. McCann, S.L. Tait,* Indiana University | Invited talk continues. |
| 9:00am | **INVITED: SS+AS+HC-MoM3** Controlled Reactions of Coordination Complexes on Oxide Surfaces, ***Susannah Scott***, University of California at Santa Barbara | |
| 9:20am | Invited talk continues. | **TF-MoM4** Time-resolved IR Spectroscopy during ALD of $La_2O_3/Al_2O_3$ Nanolaminates, ***Brent Sperling***, *J.E. Maslar, B. Kalanyan,* National Institute of Standards and Technology (NIST) |
| 9:40am | **SS+AS+HC-MoM5** Adsorption and Activation of $CO_2$ on Cu(997) at Low Temperature, ***Jun Yoshinobu***, The University of Tokyo, Japan | **INVITED: TF-MoM5** Incomplete Elimination of Precursor Ligands during Atomic Layer Deposition of Metal Oxides, ***Adrie Mackus***, Eindhoven University of Technology, Netherlands; *C. MacIsaac,* Stanford University; *V. Vandalon, W.M.M. Kessels,* Eindhoven University of Technology, Netherlands; *S.F. Bent,* Stanford University |
| 10:00am | **SS+AS+HC-MoM6** $D_2O$ Interaction with Planar ZnO(0001) Bilayer Supported on Au(111): Structures, Energetics and Influence of Hydroxyls, ***Xingyi Deng***, *D.C. Sorescu, J. Lee,* National Energy Technology Laboratory | Invited talk continues. |
| 10:20am | **BREAK** | **BREAK** |
| 10:40am | **SS+AS+HC-MoM8** Nanoscale Silicon as a Catalyst for Graphene Growth: Mechanistic Insight from In-Situ Raman Spectroscopy, ***Keith Share***, *R.E. Carter,* Vanderbilt University; *P. Nikolaev, D. Hooper,* Air Force Research Laboratory; *L. Oakes, A.P. Cohn,* Vanderbilt University; *R. Rao,* Air Force Research Laboratory; *A.A. Puretzky,* Oak Ridge National Lab; *D.B. Geohegan, B. Maruyama,* Air Force Research Laboratory; *C.L. Pint,* Vanderbilt University | **TF-MoM8** Surface Chemistry of Pt and Al2O3 ALD Studied with Vibrational Sum-Frequency Generation, ***Vincent Vandalon***, *W.M.M. Kessels,* Eindhoven University of Technology, Netherlands |
| 11:00am | **SS+AS+HC-MoM9** Functionalization of Graphene on Ru(0001) with Atomic Oxygen, ***Zbynek Novotny***, Pacific Northwest National Laboratory; *F.P. Netzer,* Karl-Franzens University, Austria; *Z. Dohnálek,* Pacific Northwest National Laboratory | **TF-MoM9** Surface Chemistry of Molybdenum Oxide Atomic Layer Deposition: Role of Precursor Chemisorption on Nucleation Delay and Initiating the ALD Process, ***Charith Nanayakkara***, *A. Vega,* The University of Texas at Dallas; *G. Liu, C. Dezelah, R. Kanjolia,* SAFC Hitech; *Y.J. Chabal,* University of Texas at Dallas |
| 11:20am | **SS+AS+HC-MoM10** Interaction of BaO with $H_2O$, $CO_2$ and $NO_2$ Studied with APXPS and NEXAFS, ***Osman Karslioglu***, *I. Zegkinoglou, L. Trotochaud, H. Bluhm,* Lawrence Berkeley National Laboratory | **TF-MoM10** *In situ* FTIR Study of the Surface Reactions during Plasma-assisted Atomic Layer Deposition of $SiN_x$ from Silicon Amides, ***Noemi Leick***, *R.A. Ovanesyan, R.J. Gasvoda, P. Walker,* Colorado School of Mines; *K.M. Kelchner, D.M. Hausmann,* Lam Research Corporation; *S. Agarwal,* Colorado School of Mines |
| 11:40am | | |

**Vacuum Technology**
**Room 104C - Session VT-MoM**
**Vacuum Measurement, Calibration, Primary and Industry Standards**
**Moderators:** Yulin Li, Cornell Laboratory for Accelerator-Based Sciences and Education, Joe Becker, Kurt J. Lesker Company

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| 8:20am | **INVITED: VT-MoM1** Industry Practice for Using Primary Leak Standards to Validate Calibration Methods, ***Jason Alfrey,*** VACUUM TECHNOLOGY INC | |
| 8:40am | Invited talk continues. | |
| 9:00am | **VT-MoM3** Fixed Length Optical Cavity for Photonic Realization of the Pascal, ***Jay Hendricks,*** *J. Ricker, P. Egan, J. Stone, G. Scace, G.F. Strouse,* National Institute of Standards and Technology | |
| 9:20am | **VT-MoM4** Analysis of a Quantum Based Refractometer to Replace Mercury Manometers as the Primary Standard for the United States, ***Jacob Ricker,*** *J. Hendricks, P. Egan, J. Stone,* NIST | |
| 9:40am | **VT-MoM5** Creating Vacuum Standards in the UHV and XHV to Support Cold-Atom Physics and Other Cool Stuff, ***James A. Fedchak,*** *J. Scherschligt, M.S. Sefa, S. Eckel, D. Barker,* National Institute of Standards and Technology (NIST) | |
| 10:00am | **VT-MoM6** Technical Challenges of the Cold Atom Vacuum Standard, ***Julia Scherschligt,*** *J.A. Fedchak, M.S. Sefa, S. Eckel, D. Barker,* National Institute of Standards and Technology (NIST) | |
| 10:20am | **BREAK** | |
| 10:40am | **VT-MoM8** Investigation of a Novel Cold Cathode Ionization Gauge Geometry with Wide Range from High Vacuum to Atmosphere in a Single Gauge, *T.R. Swinney, C. Percy,* ***Gerardo Alejandro Brucker,*** Pressure & Vacuum Measurement Solutions, MKS Instruments, Inc. | |
| 11:00am | **VT-MoM9** Advanced Manufacturing Techniques for Cold Cathode Ionization Gauges, ***Clinton Percy,*** Pressure & Vacuum Measurement Solutions, MKS Instruments, Inc. | |
| 11:20am | **VT-MoM10** Operation and Performance of a Wide Range Cold Cathode Ionization Gauge, ***Tim Swinney,*** *C. Percy,* Pressure & Vacuum Measurement Solutions, MKS Instruments, Inc. | |
| 11:40am | **VT-MoM11** Improving Process Resistance of Capacitance Diaphragm Gauges, *B. Andreaus, C. Strietzel,* ***Martin Wüest,*** INFICON Ltd., Liechtenstein | |

| | **2D Materials Focus Topic**<br>**Room 103B - Session 2D+MI-MoA**<br>**Dopants, Defects and Interfaces in 2D Materials**<br>**Moderators:**<br>Philip Hofmann, Aarhus University, Denmark,<br>Adina Luican-Mayer, University of Ottawa, Canada | **Applied Surface Science**<br>**Room 101B - Session AS+BI-MoA**<br>**Practical Surface Analysis I: Advancing Biological Surface Analysis/Imaging Beyond 'Show and Tell'**<br>**Moderators:** Ian S. Gilmore, National Physical Laboratory, UK,<br>Jordan Lerach, The Pennsylvania State University |
|---|---|---|
| 1:40pm | **2D+MI-MoA1** High-k Dielectrics on $WSe_2$ by Ozone-based Atomic Layer Deposition: An In-situ XPS Study, ***Angelica Azcatl***, *R.M. Wallace,* The University of Texas at Dallas | **AS+BI-MoA1** A Multi-technique Approach for Studying the Effect of Protein G B1 Orientation on Antibody Binding, ***Elisa Harrison***, *G. Interlandi, D.G. Castner,* University of Washington |
| 2:00pm | **2D+MI-MoA2** A Two-step Atomic Layer Etching on $MoS_2$ Realized by Remote $O_2$ Plasma, ***Hui Zhu***, *X. Qin, L. Cheng, A. Azcatl, J. Kim, R.M. Wallace,* University of Texas at Dallas | **AS+BI-MoA2** ME-SIMS Revisited: Attempting to Unlock the Potential using Advancements in Sample Preparation and SIMS Technology, ***Nina Ogrinc Potocnik***, Maastricht University, The Netherlands; *C.R. Anderton, L. Pasa-Tolic,* Pacific Northwest National Laboratory; *R.M.A. Heeren,* Maastricht University, The Netherlands |
| 2:20pm | **INVITED: 2D+MI-MoA3** Engineering the Atomic Structure of 2D Transition Metal Dichalcogenides using Electron Beam: Experiments and Simulations, ***Arkady Krasheninnikov***, Helmholtz Zentrum Dresden-Rossendorf, Germany | **INVITED: AS+BI-MoA3** Improvements in SIMS Methods and Instrumentation in Effort to Make Measurements Biologists Can Use, ***Christopher R. Anderton***, Pacific Northwest National Laboratory |
| 2:40pm | Invited talk continues. | Invited talk continues. |
| 3:00pm | **2D+MI-MoA5** New Computational Tool for Electron Localization: Application to Low-dimensional Monolayers of h-BN and $MoS_2$, ***Chinedu Ekuma***, NRC/NRL Postdoctoral Fellow; *V. Dobrosavljevic,* Florida State University; *D. Gunlycke,* Naval Research Laboratory | **AS+BI-MoA5** Towards Bacterial Differentiation with Quantitative SIMS, ***Christopher Szakal***, *S. Da Silva,* National Institute of Standards and Technology (NIST); *N. Olson,* National Institute of Standards and Technology(NIST) |
| 3:20pm | **2D+MI-MoA6** Effects of helium-ion beam irradiation on opto-electrical properties of multi-layers WSe2, ***Anna Hoffman***, *P.R. Pudasaini, M.G. Stanford, P.D. Rack, D.G. Mandrus, N. Cross, J.H. Noh, M. Koehler, G. Duscher,* The University of Tennessee Knoxville; *A. Belianinov, A.J. Rondinone,* Oak Ridge National Laboratory; *I. Ivanov, T.Z. Ward,* Oak Ridge National Lab | **AS+BI-MoA6** New Insights into the Microenvironment of Cancerous Tissue by Combined Mass Spectrometry, Microscopy and Multivariate Analysis, ***Tina Angerer***, University of Gothenburg, Sweden; *Y. Magnusson, G. Landberg,* Sahlgrenska Cancer Center, Sweden; *J.S. Fletcher,* University of Gothenburg, Sweden |
| 3:40pm | **BREAK** | **BREAK** |
| 4:00pm | **2D+MI-MoA8** $CO_2$ Adsorption Kinetics on Nitrogen Doped Graphene and Graphite, ***Takahiro Kondo***, *R. Shibuya, D. Guo, J. Nakamura,* University of Tsukuba, Japan | **AS+BI-MoA8** Super-resolution Mass Spectrometry Imaging of Biological Materials with the New 3D nanoSIMS, ***Ian S. Gilmore***, *M.K. Passarelli,* National Physical Laboratory, UK; *A. Pirkl, R. Moellers, E. Niehuis,* ION-TOF GmbH, Germany; *A.A. Makarov,* Thermo Fisher Scientific; *H.F. Arlinghaus,* ION-TOF GmbH, Germany; *R. Havelund, P.D. Rakowska, A.M. Race, A.G. Shard,* National Physical Laboratory, UK; *A. West,* GlaxoSmithKline; *S. Horning,* Thermo Fisher Scientific; *P. Marshall,* GlaxoSmithKline; *M.R. Alexander,* The University of Nottingham, UK; *C.T. Dollery,* GlaxoSmithKline |
| 4:20pm | **2D+MI-MoA9** Electronic Structure of Metallic Twin Grain Boundaries in Monolayer $MoSe_2$, ***Matthias Batzill***, University of South Florida | **AS+BI-MoA9** High-resolution, Sub-cellular Imaging of Pharmaceutical Localization by Correlative SIMS and TEM, ***Paulina Rakowska***, National Physical Laboratory, UK; *H. Jiang,* University of Western Australia; *I.S. Gilmore,* National Physical Laboratory, UK |
| 4:40pm | | **INVITED: AS+BI-MoA10** Sub-Micron Imaging and Identification of Molecular Chemistry by TOF-SIMS Parallel Imaging MS/MS, ***Gregory Fisher***[*], Physical Electronics; *N. Ogrinc Potocnik, A.L. Bruinen,* Maastricht University, The Netherlands; *J.S. Hammond, S.R. Bryan,* Physical Electronics; *R.M.A. Heeren,* Maastricht University; *S. Iida, T. Miyayama,* ULVAC-PHI |
| 5:00pm | | Invited talk continues. |

[*] **ASSD Peter Sherwood Award**

| | **Electronic Materials and Photonics**<br>**Room 102A - Session EM-MoA**<br>**Surface and Interface Challenges in Wide Bandgap Materials**<br>**Moderators:** Charles Eddy Jr., U.S. Naval Research Laboratory, Rachael Myers-Ward, U.S. Naval Research Laboratory | **Magnetic Interfaces and Nanostructures**<br>**Room 101C - Session MI+2D+AC-MoA**<br>**Magnetism and Spin Orbit Effects at Interfaces and Surfaces: Recent Experimental and Theoretical Advances**<br>**Moderator:** Valeria Lauter, Oak Ridge National Laboratory |
|---|---|---|
| 1:40pm | **INVITED: EM-MoA1** ALD Gate Dielectrics for GaN HEMTs, ***Andrea Corrion,*** HRL Laboratories, LLC | **MI+2D+AC-MoA1** Bi-$_1$Te$_1$: A New Dual Topological Insulator, ***Lukasz Plucinski,*** *M. Eschbach, M. Lanius, C. Niu, E. Mlynczak, P. Gospodaric,* FZ Jülich GmbH, Germany*; J. Kellner,* RWTH Aachen University, Germany*; P. Schüffelgen, M. Gehlmann, S. Döring, E. Neumann, M. Luysberg, B. Holländer, G. Mussler,* FZ Jülich GmbH, Germany*; M. Morgenstern,* RWTH Aachen University, Germany*; D. Grützmacher, G. Bihlmayer, S. Blügel, Schneider,* FZ Jülich GmbH, Germany |
| 2:00pm | Invited talk continues. | **MI+2D+AC-MoA2** Spin-Polarized Scanning Tunneling Microscopy of a Two-Dimensional Ferromagnetic Semiconductor at Room-Temperature, ***Yingqiao Ma,*** *A.R. Smith,* Ohio University*; A. Barral, V. Ferrari,* Centro At´omico Constituyentes, GIyA, CNEA, Argentina |
| 2:20pm | **EM-MoA3** Advances in High-k Dielectric Integration with Ga-polar and N-polar GaN, ***Charles Eddy, Jr.,*** U.S. Naval Research Laboratory*; C.R. English,* University of Wisconsin*; V.D. Wheeler,* U.S. Naval Research Laboratory*; D.I. Shahin,* University of Maryland College Park*; N.Y. Garces,* U.S. Patent & Trade Office*; A. Nath, J.K. Hite, M.A. Mastro, T.J. Anderson,* U.S. Naval Research Laboratory | **INVITED: MI+2D+AC-MoA3** Spin-Orbit Induced Surface States of Rashba Systems and Topological Insulators, ***Peter Krüger,*** *T. Förster, M. Rohlfing, P. Eickholt, A.B. Schmidt, M. Donath,* Westfälische Wilhelms-Universität Münster, Germany |
| 2:40pm | **EM-MoA4** Effects of Surface Cleaning and Different Metals as Schottky Contacts to Bulk and Epitaxial β-$Ga_2O_3$, ***Yao Yao,*** *R. Gangireddy, J. Kim,* Carnegie Mellon University*; T. Salagaj, N. Sbrockey, G.S. Tompa,* Structured Materials Industries, Inc.*; K.K. Das,* JBP Materials*; R.F. Davis, L.M. Porter,* Carnegie Mellon University | Invited talk continues. |
| 3:00pm | **INVITED: EM-MoA5** Deep Traps in Wide Bandgap Semiconductors: From GaN to beta-$Ga_2O_3$, ***Steven Ringel,*** *A. Arehart, E. Farzana, Z. Zhang,* The Ohio State University*; E. Ahmadi, Y. Oshima, J. Speck,* University of California at Santa Barbara | **INVITED: MI+2D+AC-MoA5** Spin-Resolved Momentum Microscopy of Strongly Correlated Electron Systems and Topological Insulators, ***Christian Tusche,*** Forschungszentrum Jülich, Germany |
| 3:20pm | Invited talk continues. | Invited talk continues. |
| 3:40pm | **BREAK** | **BREAK** |
| 4:00pm | **EM-MoA8** Study of Oxygen and Moisture Effect on Device Instability of Bottom-Gate ZnO Transistors with Sol-Gel Derived Channel Layers, ***Kosala Yapabandara,*** *M. Park, M.C. Hamilton, D.-J. Kim, V. Mirkhani, S. Wang, M. Sultan, B. Ozden, M.P. Khanal, S. Uprety, Y. Chung,* Auburn University*; M.H. Sk,* Qatar University, Qatar | **MI+2D+AC-MoA8** Spin-orbit-Induced Effects in the Electronic Structure of W(110) and Ta(110): Similarities and Differences, ***Markus Donath,*** *K. Miyamoto, H. Wortelen, B. Engelkamp,* Muenster University, Germany*; H. Mirhosseini,* Max Planck Institute for Microstructure Physics, Germany*; T. Okuda,* Hiroshima Synchrotron Radiation Center, Japan*; A. Kimura,* Hiroshima University, Japan*; A.B. Schmidt,* Muenster University, Germany*; J. Henk,* Martin Luther University Halle-Wittenberg, Germany |
| 4:20pm | **EM-MoA9** Depth Dependent Modification of Optical Constants Arising from $H^+$ Implantation in n-type 4H-SiC Measured using Coherent Acoustic Phonons, ***Andrey Baydin,*** *H. Krzyzanowska,* Vanderbilt University*; M. Dhanunjaya, S.V.S. Nageswara Rao,* University of Hyderabad, India*; J.L. Davidson,* Vanderbilt University*; L.C. Feldman,* Vanderbilt University, Rutgers University*; N.H. Tolk,* Vanderbilt University | **MI+2D+AC-MoA9** Formation of a 2D Interface by Low Energy Proton Implantation in ZnO Microwires, ***Israel Lorite,*** *Y. Kumar,* Universität Leipzig, Germany*; B. Straube, S. Perez,* Universidad Nacional de Tucumán, Argentina*; C. Rodriguez,* Universidad Nacional de La Plata, Argentina*; P. Esquinazi,* Universität Leipzig, Germany |
| 4:40pm | **EM-MoA10** Electrical and Thermal Stability of ALD-TiN Schottky Gates for AlGaN/GaN HEMTs, *D.I. Shahin,* University of Maryland College Park*; **Travis Anderson,** V.D. Wheeler, M.J. Tadjer, A.D. Koehler, K. Hobart, C.R. Eddy Jr., F. Kub,* U.S. Naval Research Laboratory*; A. Christou,* University of Maryland College Park | **INVITED: MI+2D+AC-MoA10** Density Functional Studies of Magnetic and Spintronic Materials, ***Ruqian Wu,*** University of California Irvine |
| 5:00pm | **EM-MoA11** Spectroscopic Photo Current Voltage Measurements to Investigate Non-uniform Defect Distributions in AlGaN/GaN HEMT Hetererostructures, ***Burcu Ozden,*** *M.P. Khanal, C. Yang, L. Shen, V. Mirkhani, K. Yapabandara, M. Park,* Auburn University | Invited talk continues. |

| | **Manufacturing Science and Technology**<br>**Room 103A - Session MS-MoA**<br>**Advanced Manufacturing: Systems, Devices, and Materials**<br>**Moderator:** Gary Rubloff, Institute for System Research, University of Maryland | **Nanometer-scale Science and Technology**<br>**Room 101D - Session NS-MoA**<br>**Nanophotonics, Plasmonics, and Energy**<br>**Moderators:**<br>Stephane Evoy, University of Alberta, Canada,<br>Wei Wu, University of Southern California |
|---|---|---|
| 1:40pm | **INVITED: MS-MoA1** Metrology of Laser-based Powder Bed Fusion Additive Manufacturing Systems, ***John Slotwinski,*** The Johns Hopkins University Applied Physics Laboratory | **NS-MoA1** CIGS/CZTS based Solar Cells with Thin Films or Nanowires Cell Configuration, ***Mohammad Islam,*** King Saud University, Saudi Arabia*; M. Akram, M. Mujahid,* National University of Sciences and Technology, Pakistan |
| 2:00pm | Invited talk continues. | **NS-MoA2** The Effects of N Incorporation in GaAsSb/GaAs Core-shell Nanowires, ***Prithviraj Deshmukh****, P. Kasanaboina,* NCA&T State University*; C. Reynolds Jr., Y. Liu,* North Carolina State University*; S. Iyer,* NCA&T State University |
| 2:20pm | **MS-MoA3** Investigation of Superconductive Heavily Doped Boron Diamond for Device Fabrication, ***Delroy Green****, G.L. Harris,* Howard University*; R.D. Vispute,* Bluewave Semiconductor Inc. | **INVITED: NS-MoA3** Exploitation of Microwave Interaction and Photoconductive Effects in $TiO_2$ Nanotube/Nanowire Arrays for Use in Light Harvesting and Sensing Devices, ***Karthik Shankar,*** University of Alberta and The National Institute for Nanotechnology, Canada*; M.H. Zarifi, S. Farsinezhad, M. Daneshmand,* University of Alberta, Canada |
| 2:40pm | **MS-MoA4** Two-Dimensional Layered Materials For Composites Applications, ***Jorge Catalan****, A. Delgado, A.B. Kaul,* University of Texas at El Paso | Invited talk continues. |
| 3:00pm | **INVITED: MS-MoA5** Architectonics and Multi-Materials in Big Additive Manufacturing Clusters, *S.H. Gardner,* SG Advanced Manufacturing and Materials*;* ***Massimiliano Moruzzi****, M. Bergin, F. Lorio,* CTO-Autodesk Research, Canada | **INVITED: NS-MoA5** Next Generation Photovoltaics from Solution-processed Quantum Dot Assemblies, ***Joseph Luther,*** National Renewable Energy Laboratory |
| 3:20pm | Invited talk continues. | Invited talk continues. |
| 3:40pm | **BREAK** | **BREAK** |
| 4:00pm | **INVITED: MS-MoA8** AIM Photonics – Manufacturing Challenges for Photonic Integrated Circuits, ***Michael Liehr,*** SUNY Polytechnic Institute | **INVITED: NS-MoA8** Negative Index and Hyperbolic Metamaterials: Into the Ultra-Violet, ***Henri Lezec,*** National Institute of Standards and Technology (NIST) |
| 4:20pm | Invited talk continues. | Invited talk continues. |
| 4:40pm | **MS-MoA10** Development of III-Nitrides for Energy Harvesting Applications, *B. Kucukgok, N. Lu,* Purdue University*;* ***IanT. Ferguson****,* Missouri University of Science and Technology | **NS-MoA10** Probing Sub-5 nm Gap Plasmon Using Collapsible Nano-fingers, ***Boxiang Song****, W. Wu,* University of Southern California |
| 5:00pm | | **NS-MoA11** Strong Near-Field Coupling of Plasmonic Resonators Embedded in Si Nanowires, ***Dmitriy Boyuk****, L.-W. Chou, M.A. Filler,* Georgia Institute of Technology |

| | **Plasma Processing for Biomedical Applications Focus Topic**<br>**Room 101A - Session PB+BI+PS-MoA**<br>**Plasma Processing of Biomaterials**<br>**Moderators:** Denis Dowling, University College Dublin, Deborah O'Connell, University of York, UK | **Plasma Science and Technology**<br>**Room 104D - Session PS+AS+SS-MoA**<br>**Plasma Surface Interactions**<br>**Moderator:**<br>Michael Gordon, University of California at Santa Barbara |
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| 1:40pm | **PB+BI+PS-MoA1** Design of Bone Bioceramics with Controlled Drug Release and Suitable Biocompatibility through Plasma Polymerized Coatings, ***Kanupriya Khurana,*** Technical University of Catalonia, Spain; *F. Soldero, F. Muchklich,* Saarland University, Germany; *M.P. Ginebra, C. Canal,* Technical University of Catalonia, Spain | **INVITED: PS+AS+SS-MoA1** Atomic-scale Analyses of Plasma Etching for Unconventional Materials in Microelectronics, ***Satoshi Hamaguchi,*** *K. Karahashi,* Osaka University, Japan |
| 2:00pm | **PB+BI+PS-MoA2** Atmospheric Plasma Deposition of Antimicrobial Nano-Coatings on Biomedical Textiles, *A. Nikiforov, I. Kuchakova, T. Coenye, C. Leys,* Ghent University, Belgium; *N. Hojnik, M. Modic,* ***Uroš Cvelbar,*** Jozef Stefan Institute, Slovenia | Invited talk continues. |
| 2:20pm | **INVITED: PB+BI+PS-MoA3** Plasma Polymers for Biomedical Applications, ***Farzaneh Arefi-Khonsari,*** l'université Pierre et Marie Curie, France; *A. Baitukha, J. Pulpytel, A. Valinataj Omran,* Sorbonne Universités, UPMC, France | **PS+AS+SS-MoA3** Plasma Wall Interactions: $Y_2O_3$ Wall Interaction in $Cl_2$ Plasma Etching of Si and $NF_3$ Plasma Cleaning, ***Tianyu Ma,*** *T. List, V.M. Donnelly,* University of Houston |
| 2:40pm | Invited talk continues. | **PS+AS+SS-MoA4** Novel atomic order CD Control Technology by Fusion of Quasi-ALE and ALD, ***Yoshihide Kihara,*** *T. Hisamatsu,* Tokyo Electron Miyagi Limited, Japan; *T. Oishi, S. Ogawa, H. Watanabe,* Tokyo Electron Miyagi Limited; *A. Tsuji, M. Honda,* Tokyo Electron Miyagi Limited, Japan |
| 3:00pm | **INVITED: PB+BI+PS-MoA5** Plasma Coating Using Biologics: Degradation or Polymerisation?, ***Liam O'Neill,*** *J. O'Donoghue,* TheraDep, Ireland | **PS+AS+SS-MoA5** Development of a New Analysis Technique of Nanostructures Etched by Plasmas: Quasi In-Situ TEM EDX Characterization, ***Matthieu Serege,*** LTM, Univ. Grenoble Alpes, CEA-LETI; *G. Cunge,* LTM, Univ. Grenoble Alpes, CEA-LETI, France; *L. Vallier, E. Latu-Romain,* LTM, Univ. Grenoble Alpes, CEA-LETI; *O. Joubert,* LTM, Univ. Grenoble Alpes, CEA-LETI, France |
| 3:20pm | Invited talk continues. | **PS+AS+SS-MoA6** Atomistic Simulations of He Plasma Modification of Si/SiN Thin-Films for Advanced Etch Processes, ***Vahagn Martirosyan,*** LTM, Univ. Grenoble Alpes, CEA-LETI, France; *E. Despiau-Pujo,* CNRS - LTM, France; *O. Joubert,* LTM, Univ. Grenoble Alpes, CEA-LETI, France |
| 3:40pm | **BREAK** | **BREAK** |
| 4:00pm | **INVITED: PB+BI+PS-MoA8** Low and Atmospheric Pressure Plasma Polymerization for Immunosensing and Tissue Engineering, ***Lenka Zajickova,*** *A. Manakhov, E. Makhneva, J. Medalova, D. Necas,* Masaryk University, Czech Republic; *L. Strbkova,* Brno University of Technology, Czech Republic; *A. Obrusnik, M. Landova,* Masaryk University, Czech Republic | **PS+AS+SS-MoA8** SiGe Channel Materials Surface Preparation and Process Control in Advanced CMOS Technologies, ***Zhenxing Bi,*** *S. Mochizuki, T. Devarajan, S. Naczas, A. Arceo, M. Ebrish, D. Canaperi, C. Surisetty,* IBM Semiconductor Technology Research |
| 4:20pm | Invited talk continues. | **PS+AS+SS-MoA9** Patterned Chromium Hard Mask Etching in a Two Reactant Gas for Bit Patterned Media Template Fabrication, ***Daniel Staaks**,*** Molecular Foundry, Lawrence Berkeley National Lab; *X. Yang,* Seagate Technology; *S. Dallorto, S.D. Dhuey, S. Sassolini,* Molecular Foundry, Lawrence Berkeley National Lab; *K.Y. Lee,* Seagate Technology; *I.W. Rangelow,* Ilmenau University of Technology, Germany; *D.L. Olynick,* Molecular Foundry, Lawrence Berkeley National Lab |
| 4:40pm | **PB+BI+PS-MoA10** Low-Temperature Plasma Processing of Polymeric Materials for Biomedical Applications, ***Michelle Mann,*** *M.R. Maynard, E.R. Fisher,* Colorado State University | **PS+AS+SS-MoA10** Alternative Solutions for Nanometric-Precision Etching: H2 Plasmas Modification of Si/ SiN Thin-Films, ***Emilie Despiau-Pujo,*** *V. Martirosyan, O. Joubert,* LTM - CNRS/Univ Grenoble Alpes/CEA, France |
| 5:00pm | **PB+BI+PS-MoA11** Plasma-based Functionalization of Polystyrene Surfaces of Cell Culture Plates, ***Kazuma Nishiyama,*** *T. Ito, S. Sugimoto, K. Gotoh, M. Isobe,* Osaka University, Japan; *M. Okamoto,* Osaka University Hospital, Japan; *A. Myoui,* Osaka University Hospital, Japanl; *H. Yoshikawa, S. Hamaguchi,* Osaka University, Japan | **PS+AS+SS-MoA11** Plasma Dynamics at the Surface Interface in Low Pressure Capacitively and Inductively Coupled Plasmas, ***Martin Blake,*** *D. O'Connell,* University of York, UK; *A.R. Gibson,* LPP, CNRS, Ecole Polytechnique, Université Paris-Saclay, France; *T. Gans,* University of York, UK |

* **Coburn & Winters Student Award Finalist**

| | **Plasma Science and Technology**<br>**Room 104B - Session PS-MoA**<br>**Advanced BEOL/Interconnect Etching**<br>**Moderator:** Hisataka Hayashi, Toshiba, Japan | **Novel Trends in Synchrotron and FEL-Based Analysis Focus Topic**<br>**Room 103C - Session SA+AS-MoA**<br>**Frontiers of Photoemission with Synchrotron and XFEL Radiation/Advances in High-resolution Imaging Techniques**<br>**Moderators:** Maya Kiskinova, Elettra-Sincrotrone Trieste, Italy, Olivier Renault, CEA-University Grenoble Alps, France |
|---|---|---|
| 1:40pm | **PS-MoA1** The Search for New Multi-Pattern Etch Colors: Usual ($SiO_2$, SiN, SiC) and Unusual (hi-k, BN, BC:H) Suspects, ***Michelle Paquette,*** *S. Dhungana, B.J. Nordell, A.N. Caruso,* University of Missouri-Kansas City*; W.A. Lanford,* University at Albany*; G. Chollon, C. Pallier, F. Teyssandier,* Universite de Bordeaux, France*; K. Scharfenberger, D. Jacob, S.W. King,* Intel Corporation | **INVITED: SA+AS-MoA1** Photoemission with Soft and Hard X-Rays: Past, Present, and Future, ***Charles Fadley,*** University of California, Davis |
| 2:00pm | **PS-MoA2** An Investigation into the Mechanism of High Selectivity $SiO_x$ and $SiN_x$ Dielectric Etching, ***Robert Bruce,*** *H. Miyazoe, N.P. Marchack,* IBM Research Division, T.J. Watson Research Center*; J. Lee, J.C. Shearer,* IBM Research, Albany, NY*; JM. Papalia, S.U. Engelmann, E.A. Joseph,* IBM Research Division, T.J. Watson Research Center*; J.C. Arnold,* IBM Research, Albany, NY | Invited talk continues. |
| 2:20pm | **PS-MoA3** The Impact of Highly Selective Dielectric Etches on Etch Stop Layers, ***Andre Labonte,*** GLOBALFOUNDRIES*; A. Carr,* IBM*; J.M. Dechene,* GLOBALFOUNDRIES*; J.C. Shearer,* IBM*; J.M. Lucas, B. Messer, A. Metz,* Tokyo Electron America | **SA+AS-MoA3** Honorary Session for Prof. Charles Fadley*, O.J. Renault,* CEA-University Grenoble Alps, France*;* ***Julien Rault,*** Synchrotron SOLEIL, France |
| 2:40pm | **PS-MoA4** Plasma Etching of High Aspect Ratio Contacts in $SiO_2$ using $Ar/C_4F_8/O_2$ Mixtures: A Computational Investigation, ***Shuo Huang,*** *C.M. Huard,* University of Michigan*; S. Shim, S. Lee, I.-C. Song, S. Lu,* Samsung Electronics Co., Ltd.*; M.J. Kushner,* University of Michigan | **SA+AS-MoA4** Ultrafast Magnetization Relaxation Dynamics in $La_{0.66}Sr_{0.33}MnO_3$ Films, ***Tommaso Pincelli,*** Università di Milano, Italy*; A.Yu. Petrov, G. Panaccione,* Laboratorio TASC, IOM-CNR, Italy*; M. Oura,* RIKEN SPring-8, Japan*; T.L. Lee,* Diamond Light Source Ltd., UK*; G. Rossi,* Università di Milano, Italy |
| 3:00pm | **INVITED: PS-MoA5** BEOL & Interconnect Challenges in Memory Scaling, ***Mark Kiehlbauch,*** Micron Technology | **SA+AS-MoA5** Inelastic Background Analysis of Haxpes Spectra for Device Technology: A Non-Destructive Tool for Accessing Deeply Buried Interfaces, ***Charlotte Zborowski,*** *O.J. Renault, E. Martinez, A. Torres,* CEA, LETI, MINATEC Campus, France*; Y. Yamashita,* NIMS, Japan*; G. Grenet,* Inl, Ecl, France*; S. Tougaard,* SDU, Denmark |
| 3:20pm | Invited talk continues. | **SA+AS-MoA6** Soft X-ray ARPES Investigation of the Spin-polarized n-$BaTiO_3/SrRuO_3$ Buried interface, ***Julien Rault,*** *P. Le Fèvre, F. Bertran, J. Rebellato,* Synchrotron SOLEIL, France*; T. Maroutian, P. Lecoeur,* Université Paris-Sud - CNRS, France |
| 3:40pm | **BREAK** | **BREAK** |
| 4:00pm | **PS-MoA8** Control of Uniformity and Ion Energy Distributions in Tri-frequency Capacitively Coupled Plasmas Accounting for Finite Wavelength Effects, ***Peng Tian,*** *S. Huang,* University of Michigan*; S. Shim, S. Lee, I.-C. Song, S. Lu,* Samsung Electronics Co., Ltd.*; M.J. Kushner,* University of Michigan | **INVITED: SA+AS-MoA8** Progress and Perspectives in Photoemission using XFEL Radiation, ***Serguei Molodtsov,*** European XFEL GmbH, Germany |
| 4:20pm | **PS-MoA9** Metal Etch Mechanisms Using $NH_x$ and CN-based Chemistry, ***Nathan Marchack,*** IBM Research Division, T.J. Watson Research Center*; M. Yamazaki, Q. Yang, N. Joy,* TEL Technology Center, America, LLC*; S.U. Engelmann, E.A. Joseph,* IBM Research Division, T.J. Watson Research Center*; A. Ranjan,* TEL Technology Center, America, LLC | Invited talk continues. |
| 4:40pm | **PS-MoA10** The Impact of Gate Overlap on Self-Aligned Contact (SAC) Etching, ***Jeffrey Shearer,*** IBM Research Division, Albany*; A.P. Labonte,* GLOBALFOUNDRIES*; J.M. Lucas, A. Metz,* Tokyo Electron - TTCA*; J.C. Arnold,* IBM Research Division, Albany | **INVITED: SA+AS-MoA10** Revealing the Origins of Non-Joulian Magnetism with High-Resolution Photoemission Microscopy, ***Alexander Gray,*** *R.U. Chandrasena,* Department of Physics, Temple University*; H.D. Chopra,* Department of Mechanical Engineering, Temple University |
| 5:00pm | **PS-MoA11** Dynamic Plasma Etching of EUV Photoresist for Contact Profile Control and PR Selectivity Improvement, ***Hongyun Cottle,*** *I. Saraf, A. Metz, P. Biolsi,* TEL Technology Center, America, LLC | Invited talk continues. |

| | **Scanning Probe Microscopy Focus Topic**<br>**Room 104A - Session SP+2D+AS+NS+SS-MoA**<br>**Probing Topological States And Superconductivity**<br>**Moderators:** An-Ping Li, Oak Ridge National Laboratory, Chuanxu Ma, Oak Ridge National Laboratory | **Surface Science**<br>**Room 104E - Session SS+AS+HC-MoA**<br>**Metals, Alloys, and Oxides: Reactivity and Catalysis**<br>**Moderator:** David Mullins, Oak Ridge National Laboratory |
|---|---|---|
| 1:40pm | **INVITED: SP+2D+AS+NS+SS-MoA1** Tuning Dirac States by Strain in Topological Insulators, ***Lian Li,*** University of Wisconsin-Milwaukee | **SS+AS+HC-MoA1** Scanning Tunneling Microscopy Studies of Hydrogen adsorption on the $RuO_2$(110) Surface, ***Arjun Dahal,*** *R. Mu, Z. Dohnálek, I. Lyubinetsky,* Pacific Northwest National Laboratory |
| 2:00pm | Invited talk continues. | **SS+AS+HC-MoA2** Metal Vapor Adsorption Calorimetry on Layered Ca Niobate Nanosheets: Energetics and Adsorbate Structure, ***Wei Zhang,*** *J. Lownsbury,* University of Washington*; R. Uppuluri, T.E. Mallouk,* The Pennsylvania State University*; C.T. Campbell,* University of Washington |
| 2:20pm | **SP+2D+AS+NS+SS-MoA3** Detection of Current Induced Spin Polarization in Topological Insulators via Four-Probe Spectroscopy, ***Saban Hus,*** Oak Ridge National Laboratory*; Y. Chen,* Purdue University*; A.-P. Li,* Oak Ridge National Laboratory | **INVITED: SS+AS+HC-MoA3** Structure and Reactivity of Model Iron Oxide Surfaces, ***Gareth Parkinson,*** TU Wien, Austria |
| 2:40pm | **SP+2D+AS+NS+SS-MoA4** Switching Handedness of Chiral Solitons Under $Z_4$ Topology, ***Tae-Hwan Kim,*** Pohang University of Science and Technology, Republic of Korea*; S. Cheon, H.W. Yeom,* Institute for Basic Science (IBS), Republic of Korea | Invited talk continues. |
| 3:00pm | **INVITED: SP+2D+AS+NS+SS-MoA5** Spectroscopic-imaging STM Studies on Dirac-Landau Levels in the Topological Surface State, ***Tetsuo Hanaguri,*** RIKEN Center for Emergent Matter Science, Japan | **SS+AS+HC-MoA5** Structure and Ethanol Reactivity of Ti-modified $CeO_x$(111) Mixed Oxide Surfaces, *E.W. Peterson,* ***Jing Zhou,*** University of Wyoming |
| 3:20pm | Invited talk continues. | **SS+AS+HC-MoA6** New Insights into the Coverage-Dependent Structure and Desorption Kinetics of CO on Palladium(111), ***Pan Xu,*** Stony Brook University*; S.-Y. Hong,* Brookhaven National Laboratory*; S. Liu,* Stony Brook University*; N.R. Camillone, M.G. White, N. Camillone,* Brookhaven National Laboratory |
| 3:40pm | **BREAK** | **BREAK** |
| 4:00pm | **INVITED: SP+2D+AS+NS+SS-MoA8** The Rashba and Quantum Size Effects in Ultrathin Bi films, ***Toru Hirahara,*** Tokyo Institue of Technology, Japan | **SS+AS+HC-MoA8** Combined Experimental and Computational Study of Water on $Fe_3O_4$ (001), ***Jan Hulva,*** Vienna University of Technology, Austria*; M. Meier,* Universität Wien, Austria*; J. Pavelec, S. Maaß, R. Bliem, M. Schmid, U. Diebold,* Vienna University of Technology, Austria*; C. Franchini,* Universität Wien, Austria*; G.S. Parkinson,* Vienna University of Technology, Austria |
| 4:20pm | Invited talk continues. | **SS+AS+HC-MoA9** Water Desorption from Sulfur-Doped Oxide Thin Films on W (100), ***Anthony Babore,*** *J.C. Hemminger,* University of California Irvine |
| 4:40pm | **SP+2D+AS+NS+SS-MoA10** Understanding the Microscopic Effects of Annealing in $Ba(Fe_{1-x}Co_x)_2As_2$ Superconductor, ***Qiang Zou,*** *Z. Wu, Q. Zheng, S. Rajputt, D.S. Parker, A.S. Sefat, Z. Gai,* Oak Ridge National Laboratory | **SS+AS+HC-MoA10** Adsorption and Decomposition of Dimethyl Methylphosphonate on Metal Oxide Surfaces Under Atmospheric Conditions, ***Ashley Head,*** *L. Trotochaud,* Lawrence Berkeley National Laboratory (LBNL)*; R. Tsyshevsky,* University of Maryland College Park*; O. Karslioglu,* Lawrence Berkeley National Laboratory (LBNL)*; M.M. Kuklja,* University of Maryland College Park*; H. Bluhm,* Lawrence Berkeley National Laboratory (LBNL) |
| 5:00pm | **SP+2D+AS+NS+SS-MoA11** Annealing Effect on the Properties of Superconducting Parent $BaFe_2As_2$ Crystal, ***Shivani Rajput,*** *Q. Zou, A.S. Sefat, Z. Gai,* Oak Ridge National Laboratory | **SS+AS+HC-MoA11** Oxygen Chemisorption and Thermal Oxidation of TiAlN High Power Pulsed Magnetron Sputtering Hard Coatings, ***Martin Wiesing,*** *T. de los Arcos, G. Grundmeier,* University of Paderborn, Germany |

| | **Thin Film**<br>**Room 105A - Session TF+EM-MoA**<br>**ALD for Energy Conversion and Storage**<br>**Moderators:** Virginia Wheeler, U.S. Naval Research Laboratory, Angel Yanguas-Gil, Argonne National Laboratory | **Thin Film**<br>**Room 102B - Session TF+PS+SE-MoA**<br>**Plasma-based Deposition Techniques and Film Characterization**<br>**Moderators:** Jim Fitz-Gerald, University of Virginia, Tansel Karabacak, University of Arkansas at Little Rock |
|---|---|---|
| 1:40pm | **TF+EM-MoA1** Fabrication of Nano-power Generators using Thin Atomic Layer Deposited Films, ***Giovanna Scarel,*** *H.S. Mann, B.N. Lang,* James Madison University*; V.D. Wheeler,* Naval Research Laboratory*; B.C. Utter,* Bucknell University | **TF+PS+SE-MoA1** Microcrystalline Silicon Thin Film Deposited by Tailored Voltage Waveform Plasmas using an $SiF_4/H_2$/Ar Chemistry and its Application to Photovoltaics, ***Junkang Wang,*** LPICM, CNRS, École Polytechnique, Université Paris Saclay, France*; M. Elyaakoubi,* TFSC-Instrument, Palaiseau, France*; E.V. Johnson,* LPICM, CNRS, École Polytechnique, Université Paris Saclay, France |
| 2:00pm | **TF+EM-MoA2** Ultrafast Triggered Transient Energy Storage by Atomic Layer Deposition Into Porous Silicon for Integrated Transient Electronics, ***Anna Douglas,*** *N. Muralidharan, R.E. Carter, K. Share, C.L. Pint,* Vanderbilt University | **TF+PS+SE-MoA2** Boron Carbide-Aromatic Composite Films by PECVD: A Novel Approach to Electron-hole Separation, *B. Dong, A. Oyelade,* University of North Texas*; E.M. Echeverria,* University of Nebraska-Lincoln*; Y-S. Jun, G.D. Stucky,* University of California at Santa Barbara*; P.A. Dowben,* University of Nebraska-Lincoln*;* ***Jeffry Kelber,*** University of North Texas |
| 2:20pm | **TF+EM-MoA3** Refractory Solar Selective Coatings Synthesized by Atomic Layer Deposition, ***Jeffrey Elam,*** *A. Mane, A. Yanguas-Gil, J.A. Libera, J.R. Avila,* Argonne National Laboratory | **TF+PS+SE-MoA3** Impact of Pulsing the rf Power and the Precursor Injection on the Structure and Optical Properties of $TiO_2$ and TiSiO Thin Films Deposited by PECVD, ***Agnes Granier,*** *S. Elisabeth, R. Michaud, N. Gautier, M. Richard Plouet,* IMN, University of Nantes CNRS, France*; M. Carette,* IEMN CNRS/Université Lille 1, France*; A. Goullet,* IMN, University of Nantes CNRS, France |
| 2:40pm | **TF+EM-MoA4** Sequential Infiltration Synthesis of Doped Polymer Films with Tunable Electrical Properties for Efficient Triboelectric Nanogenerator Development, ***Yanhao Yu****, *X.D. Wang,* University of Wisconsin-Madison | **TF+PS+SE-MoA4** Plasma CVD of Boron-Carbon Thin Films from Organoboron Precursors for Next Generation Neutron Detectors, ***Mewlude(Maiwulidan) Imam (Yimamu),*** Linköping University, Sweden*; C. Höglund,* Linköping University and European Spallation Source ERIC, Sweden*; R. Hall-Wilton,* European Spallation Source ERIC, Sweden*; J. Jensen,* Linköping University, Sweden*; S. Schmidt,* Linköping University and European Spallation Source ERIC, Sweden*; I.G. Ivanov, J. Birch, H. Pedersen,* Linköping University, Sweden |
| 3:00pm | **INVITED: TF+EM-MoA5** ALD for Interfacial Engineering of Energy Conversion Devices, ***Neil P. Dasgupta†,*** University of Michigan, Ann Arbor | **TF+PS+SE-MoA5** Plasma Enhanced Atomic Layer Deposition of Superconducting $Nb_xTi_yN$ Films, ***Mark Sowa,*** Ultratech/CNT*; Y. Yemane, J. Provine,* Stanford University*; E.W. Deguns,* Ultratech/CNT*; F. Prinz,* Stanford University |
| 3:20pm | Invited talk continues. | **TF+PS+SE-MoA6** Mechanical Reliability of PECVD Barrier Films for Flexible Electronics, ***Kyungjin Kim,*** *A. Singh, H. Luo, T. Zhu, O. Pierron, S. Graham,* Georgia Institute of Technology |
| 3:40pm | **BREAK** | **BREAK** |
| 4:00pm | **TF+EM-MoA8** Anchoring Down Soluble Polysulfides for Lithium and Sodium Sulfur Battery Cathodes using Atomic Layer Deposition, ***Rachel Carter,*** *A.P. Cohn, L. Oakes, N. Miralidharan, A.E. Douglas, K. Share, C.L. Pint,* Vanderbilt University | **TF+PS+SE-MoA8** Origin of Stress in Sputtered CdTe and ZnS Films: Influence of Sputter Ion Mass on Mechanical and Chemical Layer Properties, ***Ségolène Liénard,*** Univ. Grenoble Alpes, LTM CNRS, 38000 Grenoble, France*; D. Sam-Giao, A. Kerlain,* Sofradir, BP 21-38113, Veurey-Voroize, France*; F. Boulard, C. Vallée,* Univ. Grenoble Alpes, France |
| 4:20pm | **TF+EM-MoA9** Improved Seebeck Coefficient for Thermoelectric ALD Lead Chalcogenide Films Synthesized on Nano-Patterned Templates, ***Xin Chen,*** *P. Lin, K. Zhang,* Old Dominion University | **TF+PS+SE-MoA9** Synthesis and Characterisation of $MoB_{2-X}$ and Mo-B-C Thin Films by Non-Reactive DC Magnetron Sputtering, ***Paulius Malinovskis,*** Uppsala University, Sweden*; J.P. Palisaitis,* Linkoping University, Sweden*; P.O.A. Persson,* Linköping University, Sweden*; E.L. Lewin, U.J. Jansson,* Uppsala University, Sweden |
| 4:40pm | **INVITED: TF+EM-MoA10** Hybrid Inorganic-Organic Thin Films by ALD/MLD for Emerging Energy Technologies, ***Maarit Karppinen,*** Aalto University, Finland | **TF+PS+SE-MoA10** Molybdenum Back Contacts Deposited by High Power Impulse Magnetron Sputtering, *D.A. Loch,* ***Arutiun Ehiasarian,*** Sheffield Hallam University, UK |
| 5:00pm | Invited talk continues. | **TF+PS+SE-MoA11** Plasma Characterization of Al and Cu with HIPIMS, ***Jason Hrebik,*** Kurt J. Lesker Company*; R. Bandorf, H. Gerdes, D. Spreemann,* Fraunhofer Institute for Surface Engineering and Thin Films IST, Germany |

* **TFD James Harper Award Finalist**

† **Paul Holloway Award Winner**

**Vacuum Technology**
**Room 104C - Session VT-MoA**
**Gas Dynamics, Simulation and Partial Pressure Analysis**
**Moderators:** Steve Borichevsky, Applied Materials, Varian Semiconductor Equipment,
Ted Martinez, SLAC National Accelerator Laboratory

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|---|---|---|
| 1:40pm | **INVITED: VT-MoA1** Vacuum System Analysis of a Next Generation Light Source with Synrad and MolFlow+, ***Jason Carter,*** Argonne National Laboratory | |
| 2:00pm | Invited talk continues. | |
| 2:20pm | **VT-MoA3** Simulations of Vacuum Pumping and Beam Conditioning for CHESS-U Vacuum System, ***Yulin Li****, X. Liu,* Cornell Laboratory for Accelerator-Based Sciences and Education*; J.S. Mershon,* The College of Wooster | |
| 2:40pm | **VT-MoA4** MFIG, A New Vacuum Sensor for Yield Enhancement, *N.B. Koster, F. de Graaf,* ***Michel van Putten****, P.M. Muilwijk, E. Nieuwkoop, O. Kievit, D.J. Maas,* TNO Technical Sciences, Netherlands | |
| 3:00pm | **VT-MoA5** Dynamic Process Modeling on a Condensation-based Depressurization System, ***Bo Zhang****, G. Guo, C. Zhu, Z. Ji,* New Jersey Institute of Technology | |
| 3:20pm | **VTD BUSINESS MEETING** | |
| 3:40pm | **VACUUM TECHNOLOGY FLASH NETWORKING SESSION:**<br>**WAN-SUP CHEUNG,** KRISS, Republic of Korea (VT-TuP1); **KYO SHIBATA,** KEK, Japan (VT-TuP2); **ERNESTO BARRAZA-VALDEZ,** Tri Alpha Energy (VT-TuP3); **HUGO ALVAREZ,** Universidade Estadual de Campinas, Brazil (VT-TuP4); **JONGYEON LIM,** Korea Research Institute of Standards and Science, Republic of Korea (VT-TuP5) | |
| 4:00pm | **INVITED: VT-MoA8** Vacuum Adventures Encountered Towards a Field-Portable Helium Isotope Detector, ***Gary McMurtry,*** SOEST, University of Hawaii*; J.R. DeLuze,* Fusion Energy Solutions of Hawaii*; D.R. Hilton,* Scripps Institution of Oceanography, UCSD*; J.E. Blessing,* MKS Instruments | |
| 4:20pm | Invited talk continues. | |
| 4:40pm | **VT-MoA10** Use Of A Novel Sensor Using Remote Plasma Emission Spectroscopy For Monitoring And Control Of Vacuum Processes, ***Joseph Brindley****, T. Williams, B. Daniel, V. Bellido-Gonzalez,* Gencoa Limited, UK*; F. Papa,* Gencoa USA | |
| 5:00pm | **VT-MoA11** Calibration of Quadrupole Mass Spectrometers with a Molecular Flow Gas Source, ***Robert Ellefson,*** REVac Consulting | |

# Anticipated Schedule Tuesday, November 08, 2016

## Anticipated Schedule Tuesday Morning, November 8

8:00 AM _____

8:20 AM _____

8:40 AM _____

9:00 AM _____

9:20 AM _____

9:40 AM _____

10:00 AM _____

10:20 AM _____

10:40 AM _____

11:00 AM _____

11:20 AM _____

11:40 AM _____

12:00 PM _____

## Anticipated Schedule Tuesday Lunch, November 8

When _____

Where _____

With _____

## Anticipated Schedule Tuesday Afternoon, November 8

1:00 PM _____

1:20 PM _____

1:40 PM _____

2:00 PM _____

2:20 PM _____

2:40 PM _____

3:00 PM _____

3:20 PM _____

3:40 PM _____

4:00 PM _____

4:20 PM _____

4:40 PM _____

5:00 PM _____

5:20 PM _____

5:40 PM _____

6:00 PM _____

# Special Events Tuesday

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|---|---|
| 7:00 AM | Diversity & Inclusion Breakfast: "The Industrial Scientist's Guide to Riches, Fame, and Fortune or at least a Raise"/Belmont, Renaissance Nashville |
| 7:30 AM | Awards Committee Meeting and Lunch/Classical, Renaissance Nashville (by invitation) |
| 8:00 AM | Science Educators' Workshop/Ryman, Renaissance Nashville (by invitation) |
| 12:30 PM | Chapters, Divisions, and Groups Meeting and Lunch/108 (by invitation) |
| 12:30 PM | Professional Development: Job Information Forum and Lunch/102A |
| 3:00 PM | Marketing & Communications Comm. Meeting/Boardroom 5th Avenue, Music City Center (by invitation) |
| 6:05 PM | MIND Business Meeting/102B |
| 6:25 PM | EMPD Business Meeting/102A |
| 6:25 PM | NSTD Business Meeting/101D |
| 6:25 PM | PSTD Business Meeting & 2016 Plasma Prize Award Announcement/104B |
| 6:25 PM | SSD Business Meeting/104E |
| 6:25 PM | TFD Business Meeting/105A |
| 6:30 PM | EMPD Forum: Careers at Lam Research/102A |
| 6:30 PM | Tuesday Poster Session & Refreshments (Sponsored by MKS)/Hall D |
| 7:00 PM | MEMS and NEMS Technical Group Executive Committee Meeting and Dinner/Classical, Renaissance Nashville (by invitation) |
| 7:00 PM | MIND Executive Committee Meeting and Dinner/Rhythm & Blues, Renaissance Nashville (by invitation) |
| 7:30 PM | ASSD Business Meeting/Belmont 2-3, Renaissance Nashville |
| 7:30 PM | NSTD Executive Committee Meeting and Dinner/Fisk 2, Renaissance Nashville (by invitation) |
| 7:30 PM | PSTD Executive Committee Meeting and Dinner/Fisk 1, Renaissance Nashville (by invitation) |
| 7:30 PM | SSD Executive Committee Meeting and Dinner/Rock & Roll, Renaissance Nashville (by invitation) |
| 7:30 PM | TFD Executive Committee Meeting and Dinner/Ryman, Renaissance Nashville (by invitation) |
| 7:45 PM | BID Executive Committee Meeting and Dinner/Bluegrass, Renaissance Nashville (by invitation) |
| 7:45 PM | EMPD Executive Committee Meeting and Dinner/Jazz, Renaissance Nashville (by invitation) |
| 8:00 PM | ASTM E-42/ASSD Joint Workshop, "Frontiers of Surface Analysis"/Belmont 2-3, Renaissance Nashville |

## Short Courses Tuesday

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|---|---|
| 8:30 AM | A Comprehensive Course on Surface Analysis and Depth Profiling by X-ray Photoelectron Spectrscopy (XPS or ESCA), Auger Electron Spectroscopy (AES), Focused Ion Beam Analysis (FIB) and Secondary Ion Mass Spectrometry (SIMS) (2 days) |
| 8:30 AM | Focused Ion Beams (FIB) and Secondary Ion Mass Spectrometry (SIMS) (Day 2 of Comprehensive SA Course) |
| 8:30 AM | Fundamentals of Vacuum Technology |
| 8:30 AM | Partial Pressure Analysis with Residual Gas Analyzers |

LOCATION: All AVS Short Courses will be held at Music City Center

COURSE HOURS: All AVS Short Courses Hours: 8:30 a.m.–5:00 p.m. — with 1.5 hour break for Lunch (Lunch not included)

| | **2D Materials Focus Topic**<br>**Room 103B - Session 2D+MI-TuM**<br>**Novel 2D Materials**<br>**Moderators:** Daniel Gunlycke, Naval Research Laboratory, Yuanbo Zhang, Fudan University, China | **Applied Surface Science**<br>**Room 101B - Session AS+AC-TuM**<br>**Practical Surface Analysis II: Microanalysis, Nanoanalysis, Atom Probe, and All Things 'Small'**<br>**Moderators:**<br>Arun Devaraj, Pacific Northwest National Laboratory, Daniel Gaspar, Pacific Northwest National Laboratory |
|---|---|---|
| 8:00am | **INVITED: 2D+MI-TuM1** Computational Design of 2D Materials and Layered Heterostructures for Opto-electronics, ***Kristian Thygesen,*** Technical University of Denmark | **INVITED: AS+AC-TuM1** Progress Toward Atomic-Scale Tomography, ***Thomas Kelly,*** CAMECA Instruments Inc. |
| 8:20am | Invited talk continues. | Invited talk continues. |
| 8:40am | **2D+MI-TuM3** $Mo_2Ga_2C$: Structural Determination of a New Nanolaminated Carbide and its 2D Modification by Selective Etching, ***Chung-Chuan Lai,*** *R. Meshkian, M. Dahlqvist, J. Lu, L.-Å. Näslund,* Linköping University, Sweden*; O. Rivin, E.N. Caspi,* Nuclear Research Center-Negev, Israel*; O. Ozeri,* Nuclear Research Center-Soreq, Israel*; L. Hultman, P. Eklund,* Linköping University, Sweden*; M.W. Barsoum,* Drexel University*; J. Rosen,* Linköping University, Sweden | **INVITED: AS+AC-TuM3** Atom Probe Tomography of Nano Materials. Additive Sample Preparation at the Nanoscale, ***Peter Felfer,*** Friedrich-Alexander University Erlangen-Nürnberg, Germany*; J.M. Cairney,* University of Sydney, Australia |
| 9:00am | **2D+MI-TuM4** Synthesis of Borophenes: Anisotropic, Two-Dimensional Boron Polymorphs, ***Andrew Mannix****†, *B. Kiraly,* Northwestern University/Argonne National Lab.*; J.D. Wood, M.C. Hersam,* Northwestern University*; N.P. Guisinger,* Argonne National Laboratory | Invited talk continues. |
| 9:20am | **2D+MI-TuM5** Atomic and Electronic Structures of Graphitic Carbon Nitride (g-C3N4) Monolayers on HOPG, ***Sangwoo Park,*** *HM. Kang,* Sungkyunkwan University, Republic of Korea*; J.H. Yang, J.H. Choy,* Ewha Womans University, Republic of Korea*; YJ. Song,* Sungkyunkwan University, Republic of Korea | **AS+AC-TuM5** Atom Probe Tomography and Electron Microscopy Investigation of Composition and Structure of Functionalized Carbon, ***Chilan Ngo,*** *D.R. Diercks, M.B. Strand, S. Pylypenko,* Colorado School of Mines |
| 9:40am | **2D+MI-TuM6** Periodic Array of Graphene Quantum Dots Embedded in a Carbon-Boron-Nitrogen Alloy, ***Jakob Jørgensen,*** Aarhus University, Denmark*; L. Camilli, A. Stoot,* Technical University of Denmark*; A. Cassidy, R. Balog,* Aarhus University, Denmark*; J. Sadowski,* Brookhaven National Laboratory*; P. Bøggild,* Technical University of Denmark*; L. Hornekær,* Aarhus University, Denmark | **AS+AC-TuM6** Advanced XPS Imaging and Spectromicroscopy: a Review of Current Capabilities, ***Olivier Renault,*** CEA-University Grenoble Alps, France |
| 10:00am | **BREAK - Complimentary Coffee in Exhibit Hall** | **BREAK - Complimentary Coffee in Exhibit Hall** |
| 10:20am | **BREAK - Complimentary Coffee in Exhibit Hall** | **BREAK - Complimentary Coffee in Exhibit Hall** |
| 10:40am | **BREAK - Complimentary Coffee in Exhibit Hall** | **BREAK - Complimentary Coffee in Exhibit Hall** |
| 11:00am | **INVITED: 2D+MI-TuM10** Electric Field Control of 2D Materials with Electron Correlation, ***Yoshi Iwasa,*** University of Tokyo, Japan | **INVITED: AS+AC-TuM10** Challenges and Solutions for Confined Volume Characterization in Semiconductor Systems, ***Wilfried Vandervorst,*** IMEC & KULeuven, Belgium |
| 11:20am | Invited talk continues. | Invited talk continues. |
| 11:40am | **2D+MI-TuM12** Graphene-based Hybrid Materials by Designer Interfaces for High-Performance Hybrid Supercapacitors, ***Sanju Gupta,*** Western Kentucky University | **AS+AC-TuM12** Characterization of Protein G B1 Immobilized Gold Nanoparticles using Time of Flight Secondary Ion Mass Spectrometry and X-ray Photoelectron Spectroscopy, *Y.-C. Wang,* ***David Castner,*** University of Washington |
| 12:00pm | **2D+MI-TuM13** Realization of $TaS_2$ in the Single-Layer Limit, ***Charlotte Sanders,*** *M. Dendzik,* Aarhus University, Denmark*; A.S. Ngankeu,* Aarhus University*; A. Eich,* Radboud University, Netherlands*; A. Bruix, J.A. Miwa, B. Hammer,* Aarhus University, Denmark*; A.A. Khajetoorians,* Radboud University, Netherlands*; P. Hofmann,* Aarhus University, Denmark | **AS+AC-TuM13** What's New in Wetting? Inorganic Nanotubes at a Water Interface - A Molecular View, ***Sidney Cohen,*** *O. Goldbart, I. Kaplan-Ashiri,* Weizmann Institute of Science, Israel*; P. Glazyrina,* Ural Federal University, Russia*; H.D. Wagner,* Weizmann Institute of Science, Israel*; A. Enyashin,* Ub Ras, Russia*; R. Tenne,* Weizmann Institute of Science, Israel |

* **Morton S. Traum Award Finalist**
† **National Student Award Finalist**

# Tuesday Morning, November 8, 2016

| | **Electronic Materials and Photonics**<br>**Room 102A - Session EM+MN-TuM**<br>**New Materials and Devices for TFETs, Spintronics, and Extended CMOS**<br>**Moderator:** Wilman Tsai, TSMC | **Exhibitor Technology Spotlight**<br>**Room Hall C - Session EW-TuM**<br>**Exhibitor Technology Spotlight Session**<br>**Moderator:** Chris Moffitt, Kratos Analytical Limited |
|---|---|---|
| 8:00am | **INVITED: EM+MN-TuM1** Vertical TFETs using III-V Nanowire/Si Heterojunctions, ***Katsuhiro Tomioka,*** Hokkaido University/JST-PRESTO, Japan; *J. Motohisa,* Hokkaido University, Japan | |
| 8:20am | Invited talk continues. | |
| 8:40am | **INVITED: EM+MN-TuM3** Tunneling FET Technology using Ge and III-V Semiconductors, ***Shinichi Takagi,*** *M. Takenaka,* The University of Tokyo, JST-CREST, Japan | |
| 9:00am | Invited talk continues. | |
| 9:20am | **INVITED: EM+MN-TuM5** Thin Film Materials in Novel Spintronic Devices, ***Gang Xiao,*** Brown University | |
| 9:40am | Invited talk continues. | |
| 10:00am | **BREAK - Complimentary Coffee in Exhibit Hall** | **BREAK - Complimentary Coffee in Exhibit Hall** |
| 10:20am | **BREAK - Complimentary Coffee in Exhibit Hall** | **EW-TuM8** Toxic, Flammable and Corrosive Waste Gas Treatment. Protect your Employees and Environment, ***D.K. Prasad,*** CS CLEAN SYSTEMS, Inc. |
| 10:40am | **BREAK - Complimentary Coffee in Exhibit Hall** | **BREAK - Complimentary Coffee in Exhibit Hall** |
| 11:00am | **INVITED: EM+MN-TuM10** Tunneling in Low-Dimensional Materials, ***Joerg Appenzeller,*** Purdue University | |
| 11:20am | Invited talk continues. | |
| 11:40am | **INVITED: EM+MN-TuM12** Controlled Phase Transition for Ultra Low Power Transistors, ***Sayeef Salahuddin,*** University of California, Berkeley | |
| 12:00pm | Invited talk continues. | |

# Tuesday Morning, November 8, 2016

| | **Manufacturing Science and Technology**<br>**Room 103A - Session MS+AS-TuM**<br>**Characterization and Processing for IC Manufacturing**<br>**Moderator:** Alain C. Diebold, SUNY College of Nanoscale Science and Engineering | **Nanometer-scale Science and Technology**<br>**Room 101D - Session NS-TuM**<br>**Nanodiamonds, Thin Films and Electronics (8:20–10:00 am)/Health and Environmental Impact of Nanotechnology (11:00 am–12:20 pm)**<br>**Moderators:** Trevor Wiley, Lawrence Livermore National Laboratory, Leonidas Ocola, Argonne National Laboratory |
|---|---|---|
| 8:00am | **MS+AS-TuM1** Thermal Decomposition Properties of Bis(cyclopentadienyl)magnesium for Various Gas Supply System Materials, ***Hidekazu Ishii,*** Tohoku University, Japan*; S. Yamashita, M. Nagase, A. Hidaka, K. Ikeda,* Fujikin Incorporated, Japan*; Y. Shiba, Y. Shirai, S. Sugawa,* Tohoku University, Japan | **NS-TuM1** Formation of Dynamic Topographic Patterns during Electron Beam Induced Etching of Diamond, ***Aiden Martin,*** Lawrence Livermore National Laboratory*; A. Bahm,* FEI Company*; J. Bishop, I. Aharonovich, M. Toth,* University of Technology, Sydney |
| 8:20am | | **NS-TuM2** Towards a Gold Standard in Single Digit Detonation Nanodiamond, *N.J. Nunn, O.A. Shenderova, M. Torelli,* Adamas Nanotechnologies, Inc.*;* ***Gary McGuire,*** International Technology Center |
| 8:40am | **INVITED: MS+AS-TuM3** High Volume Materials Characterization in the CMOS Industry, ***Paul van der Heide,*** GLOBALFOUNDRIES | **INVITED: NS-TuM3** Microfabricated Ultrananocrystalline Diamond (UNCD) Electrodes & Electrochemical Technology for Point-of-use Ozone Applications, ***Donato Ceres,*** Advanced Diamond Technologies |
| 9:00am | Invited talk continues. | Invited talk continues. |
| 9:20am | **INVITED: MS+AS-TuM5** Dynamics in SIMS Characterization for Advanced Nano-Technology: Challenges and Solutions for Novel Materials and 3-D Devices, ***Marinus Hopstaken,*** IBM T.J. Watson Research Center | **NS-TuM5** Field Emission Electron Source Based on UltraNanoCrystalline Diamond Films for Electron Accelerators Applications, *S. Baryshev, S. Antipov, C. Jing,* Euclid TechLabs LLC*;* ***Anirudha Sumant,*** Argonne National Laboratory |
| 9:40am | Invited talk continues. | **NS-TuM6** Time-resolved Small Angle X-ray Scattering during the Formation of Detonation Nanodiamond, ***Michael Bagge-Hansen,*** *M. Nielsen, L. Lauderbach, R. Hodgin, S. Bastea, L. Fried, D. Hansen, C. May,* Lawrence Livermore National Laboratory*; T. Graber,* Washington State University*; B.J. Jensen, R. Gustavsen, D. Dattelbaum, E. Watkins, M. Firestone,* Los Alamos National Laboratory*; J. Ilavsky,* Argonne National Laboratory*; T. van Buuren, T.M. Willey,* Lawrence Livermore National Laboratory |
| 10:00am | **BREAK - Complimentary Coffee in Exhibit Hall** | **BREAK - Complimentary Coffee in Exhibit Hall** |
| 10:20am | **BREAK - Complimentary Coffee in Exhibit Hall** | **BREAK - Complimentary Coffee in Exhibit Hall** |
| 10:40am | **BREAK - Complimentary Coffee in Exhibit Hall** | **BREAK - Complimentary Coffee in Exhibit Hall** |
| 11:00am | | **INVITED: NS-TuM10** Transformations and Biological Impact of Emerging Energy Storage Nanomaterials, ***Robert Hamers,*** University of Wisconsin-Madison |
| 11:20am | **MS+AS-TuM11** Characterization of Electrical Properties of Si and GaN Devices using Scanning Microwave Impedance Microscopy (sMIM) and Nano-scale Capacitance-voltage Curves, ***Stuart Friedman,*** *F. Stanke, Y. Yang, O. Amster,* PrimeNano, Inc | Invited talk continues. |
| 11:40am | **INVITED: MS+AS-TuM12** Results of the 2016 Triennial Review of the National Nanotechnology Initiative, ***James Murday,*** University of Southern California*; B.R. Rogers,* Vanderbilt University*; E.B. Svedberg,* The National Academies | **INVITED: NS-TuM12** Bio-inspired Nanosystems for Healthcare Applications, ***Elena Rozhkova,*** Argonne National Laboratory |
| 12:00pm | Invited talk continues. | Invited talk continues. |

| | **Plasma Processing for Biomedical Applications Focus Topic**<br>**Room 101A - Session PB+BI+PS-TuM**<br>**Plasma Processing of Biological/Biomimetic Surfaces**<br>**Moderators:** Uroš Cvelbar, Jozef Stefan Institute, Slovenia, Satoshi Hamaguchi, Osaka University, Japan | **Plasma Science and Technology**<br>**Room 104B - Session PS-TuM**<br>**Plasma Diagnostics, Sensors and Control**<br>**Moderator:**<br>Richard van de Sanden, FOM Institute DIFFER, Netherlands |
|---|---|---|
| 8:00am | **PB+BI+PS-TuM1** Investigation of Discharge Propagation on Cell and Plasmid Suspension in Plasma Gene Transfection, ***Yugo Kido,*** Pearl Kogyo Co., Ltd., Japan; *H. Motomura, Y. Ikeda,* Ehime University, Japan; *S. Satoh,* Y's Corp., Japan; *M. Jinno,* Ehime University, Japan | **INVITED: PS-TuM1** Translational and Vibrational Energy in $Cl_2$ and $O_2$ Plasmas Probed by Innovative Optical Diagnostics, ***Jean-Paul Booth,*** *D. Marinov, M. Foucher, O.Y.N. Guaitella,* LPP-CNRS, Ecole Polytechnique, France; *C. Drag,* Laboratoire Aime Cotton, CNRS-U. Paris-Sud, France; *A. Agarwal, S. Rauf,* Applied Materials Inc. |
| 8:20am | **PB+BI+PS-TuM2** Spectroscopic Study of Permeability of Stratum Corneum by Plasma Treatment for Transdermal Drug Delivery, ***Jaroslav Kristof,*** *N. Tran, M. Blajan, K. Shimizu,* Shizuoka University, Japan | Invited talk continues. |
| 8:40am | **INVITED: PB+BI+PS-TuM3** Cell Attachment to Microwave Plasma-oxidized Titanium and Titanium Alloy Substrates, ***Denis Dowling,*** University College Dublin, Ireland; *M. Naciri,* University Mohamed V of Rabat, Morocco; *M. Al-Rubeai, A. Breen,* University College Dublin, Ireland | **PS-TuM3** Spectroscopic Measurement of Molecular Densities and Temperatures in Processing Plasmas, ***Yaser Helal****, *C.F. Neese, F.C. De Lucia,* The Ohio State University; *A. Agarwal, B. Craver, P.R. Ewing, P.J. Stout, M.D. Armacost,* Applied Materials, Inc. |
| 9:00am | Invited talk continues. | **PS-TuM4** Optical Emission Spectroscopy to Determine Plasma Parameters in Low-pressure Oxygen Plasmas, ***Nathaniel Ly,*** *J. Boffard, C.C. Lin, A.E. Wendt,* University of Wisconsin - Madison |
| 9:20am | **INVITED: PB+BI+PS-TuM5** The Role of Electrical and Chemical Factors in the Molecular/Gene Transfection by Micro-Plasma Irradiation, ***Masafumi Jinno,*** *Y. Ikeda, H. Motomura,* Ehime University, Japan; *Y. Kido,* Pearl Kogyo Co. Ltd., Japan; *S. Satoh,* Y's Crop., Japan | **PS-TuM5** Pulsed Capacitively Coupled Plasma Ignition: PROES and RF-IV Diagnostics, ***John Poulose,*** *M.J. Goeckner, L.J. Overzet,* The University of Texas at Dallas |
| 9:40am | Invited talk continues. | **PS-TuM6** Control of Ion Energy Distributions on Insulating Surfaces using Pulsed Plasmas, ***Tyler List,*** *T. Mu, V.M. Donnelly, D.J. Economou,* University of Houston |
| 10:00am | **BREAK - Complimentary Coffee in Exhibit Hall** | **BREAK - Complimentary Coffee in Exhibit Hall** |
| 10:20am | **BREAK - Complimentary Coffee in Exhibit Hall** | **BREAK - Complimentary Coffee in Exhibit Hall** |
| 10:40am | **BREAK - Complimentary Coffee in Exhibit Hall** | **BREAK - Complimentary Coffee in Exhibit Hall** |
| 11:00am | **PB+BI+PS-TuM10** Control of Plant Growth by RONS Produced Using Nonthermal Atmospheric Air Plasma, ***Kazunori Koga,*** Kyushu University, Japan; *T. Sarinont,* Kyushu University; *M. Shiratani,* Kyushu University, Japan | **INVITED: PS-TuM10** Charged Particle Dynamics in Technological Radio Frequency Plasmas Operated in $CF_4$, ***Julian Schulze,*** West Virginia University; *B. Berger,* Ruhr-University Bochum, Germany; *S. Brandt,* West Virginia University; *B. Bruneau,* Ecole Polytechnique, Palaiseau, France; *Y. Liu,* Dalian University of Technology; *I. Korolov, A. Derzsi,* Hungarian Academy of Sciences; *E. Schuengel, M. Koepke,* West Virginia University; *T. Mussenbrock,* Ruhr-University Bochum, Germany; *E.V. Johnson, T. Lafleur, J.-P. Booth,* Ecole Polytechnique, Palaiseau, France; *D. O'Connell, T. Gans,* University of York, UK; *YN. Wang,* Dalian University of Technology; *Z. Donko,* Hungarian Academy of Sciences |
| 11:20am | **PB+BI+PS-TuM11** Generation of Reactive Species in Medium Irradiated Laser-Induced-Plasmas, ***Yukihiro Kurokawa,*** *N. Kurake, K. Takeda, K. Ishikawa, H. Hashizume, H. Tanaka, H. Kondo, M. Sekine, M. Hori,* Nagoya University, Japan | Invited talk continues. |
| 11:40am | **INVITED: PB+BI+PS-TuM12** Electric Fields in kHz-driven Plasma Jets, *ET. Slikboer, Y.N. Nguyen,* Eindhoven University of Technology, The Netherlands; *O.Y.N. Guaitella,* Ecole Polytechnique, Palaiseau, France; *G. Sretenović,* University of Belgrade; *A. Obrusnik,* Masaryk University, Brno; ***Ana Sobota,*** Eindhoven University of Technology, The Netherlands | **PS-TuM12** Correlation of III/V Semiconductor Etch Results with Physical Parameters of High Density Reactive Plasmas Excited by Electron Cyclotron Resonance, ***Gerhard Franz,*** Munich University of Applied Sciences, Germany; *R. Meyer, M.-C. Amann,* Technische Universität München, Germany |
| 12:00pm | Invited talk continues. | **PS-TuM13** Mapping Plasma Potential of Rotating Ionization Zone in DC Magnetron Sputtering, ***Matjaz Panjan,*** Lawrence Berkeley National Laboratory, Slovenia; *A. Anders,* Lawrence Berkeley National Laboratory |

* **Coburn & Winters Student Award Finalist**

# Tuesday Morning, November 8, 2016

| | **Novel Trends in Synchrotron and FEL-Based Analysis Focus Topic**<br>**Room 103C - Session SA+2D+AC+AS+TF-TuM**<br>**Applications of Synchrotron-based Techniques to 2D Materials (8:00-10:00 am)/Complex Functional Materials and Heterostructures (11:00 am-12:20 pm)**<br>**Moderators:** Giacomo Ceccone, European Commission, Joint Research Centre, IHCP, Italy,<br>Alberto Herrera-Gomez, CINVESTAV-Queretaro, Mexico | **Advanced Surface Engineering**<br>**Room 101C - Session SE+NS+TF+TR-TuM**<br>**Nanostructured Thin Films and Coatings**<br>**Moderators:**<br>Jolanta Klemberg-Sapieha, Ecole Polytechnique de Montreal, Canada,<br>Robert Franz, Montanuniversität Leoben, Austria |
|---|---|---|
| 8:00am | | **INVITED: SE+NS+TF+TR-TuM1** Design and Predictive Synthesis of Thin Films and Coatings*, P.A. Salvador,* ***Gregory Rohrer,*** Carnegie Mellon University |
| 8:20am | **SA+2D+AC+AS+TF-TuM2** A Versatile Method for the Fabrication of 2D-electron Systems at Functional Oxide Surfaces*, T.C. Rödel,* Université Paris-Sud - SOLEIL, France*;* ***Patrick Le Fèvre,*** Synchrotron SOLEIL, France*; F. Fortuna, E. Frantzeskakis,* Université Paris-Sud - IN2P3, France*; F. Bertran,* Synchrotron SOLEIL, France*; T. Maroutian, P. Lecoeur,* Université Paris-Sud - CNRS, France*; B. Mersey,* Université de Caen, France*; A.F. Santander-Syro,* Université Paris-Sud - IN2P3, France | Invited talk continues. |
| 8:40am | **INVITED: SA+2D+AC+AS+TF-TuM3** Advanced Spectro-microscopy of Ion Irradiated Graphene-metal Interfaces: From Substitutional Implantation to Nanobubble Formation*,* ***Andrea Locatelli****, A. Sala, T.-O. Menteş,* Elettra - Sincrotrone Trieste, Italy*; G. Zamborlini,* Peter Grünberg Institute (PGI-6) Jülich*; L. Patera, C. Africh,* IOM-CNR Laboratorio TASC, Italy*; M. Imam, N. Stojić, N. Binggeli,* Abdus Salam International Centre for Theoretical Physics, Italy | **SE+NS+TF+TR-TuM3** Nanoscale Atomic Arrangement in Multicomponent Thin Films Synthesized Far-from-Equilibrium*, V. Elofsson, G.A. Almyras, B. Lü, R.D. Boyd,* ***Kostas Sarakinos,*** Linköping University, Sweden |
| 9:00am | Invited talk continues. | **SE+NS+TF+TR-TuM4** Is *Intrinsic* Nanocrystalline Stability Practically Achievable? Insights from Investigations with Pt-Au Alloys*,* ***Nicolas Argibay****, T.A. Furnish, D.P. Adams, P. Lu, M. Chandross, M.A. Rodriguez, B.L. Boyce, B.L. Clark, M.T. Dugger,* Sandia National Laboratories |
| 9:20am | **SA+2D+AC+AS+TF-TuM5** Gas-source MBE Growth of 2D Materials Examined using X-ray Synchrotron Radiation*,* ***Hugh Bullen****, R.K. Nahm, S. Vishwanath, H.G. Xing, J.R. Engstrom,* Cornell University | **SE+NS+TF+TR-TuM5** Improved Mechanical Properties In Tungsten-Molybdenum Nanostructured Thin Films*,* ***Gustavo Martinez****, C.V. Ramana,* University of Texas at El Paso |
| 9:40am | **SA+2D+AC+AS+TF-TuM6** Nanostructured Surface of Multilayer Graphene on Cubic-SiC*,* ***Victor Aristov****,* ISSP RAS, Chernogolovka, Russia, Russian Federation*; H.-C. Wu,* BIT, Beijing, China*; O.V. Molodtsova, S.V. Babenkov,* DESY, Hamburg, Germany*; A.N. Chaika,* ISSP RAS, Chernogolovka, Russia, Russian Federation | **SE+NS+TF+TR-TuM6** Hierarchical Monolith Scaffolds for Silicon Lithium Ion Battery Electrodes*,* ***Kevin Laughlin****,* Brigham Young University |
| 10:00am | **BREAK - Complimentary Coffee in Exhibit Hall** | **BREAK - Complimentary Coffee in Exhibit Hall** |
| 10:20am | **BREAK - Complimentary Coffee in Exhibit Hall** | **BREAK - Complimentary Coffee in Exhibit Hall** |
| 10:40am | **BREAK - Complimentary Coffee in Exhibit Hall** | **BREAK - Complimentary Coffee in Exhibit Hall** |
| 11:00am | **INVITED: SA+2D+AC+AS+TF-TuM10** Full-field Photoelectron Spectromicroscopy of Ferroelectric Surfaces*,* ***Nicholas Barrett****,* CEA Saclay, France | **INVITED: SE+NS+TF+TR-TuM10** Technological Developments in Coatings for Components and Cutting Tools*,* ***Roel Tietema****,* IHI Hauzer Techno Coating B.V., Netherlands*; D. Doerwald,* Hauzer, Netherlands*; R. Jacobs, G. Negrea, I. Kolev, J. Zhu, J. Landsbergen,* Hauzer |
| 11:20am | Invited talk continues. | Invited talk continues. |
| 11:40am | **INVITED: SA+2D+AC+AS+TF-TuM12** Electron Confinement at Magnetic Oxide Interfaces: Insight from Photoemission Spectroscopy*,* ***Martina Mueller,*** Forschungszentrum Juelich GmbH, Germany | **SE+NS+TF+TR-TuM12** Influence of Transition Metal Dopants on Target Poisoning and Oxidation Mechanisms of Reactively Sputtered γ-$Al_2O_3$ Thin Films*,* ***Helmut Riedl****, B. Kohlhauser,* TU Wien, Institute of Materials Science and Technology, Austria*; V. Paneta,* Uppsala University, Sweden*; C.M. Koller,* TU Wien, Institute of Materials Science and Technology, Austria*; S. Kolozsvári,* Plansee Composite Materials GmbH, Germany*; D. Primetzhofer,* Uppsala University, Sweden*; P.H. Mayrhofer,* TU Wien, Institute of Materials Science and Technology, Austria |
| 12:00pm | Invited talk continues. | **SE+NS+TF+TR-TuM13** Non-volatile Memory Effects in Carbon Films Deposited by High Power Impulse Magnetron Sputtering*,* ***Rajesh Ganesan****, B. Treverrow,* The University of Sydney, Australia*; J. Partridge, D. McCulloch,* RMIT, Melbourne, Australia*; D. McKenzie, M. Bilek,* The University of Sydney, Australia |

# Tuesday Morning, November 8, 2016

| | Scanning Probe Microscopy Focus Topic<br>Room 104A - Session SP+AS+MI+NS+SS-TuM<br>Probing Chemical Reactions at the Nanoscale<br>**Moderator:**<br>Tae-Hwan Kim, Pohang University of Science and Technology | Surface Science<br>Room 104D - Session SS1+AS+HC+NS-TuM<br>Surface Dynamics, Non-Adiabaticity, and Theory and Modeling of Surface and Interfacial Phenomena<br>**Moderator:**<br>Greg Kimmel, Pacific Northwest National Laboratory |
|---|---|---|
| 8:00am | **SP+AS+MI+NS+SS-TuM1** *In Situ* Probing of Oxygen Vacancy Diffusion Across Multilayer Oxide Heterostructures, *J. Zhu,* University of Massachusetts - Amherst; *J.-W. Lee, H. Lee,* University of Wisconsin - Madison; *R. DeSouza,* RWTH Aachen University, Germany; *C.-B. Eom,* University of Wisconsin - Madison; ***Stephen Nonnenmann,*** University of Massachusetts - Amherst | **SS1+AS+HC+NS-TuM1** Graphene-Semiconductor Catalytic Nanodiodes for Quantitative Detection of Hot Electrons Induced by a Chemical Reaction, ***Hyosun Lee****, KAIST & IBS, Republic of Korea; *I. Nedrygailov,* IBS & KAIST, Republic of Korea; *Y.K. Lee, C. Lee,* KAIST & IBS, Republic of Korea; *H. Choi,* Electronics and Telecommunications Research Institute (ETRI), Republic of Korea; *J.Y. Park,* Institute for Basic Science (IBS) & Korea Advanced Institute of Science and Technology (KAIST), Republic of Korea |
| 8:20am | **SP+AS+MI+NS+SS-TuM2** Study of Surface Chemistry on Various Noble Metal Surfaces by Ultrahigh Vacuum Tip-Enhanced Raman Spectroscopy, ***Naihao Chiang,*** Northwestern University; *D. Chulhai,* Pennsylvania State University; *G. Goubert, L. Madison, X. Chen, E. Pozzi, M.C. Hersam, T. Seideman,* Northwestern University; *N. Jiang,* University of Illinois at Chicago; *L. Jensen,* Pennsylvania State University; *G. Schatz, R.P. Van Duyne,* Northwestern University | **SS1+AS+HC+NS-TuM2** Adlayer-Structure Dependent Ultrafast Desorption Dynamics: The Coverage Dependence of Substrate–Adsorbate Energy Transfer in Carbon Monoxide on Pd(111), ***Sung-Young Hong,*** Brookhaven National Laboratory; *P. Xu,* Stony Brook University; *N.R. Camillone, M.G. White, N. Camillone,* Brookhaven National Laboratory |
| 8:40am | **INVITED: SP+AS+MI+NS+SS-TuM3** Exploring Surface-assisted Reactions Toward Functional Carbon Nanostructures, ***Xiaohui Qiu,*** National Center for Nanoscience and Technology, China | **SS1+AS+HC+NS-TuM3** Evidence for a Spin Accelerated Reaction Mechanism in the Thermal Decomposition of Alkyl Radicals on the Si(100) Surface, *A.J. Pohlman, D.S. Kaliakin, S.A. Varganov,* ***Sean Casey,*** University of Nevada |
| 9:00am | Invited talk continues. | **SS1+AS+HC+NS-TuM4** Hyperthermal Ion Induced Hot Carrier Excitations in a Metal Probed using Schottky Diodes, ***Dhruva Kulkarni,*** *D.A. Field, D.B. Cutshall, J.E. Harriss, W.R. Harrell, C.E. Sosolik,* Clemson University |
| 9:20am | **SP+AS+MI+NS+SS-TuM5** Landscapes in Conversion of Quasi-Free-Standing Polymer Chains to Graphene Nanoribbons, ***Chuanxu Ma,*** Oak Ridge National Laboratory; *Z. Xiao,* North Carolina State University; *L. Liang,* Oak Ridge National Laboratory; *W. Lu, J. Bernholc,* North Carolina State University; *K. Hong, B.G. Sumpter, A.-P. Li,* Oak Ridge National Laboratory | **INVITED: SS1+AS+HC+NS-TuM5** H Atom Scattering, Adsorption, and Absorption in Collisions with Metal Surfaces: the crucial role of electron-hole-pair excitation, *M. Alducin,* Donostia International Physics Center, Spain; ***Daniel Auerbach,*** Max Planck Institute for Biophysical Chemistry, Germany; *M. Blanco-Rey,* Donostia International Physics Center, Spain; *O. Bünermann, Y. Dorenkamp,* Georg-August University of Göttingen; *S.M. Janke,* Max Planck Institute for Biophysical Chemistry, Germany; *H. Jiang,* Georg-August University of Göttingen; *A. Kandratsenka,* Max Planck Institute for Biophysical Chemistry; *G-J. Kroes,* Leiden Institute of Chemistry, The Netherlands; *M. Kammler,* Max Planck Institute for Biophysical Chemistry; *M. Pavenelo,* Leiden Institute of Chemistry |
| 9:40am | **SP+AS+MI+NS+SS-TuM6** High Spatial Resolution Mapping of Catalytic Reactions on Single Pt Nanoparticles, ***Elad Gross,*** *Y. Levratovsky,* The Hebrew University of Jerusalem, Israel | Invited talk continues. |
| 10:00am | **BREAK - Complimentary Coffee in Exhibit Hall** | **BREAK - Complimentary Coffee in Exhibit Hall** |
| 10:20am | **BREAK - Complimentary Coffee in Exhibit Hall** | **BREAK - Complimentary Coffee in Exhibit Hall** |
| 10:40am | **BREAK - Complimentary Coffee in Exhibit Hall** | **BREAK - Complimentary Coffee in Exhibit Hall** |
| 11:00am | **INVITED: SP+AS+MI+NS+SS-TuM10** Imaging Single Molecule Chemistry, ***Wilson Ho,*** University of California Irvine | **SS1+AS+HC+NS-TuM10** Progress in Characterizing Submonolayer Island Growth: Capture-Zone Distributions, Growth Exponents, and Transient Mobility, ***Theodore L. Einstein,*** University of Maryland, College Park; *A. Pimpinelli,* Rice University; *J.R. Morales-Cifuentes,* Unversity of Maryland, College Park; *D.L. González,* Universidad del Valle, Colombia |
| 11:20am | Invited talk continues. | **SS1+AS+HC+NS-TuM11** Hindered Translator and Hindered Rotor Models for Calculating the Entropy of Adsorbed Species, ***Lynza H. Sprowl***†, Oregon State University; *C.T. Campbell,* University of Washington; *L. Arnadottir,* Oregon State University |
| 11:40am | **INVITED: SP+AS+MI+NS+SS-TuM12** Atomic Force Microscopy: A Tool for Chemical Analysis of Surfaces and Molecules on Atomic Scale, ***Pavel Jelinek,*** Institute of Physics of the AS CR, Czech Republic | **SS1+AS+HC+NS-TuM12** Stabilization of *X*-Au-*X* Complexes on the Au(111) Surface: A Theoretical Investigation and Comparison of *X*=Sulfur, Chlorine, Methythiolate, and Silylthiolate, *J. Lee, J.S. Boschen, T.L. Windus, P.A. Thiel, J.W. Evans,* ***Da-Jiang Liu,*** Iowa State University |
| 12:00pm | Invited talk continues. | **SS1+AS+HC+NS-TuM13** Contrasting Phonon Confinement and Interface Stability at Fe-Ag and Fe-Cr Multilayers: Insights from *Ab Initio* Calculations, *S. Hong,* ***Talat Rahman,*** University of Central Florida |

* **National Student Award Finalist**
† **Morton S. Traum Award Finalist**

# Tuesday Morning, November 8, 2016

| | Surface Science<br>Room 104E - Session SS2+AS+HC+NS-TuM<br>Nanostructures: Growth, Reactivity, and Catalysis<br>**Moderator:** Bruce Koel, Princeton University | Thin Film<br>Room 102B - Session TF+SA+MI-TuM<br>Thin Films for Synchrotron and Magnetism Applications<br>**Moderators:** Joshua Ballard, Zyvex Labs,<br>Divine Kumah, North Carolina State University |
|---|---|---|
| 8:00am | **INVITED: SS2+AS+HC+NS-TuM1** Use of Size Correlations to Probe Reaction Mechanisms on Size-selected Model Catalysts, ***Scott Anderson,*** University of Utah | **TF+SA+MI-TuM1** Achieving High-Temperature Ferromagnetic Topological Insulator by Proximity Coupling, ***Valeria Lauter,*** Oak Ridge National Laboratory |
| 8:20am | Invited talk continues. | **TF+SA+MI-TuM2** Soft X-ray Induced Spin Crossover Transition at Room Temperature, ***Paulo Costa,*** *X. Zhang, S. Beniwal,* University of Nebraska-Lincoln*; A.T. N'Diaye,* Lawrence Berkeley National Laboratory*; J-F. Létard,* Université de Bordeaux*; P.A. Dowben, A. Enders,* University of Nebraska-Lincoln |
| 8:40am | **SS2+AS+HC+NS-TuM3** Role of the Strong Metal Support Interaction on the Catalytic Activity of Platinum Deposited on $TiO_2$ Supports, ***R.Paul Hansen,*** *R.S. Phillips,* University at Albany-SUNY*; E.T. Eisenbraun, C.A. Ventrice, Jr.,* SUNY Polytechnic Institute | **TF+SA+MI-TuM3** Probing Thermochromic Phase Transitions in ALD $VO_2$ using Synchrotron Radiation, ***Alexander Kozen,*** U.S. Naval Research Laboratory*; H. Joress,* Cornell University*; V.D. Wheeler, C.R. Eddy,* U.S. Naval Research Laboratory |
| 9:00am | **SS2+AS+HC+NS-TuM4** Adsorption and Adhesion Energies of Au, Cu, and Ag Nanoparticles on $CeO_2$(111), MgO(100) and Other Oxide Surfaces, ***Charles T. Campbell,*** *S.L. Hemmingson, G.M. Feeley,* University of Washington | **TF+SA+MI-TuM4** Standing-wave Synchrotron Photoemission Studies of Electronic Structure in $SrTiO_3$-$LaCrO_3$ Superlattices, ***Ryan Comes,*** Auburn University*; S.C. Lin,* University of California, Davis*; C.T. Kuo,* Lawrence Berkeley National Laboratory (LBNL)*; L. Plucinski,* FZ Juelich*; S. Spurgeon,* Pacific Northwest National Laboratory*; D. Kepaptsoglou, Q. Ramasse,* SuperSTEM*; J.E. Rault,* Synchrotron SOLEIL*; S. Nemsak,* Forschungszentrum Juelich GmbH, Germany*; C. Fadley,* Lawrence Berkeley National Laboratory (LBNL)*; P.V. Sushko, S.A. Chambers,* Pacific Northwest National Laboratory |
| 9:20am | **SS2+AS+HC+NS-TuM5** Effects of Nanoparticles on Surface Resistivity: Ni on Au(111), ***Joshua Cohen,*** *R.G. Tobin,* Tufts University | **INVITED: TF+SA+MI-TuM5** *In Situ* Synchrotron X-ray Studies of Complex Oxide Thin Film Growth, ***Dillon Fong,*** Argonne National Laboratory |
| 9:40am | **SS2+AS+HC+NS-TuM6** Three-Dimensional Control of Nanoparticle Layer Deposition by "Click Chemistry", ***Mackenzie Williams,*** *A.V. Teplyakov,* University of Delaware | Invited talk continues. |
| 10:00am | **BREAK - Complimentary Coffee in Exhibit Hall** | **BREAK - Complimentary Coffee in Exhibit Hall** |
| 10:20am | **BREAK - Complimentary Coffee in Exhibit Hall** | **BREAK - Complimentary Coffee in Exhibit Hall** |
| 10:40am | **BREAK - Complimentary Coffee in Exhibit Hall** | **BREAK - Complimentary Coffee in Exhibit Hall** |
| 11:00am | **SS2+AS+HC+NS-TuM10** Spherical Metallic Nanostructures Based on Fullerene Scaffolds with Tunable Bandgap, A Scanning Tunneling Microscopy/Spectroscopy (STM/STS) Study, ***Ehsan Monazami,*** University of Virginia*; J.B. McClimon,* University of Pennsylvania*; J.M. Rondinelli,* Northwestern University*; P. Reinke,* University of Virginia | **TF+SA+MI-TuM10** Probing CVD Growth Mechanisms of SiC with *In Operando* Synchrotron-based X-ray Diagnostics, ***Philip DePond,*** *A.A. Martin, J.H. Yoo, M. Bagge-Hansen, J. Lee, S. Elhadj, M. Matthews, T. van Buuren,* Lawrence Livermore National Laboratory |
| 11:20am | **SS2+AS+HC+NS-TuM11** Facile Synthesis of Gold Nanoworms and their Excellent Surface Enhanced Raman Scattering (SERS) and Catalytic Properties, ***Waqqar Ahmed,*** COMSATS Institute of Information Technology, Pakistan*; J.M. van Ruitenbeek,* Leiden University, Netherlands | **TF+SA+MI-TuM11** Unusual Effects in Organic Thin Film Growth as Revealed by the Use of *In Situ* Real Time Synchrotron X-ray Techniques, *R.K. Nahm, H.J. Bullen, T. Suh,* ***James Engstrom,*** Cornell University |
| 11:40am | **SS2+AS+HC+NS-TuM12** Surface Hydrogen Enables Sub-Eutectic Vapor-Liquid-Solid Semiconductor Nanowire Growth, *S.V. Sivaram, H. Hui,* Georgia Institute of Technology*; M. de la Mata, J. Arbiol,* Catalan Institute of Nanoscience and Nanotechnology, Spain*;* ***Michael Filler,*** Georgia Institute of Technology | **TF+SA+MI-TuM12** Understanding the Effect of Nitrogen Plasma on Plasma Assisted Atomic Layer Epitaxy of InN Monitored by Real Time GISAXS, ***Neeraj Nepal,*** *V. Anderson, S.D. Johnson, D.J. Meyer, B.P. Downey, A.C. Kozen,* US Naval Research Laboratory*; Z.R. Robinson,* SUNY College at Brockport*; D.R. Boris, S.C. Hernández, S.G. Walton,* US Naval Research Laboratory*; K.F. Ludwig,* Boston University*; C.R. Eddy, Jr.,* US Naval Research Laboratory |
| 12:00pm | **SS2+AS+HC+NS-TuM13** Ultrafine Sodium Titanate Nanowires with Extraordinary Strontium Ion-Exchange Property, ***Koji Nakayama,*** Tohoku University, Japan | **TF+SA+MI-TuM13** Spintronics Based on the Chiral Induced Spin Selectivity (CISS) Effect, ***Yossi Paltiel,*** The Hebrew University, Israel*; R. Naaman,* The Weizmann Institute of Science, Israel |

# Tuesday Morning, November 8, 2016

| | **Thin Film**<br>**Room 105A - Session TF-TuM**<br>**Advanced CVD and ALD Processing, ALD Manufacturing and Spatial-ALD**<br>**Moderators:** Steven M. George, University of Colorado at Boulder, Jesse Jur, North Carolina State University | **Vacuum Technology**<br>**Room 104C - Session VT-TuM**<br>**Vacuum Pumping and Material Outgassing**<br>**Moderators:** Martin Wüest, INFICON Ltd., Liechtenstein, Jacob Ricker, NIST |
|---|---|---|
| 8:00am | **TF-TuM1** An Analytic Expression for Reactant Utilization in CVD and ALD Chambers, ***Edward McInerney,*** Lam Research Corporation | **INVITED: VT-TuM1** Applicative Challenges for today's Turbo Molecular Pumps, ***Adrian Wirth,*** *H. Bernhardt,* Pfeiffer Vacuum GmbH, Germany*; N. Cotton,* Pfeiffer Vacuum Inc |
| 8:20am | **TF-TuM2** Growth of Silicon Films at Room Temperature Using Electron Enhanced Atomic Layer Deposition, ***Jaclyn Sprenger,*** *A.S. Cavanagh, H. Sun, S.M. George,* University of Colorado, Boulder | Invited talk continues. |
| 8:40am | **INVITED: TF-TuM3** Chemical Vapor Deposition within the ALD window – Quantitative Analysis of Precursor Surface Kinetics in Thin Film Formation, ***Michael Reinke,*** *Y. Kuzminykh, P. Hoffmann,* Empa, Swiss Federal Laboratories for Materials Science and Technology, Switzerland | **VT-TuM3** Ion Pump Design for Improved Pumping Speed at Low Pressure, ***Alessandro Abatecola,*** *M. Audi,* Agilent Technologies, Italy |
| 9:00am | Invited talk continues. | **VT-TuM4** Multi Scaled Titanium Gettered Surfaces for Enhanced Pumping of $H_2$, ***Alan Van Drie,*** Tri Alpha Energy |
| 9:20am | **TF-TuM5** A Rotation Fluidization Coupled Atomic Layer Deposition Reactor for Nanoparticle Coating, *C.L. Duan,* State Key Laboratory of Digital Manufacturing Equipment and Technology, School of Mechanical Science and Engineering, Huazhong University of Science and Technology, China*; R. Chen,* State Key Laboratory of Digital Manufacturing Equipment and Technology, School of Mechanical Science and Engineering, School of Optical and Electronic Information, Huazhong University of Science and Technology, China*;* ***Kun Cao,*** Huazhong University of Science and Technology, Wuhan, China | **VT-TuM5** Challenges of Using Molecular Adsorbers for Maintaining High Vacuum, ***Mihail Petkov,*** *G.E. Voecks,* NASA Jet Propulsion Laboratory/California Institute of Technology |
| 9:40am | **TF-TuM6** Atmospheric Pressure ALD in Porous Substrates: The Effect of Pressure on Step Coverage, *E. Balder, F. Roozeboom,* ***Paul Poodt,*** Holst Centre / TNO, Netherlands | **VT-TuM6** Outgassing of UHV Stainless Steel Cans, ***Lily Wang,*** *P.D. Honnell,* Los Alamos National Laboratory |
| 10:00am | **BREAK - Complimentary Coffee in Exhibit Hall** | **BREAK - Complimentary Coffee in Exhibit Hall** |
| 10:20am | **BREAK - Complimentary Coffee in Exhibit Hall** | **BREAK - Complimentary Coffee in Exhibit Hall** |
| 10:40am | **BREAK - Complimentary Coffee in Exhibit Hall** | **BREAK - Complimentary Coffee in Exhibit Hall** |
| 11:00am | **INVITED: TF-TuM10** New Spatial ALD platform for Semiconductor Manufacturing, ***Joseph Yudovsky,*** Applied Materials, Inc. | **VT-TuM10** Calibration of Reference Samples for Water Vapor Outgassing and Water Vapour Transfer Rate, ***Janez Setina,*** Institute of Metals and Technology (IMT), Slovenia*; K. Jousten,* Physikalisch-Technische Bundesanstalt (PTB), Germany |
| 11:20am | Invited talk continues. | **VT-TuM11** Simulated and Measured Extreme High Vacuum in the Jefferson Lab Polarized Electron Source, ***Marcy Stutzman,*** Thomas Jefferson National Accelerator Facility |
| 11:40am | **TF-TuM12** Spatial MLD of Polyamide Films on Flexible Substrates using a New Rotating Cylinder Reactor in a Custom Oven, ***Daniel Higgs,*** University of Colorado Boulder*; S.M. George,* University of Colorado at Boulder | **VT-TuM12** Outgassing Rate Measurements of 3-D Printed Materials, ***Makfir Sefa,*** *J.A. Fedchak, J. Scherschligt,* National Institute of Standards and Technology (NIST) |
| 12:00pm | **TF-TuM13** Spatial Atomic Layer Deposition for Porous and Fibrous Materials, ***Gregory Parsons,*** *A.H. Brozena, C.J. Oldham,* North Carolina State University | **VT-TuM13** Characterization Studies of UHV Polished Surfaces, ***Melisa Buie,*** *C. Fields,* Coherent Inc*; A. Cress,* San Jose State University |

# Tuesday Lunch, November 8, 2016

**Exhibitor Technology Spotlight**
**Room Hall C - Session EW-TuL**
**Exhibitor Technology Spotlight Session**
**Moderator:** Chris Moffitt, Kratos Analytical Limited

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|---|---|---|
| 12:20pm | | |
| 12:40pm | **EW-TuL2** Spin-resolved Momentum Microscopy, ***Thomas Stempel Pereira,*** SPECS Surface Nano Analysis GmbH | |
| 1:00pm | **EW-TuL3** The New Generation of the Hemispherical Energy Analyser in the Novel Surface Science Research, ***Lukasz Walczak,*** PREVAC Sp z o.o., Rogow, Poland | |
| 1:20pm | **EW-TuL4** Latest Developments in XPS and Related Methods from Kratos Analytical, ***Chris Blomfield,*** *J.D.P. Counsell, S.J. Coultas, S.C. Page,* Kratos Analytical Limited, UK*; C. Moffitt,* Kratos Analytical Limited | |
| 1:40pm | **EW-TuL5** What's New with Physical Electronics, ***John Newman,*** Physical Electronics USA | |
| 2:00pm | | |

| | **2D Materials Focus Topic**<br>**Room 103B - Session 2D-TuA**<br>**Novel Quantum Phenomena in 2D Materials**<br>**Moderators:** Yoshi Iwasa, University of Tokyo, Japan<br>Kristian Thygesen, Technical University of Denmark | **Applied Surface Science**<br>**Room 101B - Session AS+SS-TuA**<br>**Data Analytics in Surface Science and Nanoscience**<br>**Moderators:** Anders Mikkelsen, Lund University, Sweden,<br>Petra Reinke, University of Virginia |
|---|---|---|
| 2:20pm | **2D-TuA1** Time-dependent Density-functional Theory Simulation of Local Currents in Pristine and Single-defect Zigzag Graphene Nanoribbons, ***S He***, *A. Russakoff, Y. Li, K. Varga,* Vanderbilt University | **AS+SS-TuA1** Fast Strain Mapping of Nanowire Light-Emitting Diodes Using Nanofocused X-ray Beams, *T. Stankevic,* Copenhagen University, Denmark*; U. Johansson, L. Samuelson,* Lund University, Sweden*; G. Falkenberg,* DESY, Hamburg, Germany*; R. Feidenhans'l,* Copenhagen University, Denmark*;* ***Anders Mikkelsen,*** Lund University, Sweden |
| 2:40pm | **2D-TuA2** Effect of Environmental Parameters on 2D Excitonic Complexes, ***David Zhang***, *D.W. Kidd, K. Varga,* Vanderbilt University | **AS+SS-TuA2** Bellerophon Environment for Analysis of Materials (BEAM), A High Performance Computing Workflow Platform for Materials Research, *E.J. Lingerfelt, A. Belianinov, E. Endeve,* Oak Ridge National Laboratory*; O.S. Ovchinnikov,* Vanderbilt University*; S. Somnath, R.K. Archiblad, S.V. Kalinin,* ***Stephen Jesse,*** Oak Ridge National Laboratory |
| 3:00pm | **2D-TuA3** Studies of Conductance in Graphene Defects and Junctions using Complex-Injecting Potentials and TDDFT, ***Cody Covington***, *K. Varga,* Vanderbilt University | **INVITED: AS+SS-TuA3** The Center for Advanced Methods for Energy Research Applications (CAMERA):Mathematical Methods for Data Science from Experimental Facilities, ***James Sethian,*** University of California at Berkeley |
| 3:20pm | **2D-TuA4** Excited Biexcitons in Two-Dimensional Transition Metal Dichalcogenides, ***Daniel Kidd***, *D. Zhang, K. Varga,* Vanderbilt University | Invited talk continues. |
| 3:40pm | **BREAK** | **BREAK** |
| 4:00pm | **BREAK** | **BREAK** |
| 4:20pm | **2D-TuA7** Electron Talbot Effect on Graphene, ***Jorge Salas,*** Vanderbilt University | **AS+SS-TuA7** New Data Analysis Tools for X-ray Photoelectron Spectroscopy (XPS) and Spectroscopic Ellipsometry (SE), ***Matthew Linford***, *B. Singh, J. Bagley,* Brigham Young University*; J. Terry,* Illinois Institute of Technology*; A. Herrera-Gomez,* CINVESTAV-Unidad, Mexico |
| 4:40pm | **2D-TuA8** Femtosecond Hot Electron-Phonon Interactions of Single Layer Graphene and the undelying Substrate, ***Zina Jarrahi***, *J.L. Davidson, N.H. Tolk,* Vanderbilt University | **AS+SS-TuA8** A Surface Investigation of Parchments using ToF-SIMS and Principle Component Analysis, ***Marie-Laure Abel***, *J.F. Watts, V. Vilde,* University of Surrey, UK |
| 5:00pm | **INVITED: 2D-TuA9** New Opportunities in Two-Dimensional Material Research, ***Yuanbo Zhang,*** Fudan University, China | **INVITED: AS+SS-TuA9** Multivariate Analysis of Very Large Hyperspectral SIMS Datasets: What Can We Do, and What Would We Like to Do?, ***Henrik Arlinghaus,*** ION-TOF GmbH, Germany |
| 5:20pm | Invited talk continues. | Invited talk continues. |
| 5:40pm | **2D-TuA11** Ultrafast Carrier Dynamics in the Quasi-2D Metal Dichalcogenide $SnS_2$, ***Oliver Monti***, *C. Eads, D. Bandak,* University of Arizona*; D. Nordlund,* SLAC National Accelerator Laboratory*; M. Neupane,* US Army Research Laboratory | **AS+SS-TuA11** High mass-resolution 3D ToF-SIMS: PCA and visualization in seconds using Graphical Processor Units (GPUs), ***Peter Cumpson***, *I.W. Fletcher, N. Sano, A.J. Barlow,* Newcastle University, UK |
| 6:00pm | **2D-TuA12** MBE Growth of $WTe_2$ for Novel Electronic and Topologically Protected Devices, ***Lee Walsh***, *R. Yue, A.T. Barton, H. Zhu, L. Cheng, R. Addou, J. Hsu, J. Kim, M. Kim,* University of Texas at Dallas*; L. Colombo,* Texas Instruments*; R.M. Wallace, C.L. Hinkle,* University of Texas at Dallas | **AS+SS-TuA12** Mass Spectrometry Image Fusion, ***Bonnie June Tyler,*** Universität Münster, Germany*; H.F. Arlinghaus,* University of Muenster, Germany |

# Tuesday Afternoon, November 8, 2016

| | **Biomaterial Interfaces**<br>**Room 101A - Session BI+AS+SA-TuA**<br>**Biophysics and Characterization of Biological and Biomaterial Surfaces**<br>**Moderators:** Eva Chi, University of New Mexico,<br>Axel Rosenhahn, Ruhr-University Bochum, Germany | **Electronic Materials and Photonics**<br>**Room 102A - Session EM+MI+MN-TuA**<br>**New Materials and Devices for Emerging Memory Technologies**<br>**Moderators:** Andy Antonelli, Nanometrics,<br>Sean King, Intel Corporation |
|---|---|---|
| 2:20pm | **BI+AS+SA-TuA1** Resolving Non-specific and Specific Adhesive Interactions of Catechols at Solid/Liquid Interfaces at the Single Molecular Scale*, T. Utzig,* Max-Planck Institut für Eisenforschung GmbH, Germany*; P. Stock,* Max Planck Institut fur Eisenforschung GmbH, Germany*;* ***Markus Valtiner****,* Technische Universität Freiberg, Germany | **INVITED: EM+MI+MN-TuA1** Emerging Processing Challenges for Advanced Memory Technologies*,* ***Bart Van Schravendijk****,* Lam Research |
| 2:40pm | **BI+AS+SA-TuA2** Protein-Nanoparticles Interactions: Surface Chemistry, Protein Corona and Secondary Structural Changes*, I. Ojea, R. Capomaccio, L. Calzolai, D. Gilliland, P. Colpo,* ***Giacomo Ceccone****,* EC-JRC-IHCP, Italy*; G. Siligardi, R. Hussein,* Diamond Light Source, Oxfordshire, UK | Invited talk continues. |
| 3:00pm | **INVITED: BI+AS+SA-TuA3** Measuring the Impact of the Surface of Protein Stability using Single Molecule Experiments with the AFM*,* ***Phil Williams****, S. Allen, A. Oyefeso, G. Milson, E. Fornari,* University of Nottingham, UK | **INVITED: EM+MI+MN-TuA3** STT-MRAM: A Versatile Memory Solution Enabled by Atomic Level Engineering*,* ***Yu Lu****,* Hikstor Technology Co. Ltd, China |
| 3:20pm | Invited talk continues. | Invited talk continues. |
| 3:40pm | **BREAK** | **BREAK** |
| 4:00pm | **BREAK** | **BREAK** |
| 4:20pm | **INVITED: BI+AS+SA-TuA7** In Vitro Characterization of Interfaces for the Development of Antibacterial and Biocompatible Surfaces*,* ***Katharina Maniura****,* Empa, Swiss Federal Laboratories for Materials Science and Technology, Switzerland | **INVITED: EM+MI+MN-TuA7** Resistance Change Memory and its Perspective toward 3D Integration*,* ***Yoshio Nishi****, B. Magyari-Kope,* Stanford University |
| 4:40pm | Invited talk continues. | Invited talk continues. |
| 5:00pm | **BI+AS+SA-TuA9** Vibrational Sum-Frequency Scattering Spectroscopy for Characterization of Biomaterial Interfaces in Biological Environments*,* ***Patrik Johansson****, C. McDonald, Y.-C. Wang, P. Koelsch, D.G. Castner,* University of Washington | **INVITED: EM+MI+MN-TuA9** Atomic Disorder As an Intrinsic Source of Variability in Filamentary Rram Devices – Ab Initio Investigations*,* ***Sergiu Clima****,* IMEC, Belgium*; L. Goux, B. Govoreanu, M. Jurczak, G. Pourtois, A. Fantini,* IMEC |
| 5:20pm | **BI+AS+SA-TuA10** Imaging ToF-SIMS of Human Breast Cancer Tissues: Connecting Chemical Images to Biology*,* ***Blake Bluestein****,* University of Washington*; F. Morrish, D. Hockenbery,* Fred Hutchinson Cancer Research Center*; L.J. Gamble,* University of Washington | Invited talk continues. |
| 5:40pm | **BI+AS+SA-TuA11** Some of These Images are Just Like the Others: Finding Similar Images in Imaging Mass Spectrometry Data Sets*,* ***Daniel Graham****, L.J. Gamble,* University of Washington | **EM+MI+MN-TuA11** Reduction of Radiation Damage to HfOx-Based Resistive Random Access Memory using a Thin ALD HfOx Film*,* ***Kai-wen Hsu****, T. Chang,* University of Wisconsin-Madison*; L. Zhao, Z. Wang,* Stanford University*; R. Agasie, T. Betthauser, J. Nickles, Z. Ma, J. Chang,* University of Wisconsin-Madison*; Y. Nishi,* Stanford University*; J.L. Shohet,* University of Wisconsin-Madison |
| 6:00pm | **BIOMATERIAL INTERFACES FLASH NETWORKING SESSION:** **DMITRI PETROVYKH,** Int'l Iberian Nanotech Lab, Portugal (BI+PB-TuP1); **GEORGE BANIS**, Univ. of Maryland, (BI+PB-TuP2); **LUIS SOLIS**, Univ, of Texas El Paso (BI+PB-TuP3); **RICHARD ROSENBERG,** Argonne National Lab *(*BI+PB-TuP4); **JINN P. CHU**, National Taiwan Univy of Sci. & Tech., Republic of China (BI+PB-TuP6); **DANIEL BARLOW,** US Naval Research Lab (BI+PB-TuP7); **DAVID FLORIAN**, Univ. of Virginia (BI+PB-TuP8) | **EM+MI+MN-TuA12** Potential Dependent Resistance of Doped $TiO_2$ Film Fabricated by Solgel Process: Perspective for Resistive Memory*, R.R. Pandey,* ***Jyotirmay Sharma****, C. Kant, K. Saini,* CSIR-National Physical Laboratory, India |
| 6:25 pm<br>6:45 pm | | **EMPD BUSINESS MEETING**<br>**EMPD FORUM: CAREERS AT LAM RESEARCH** |

# Tuesday Afternoon, November 8, 2016

| | **Magnetic Interfaces and Nanostructures**<br>**Room 102B - Session MI-TuA**<br>**Magnetic Phenomena in Organic Systems**<br>**Moderators:** Gary Mankey, University of Alabama, Mikel Holcomb, West Virginia University | **Manufacturing Science and Technology**<br>**Room 103A - Session MS-TuA**<br>**Working with National Labs and User Facilities**<br>**Moderator:** Bridget Rogers, Vanderbilt University |
|---|---|---|
| 2:20pm | **INVITED: MI-TuA1** Promises and Challenges of Organic Spintronics, ***Christoph Boehme,*** University of Utah | **MS-TuA1** Southeastern Nanotechnology Infrastructure Corridor (SENIC) – A Nano Fabrication and Characterization Resource as part of the National Nanotechnology Coordinated Infrastructure (NNCI), *P. Joseph, D. Gottfried,* ***Gary Spinner,*** *O. Brand,* Georgia Institute of Technology |
| 2:40pm | Invited talk continues. | **MS-TuA2** The Cornell NanoScale Science and Technology Facility (CNF), ***Michael Skvarla,*** Cornell NanoScale Science and Technology Facility |
| 3:00pm | **MI-TuA3** Spin-Polarized STM Observation of Hybridization at the Interface between Different 8-hydroxyquinolates and the Cr(001) Surface, ***Daniel Dougherty,*** *J. Wang, A. Deloach,* North Carolina State University | **MS-TuA3** The CNST NanoFab at NIST: *Nanofabrication for US Commerce,* ***Vincent Luciani,*** NIST Center for Nanoscale Science and Technology |
| 3:20pm | **MI-TuA4** Charge Transport in Thin Films of a Molecular Spin-Crossover Compound, ***Greg Szulczewski,*** *E. Ellingsworth,* The Univeristy of Alabama | **MS-TuA4** In-Situ Characterization Tools for Materials Growth and Processing at NSLS-II, ***Klaus Attenkofer,*** *E. Stavitski, K. Evans-Lutterodt, C. Nelson,* Brookhaven National Laboratory |
| 3:40pm | **BREAK** | **BREAK** |
| 4:00pm | **BREAK** | **BREAK** |
| 4:20pm | **INVITED: MI-TuA7** Single Organic Radicals on Metal Surfaces: A Model System for Spin-1/2 Kondo Physics, ***Peter Wahl,*** University of St Andrews, UK | **MS-TuA7** The Center for Nanophase Materials Sciences, ***Michael Simpson,*** Oak Ridge National Laboratory |
| 4:40pm | Invited talk continues. | **MS-TuA8** User Opportunities at the Center for Nanoscale Materials, ***Kathleen Carrado Gregar,*** Center for Nanoscale Materials at Argonne National Laboratory |
| 5:00pm | **INVITED: MI-TuA9** Tunneling in III-N Heterostructures for Low Power Electronics, ***Patrick Fay,*** *W. Li, L. Cao, K. Pourang,* University of Notre Dame; *S. Islam,* Cornell University; *C. Lund,* University of California at Santa Barbara; *H. Ilatikhameneh, R. Rahman, T. Amin,* Purdue University; *D. Jena,* Cornell University; *S. Keller,* University of California at Santa Barbara; *G. Klimeck,* Purdue University | **MS-TuA9** The Center for Integrated Nanotechnologies--Resources and Capabilities, ***Dale Huber,*** Sandia National Laboratories |
| 5:20pm | Invited talk continues. | **MS-TuA10** Using EMSL Capabilities in Combination with those from other User Facilities to Address Fundamental and Applied Problems, ***Donald Baer,*** *M.H. Engelhard, T.J. Law,* Pacific Northwest National Laboratory |
| 5:40pm | **INVITED: MI-TuA11** A Spins-Inside Quantum Processor, *T. Fujita,* Delft University of Technology, The Netherlands; *L.M.K. Vandersypen,* Delft University of Technology, The Netherlands; ***T. Hensgens,*** Delft University of Technology, The Netherlands | **PANEL DISCUSSION** |
| 6:00pm | Invited talk continues. | |
| 6:05 pm | **MIND BUSINESS MEETING** | |

| | **Nanometer-scale Science and Technology**<br>**Room 101D - Session NS-TuA**<br>**Nanoscale Imaging and Characterization**<br>**Moderators:** Mehmet Z. Baykara, Bilkent University, Turkey, Sidney Cohen, Weizmann Institute of Science, Israel, Rainer Timm, Lund University, Sweden | **Plasma Science and Technology**<br>**Room 104B - Session PS+2D-TuA**<br>**Plasma Processing for Nanomaterials and 2D Materials**<br>**Moderator:** Sumit Agarwal, Colorado School of Mines |
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| 2:20pm | **INVITED: NS-TuA1** Frontiers of Force Microscopy in Nanoscience and Nanotechnology, ***Ricardo Garcia****, CSIC, Spain | **PS+2D-TuA1** Analysis of Microplasma Reduction of Aqueous Silver and Gold Salts to Colloidal Nanoparticles, ***Caroline De Vos,*** Université Libre de Bruxelles, Belgium; *M.J. Gordon,* University of California, Santa Barbara; *R.M. Sankaran,* Case Western Reserve University; *F. Reniers,* Université Libre de Bruxelles, Belgium |
| 2:40pm | Invited talk continues. | **PS+2D-TuA2** Controllable Optical Properties of Plasmonic TiN Nanoparticles Synthesized by a Scalable Non-Thermal Plasma Method, ***Alejandro Alvarez Barragan,*** *L. Zhong, L. Mangolini,* University of California Riverside |
| 3:00pm | **INVITED: NS-TuA3** Elemental and Magnetic Fingerprinting of Materials at the Nanoscale by Synchrotron X-ray Scanning Tunneling Microscopy, ***Volker Rose,*** Argonne National Laboratory | **INVITED: PS+2D-TuA3** Plasma Prize Talk: Nonthermal Plasma Synthesis of Nanocrystal Materials, *N.J. Kramer, K. Schramke, T. Chen, H. Fu, S. Ehrenberg, K. Reich, B. Shklovskii,* ***Uwe Kortshagen****, University of Minnesota |
| 3:20pm | Invited talk continues. | Invited talk continues. |
| 3:40pm | **BREAK** | **BREAK** |
| 4:00pm | **BREAK** | **BREAK** |
| 4:20pm | **INVITED: NS-TuA7** Quantitative Nanomechanics of Soft Materials with AFM: Old and New Methods, ***Igor Sokolov,*** Tufts University | **PS+2D-TuA7** Initiated Plasma Enhanced Chemical Vapor Deposition of Metalloporphyrins: A Simple Route towards the Deposition of Metal Organic Covalent Networks, ***Nicolas BOSCHER,*** Luxembourg Institute of Science and Technology, Luxembourg; *M. WANG, K. GLEASON,* Massachusetts Institute of Technology |
| 4:40pm | Invited talk continues. | **PS+2D-TuA8** $H_2$ Plasma Interaction with CVD Graphene, ***Gilles Cunge,*** CNRS-LTM, France; *D. Ferrah,* CEA-LETI, France; *D. Marinov,* LPP-CNRS, Ecole Polytechnique, France; *J. Arias-Zapata,* LTM-CNRS, France; *E. Despiau-Pujo, A. Davydova,* CNRS-LTM, France; *H. Okuno,* INAC; *V. Bouchiat,* CNRS I-Neel, France; *O.J. Renault,* CEA-LETI, France |
| 5:00pm | **NS-TuA9** AFM Based Nanoscale Structure-Property Characterization of Nanoporous Organo-Silicates, ***Qichi Hu,*** *K. Kjoller,* Anasys Instruments; *G. Stan,* NIST/Material Measurement Laboratory; *S.W. King,* Intel Corporation | **INVITED: PS+2D-TuA9** Plasma-graphene Interaction and its Effects on Nanoscale Patterning, *A. Harpale,* University of Illinois at Urbana-Champaign; ***Huck Beng Chew,*** University of Illinois at Urbana Champaign |
| 5:20pm | **NS-TuA10** Probing Single Molecule Reactions with Laser-coupled STM, ***Nicholas Tallarida,*** *L. Rios, V.A. Apkarian, J. Lee,* University of California, Irvine | Invited talk continues. |
| 5:40pm | **NS-TuA11** Scanning Microwave Microscopy Imaging in Liquids through Ultra-Thin Membranes, ***Alexander Tselev,*** Oak Ridge National Laboratory; *J. Velmurugan,* National Institute of Standards and Technology (NIST), University of Maryland (UMD); *A. Kolmakov,* NIST/CNST | **INVITED: PS+2D-TuA11** A Closer Look at Chemically Modified Graphene, ***Sandra Hernández,*** Naval Research Laboratory |
| 6:00pm | **NS-TuA12** SnS Nanoplates, ***Nancy Trejo,*** *A. Hunter, C. Wrasman, S. Ganguly,* University of Minnesota; *J. Dwyer,* St. Catherine University; *E.S. Aydil,* University of Minnesota | Invited talk continues. |
| 6:25 pm | **NSTD BUSINESS MEETING** | **PSTD BUSINESS MEETING & 2016 PLASMA PRIZE AWARD ANNOUNCEMENT** |

* **NSTD Recognition Award**

† **PSTD Plasma Prize**

| | **Novel Trends in Synchrotron and FEL-Based Analysis Focus Topic**<br>**Room 103C - Session SA+AS+BI+MI-TuA**<br>**Synchrotron and XFEL Advances for Biological Systems (2:20-3:40 pm)/Synchrotron Radiation at the Frontiers of Device Technology (4:20-6:20 pm)**<br>**Moderators:** David Shuh, Lawrence Berkeley National Lab, Olivier Renault, CEA-University Grenoble Alps, France | **Advanced Surface Engineering**<br>**Room 101C - Session SE+MS+TF-TuA**<br>**Innovations in PVD, CVD, Atmospheric Pressure Plasma and Other Surface Technologies**<br>**Moderators:** Hana Barankova, Uppsala University, Sweden, Robert Franz, Montanuniversität Leoben, Austria |
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| 2:20pm | **INVITED: SA+AS+BI+MI-TuA1** Crystal Growth Mechanisms of Biominerals Revealed by Polarization-dependent Imaging Contrast (PIC) Mapping, ***Pupa Gilbert,*** University of Wisconsin - Madison | **SE+MS+TF-TuA1** Investigation of Critical Processing Parameters on Laser Surface Processing of Mg-Al-Zn Alloys: Impact on Corrosion Kinetics, ***Michael Melia,*** *D.C. Florian, J.R. Scully, J.M. Fitz-Gerald,* University of Virginia |
| 2:40pm | Invited talk continues. | **SE+MS+TF-TuA2** Engineering a WC/Co Carbide Surface for PVD and CVD coatings, ***Aharon Inspektor,*** *P.A. Salvador,* Carnegie Mellon University; *D. Banerjee, C. McNerny, M. Rowe, P. Mehrotra,* Kennametal Inc. |
| 3:00pm | **INVITED: SA+AS+BI+MI-TuA3** New Dimensions in Synchrotron IR Spectroscopy, ***Michael Martin,*** Lawrence Berkeley National Laboratory | **INVITED: SE+MS+TF-TuA3** Room-Temperature Ductility in Refractory Transition-Metal Carbides: Potential to Create Ultra-Tough, Flexible Thin Films, ***Suneel Kodambaka,*** University of California at Los Angeles |
| 3:20pm | Invited talk continues. | Invited talk continues. |
| 3:40pm | **BREAK** | **BREAK** |
| 4:00pm | **BREAK** | **BREAK** |
| 4:20pm | **INVITED: SA+AS+BI+MI-TuA7** Sample Delivery Methods for X-ray Free Electron Lasers, ***Uwe Weierstall,*** Arizona State University | **SE+MS+TF-TuA7** Spray-Coated Carbon-Nanotubes for Crack-Tolerant Metal Matrix Composites as Photovoltaic Gridlines, ***Omar K. Abudayyeh,*** University of New Mexico; *N.D. Gapp, G.K. Bradshaw, D.M. Wilt,* Air Force Research Laboratories; *S.M. Han,* University of New Mexico |
| 4:40pm | Invited talk continues. | **SE+MS+TF-TuA8** Atmospheric Pressure Plasma Enhanced CVD of High Quality Silica-Like Bilayer Encapsulation Films, ***Fiona Elam,*** FUJIFILM Manufacturing Europe B.V., Netherlands; *A.S. Meshkova,* DIFFER, Netherlands; *S.A. Starostin, J.B. Bouwstra,* FUJIFILM Manufacturing Europe B.V.; *M.C.M. van de Sanden,* Dutch Institute for Fundamental Energy Research (DIFFER), Netherlands; *H.W. de Vries,* DIFFER, Netherlands |
| 5:00pm | **INVITED: SA+AS+BI+MI-TuA9** Synchrotron-based Spectroscopy Investigation for Electronic Phase Transition at Highly-Charged Electric-Double-Layer Interfaces, ***Hongtao Yuan,*** SLAC National Accelerator Laboratory | **SE+MS+TF-TuA9** Plasma Polymerization of Organic Coatings at Atmospheric Pressure: Relationship between the Precursor Chemistry, the Plasma Chemistry and the Final Coating Chemistry, *B. Nisol, N. Vandencasteele, J. Hubert, C. De Vos, J. Ghesquière, D. Merche,* ***François Reniers,*** Université Libre de Bruxelles, Belgium |
| 5:20pm | Invited talk continues. | **INVITED: SE+MS+TF-TuA10** Innovations in Atmospheric Pressure Plasma Technologies for Surface Engineering, ***David Ruzic,*** *Y.L. Wu, L. Na, S. Hammouti, I.A. Shchelkanov,* University of Illinois at Urbana-Champaign |
| 5:40pm | **SA+AS+BI+MI-TuA11** Correlation of the Conductivity/Magnetic Properties and the Electronic, Crystalline and Compositional Structure of Strongly Correlated Complex-oxide Interfaces and Thin Films, ***Juan Rubio-Zuazo,*** SpLine CRG Beamline at the ESRF The European Synchrotron, France; *G.R. Castro,* SpLIne CRG Beamline at the ESRF The European Synchrotron, France | Invited talk continues. |
| 6:00pm | **SA+AS+BI+MI-TuA12** Interface Passivation of III-V/High-k Materials by High Energy X-ray Photoelectron Spectroscopy: A Quantitative Evaluation, ***Thierry Conard,*** *V. Spampinato, L. Nyns, S. Sioncke,* IMEC, Belgium; *J.M. Ablett,* Synchrotron SOLEIL- Ligne GALAXIES, France; *W. Vandervorst,* IMEC, KU Leuven, Belgium | **SE+MS+TF-TuA12** Solid-state Dewetting: Control and Applications, ***Lukasz Borowik,*** *Y. Almadori, N. Chevalier, J.-C. Barbé,* CEA, LETI, MINATEC Campus, France |

| | Scanning Probe Microscopy Focus Topic<br>Room 104A - Session SP+AS+MI+NS+SS-TuA<br>Probing Spin-Dependent Phenomena<br>**Moderators:** Phillip First, Georgia Institute of Technology, Shivani Rajput, Oak Ridge National Laboratory | Surface Science<br>Room 104E - Session SS+AS-TuA<br>Structure and Characterization of Oxides<br>**Moderator:**<br>Robert Bartynski, Rutgers, the State University of New Jersey |
|---|---|---|
| 2:20pm | **INVITED: SP+AS+MI+NS+SS-TuA1** Spin Sensing and Magnetic Design at the Single Atom Level, ***Alexander Khajetoorians,*** Radboud University, The Netherlands | **SS+AS-TuA1** Phase Formation and Stability of Reactive Sputtered Zirconium Dioxide Thin Films, ***Mohsin Raza,*** *D. Cornil, J. Cornil,* University of Mons, Belgium*; S. Lucas,* University of Namur, Belgium*; A.L. Thomann, A. Caillard, M. El Mokh,* GREMI CNRS/Université d'Orléans, France*; J.F. Pierson, P. Boulet,* Université de Lorraine, France*; R. Snyders, S. Konstantinidis,* University of Mons, Belgium |
| 2:40pm | Invited talk continues. | **SS+AS-TuA2** W-oxide on Ag(100): a Flexible Decoupled 2-D Oxide Layer, *T. Obermüller, S. Surnev,* ***Falko P. Netzer,*** Karl-Franzens University, Austria |
| 3:00pm | **INVITED: SP+AS+MI+NS+SS-TuA3** Electron Spin Resonance of Single Atom and Engineered Spin Structures, ***Taeyoung Choi****, W. Paul, C.P. Lutz, A.J. Heinrich,* IBM Almaden Research Center | **SS+AS-TuA3** Growth and Termination of a Rutile IrO2(100) Layer on Ir(111), ***Rahul Rai****, T. Li, Z. Liang,* University of Florida, Gainesville*; M. Kim, A. Asthagiri,* Ohio State University*; J.F. Weaver,* University of Florida, Gainesville |
| 3:20pm | Invited talk continues. | **SS+AS-TuA4** Vibrational Spectroscopy of Iron Oxide Nanostructures and Thin Films Supported on Graphite, ***Joel Langford****, F. Rosner, J.Y. Kwon, J.C. Hemminger,* University of California Irvine |
| 3:40pm | **BREAK** | **BREAK** |
| 4:00pm | **BREAK** | **BREAK** |
| 4:20pm | **SP+AS+MI+NS+SS-TuA7** Probe the Inter-atomic Spin Coupling in Mn Clusters on Graphene with LT-Spin-IETS, ***Haiming Guo,*** Institute of Physics, Chinese Academy of Sciences, China | **INVITED: SS+AS-TuA7** Electron Transfer Processes on Single Crsystalline Alkaline Earth Metal Oxide Films, ***Thomas Risse,*** Freie Universität Berlin, Germany |
| 4:40pm | **SP+AS+MI+NS+SS-TuA8** Controlling Kondo Effect of Magnetic Molecules on Au(111) by Small Molecule Binding, ***MinHui Chang****, S.J. Kahng,* Korea University, Republic of Korea*; Y.H. Chang,* Korea Advanced Institute of Science and Technology (KAIST), Republic of Korea*; H.W. Kim, S.H. Lee,* Korea University, Republic of Korea*; Y.-H. Kim,* KAIST, Republic of Korea | Invited talk continues. |
| 5:00pm | **INVITED: SP+AS+MI+NS+SS-TuA9** Spin-polarized Scanning Tunneling Microscopy on Surfaces Prepared by Molecular Beam Epitaxy, ***Arthur Smith,*** Ohio University Nanoscale and Quantum Phenomena Institute | **SS+AS-TuA9** Tungsten Trioxide Monolayer on Pd(100), *N. Doudin, M. Blatnik,* Karl-Franzens University, Austria*; D. Kuhness,* Karl-Franzens University, Germany*; A. Fortunelli,* CNR-ICCOM & IPCF Pisa, Italy*; F.P. Netzer,* ***Svetlozar Surnev,*** Karl-Franzens University, Austria |
| 5:20pm | Invited talk continues. | **SS+AS-TuA10** Electron Energy Loss Study of Excess Electrons in Reducible $TiO_2$: Dual Behaviour or Coexistence of Trapped and Free States? Bulk or Surface Defects?, ***Remi Lazzari****, J. Li, J. Jupille,* Institut des NanoSciences de Paris, France |
| 5:40pm | **SP+AS+MI+NS+SS-TuA11** The Use of Scanning Probe Techniques to Study the Behaviour of Second Phase Particles in Beryllium and Their Role in Localised Corrosion, ***Christopher Mallinson****, J.F. Watts,* University of Surrey, UK | **SS+AS-TuA11** Interplay between Steps and Oxygen Vacancies on Curved Rutile $TiO_2$(110), ***Enrique Ortega,*** Universidad del País Vasco, Spain*; L.A. Miccio,* Bihurcrystal Ltd.*; M. Setvin,* Technical University of Vienna, Austria*; M. Müller, M. Abadía, I. Piquero,* Centro de Fisica de Materiales, Spain*; J. Lobo-Checa,* Instituto de Ciencia de Materiales de Aragón, Spain*; F. Schiller, C. Rogero,* Centro de Fisica de Materiales, Spain*; M. Schmid,* Technical University of Vienna, Austria*; D. Sánchez-Portal,* Centro de Fisica de Materiales, Spain*; U. Diebold,* Technical University of Vienna, Austria |
| 6:00pm | **SP+AS+MI+NS+SS-TuA12** Many-body Interaction induced Spin-split States of Single Vacancy in Graphite, ***Wonhee Ko,*** Samsung Advanced Institute of Technology, Republic of Korea*; H.W. Kim, Y. Cho,* Samsung Advanced Institute of Technology*; Y. Kuk,* Seoul National University, Korea, Republic of Korea*; S.W. Hwang,* Samsung Advanced Institute of Technology | **SS+AS-TuA12** Vanadium on Anatase $TiO_2$, ***Stig Koust****, L. Arnarson,* iNANO, Aarhus University, Denmark*; P.G. Moses,* Haldor Topsøe Research Lab, Denmark*; I. Beinik, J.V. Lauritsen, S. Wendt,* iNANO, Aarhus University, Denmark |
| 6:25 pm | | **SSD BUSINESS MEETING** |

# Tuesday Afternoon, November 8, 2016

| | **Surface Science**<br>**Room 104D - Session SS+HC-TuA**<br>**Photocatalysis and Photochemistry at Surfaces**<br>**Moderator:** Arthur Utz, Tufts University | **Thin Film**<br>**Room 105A - Session TF-TuA**<br>**Thin Film Photovoltaics**<br>**Moderators:** Eray Aydil, University of Minnesota, Colin Wolden, Colorado School of Mines |
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| 2:20pm | **SS+HC-TuA1** Investigations of Surface Chemistry for Pyridine-catalyzed $CO_2$ Reduction on GaP, *C.X. Kronawitter,* ***Bruce Koel,*** Princeton University | **INVITED: TF-TuA1** Perovskite Solar Cells: Material Synthesis, Device Operation and Charge Carrier Dynamics, ***Kai Zhu,*** National Renewable Energy Laboratory |
| 2:40pm | **SS+HC-TuA2** Photoreactivity of Benzoate Monolayers on $TiO_2$: Comparison of Anatase (001) and Rutile (110), ***Erik Skibinski,*** *W.J.I. DeBenedetti, A. Song, A. Ortoll-Bloch, M.A. Hines,* Cornell University | Invited talk continues. |
| 3:00pm | **INVITED: SS+HC-TuA3** Light-driven $H_2$ Generation using Multicomponent Semiconductor-metal Colloidal Nanorod Heterostructures, ***Tianquan Lian,*** Emory University | **TF-TuA3** Perovskite Film Growth And Degradation Mechanisms In Graphene-Based Perovskite Solar Cells By In Situ Spectroscopy, ***Muge Acik,*** Argonne National Laboratory; *S.B.D. Darling,* Argonne National Laboratory, University of Chicago |
| 3:20pm | Invited talk continues. | **TF-TuA4** ALD Processing for Organo-Metal Halide Perovskite Solar Cells: Opportunities and Challenges, *V. Zardetto,* Eindhoven University of Technology, Netherlands; *F. di Giacomo, R. Andriessen,* Solliance/TNO, Netherlands; *T.M. Brown, A. di Carlo,* University of Rome "Tor Vergata", Italy; *W.M.M. Kessels,* ***Mariadriana Creatore,*** Eindhoven University of Technology, Netherlands |
| 3:40pm | **BREAK** | **BREAK** |
| 4:00pm | **BREAK** | **BREAK** |
| 4:20pm | **SS+HC-TuA7** Quenching of Electron Transfer Reactions through Coadsorption: A Study of Oxygen Photodesorption from $TiO_2$(110), ***Greg Kimmel,*** *N.G. Petrik, M. Shen, M.A. Henderson,* Pacific Northwest National Laboratory | **TF-TuA7** Identification of Critical Defects in Thin Film CdTe Solar Cells Deposited by Magnetron Sputtering, *P.M. Kaminski, A. Abbas, S. Yilmaz,* ***John Walls,*** Loughborough University, UK |
| 4:40pm | **SS+HC-TuA8** Different Effects of Oxygen Adsorption on the Band Bending of $TiO_2$ Nanoparticles Studied by Photoluminescence Spectroscopy, ***Shiliang Ma,*** *M. Reish, Z. Zhang, I. Harrison, J.T. Yates, Jr.,* University of Virginia | **TF-TuA8** Solar Energy Conversion Properties and Defect Physics of $ZnSiP_2$, ***Aaron Martinez,*** Colorado School of Mines; *E.L. Warren, P. Gorai,* National Renewable Energy Laboratory; *K.A. Borup,* Aarhus University, Denmark; *D. Kuciauskas, P.C. Dippo,* National Renewable Energy Laboratory; *B.R. Ortiz,* Colorado School of Mines; *R.T. Macaluso,* University of Texas at Arlington; *S.D. Nguyen,* University of Northern Colorado; *A.L. Greenaway, S.W. Boettcher,* University of Oregon, Eugene; *A.G. Norman,* National Renewable Energy Laboratory; *V. Stevanovic, E.S. Toberer,* Colorado School of Mines; *A.C. Tamboli,* National Renewable Energy Laboratory |
| 5:00pm | **SS+HC-TuA9** Imaging Photodecomposition of Trimethyl Acetic Acid on Cross-linked (1 × 2) Rutile $TiO_2$(110), *Y. Xia, K. Zhu,* ***Zhenrong Zhang,*** *K.T. Park,* Baylor University | **TF-TuA9** Controlling the Composition of Zn(O,S) Alloys Grown by Atomic Layer Deposition, ***Diane K. Lancaster,*** *H. Sun,* University of Colorado, Boulder; *S.M. George,* University of Colorado at Boulder |
| 5:20pm | **SS+HC-TuA10** Non-Fullerene Acceptors for Organic Photovoltaics: PTCDA versus $C_{60}$, ***Steven Robey,*** National Institute of Standards and Technology | **TF-TuA10** ALD Ta-doped ZnO Transparent Conducting Oxide, ***Zhengning Gao,*** *Y. Myung, R. Mishra,* Washington University in St. Louis; *R. Kanjolia,* SAFC, Sigma; *J. Park,* Korea University, Republic of Korea; *P. Banerjee,* Washington University in St. Louis |
| 5:40pm | **SS+HC-TuA11** Use of Photoluminescence to Monitor Surface Chemistry of Metal Oxide Nanoparticles, *S. Kim, D. Somaratne,* ***James Whitten,*** University of Massachusetts Lowell | **TF-TuA11** Leveraging Small Molecules to Control Interfacial Stability of Transparent Conductive Oxides, ***Ina Martin,*** *R. Matthews, E.B. Pentzer, T.J. Peshek,* Case Western Reserve University |
| 6:00pm<br><br>6:25 pm | **SS+HC-TuA12** Exploring Pd Adsorption, Diffusion, Permeation, and Nucleation on Bilayer $SiO_2$/Ru as a Function of Hydroxylation and Precursor Environment: From UHV to Catalyst Preparation, ***William Kaden,*** University of Central Florida | **TF-TuA12** Thickness Dependence of Electro-optical Properties of $Pb_{0.95}La_{0.05}Zr_{0.54}Ti_{0.46}O_3$ Thin Films for Photovoltaic Applications, ***Vaishali Batra,*** *S. Kotru,* The University of Alabama<br><br>**TFD BUSINESS MEETING** |

**Vacuum Technology**
**Room 104C - Session VT-TuA**
**Accelerator and Large Vacuum Systems**
**Moderators:** Marcy Stutzman, Thomas Jefferson National Accelerator Facility,
Marcelo Ferreira, European Spallation Source-ESS, Sweden

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| 2:20pm | **INVITED: VT-TuA1** Vacuum Design of the European Spallation Source Target Monolith System, ***Peter Ladd***, European Spallation Source, Sweden | |
| 2:40pm | Invited talk continues. | |
| 3:00pm | **VT-TuA3** Achievements and Problems in the First Commissioning of SuperKEKB Vacuum System, ***Yusuke Suetsugu***, *K. Shibata, T. Ishibashi, M. Shirai, S. Terui, K. Kanazawa, H. Hisamatsu,* KEK, Japan | |
| 3:20pm | **VT-TuA4** Leak Testing of a Large Fusion Device and Measurement of Leak Rates, ***Tom Keenan***, UKAEA, UK | |
| 3:40pm | **BREAK** | |
| 4:00pm | **BREAK** | |
| 4:20pm | **INVITED: VT-TuA7** Saving Megawatts in a Micron: Tailoring the Surfaces of Superconducting RF Cavities, ***Sam Posen****, Fermi National Accelerator Laboratory | |
| 4:40pm | Invited talk continues. | |
| 5:00pm | **VT-TuA9** NEG Coating of Narrow-Gap Insertion Devices and Beam Pipes: Recent Achievements and Future Perspectives, ***Paolo Manini***, *M. Puro, S. Raimondi, T. Porcelli, F. Siviero, E. Maccallini, G. Bongiorno,* SAES Getters S.p.A., Italy | |
| 5:20pm | **VT-TuA10** Realisation of a Vacuum System of an EUV Exposure System, ***Freek Molkenboer***, *N.B. Koster, A.F. Deutz, B.A.H. Nijland, P.J. Kerkhof, P.M. Muilwijk, B.W. Oostdijck, J. Westerhout, C.L. Hollemans, E. te Sligte, W.F.W. Mulckhuyse, M. van Putten, A.M. Hoogstrate, P. van der Walle, J.R.H. Diesveld, A. Abutan,* TNO Technical Sciences, Netherlands | |
| 5:40pm | **INVITED: VT-TuA11** Cleaning and Verification Strategies for UCV and UHV Components, ***Michael Flämmich***, VACOM, Vakuum Komponenten & Messtechnik GmbH, Germany; *C. Worsch, S. Gottschall, R. Bauer, U. Bergner,* VACOM Vakuum Komponenten & Messtechnik GmbH, Germany | |
| 6:00pm | Invited talk continues. | |

* **VTD Early Career Award**

## Actinides and Rare Earths Focus Topic
## Room Hall D - Session AC-TuP
## Chemistry and Physics of the Actinides and Rare Earths Poster Session
## 6:30pm

**AC-TuP1** Spatially Resolved Uranium Speciation in Nuclear Materials by Scanning Transmission X-ray Microscopy, ***Joseph Pacold***, Lawrence Berkeley National Laboratory; *M.J. Kristo, K.B. Knight, K.S. Holliday,* Lawrence Livermore National Laboratory; *W.W. Lukens, C.H. Booth, S.G. Minasian, T. Tyliszczak, D.K. Shuh,* Lawrence Berkeley National Laboratory

**AC-TuP2** XPS Investigation on the Reduction of Aged $UO_2$ Powders during Exposure to Vacuum, ***Scott Donald***, *M. Davisson, Z. Dai, A.J. Nelson,* Lawrence Livermore National Laboratory

**AC-TuP3** Ab initio Study of Electronic Structure Magnetic and Thermodynamic Properties of UO2 and PuO2., ***Nisar Ahmed***, *M. Hasan Nasim,* PIEAS

**AC-TuP4** Atomic Layer Deposited Cerium Oxide for Biosensing Application, ***Ankur Gupta***, *S. Das, C.J. Neal, S. Seal,* University of Central Florida

## Applied Surface Science
## Room Hall D - Session AS-TuP
## Applied Surface Science Division Poster Session
## 6:30pm

**AS-TuP2** Observing the Effects of Jetting from Sputtering with Both Monatomic Argon and Argon Gas Clusters of Multi-layered Samples Using XPS with Rapid Mapping, ***Timothy Nunney***, Thermo Fisher Scientific, UK; *R. Simpson,* University of Surrey, UK; *C. Deeks, P. Mack, J.P.W. Treacy,* Thermo Fisher Scientific, UK

**AS-TuP3** Multitechnique Surface Analysis for Advanced Microelectronics Materials, ***James Lallo***, Thermo Fisher Scientific; *C. Deeks, P. Mack, T.S. Nunney, J.P.W. Treacy,* Thermo Fisher Scientific, UK

**AS-TuP4** Surface Analysis of Human Hair – a Multi-technique Approach, ***Sarah Coultas***, *J.D.P. Counsell, C.J. Blomfield,* Kratos Analytical Limited, UK; *M. Openshaw,* Shimadzu - MALDI Technologies Group; *C. Moffitt,* Kratos Analytical Inc.

**AS-TuP5** Exploring the Surface and Sub-Surface Nature of Nuclear Graphite, *J.D.P. Counsell, S.J. Coultas, C.J. Blomfield,* Kratos Analytical Limited, UK; ***Chris Moffitt***, Kratos Analytical Limited; *A. Theodosiou,* University of Manchester

**AS-TuP6** Comparison of Angle Resolved XPS and Ultra-shallow Ar Gas Cluster Depth Profiling of Organometallic Multilayer Materials, ***Simon Hutton***, Kratos Analytical Limited, UK; *T. Bendikov,* Weizmann Institute of Science, Israel; *K. Macak, W. Boxford, S.C. Page, S.J. Coultas, C.J. Blomfield, J.D.P. Counsell,* Kratos Analytical Limited, UK

**AS-TuP7** Pd deposited on $Al_2O_3$ analyzed by Low Energy Ion Scattering (LEIS), *P. Bruener, T. Grehl,* ION-TOF GmbH, Germany; ***Nathan Havercroft***, ION-TOF USA; *J.Z. Mundy, G.N. Parsons,* North Carolina State University

**AS-TuP8** Real-time Monitoring of Surface Reactions by Means of Cluster-induced Desorption/Ionization Mass Spectrometry, *A. Portz,* Justus Liebig University Giessen, Germany; ***ChristophR. Gebhardt***, Bruker Daltonics Bremen, Germany; *M. Durr,* Justus Liebig University Giessen, Germany

**AS-TuP9** Improved X-ray Photoelectron Spectroscopy Analysis using the PHI *VersaProbe* III, ***Jennifer Mann***, *J.S. Hammond, J.F. Moulder, B. Schmidt,* Physical Electronics USA

**AS-TuP10** Multiple Technique Investigation of UV-grafted Polymers, ***Lopamudra Das***, *M.J. Kelley,* College of William and Mary

**AS-TuP11** Analysis of Thin Phase-Shifter Films using Surface Analysis Techniques, ***Vincent Smentkowski***, General Electric Global Research Center; *L. Le Tarte,* GGeneral Electric Global Research Center; *H. Piao,* General Electric Global Research Center; *M. Marko,* Wadsworth Center

**AS-TuP12** Improving the Performance of the Cylindrical Mirror Analyzer by Electrode Segmentation, ***David Edwards, Jr***, IJL Research Center

**AS-TuP13** Expanding the Use of Frequency-specific Techniques during Nano Mechanical Testing, *S.P. Pardhasaradhi,* ***Warren Oliver***, No Matching Affiliation

**AS-TuP14** Utilization of Secondary Vegetable Oils and Transformation Into Biodiesel, ***Eliso Abramishvili***, No Matching Affiliation, Georgia

**AS-TuP15** Impact of Surface Contaminants on ToF-SIMS analysis of Wood Polymer Composites (WPCs), ***Laura D. Brunelle***, *Z.A. Gernold, C.S. Swagler, E.R. Welton, R.E. Goacher,* Niagara University

**AS-TuP16** Examining the General Applicability of ToF-SIMS for Wood Polymer Composite (WPC) Analysis, ***Christopher S. Swagler***, *L.D. Brunelle, M.R. Michienzi, E.R. Welton, R.E. Goacher,* Niagara University

**AS-TuP17** Swift Heavy Ion Irradiation for Designing Planar Field Emitters and Exchange Bias Layers, ***Debalaya Sarker****, *S. Bhattacharya,* Indian Institute of Technology Delhi, India; *S. Ghosh, P. Srivastava,* Indian Institute of Technology Delhi

**AS-TuP18** Improving Relative Quantitation in Imaging Lipidomics using ToF-SIMS, ***Marwa Munem***, *J.S. Fletcher,* University of Gothenburg, Sweden

**AS-TuP19** XPS Investigation of UHP Mg and Mg Alloys Exposed to Water: Peak Fitting the Mg 2p Core Level Spectra to Distinguish Oxide from Hydroxide, ***Harry Meyer***, *D. Leonard, M.P. Brady,* Oak Ridge National Laboratory

**AS-TuP20** Root-Cause Analysis of an Interfacial Adhesive Failure Based on Time-of-Flight Secondary Ion Mass Spectrometry (ToF-SIMS), ***James Ohlhausen***, *P. Vianco,* Sandia National Laboratories

**AS-TuP21** Surface and Bulk Property Studies of Newly Developed High Performance Transparent Conductor Material, ***Lei Zhang***, *W. Wu, N.G. Tassi, D. Walls,* DuPont Science and Engineering

**AS-TuP22** Optimizing the Surface of Perovskite Oxide/Carbon Composites as Catalysts for the Oxygen Reduction Reaction in Alkaline Media, ***Michael Dzara***, *C. Ngo,* Colorado School of Mines; *J. Christ,* National Renewable Energy Laboratory; *P. Joghee, C. Cadigan, T. Batson, R. Richards, R. O'Hayre, S. Pylypenko,* Colorado School of Mines

**AS-TuP23** Tuning of N-Doping in Carbon Nanospheres for Investigation of Catalyst-Support Interactions, ***Matthew Strand***, *C. Ngo, A. White, J. Hagen, S. Pylypenko,* Colorado School of Mines

**AS-TuP24** Electron Microscopy Study of Fission Product Migration in Irradiated TRISO Nuclear Fuel, ***Rachel Seibert***, Illinois Institute of Technology; *C. Parish, P. Edmondson, K. Terrani,* Oak Ridge National Laboratory; *J. Terry,* Illinois Institute of Technology

**AS-TuP25** Interfacial Investigation of Reaction of Organic Micropollutants with Manganese Oxides, ***Nabil Shaikh***, University of New Mexico; *S. Taujale, H. Zhang,* Temple University; *K. Artyushkova, A. Ali, J.M. Cerrato,* University of New Mexico

**AS-TuP26** X-ray Photoelectron Spectroscopy Analysis of Titanium Nitride-Nickel Nanocomposite Catalyst, ***Samuel Gage***, Colorado School of Mines; *V. Molinari, D. Esposito,* Max Planck Institute of Colloids and Interfaces, Germany; *S. Pylypenko,* Colorado School of Mines

**AS-TuP27** Redox Active Cerium Oxide Immobilized on Highly Ordered Polymer Nanopillars as Dopamine Sensor, ***Swetha Barkam***†, *M. Peppler, S. Das, S. Saraf, C. Li, J. Thomas, S. Seal,* University of Central Florida

**AS-TuP28** X-ray Photoelectron Spectroscopy of Raw Material for Metal Additive Manufacturing, ***David Wieliczka***, *A.S. Choi, J.A. Crow, C.J. Cook, L.F. Elder, R.D. Koch, T.A. Pond, B.C. Sartin, D.R. Shinault, S.E. Van Slyke,* Honeywell Federal Manufacturing and Technology

**AS-TuP29** Characterization of Bonding between Super-hard Ceramics and Polymer Substrate, ***Ranganathan Parthasarathy***, Tennessee State University; *JB. Beam,* Vanderbilt University; *FEH. Hoff,* Tennessee State University; *A. Misra,* University of Kansas; *L.Z. Ouyang,* Tennessee State University; *CML. Lukehart,* Vanderbilt University

**AS-TuP30** *The Early Stages of Yttrium Oxidation, V. Arellano-Arreola,* ***Jorge Alejandro Torres-Ochoa***, *O. Cortazar-Martinez, Y.L. Chipatecua-Godoy, L. Gomez-Muñoz,* Cinvestav-Unidad Queretaro, Mexico; *A. Herrera-Gomez,* CINVESTAV-Queretaro, Mexico

## Biomaterial Interfaces
## Room Hall D - Session BI+PB-TuP
## Biomaterial Interfaces Poster Session (preceded by Oral Flash Presentations)
## 6:30pm

**BI+PB-TuP2** Quantitative Sensing of Pancreatic Enzymes using Gelatin, ***George Banis***, University of Maryland, College Park; *L. Beardslee,* Walter Reed National Military Medical Center; *R. Ghodssi,* University of Maryland, College Park

* **National Student Award Finalist**

† **National Student Award Finalist**

**BI+PB-TuP3** Evaluation of Printed Cell Viability, Proliferation, and Insulin Production on Various Alginate-Gelatin Hydrogels, ***Luis Solis***, *J. Rincon, A. Varela-Ramirez, R. Aguilera, T. Boland,* University of Texas at El Paso

**BI+PB-TuP4** Synchrotron Radiation Studies of the Bonding and X-Ray Induced Reactions of Bacteriorhodopsin Adsorbed on Gold, ***Richard Rosenberg***, Argonne National Laboratory*; D. Mishra, R. Naaman,* Weizmann Institute of Science, Israel

**BI+PB-TuP5** Investigations on Peptide Incorporation and Peptide Yields in ME-SIMS, ***Martin Körsgen***, *A. Pelster, M. Heeger, B.J. Tyler, K. Dreisewerd, H.F. Arlinghaus,* Universität Münster, Germany

**BI+PB-TuP6** Developments of Non-Stick Surfaces for Medical Devices: Beneficial Effects of Thin Film Metallic Glass Coating, *G.H. Jiang, C.C. Yu, C.L. Li, Y. Tanatsugu,* ***Jinn P. Chu***, National Taiwan University of Science and Technology, Taiwan, Republic of China*; M.J. Chen, S.H. Chang,* Mackay Memorial Hospital Tamsui Campus, Taiwan, Republic of China

**BI+PB-TuP7** Polyurethane Degradation by Wild Type and Hydrolase Deficient *Pseudomonas protegens* Pf-5 Unsaturated Biofilms, ***Daniel Barlow***, US Naval Research Laboratory*; LJ. Nadeau, C.S. Hung,* Air Force Research Laboratory*; J.C. Biffinger,* US Naval Research Laboratory*; A.L. Crouch,* Air Force Research Laboratory*; J.N. Russell,* US Naval Research Laboratory*; W.J. Crookes-Goodson,* Air Force Research Laboratory

**BI+PB-TuP8** Laser Irradiation of Mg Alloys: Reduced Kinetics and Enhanced Biocompatibility, *M.A. Melia,* ***David Florian***, *W. Steuer, J.R. Scully, J.M. Fitz-Gerald,* University of Virginia

**BI+PB-TuP9** Plasma-assisted Fabrication of Silver/Bacterial Cellulose/Chitosan Functional Nano-composites and Their Properties, ***Shuquan Chang***, *A.R. Shetty, S.L. Arias Suarez, J.P. Allain,* University of Illinois at Urbana-Champaign

**BI+PB-TuP11** A Non-toxic, Super-Hydrophilic Anti-Fog Coating for Lenses used in Closed Body Cavity Surgery: VitreOx TM– In Vivo Animal Clinical Trials, ***Nicole Herbots***, SiO2 NanoTech LLC*; C.F. Watson,* SiO2 NanoTech LLC/Arizona State University Physics Dpt*; EJ. Culbertson,* University of California at Los Angeles*; PR. Thilmany, IPO. Martins,* SiO2 NanoTech LLC

## Magnetic Interfaces and Nanostructures
## Room Hall D - Session MI-TuP
## MIND Poster Session
## 6:30pm

**MI-TuP1** Static and Dynamic Magnetic Properties of FeGa/NiFe Multilayer Heterostructures for Multiferroic Applications, *C.R. Rementer, Q. Xu, P. Nordeen, G.P. Carman, Y. Wang,* ***Jane P. Chang***, University of California Los Angeles

**MI-TuP2** The Microstructure and Isotope Effects on Spin Response in Organic Spintronic Devices, ***Nuradhika Herath***, *J. Keum, H. Zhang, K. Hong, J. Jakowski, J. Huang, J. Browning, S. Bennett, C. Rouleau, I. Ivanov, V. Lauter,* Oak Ridge National Laboratory

## Manufacturing Science and Technology
## Room Hall D - Session MS-TuP
## Aspects of Manufacturing Science and Technology Poster Session
## 6:30pm

**MS-TuP1** Transformations in Surface Films by Sublimation and Heating- the Cases of Naphthalene and Diamond, ***Rahul Basu***, Alpha College of Engineering

**MS-TuP2** Study of Mechanical Properties of Nanographene/Al Composite Materials for Purpose of Industrial Applications, ***Yusuke Oguro***, *A. Matsumuro,* Aichi Institute of Technology, Japan

**MS-TuP3** Development of High-Strength Resin Composite Materials Reinforced with Nanocarbon for 3D Printing Manufacturing, ***Hiroaki Sakaguchi***, *A. Matsumuro,* Aichi Institute of Technology, Japan

**MS-TuP4** Development of Innovative 3D Printer with Superior Multifunctional Surface Modification, ***Kentaro Horiuchi***, *Y. Hasegawa, A. Matsumuro,* Aichi Institute of Technology, Japan

**MS-TuP5** Controlling the Diameter, Uniformity, and Spatial Distribution of Electrospun PVDF Nanofibers through Experiment and Simulation, ***Omar Ali***, *T. Grier, A. Ueda, C. Marvinney, S. Avanesyan, C.S. Carson, W.E. Collins,* Fisk University*; J. DeCoste,* US Army Research, Development, and Engineering Command*; R. Mu,* Fisk University

**WORKING WITH NATIONAL LABS AND USER FACILITIES**

**MS-TuP6 (MS-TuA1)** Southeastern Nanotechnology Infrastructure Corridor (SENIC) – A Nano Fabrication and Characterization Resource as part of the National Nanotechnology Coordinated Infrastructure (NNCI), *P. Joseph, D. Gottfried,* ***Gary Spinner***, *O. Brand,* Georgia Institute of Technology

**MS-TuP7 (MS-TuA2)** The Cornell NanoScale Science and Technology Facility (CNF), ***Michael Skvarla***, Cornell NanoScale Science and Technology Facility

**MS-TuP8 (MS-TuA3)** The CNST NanoFab at NIST: *Nanofabrication for US Commerce*, ***Vincent Luciani***, NIST Center for Nanoscale Science and Technology

**MS-TuP9 (MS-TuA4)** In-Situ Characterization Tools for Materials Growth and Processing at NSLS-II, ***Klaus Attenkofer***, *E. Stavitski, K. Evans-Lutterodt, C. Nelson,* Brookhaven National Laboratory

**MS-TuP10 (MS-TuA7)** The Center for Nanophase Materials Sciences, ***Michael Simpson***, Oak Ridge National Laboratory

**MS-TuP11 (MS-TuA8)** User Opportunities at the Center for Nanoscale Materials, ***Kathleen Carrado Gregar***, Center for Nanoscale Materials at Argonne National Laboratory

**MS-TuP12 (MS-TuA9)** The Center for Integrated Nanotechnologies--Resources and Capabilities, ***Dale Huber***, Sandia National Laboratories

**MS-TuP13 (MS-TuA10)** Using EMSL Capabilities in Combination with those from other User Facilities to Address Fundamental and Applied Problems, ***Donald Baer***, *M.H. Engelhard, T.J. Law,* Pacific Northwest National Laboratory

## Nanometer-scale Science and Technology
## Room Hall D - Session NS-TuP
## Nanometer-scale Science & Technology Poster Session
## 6:30pm

**NS-TuP1** tPA Loaded $Fe_3O_4$ Nanorods to Enhance and Target Stroke Treatment, ***Weijie Huang***, University of Georgia*; J.N. Hu, S.W. Huang, K.L. Jin,* University of North Texas*; Y.P. Zhao,* University of Georgia

**NS-TuP2** Gelatin Nanoparticle Encapsulation of Anti-Parasitic Compound and Characterization for Treatment of Leishmaniasis Disease, ***Carlos Serna***, *A. Ornleas, E. Iniguez, K. Michael, R. Maldonado, T. Boland,* The University of Texas at El Paso

**NS-TuP3** Synthesis and Size Dependent Magnetic Properties of Iron Oxide Nanoparticles, ***Caleb Hoffman***, *J. Summers, S. Neupane,* Middle Tennessee State Univ

**NS-TuP4** Templated Annealing of Gold Nanowires formed by Directed Assembly on DNA Origami, ***Tyler Westover***, *M. Stoddard, B. Uptrey, R.F. Davis, J. Harb, A. Woolley,* Brigham Young University

**NS-TuP5** Zinc Oxide Nanoprobe Spectroscopy for Sensing Trace Levels of Molecular Species in Solution, ***Andrew Cook***, Vanderbilt University*; C.S. Carson,* Fisk University*; J. DeCoste,* Edgewood Chemical Biological Center*; T.D. Giorgio,* Vanderbilt University*; R. Mu,* Fisk University

**NS-TuP6** Insights into Defect Emission in ZnO Nanoparticles from Simultaneous Infrared and Luminescence Measurements during Annealing and Exposure to Charge Scavengers, ***Matthew Reish***, *S. Ma, Z. Zhang,* University of Virginia*; H.O. Everitt,* Redstone Arsenal

**NS-TuP7** Effect of Deposition Temperature on the Formation of the $SiO_2$/ZnO/$SiO_2$ Heterostructure Deposited by Reactive RF Sputtering*, *R. Escobedo-Alcaraz, C. Atzin-Mondragon,* Cinvestav-IPN, Mexico*; A. Hernandez-Hernandez,* Escuela Superior de Apan, Mexico*; A. Garcia-Sotelo,* ***MiguelAngel Melendez-Lira***, Cinvestav-IPN, Mexico

**NS-TuP8** Design of High Performance Compact Plasmonic Optical Devices Based on Low Loss Silicon Hybrid Dielectric Loaded Plasmonic Waveguides, ***Cheng-Hung Hsieh***, *C.M. Kuo,* National Tsing Hua University*; M.J. Huang,* Naitoal Tsing Hua University*; R.J. Sun,* National Tsing Hua University*; K.C. Leou,* National Tsing Hua University, Taiwan, Republic of China

**NS-TuP9** Carbon Nanotube Based Digital X-ray Tube for a Very Short X-ray Pulse with High Dose Rates, ***Jun-Tae Kang***, *J.W. Jeong, J.W. Kim, Y.C. Choi, S.H. Kim, H. Jeon, S. Park, M.S. Shin, J.H. Yeon, E. Go, J.W. Lee, Y.H. Song,* Electronics and Telecommunications Research Institute (ETRI), Republic of Korea

**NS-TuP10** Processes of Adsorption and Encapsulation of Hydrogen Atoms during Scattering them onto Beam of Fullerene, ***Danila Alyabev***, Institute of Ion Plasma and Laser Technology, Tashkent, Uzbekistan*; A.A. Dzhurakhalov,* University of Antwerp, Belgium*; I.D. Yadgarov,* Institute of Ion Plasma and Laser Technology, Tashkent, Uzbekistan

## Novel Trends in Synchrotron and FEL-Based Analysis Focus Topic
## Room Hall D - Session SA-TuP
## Novel Trends in Synchrotron and FEL-Based Analysis Poster Session
## 6:30pm

**SA-TuP1** Transmission X-Ray Microscopy Characterization of PtNi Extended Surface Catalysts within MEAs for PEMFCs, ***Sarah Shulda***, Colorado School of Mines; *J. Nelson Weker,* SLAC National Accelerator Laboratory; *C. Ngo,* Colorado School of Mines; *S. Mauger, K.C. Neyerlin, S. Alia, B. Pivovar,* National Renewable Energy Laboratory; *S. Pylypenko,* Colorado School of Mines

**SA-TuP2** *In Operando* X-ray Imaging and Scattering from Detonating High Explosives, *M. Bagge-Hansen, M. Nielsen, L. Lauderbach, R. Hodgin, S. Bastea, L. Fried, D. Hansen, C. May, T. van Buuren,* ***Trevor Willey***, Lawrence Livermore National Laboratory

**SA-TuP3** Electronic Structure of FeO, $Fe_3O_4$, α-$Fe_2O_3$ and γ-$Fe_2O_3$ Thin Films, ***GermanR. Castro***, *J. Rubio-Zuazo,* SpLine Spanish CRG BM25 Beamline at the ESRF, France; *A. Chainani,* RIKEN SPring-8 Centre, Japan

## Advanced Surface Engineering
## Room Hall D - Session SE-TuP
## Advanced Surface Engineering Poster Session
## 6:30pm

**SE-TuP1** Room Temperature Bonding of Polymer and Silicon Wafer using Vacuum Ultraviolet Surface Activation, ***Yoshihiro Fujiwara***, *T. Utsunomiya, T. Ichii, H. Sugimura,* Kyoto University, Japan

**SE-TuP2** Improvement in Organic Solvent Resistance of Cyclo-Olefin Polymer by Coating with Silica-like Thin Film, ***Taiki Kanzawa***, *T. Utsunomiya, T. Ichi, H. Sugimura,* Kyoto University, Japan

**SE-TuP3** Microstructure and Properties of (ZrHf)N Thin Films Deposited by Sputtering at Room Temperature, *N.N. Chu,* ***Yu-Wei Lin***, *C.-N. Hsiao,* ITRC, National Applied Research Laboratories, Tawain, Republic of China

**SE-TuP4** Nanopatterned ZnO on Si-based Materials via Decoupled Ion Beam Modification and Metal Co-deposition, ***Zachariah Koyn***, *B. Holybee, J.P. Allain,* University of Illinois at Urbana-Champaign

**SE-TuP5** Propagating Exothermic Reactions in Al/Pt Multilayers of Varied Stoichiometry, *D.P. Adams,* Sandia National Laboratories; *R.V. Reeves,* Lawrence Livermore National Laboratory; *M. Abere,* ***Cathy Sobczak***, Sandia National Laboratories

**SE-TuP6** An Alternative for Material Plasma Etching: Ion Beam Etching Understanding and Improvement, ***Anthony De Luca***, Ion Beam Etching, France; *J. Guerrero,* Dry etching process, France; *S. Barnola,* CEA, LETI, MINATEC Campus, France

**SE-TuP7** Time-resolved Ion Energies in the Pulsed Cathodic Arc Plasma from Composite Niobium-aluminum Cathodes, ***Siegfried Zoehrer***, Montanuniversität Leoben, Austria; *A. Anders,* Lawrence Berkeley National Laboratory; *R. Franz,* Montanuniversität Leoben, Austria

## Scanning Probe Microscopy Focus Topic
## Room Hall D - Session SP-TuP
## Scanning Probe Microscopy Poster Session
## 6:30pm

**SP-TuP1** New Directions in Ultrahigh Vacuum Tip-Enhanced Raman Spectroscopy with Molecular-Resolution Scanning Tunneling Microscopy, *Z. Porach, P. Whiteman,* University of Illinois at Chicago; *N. Chiang,* Northwestern University; ***Nan Jiang***, University of Illinois at Chicago

**SP-TuP2** Atomic Force Microscopy in Liquid Metal, ***Nobumasa Tagai***, *T. Ichii, T. Utsunomiya, H. Sugimura,* Kyoto University, Japan

**SP-TuP3** Temperature-dependent Nanoscale Conductance on Water-Intercalated Graphene, ***JinHeui Hwang***, *H. Lee, J.Y. Park,* Institute for Basic Science (IBS) & Korea Advanced Institute of Science and Technology (KAIST), Republic of Korea

**SP-TuP4** Phase Coexistence in Vanadium Dioxide Crystal Probed via Scanning Probe Microscopy, ***Christina McGahan***, Vanderbilt University; *S. Gamage,* Georgia State University; *J. Liang,* Tianjin University, China; *B.G. Cross,* Georgia State University; *R.E. Marvel, R.F. Haglund,* Vanderbilt University; *Y. Abate,* Georgia State University

**SP-TuP5** Single Virus Particle Spectroscopic Nano-Imaging, ***Brendan Cross***, *S. Gamage, M. Howard, J.R. Terrell, M. Luo, Y. Abate,* Georgia State University

**SP-TuP6** Spectroscopic Nano-Imaging Patterned InGaN Nanolayers, ***Alireza Fali***, *S. Gamage, D. Seidlitz, I. Kankanamge, N. Dietz,* Georgia State University; *Y. Abate,* Georgia state university

**SP-TuP7** Nanoscopy of Black Phosphorus Degradation, ***Sampath Gamage***, Georgia State University; *L. Zhen,* University of Southern California; *V.E. Babicheva, M. Javani, V.S. Yakovlev,* Georgia State University; *H. Wang, S. Cronin,* University of Southern California; *Y. Abate,* Georgia State University

**SP-TuP8** Periodically-pulsed Laser-Assisted Tunneling May Generate Terahertz Radiation, ***Mark Hagmann***, University of Utah

## Surface Science
## Room Hall D - Session SS-TuP
## Surface Science Poster Session
## 6:30pm

**SS-TuP1** Adsorption and Decomposition Properties of Dimethyl Trisulfide Over Au(111), ***Isao Nakamura***, National Institute of Advanced Industrial Science and Technology (AIST), Japan; *M. Tokunaga,* Kyushu University, Japan; *T. Fujitani,* National Institute of Advanced Industrial Science and Technology (AIST), Japan

**SS-TuP2** Spectroscopically Monitoring the Surface and Crystallinity of Titania Nanopowders Treated with Hydrogen Peroxide: an Endeavor in Simplifying the Atomic Picture of Complex Substrates, ***Maria Kipreos***, *M. Foster,* University of Massachusetts, Boston

**SS-TuP3** Efficacy of $Ar^+$ CIRD Removal of Adsorbed O from Rh(111), ***Marie Turano***, *R.G. Farber, D.R. Killelea,* Loyola University Chicago

**SS-TuP4** Adsorption and Oxidation of n–Butane on the Stoichiometric $RuO_2$(110) Surface, ***Tao Li***, *R. Rai, Z. Liang,* University of Florida, Gainesville; *M. Kim, A. Asthagiri,* Ohio State University; *J.F. Weaver,* University of Florida, Gainesville

**SS-TuP5** Step-type Dependence of Water Desorption from Single-Crystalline Ag Surfaces, ***Sabine Auras***, Leiden University, Netherlands; *J. Janlamool,* Chulalongkorn University, Bangkok

**SS-TuP6** Topographical Changes of Liquid-Metal Alloys as a Function of Temperature, ***Nelson Bello***, University of Massachusetts, Boston; *I. Tevis,* SAFI-Tech; *M. Thuo,* Iowa State University; *M. Foster,* University of Massachusetts, Boston

**SS-TuP7** Interaction of Ethylene with Partially Chlorinated $RuO_2$(110) Surfaces, ***Zhu Liang***, *T. Li, R. Rai, J.F. Weaver,* University of Florida

**SS-TuP8** Supramolecular Assemblies of Halogenated Molecules on the Si(111) √3×√3-Ag and Cu(100) Surfaces, ***Renjie Liu***, Lakehead University, Canada; *C. Fu, A.G. Moiseev, D.F. Perepichka,* McGill University, Canada; *M.C. Gallagher,* Lakehead University, Canada

**SS-TuP9** Synthesis and Reduction of Graphene Oxide, ***Heike Geisler***, *J.M. Bachor, N.A. LaScala,* SUNY College at Oneonta

**SS-TuP10** Nanomechanical Properties of Eutectic Gallium-Indium Particles by Atomic Force Microscopy, ***Syeda Akhter***, University of Massachusetts, Boston; *I. Tevis,* SAFI-Tech; *M. Thuo,* Iowa State University; *M. Foster,* University of Massachusetts, Boston

**SS-TuP11** Reactivity of $CO_2$ at Single-site Vanadium in Metal-Organic Coordination Networks at Surfaces, *C. Tempas, B. Cook,* Indiana University; ***David Wisman***, Indiana University; NAVSEA Crane; *T. Morris, A. Polezhaev, D. Skomski, K. Smith, K. Caulton, S.L. Tait,* Indiana University

**SS-TuP12** $CO_2$ Optical Phonons for Constraining Mixing in Interstellar Ices, ***Ilsa Cooke***, University of Virginia; *K.I. Öberg,* Harvard University

**SS-TuP17** Probe the Degradation Mechanism of Hybrid Perovskite by *In Situ* DRIFTs, *Q. Peng, X. Yu,* ***Amanda Volk***, University of Alabama

**SS-TuP18** X-ray Photoelectron Studies of Polycrystalline Samples $(BiSb)_3(Cu_{1-x}Co_x)_2O_{14}$ Pyrochlore, ***Lázaro Huerta***, *R. Escamilla, M. Romero,* Universidad Nacional Autónoma de México; *A. Zamora,* Universidad Autónoma Metropolitana, México

**SS-TuP19** Interaction of Atomic Oxygen with Ag(111) and Ag(110) Surfaces: Oxygen Adsorption at Surface versus Subsurface, ***Sara Isbill***, *S. Roy,* University of Tennessee, Knoxville

**SS-TuP20** Isotope Fractionation Effect in Secondary Ions Mass Spectroscopy Analysis for Boron Quantification, ***Yibin Zhang***, GLOBALFOUNDRIES U.S. Inc.

**MORT TRAUM FINALISTS**

**SS-TuP21 (HC+SS-ThA6)** The Impact of Structure on the Catalytic Behavior of $Cu_2O$ Supported Pt Atoms, ***Andrew Therrien****, Tufts University Department of Chemistry; *E.C.H. Sykes,* Tufts University

**SS-TuP22 (2D+MI-TuM4)** Synthesis of Borophenes: Anisotropic, Two-Dimensional Boron Polymorphs, ***Andrew Mannix****, *B. Kiraly,* Northwestern University/Argonne National Lab.; *J.D. Wood, M.C. Hersam,* Northwestern University; *N.P. Guisinger,* Argonne National Laboratory

**SS-TuP23 (SS1+AS+HC+NS-TuM11)** Hindered Translator and Hindered Rotor Models for Calculating the Entropy of Adsorbed Species, ***Lynza H. Sprowl****, Oregon State University; *C.T. Campbell,* University of Washington; *L. Arnadottir,* Oregon State University

**SS-TuP24 (SS+AS-WeM13)** Capture of Hyperthermal Atoms and Molecules by Amorphous Water Ice via Ballistic Embedding, ***Grant Langlois****, *S.J. Sibener,* University of Chicago

**SS-TuP25 (SS+AS+EM-WeA10)** Adsorption of $C_{60}$ Buckminster Fullerenes on a Carbon-free Hydrazine-modified Silicon Surface, ***Fei Gao****, *A.V. Teplyakov,* University of Delaware

## Vacuum Technology
## Room Hall D - Session VT-TuP
## VT Poster Session (and Student Poster Competition)
## 6:30pm

**VT-TuP1** Smart Measurement and Diagnostics Module for Dry Vacuum Pumps, ***Wan-Sup Cheung****, K. Baik, J.Y. Lim,* KRISS, Republic of Korea

**VT-TuP2** Vacuum System of Positron Damping Ring for SuperKEKB, ***Kyo Shibata****, Y. Suetsugu, T. Ishibashi, M. Shirai, S. Terui, K. Kanazawa, H. Hisamatsu,* KEK, Japan

**VT-TuP3** Testing Pump Speed & Thermal Loading of Titanium Arc-Gettered High Speed (~2,000 $m^3/s$ for $H_2$) Cryoboxes, ***Ernesto Barraza-Valdez****,* Tri Alpha Energy

**VT-TuP4** Formation and Characterization of Hydrogenated Amorphous Silicon (a-Si:H) Thin Films Deposited by ECR-CVD with Different RF Powers, ***Hugo Alvarez****, A.R. Santos, J.G. Fo, F.H. Cioldin, J.A. Diniz,* Universidade Estadual de Campinas, Brazil

**VT-TuP5** Hydrogen Measurement Using a Thermal Desorption Spectrometer, ***JongYeon Lim****,* Korea Research Institute of Standards and Science, Republic of Korea; *K.D. Kim, S.M. Joo, C.H. Lim, Y.D. Joh,* Infinity Vacuum Technology, Republic of Korea

**VT-TuP6** Evaluation of Two-piston type Oil Flowmeter and Leak Standard System in KRISS, ***HanWook Song****, S.M. Kim, T.H. Yang, N.-K. Chung, I.-Y. Park, S.Y. Woo,* KRISS, Korea

**VT-TuP7** Low-carbon Steel Chamber and Double Viton O-ring Sealing for Electron Microscope, ***In-Yong Park****, N.-K. Chung, B. Cho,* KRISS, Republic of Korea

# Anticipated Schedule Wednesday, November 09, 2016

## Anticipated Schedule Wednesday Morning, November 9

8:00 AM _____

8:20 AM _____

8:40 AM _____

9:00 AM _____

9:20 AM _____

9:40 AM _____

10:00 AM _____

10:20 AM _____

10:40 AM _____

11:00 AM _____

11:20 AM _____

11:40 AM _____

12:00 PM _____

## Anticipated Schedule Wednesday Lunch, November 9

When _____

Where _____

With _____

## Anticipated Schedule Wednesday Afternoon, November 9

1:00 PM _____

1:20 PM _____

1:40 PM _____

2:00 PM _____

2:20 PM _____

2:40 PM _____

3:00 PM _____

3:20 PM _____

3:40 PM _____

4:00 PM _____

4:20 PM _____

4:40 PM _____

5:00 PM _____

5:20 PM _____

5:40 PM _____

6:00 PM _____

# Special Events Wednesday

| | |
|---|---|
| 6:15 AM | AVS 36th Annual 5 km Run (Register at the 5 km Booth before Wednesday)/TBD |
| 7:30 AM | Diversity Committee Meeting & Breakfast/Commerce Street Grille, Renaissance Nashville (by invitation) |
| 8:15 AM | ASED Executive Committee Meeting & Lunch/Ryman, Renaissance Nashville (by invitation) |
| 12:10 PM | PSTD Coburn and Winters Adjudication Session (Closed Session)/104B (by invitation) |
| 12:30 PM | Governance Committee Meeting & Lunch/Commerce Street Grille, Renaissance Nashville (by invitation) |
| 12:30 PM | NSTD Graduate Student Award Competition/102B |
| 12:30 PM | PacSurf Committee Meeting & Lunch/Boardroom 5th Avenue, Music City Center (by invitation) |
| 12:30 PM | Professional Development: Federal Funding Town Hall and Lunch/102A |
| 3:30 PM | History Committee Meeting/Classical, Renaissance Nashville (by invitation) |
| 6:30 PM | AVS Awards Ceremony & Reception/Davidson Ballroom, Music City Center |

## Short Courses Wednesday

| | |
|---|---|
| 8:30 am | Fundamentals of Vacuum Technology |

LOCATION: All AVS Short Courses will be held at Music City Center

COURSE HOURS: All AVS Short Courses Hours: 8:30 a.m.–5:00 p.m. — with 1.5 hour break for Lunch (Lunch not included)

# Wednesday Morning, November 9, 2016

| | **2D Materials Focus Topic**<br>**Room 103B - Session 2D+TF-WeM**<br>**2D Materials: Growth and Fabrication**<br>**Moderator:** Masoud Mahjouri-Samani, Oak Ridge National Laboratory | **Actinides and Rare Earths Focus Topic**<br>**Room 103C - Session AC+MI-WeM**<br>**Magnetism, Complexity, and Superconductivity in the Actinides and Rare Earths (8:00-11:00 am)/Actinide and Rare Earth Theory (11:00 am-12:20 pm)**<br>**Moderators:** Tomasz Durakiewicz, Los Alamos National Lab, Ladislav Havela, Charles University, Prague, Czech Republic, Alexander Lichtenstein, University of Hamburg, Germany |
|---|---|---|
| 8:00am | **2D+TF-WeM1** Synthesis and Characterization of Two-dimensional $WSe_2$ Grown using Chemical Vapor Deposition, ***Avra S. Bandophadyay,*** *G.A. Lara Saenz, C. Biswas, A.B. Kaul,* University of Texas at El Paso | **INVITED: AC+MI-WeM1** Local Magnetic Properties of Uranium Compounds Probed with XMCD, ***Fabrice Wilhelm,*** *A. Rogalev,* ESRF, France |
| 8:20am | **2D+TF-WeM2** Reduction of Graphene Oxide by a Selective Surface Modification Process via Chemical Route for Achieving Higher Proportion of Graphene, *K. Dave,* CSIR Centre for Cellular and Molecular Biology (CCMB), India; ***KyungHee Park,*** Chonnam National University, Republic of Korea; *M. Dhayal,* CCMB, India | Invited talk continues. |
| 8:40am | **INVITED: 2D+TF-WeM3** Scalabale Production of Molybdenum Disulfide-based Biosensors, ***A.T. Charlie Johnson,*** University of Pennsylvania | **INVITED: AC+MI-WeM3** Neutron and X-ray Scattering as a Probe of Complex Order in Actinides, ***Helen Walker,*** STFC, UK |
| 9:00am | Invited talk continues. | Invited talk continues. |
| 9:20am | **2D+TF-WeM5** Growth of Graphene on Cubic Silicon Carbide on Silicon Substrates, ***Mehdi Rezaee,*** *G.L. Harris, J. Griffin, C. Taylor,* Howard University; *E. Hu, D. Bell,* Harvard University | **AC+MI-WeM5** Hydrogen Contributing to 5*f*-localization in UTX Compounds, ***Silvie Maskova,*** Charles University in Prague, Czech Republic; *K. Miliyanchuk,* Ivan Franko National University of Lviv, Ukraine; *S. Danis, B. Vondrackova,* Charles University in Prague, Czech Republic; *O. Stelmakhovych,* Ivan Franko National University of Lviv, Ukraine; *L. Havela,* Charles University in Prague, Czech Republic |
| 9:40am | **2D+TF-WeM6** Growth of Graphene on Cu Single Crystal Substrates, ***Tyler Mowll,*** University at Albany-SUNY; *Z.R. Robinson,* College at Brockport-SUNY; *C.A. Ventrice, Jr.,* SUNY Polytechnic Institute | **AC+MI-WeM6** Radiation damage: Experimental Investigation of Aluminum Containing Helium Bubbles at Static High Pressure in a Diamond Anvil Cell, ***Itzhak Halevy,*** Physics Department; *B. Glam,* NRC Soreq, Israel; *S. Maskova,* Charles University, Prague, Czech Republic; *D. Moreno,* NRC Soreq, Israel; *S. Eliezer,* NRC Soreq Shalom Eliezer2, Israel |
| 10:00am | **BREAK - Complimentary Coffee in Exhibit Hall** | **BREAK - Complimentary Coffee in Exhibit Hall** |
| 10:20am | **BREAK - Complimentary Coffee in Exhibit Hall** | **BREAK - Complimentary Coffee in Exhibit Hall** |
| 10:40am | **BREAK - Complimentary Coffee in Exhibit Hall** | **BREAK - Complimentary Coffee in Exhibit Hall** |
| 11:00am | **2D+TF-WeM10** Atomic Layered Large Area Growth of 2D Monolayers Over Different Substrates, ***Joseph Waters,*** *S. Garg, S. Balci, S. Kim, P. Kung,* University of Alabama | **INVITED: AC+MI-WeM10** AVS Gaede Langmuir Award Talk: Multiplets and More for Core-Level Spectra, ***Paul Bagus****, University of North Texas |
| 11:20am | **2D+TF-WeM11** Growth of Doped Graphene from Fullerene Precursors, *X. Fei, J. Neilson, V. Lopez,* California State University Northridge; *H.J. Gao,* Chinese Academy of Sciences, People's Republic of China; *L. Gan,* Peking University, People's Republic of China; ***Li Gao,*** California State University Northridge | Invited talk continues. |
| 11:40am | **2D+TF-WeM12** Evaluation of Precursor Chemistry for Controllable Growth of Molybdenum Disulfide by Pulsed Chemical Vapor Deposition, ***Berc Kalanyan,*** *J.E. Maslar, W.A. Kimes, B.A. Sperling, E. Garratt, B. Nikoobakht, R. Beams, S.J. Stranick, A.V. Davydov,* National Institute of Standards and Technology (NIST) | **AC+MI-WeM12** Complex Magnetism of Gd Intermetallics: Ab-initio Theory and Experiment., ***Leon Petit,*** Daresbury Laboratory, UK; *D. Paudyal, Y. Mudryk, K.A. Gschneidner, V.K. Pecharsky,* Ames Laboratory, Iowa State University; *M. Lueders, Z. Szotek,* Daresbury Laboratory, UK; *J.B. Staunton,* Warwick University, United Kingdom of Great Britain and Northern Ireland |
| 12:00pm | **2D+TF-WeM13** *In-situ* Scanning Tunneling Microscopy Studies of Chemical Vapor Deposition of hexagonal Boron Nitride Monolayers on Pd(111), ***Pedro Arias,*** *A. Ebnonnasir, F. Fankhauser,* University of California at Los Angeles; *C. Ciobanu,* Colorado School of Mines; *S. Kodambaka,* University of California Los Angeles | **AC+MI-WeM13** Thermodynamics of the Doped $Sm(Co_{1-x}Fe_x)_5$ Alloys: *Ab Initio* Study, ***Alexander I. Landa,*** *A. Söderlind, E.A. Turchi,* Lawrence Livermore National Laboratory |

* **Gaede Langmuir Award Winner**

# Wednesday Morning, November 9, 2016

| | **Applied Surface Science**<br>**Room 101B - Session AS+SS-WeM**<br>**Applications where Surface Analysis is Your Only Hope**<br>**Moderators:** Jeffrey Fenton, Medtronic,<br>Svitlana Pylypenko, Colorado School of Mines | **Biomaterial Interfaces**<br>**Room 101A - Session BI+MI-WeM**<br>**Biosensors and Diagnostics**<br>**Moderators:** Daniel Graham, University of Washington,<br>Tobias Weidner, Max Planck Institute for Polymer Research, Germany |
|---|---|---|
| 8:00am | **AS+SS-WeM1** Accurate Ion Beam Analysis of Electrolytes via Rutherford Backscattering (RBS) and Positive Ion X-ray Emission (PIXE) of Uniform Thin Solid film of Blood congealed via HemaDrop™, ***Yash Pershad,*** *N.X. Herbots,* SiO2 NanoTech LLC*; C.F. Watson,* SiO2 NanoTech LLC/Arizona State University Physics Dpt*; EJ. Culbertson,* University of California at Los Angeles | **BI+MI-WeM1** Bacteriophage-Derived Surfaces for the Targeting of Pathogenic Bacteria, ***Stephane Evoy,*** University of Alberta, Canada |
| 8:20am | **AS+SS-WeM2** Surface Analysis As a Valuable Tool to Study Chemistry of Metals in Environmental Problems, ***Kateryna Artyushkova,*** University of New Mexico*; J. Blake,* New Mexico Water Science Center*; L. Rodriguez-Freire, S,. Avasarala, A. Ali, A. Brearley, E. Peterson, J.M. Cerrato,* University of New Mexico | **BI+MI-WeM2** Biomolecule Sensing at Attogram Levels via Nanophotonic-Optomechanical Resonators, ***Anandram Venkatasubramanian,*** University of Alberta, Canada*; V.T.K. Sauer, S.K. Roy,* National Institute of Nanotechnology, Canada*; D. Wishart, W.K. Hiebert,* University of Alberta, Canada |
| 8:40am | **INVITED: AS+SS-WeM3** Surface Analysis Techniques – Hope Springs Eternal, ***John Newman,*** *S.R. Bryan, D.M. Carr, G.L. Fisher, J.S. Hammond, J.E. Mann,* Physical Electronics USA*; T. Miyayama,* ULVAC-PHI, Japan*; J.F. Moulder, D. Paul,* Physical Electronics USA*; R. Inoue,* ULVAC-PHI, Japan*; B. Schmidt,* Physical Electronics USA | **BI+MI-WeM3** Hole-mask Colloidal Lithography Method to Fabricate Chiral Metal-Nanoparticles for Plasmon Enhanced CD Measurements, ***Gunnar Klös,*** Aarhus University, Denmark*; D.S. Sutherland,* Aarhus, Denmark |
| 9:00am | Invited talk continues. | **BI+MI-WeM4** Neuraminidase Assay using Glycan-Functionalized Graphene Field-Effect Transistors, ***Kaho Kamada,*** *T. Ono, Y. Kanai,* Osaka University, Japan*; Y. Ohno,* Tokushima University, Japan*; K. Maehashi,* Tokyo University of Agriculture and Technology, Japan*; K. Inoue,* Osaka University, Japan*; Y. Watanabe,* Kyoto Prefectural University of Medicine, Japan*; T. Kawahara, Y. Suzuki,* Chubu University, Japan*; S. Nakakita,* Kagawa University, Japan*; K. Matsumoto,* Osaka University, Japan |
| 9:20am | **AS+SS-WeM5** What Came First? The Black Ink or the Black Ink? That Is the Question, ***Robyn E. Goacher,*** *L.G. DiFonzo, K.C. Lesko,* Niagara University | **INVITED: BI+MI-WeM5** Surface-sensitive Imaging of Supported Membranes and Single Lipid Vesicles for Medical Applications, ***Fredrik Höök,*** Chalmers University of Technology, Sweden |
| 9:40am | **AS+SS-WeM6** ToF-SIMS Analysis of Aerospace Topcoat Degradation, ***Taraneh Bozorgzad Moghim,*** *M.L. Abel, J.F. Watts,* University of Surrey, UK | Invited talk continues. |
| 10:00am | **BREAK - Complimentary Coffee in Exhibit Hall** | **BREAK - Complimentary Coffee in Exhibit Hall** |
| 10:20am | **BREAK - Complimentary Coffee in Exhibit Hall** | **BREAK - Complimentary Coffee in Exhibit Hall** |
| 10:40am | **BREAK - Complimentary Coffee in Exhibit Hall** | **BREAK - Complimentary Coffee in Exhibit Hall** |
| 11:00am | **AS+SS-WeM10** Surface And Bulk: Are They Always The Same? X-Ray Photoelectron Spectroscopy Study, ***Tatyana Bendikov,*** *D. Barats-Damatov, B. Butschke, J. Bauer, J. Pellegrino Morono, T. Zell, R. Neumann, D. Milstein,* Weizmann Institute of Science, Israel | **BI+MI-WeM10** Impedance Spectroscopy Reveals the Effect of Efflux Pumps on Paracellular Transport at the Blood Brain Barrier, ***Ramsey Kraya,*** Johns Hopkins University |
| 11:20am | **AS+SS-WeM11** *In Situ* Chemical Imaging of Biointerfaces Using Microfluidics and Molecular Imaging, ***Xiao-Ying Yu,*** Pacific Northwest National Laboratory | **BI+MI-WeM11** Non-invasive Thermal Sensing using Thermographic Phosphors, ***Firouzeh Sabri,*** University of Memphis*; S. Allison,* EMCO*; P. Parajuli,* University of Memphis |
| 11:40am | **AS+SS-WeM12** Capturing the Transient Species at the Electrode-Electrolyte Interface by SALVI and Liquid ToF-SIMS, ***Jiachao Yu,*** *Y. Zhou, X. Hua,* Pacific Northwest National Laboratory*; S. Liu,* Southeast University, China*; Z. Zhu, X.-Y. Yu,* Pacific Northwest National Laboratory | **BI+MI-WeM12** Imaging Time-of-Flight Secondary Ion Mass Spectrometry to Characterize Tumor Progression and Regression, ***Lara Gamble,*** *B.M. Bluestein, D.J. Graham,* University of Washington*; F. Morrish, D. Hockenbery,* Fred Hutchinson Cancer Research Center |
| 12:00pm | **AS+SS-WeM13** Energy Storage Materials – Investigating the Surface, ***Jonathan Counsell,*** *S.J. Coultas, C.J. Blomfield,* Kratos Analytical Limited, UK*; C. Moffitt,* Kratos Analytical Limited | **BI+MI-WeM13** $SrI_2(Eu^{2+})$Gamma Camera for SPECT Imaging in Medical Applications, ***LaNell Williams,*** *M. Groza, E. Rowe, J. Butler,* Fisk University*; T. Peterson,* Vanderbilt University*; A. Burger,* Fisk University |

# Wednesday Morning, November 9, 2016

| | **Electronic Materials and Photonics**<br>**Room 102A - Session EM+NS-WeM**<br>**Nanoparticles for Electronics and Photonics**<br>**Moderators:** Joseph Tischler, U.S. Naval Research Laboratory, Jessica Hilton, Mantis Deposition | **Exhibitor Technology Spotlight**<br>**Room Hall C - Session EW-WeM**<br>**Exhibitor Technology Spotlight Session**<br>**Moderator:** Chris Moffitt, Kratos Analytical Limited |
|---|---|---|
| 8:00am | **INVITED: EM+NS-WeM1** Nanostructures on Surfaces: From Cluster Deposition to Low Energy Ion Bombardment, ***Luke Hanley***, *K. Steeves Lloyd, M.W. Majeski, I.L. Bolotin,* University of Illinois at Chicago*; M. Schmeling,* Loyola University Chicago*; I.V. Veryovkin,* University of Illinois at Chicago | |
| 8:20am | Invited talk continues. | |
| 8:40am | **INVITED: EM+NS-WeM3** Designer Nanocrystal Electronic and Optoelectronic Materials through Controlled Coupling and Doping, ***Cherie Kagan***, University of Pennsylvania | |
| 9:00am | Invited talk continues. | |
| 9:20am | **EM+NS-WeM5** Au Nanoparticle Modified Indium Tin Oxide Ultramicroelectrode for Single Particle Spectro-electrochemistry Study and Ultrasensitive Electrochemistry Sensing, ***Yanxiao Ma***, The University of Alabama*; S. Pan,* The Univeristy of Alabama | |
| 9:40am | **EM+NS-WeM6** Band Gap-Control of Spray Pyrolysis Synthesized CZTS Nanoparticles, ***Stephen Exarhos***, *E. Palmes, A. Alvarez-Barragan, L. Mangolini,* University of California, Riverside | |
| 10:00am | **BREAK - Complimentary Coffee in Exhibit Hall** | **BREAK - Complimentary Coffee in Exhibit Hall** |
| 10:20am | **BREAK - Complimentary Coffee in Exhibit Hall** | **EW-WeM8** From Surface Spectrometry to 3D Analysis - Latest Trends and Instrumentation for TOF-SIMS, ***Nathan Havercroft***, ION-TOF USA*; R. Moellers, A. Pirkl,* ION-TOF GmbH, Germany |
| 10:40am | **BREAK - Complimentary Coffee in Exhibit Hall** | **BREAK - Complimentary Coffee in Exhibit Hall** |
| 11:00am | **EM+NS-WeM10** Designer Nanomaterials by Magnetron Sputtering and Ion Soft Landing, ***Grant Johnson***, *V. Prabhakaran,* Pacific Northwest National Laboratory*; T. Moser,* Michigan Technological University*; M.H. Engelhard, N. Browning, J. Laskin,* Pacific Northwest National Laboratory | |
| 11:20am | **EM+NS-WeM11** A Facile Electrodeposition Method for Vertically Standing Plasmonic Nanorods for Surface Enhanced Photoelectrochemical Catalysis, ***Jue Wang***, *S. Pan,* The University of Alabama | |
| 11:40am | **EM+NS-WeM12** Influence of Surface Reaction on the Infrared Localized Surface Plasmon Resonance of Indium Tin Oxide Nanocrystals, ***Weize Hu***, *M.A. Filler,* Georgia Institute of Technology | |
| 12:00pm | **EM+NS-WeM13** Electrochemical Synthesis of Nanostructured Cu and $Cu_xO$ Electrodes for the Reduction of $CO_2$ to Usable Fuels, ***Nelly Kaneza***, *S. Pan,* The University of Alabama | |

# Wednesday Morning, November 9, 2016

| | **Fundamental Discoveries in Heterogeneous Catalysis**<br>**Focus Topic**<br>**Room 103A - Session HC+SS-WeM**<br>**Bridging Gaps in Heterogeneously-catalyzed Reactions**<br>**Moderator:** Ashleigh Baber, James Madison University | **MEMS and NEMS**<br>**Room 102B - Session MN-WeM**<br>**Multiscale Phenomena & Emerging Technologies in Micro- and Nano-Systems**<br>**Moderators:** Max Zenghui Wang, Case Western Reserve Univ., Robert Davis, Brigham Young University |
|---|---|---|
| 8:00am | **HC+SS-WeM1** Vinyl Acetate Formation Pathways and Selectivity on Model Metal Catalyst Surfaces, ***Theodore Thuening,*** University of Wisconsin-Milwaukee | **INVITED: MN-WeM1** Designing Microrobots to Interact with the Real World, ***Sarah Bergbreiter,*** *R. St. Pierre, D. Vogtmann,* University of Maryland, College Park*; A. Gerratt,* Ecole Polytechnique Fédérale de Lausanne (EPFL) |
| 8:20am | **HC+SS-WeM2** In situ Monitoring of Acetylene Hydrogenation over a Pd/Cu(111) Single Atom Alloy Surface with Polarization Dependent Infrared Spectroscopy, ***Christopher M. Kruppe,*** *J.D. Krooswyk, M. Trenary,* University of Illinois at Chicago | Invited talk continues. |
| 8:40am | **INVITED: HC+SS-WeM3** Novel in Situ Techniques for Studies of Model Catalysts, ***Edvin Lundgren,*** Lund University, Sweden | **MN-WeM3** Ferroelectric and Piezoelectric Properties of [100]-textured PZT (52/48) Films Deposited on $Pb_xTiO_3$ Nano-seed Layered Platinized Silicon, ***Sushma Kotru,*** *J. Zhong, V. Batra,* The University of Alabama |
| 9:00am | Invited talk continues. | **MN-WeM4** Methodology for Electromechanical Characterization of Resonant Micro Structures Actuated by Acoustic and Fringing Electrostatic Fields, *S. Lulinsky, T. Shmilovich,* Tel Aviv University, Israel*; B.R. Ilic,* National Institute of Standards and Technology*;* ***Slava Krylov,*** Tel Aviv University, Israel |
| 9:20am | **HC+SS-WeM5** Metastable Cluster Formation and Polymorphism of Hydrogen-bonding Molecules on Gold are a Consequence of the Pulse-deposition of a Solution into Vacuum, ***Ryan Brown,*** *S.A. Kandel,* University of Notre Dame | **MN-WeM5** Nonlinear Interactions of Micromechanical Cantilevers through Fringing Electrostatic Fields, ***Christopher Wallin,*** Center for Nanoscale Science and Technology (CNST), National Institute of Standards and Technology (NIST), and University of Maryland (UMD)*; D.A. Westly,* National Institute of Standards and Technology, Center for Nanoscale Science and Technology, Gaithersburg, MD*; S.J. Grutzik, A.T. Zenhnder, R.H. Rand,* Cornell University*; V. Aksyuk,* National Institute of Standards and Technology, Center for Nanoscale Science and Technology, Gaithersburg, MD*; S. Krylov,* Tel Aviv University, Israel*; B.R. Ilic,* National Institute of Standards and Technology, Center for Nanoscale Science and Technology, Gaithersburg, MD |
| 9:40am | **HC+SS-WeM6** Understanding the Activity of Pt-Re Bimetallic Clusters on Titania and Pt-Re Alloy Surfaces in the Water Gas Shift Reaction, ***Donna Chen,*** *A.S. Duke, K. Xie, A.J. Brandt, T.D. Maddumapatabandi,* University of South Carolina | **MN-WeM6** Reduction in Frequency Noise through Mode Coupling in a MEMS Oscillator, ***David Czaplewski,*** *C. Chen, D. Lopez,* Argonne National Laboratory*; P.M. Polunin, O. Shoshani, S.W. Shaw, M.I. Dykman,* Michigan State University |
| 10:00am | **BREAK - Complimentary Coffee in Exhibit Hall** | **BREAK - Complimentary Coffee in Exhibit Hall** |
| 10:20am | **BREAK - Complimentary Coffee in Exhibit Hall** | **BREAK - Complimentary Coffee in Exhibit Hall** |
| 10:40am | **BREAK - Complimentary Coffee in Exhibit Hall** | **BREAK - Complimentary Coffee in Exhibit Hall** |
| 11:00am | **INVITED: HC+SS-WeM10** Fundamental Studies of the Water-gas Shift and $CO_2$ Hydrogenation on Metal/oxide Catalysts: From Model Systems to Powders, ***Jose Rodriguez,*** Brookhaven National Laboratory | **MN-WeM10** Characterization of MEMS-based, Thin Film Silicon Carbide Diaphragms Using Multimode, Resonance Frequency Analysis, *A.C. Barnes,* ***Christian Zorman,*** Case Western Reserve University |
| 11:20am | Invited talk continues. | **MN-WeM11** High-resolution, MEMS-based Calorimeter for Quantitative Studies of Superconducting Phase Transitions in Thin Film Samples, ***Zhu Diao,*** *D. Campanini, A. Rydh,* Stockholm University, Sweden |
| 11:40am | **HC+SS-WeM12** The Use of EC-STM to Study the Chemical Reactivity and Nanoscale Structure of Metal Surfaces, *A. Phillips, L. Jackson, H. Morgan, G. Jones,* ***Erin Iski,*** University of Tulsa | **MN-WeM12** Microelectrode Array of Carbon Nanotube Posts with High Aspect Ratio and Millimeter-length, and Its Electrochemical Response, ***Guohai Chen,*** *R.R. Vanfleet, R.F. Davis,* Brigham Young University |
| 12:00pm | **HC+SS-WeM13** Formation and Stability of Surface Oxides on Ag(111), ***Daniel Killelea,*** *J. Derouin, R.G. Farber, M.E. Turano,* Loyola University Chicago*; E.V. Iski,* The University of Tulsa | **12:30 pm NANOMETER-SCALE SCIENCE AND TECHNOLOGY DIVISION GRADUATE STUDENT AWARD COMPETITION** |

# Wednesday Morning, November 9, 2016

| | **Plasma Science and Technology**<br>**Room 104C - Session PS+TF-WeM**<br>**Atomic Layer Etching**<br>**Moderator:** Keren Kanarik, Lam Research Corporation | **Plasma Science and Technology**<br>**Room 104B - Session PS-WeM**<br>**Plasma Sources and Novel Mechanisms for Generating Plasmas**<br>**Moderator:** David Lishan, Plasma-Therm LLC |
|---|---|---|
| 8:00am | **INVITED: PS+TF-WeM1** Selective Cyclic Plasma Etching of Thin Films in Two Heating Way, Ion Bombardment and Infrared Irradiation., *M. Izawa,* Hitachi High-Technologies Corp., Japan; ***Kazunori Shinoda,*** *N. Miyoshi, H. Kobayashi,* Hitachi, Japan; *N. Yasui, M. Tanaka, Y. Sonoda, K. Kuwahara,* Hitachi High-Technologies Corp., Japan; *K. Ishikawa, M. Hori,* Nagoya University, Japan | **PS-WeM1** Multifrequency Impedance Matching Solutions for Plasma Excitation by Tailored Voltage Waveforms, ***Erik V. Johnson,*** Ecole Polytechnique, Palaiseau, France; *S. Dine,* SOLAYL SAS, France; *J.-P. Booth,* Ecole Polytechnique, Palaiseau, France |
| 8:20am | Invited talk continues. | **PS-WeM2** Effect of Tailored Voltage Waveforms on Surface Nanotexturing of Silicon in Capacitively Coupled $SF_6/O_2$ Discharges, ***Guillaume Fischer,*** Institut Photovoltaïque d'Ile-de-France (IPVF), France; *E. Drahi, G. Poulain,* Total MS-Energies Nouvelles, France; *B. Bruneau, E.V. Johnson,* LPICM, Ecole Polytechnique, France |
| 8:40am | **PS+TF-WeM3** Concurrent Engineering of Atomic Layer Etch Patterning Processes Involving Oxide and Nitride Materials, ***Mingmei Wang,*** *P. Chan,* TEL Technology Center, America, LLC; *P. Ventzek,* Tokyo Electron America; *A. Ranjan,* TEL Technology Center, America, LLC | **INVITED: PS-WeM3** Plasma Enhanced CVD processes: Dual Frequency PECVD with pulsing of liquid precursors and PEALD for Selective Deposition, ***Christophe Vallee,*** LTM, Univ. Grenoble Alpes, CEA-LETI, France; *R. Gassilloud,* CEA, LETI, MINATEC Campus; *R. vallat,* LTM, Univ. Grenoble Alpes, CEA-LETI; *F. Piallat,* Altatech, France; *M. Aoukar,* LTM, Univ. Grenoble Alpes, CEA-LETI; *P. Kowalczyk,* LTM - CEA/LETI, France; *P.D. Szkutnik,* LTM, Univ. Grenoble Alpes, CEA-LETI; *P. Noé,* CEA, LETI, MINATEC Campus; *A. Bsiesy, P. Gonon,* LTM, Univ. Grenoble Alpes, CEA-LETI |
| 9:00am | **PS+TF-WeM4** System Trade-offs of Atomic Layer Etching (ALE) of High Aspect Ratio 3D Features, ***Chad Huard,*** University of Michigan; *Y. Zhang, S. Sriraman, A. Paterson,* Lam Research Corp.; *M.J. Kushner,* University of Michigan | Invited talk continues. |
| 9:20am | **INVITED: PS+TF-WeM5** Molecular Dynamics Simulations of Atomic Layer Etching, ***Jun-Chieh Wang,*** *S. Rauf, J.A. Kenney, L. Dorf, K.S. Collins,* Applied Materials, Inc. | **PS-WeM5** Customizing Ion Energy Distributions in Pulsed Plasmas with Chirped Bias Power, ***Steven Lanham,*** *M.J. Kushner,* University of Michigan |
| 9:40am | Invited talk continues. | **PS-WeM6** Nonlinear Frequency Pull in Pulsed Capacitively Coupled Plasmas, *J. Poulose,* ***Lawrence Overzet,*** *M.J. Goeckner,* The University of Texas at Dallas; *S. Shannon,* North Carolina State University; *D. Coumou,* MKS Instruments |
| 10:00am | **BREAK - Complimentary Coffee in Exhibit Hall** | **BREAK - Complimentary Coffee in Exhibit Hall** |
| 10:20am | **BREAK - Complimentary Coffee in Exhibit Hall** | **BREAK - Complimentary Coffee in Exhibit Hall** |
| 10:40am | **BREAK - Complimentary Coffee in Exhibit Hall** | **BREAK - Complimentary Coffee in Exhibit Hall** |
| 11:00am | **PS+TF-WeM10** Isotropic Atomic Layer Etching of Titanium Nitride Using Formation and Desorption of Ammonium Salt, ***Kazunori Shinoda,*** *N. Miyoshi, H. Kobayashi, M. Kurihara,* Hitachi, Japan; *S. Sakai, M. Izawa,* Hitachi High-Technologies, Japan; *K. Ishikawa, M. Hori,* Nagoya University, Japan | **INVITED: PS-WeM10** Plasma Source Development for Fusion Relevant Material Testing, ***John Caughman,*** *R.H. Goulding, T.M. Biewer, T.S. Bigelow, I.H. Campbell, S.J. Diem, A. Fadnek, D.T. Fehling, D.L. Green, C.H. Lau, E.H. Martin, P.V. Pesavento, J. Rapp,* Oak Ridge National Laboratory; *H.B. Ray, G.C. Shaw, M.A. Showers,* University of Tennessee; *P. Piotrowicz, D.N. Ruzic,* University of Illinois at Urbana-Champaign; *G.-N. Luo,* Chinese Academy of Sciences |
| 11:20am | **PS+TF-WeM11** Organic Etchants Toward Atomic Layer Etching of Magnetic Metals, ***Nicholas Altieri,*** *L. Minardi, E.L. Chen, J.P. Chang,* University of California Los Angeles | Invited talk continues. |
| 11:40am | **PS+TF-WeM12** Conformality of Thermal $Al_2O_3$ Atomic Layer Etching in High Aspect Ratio Structures, ***Amy Marquardt,*** *H. Sun,* University of Colorado Boulder; *S.M. George,* University of Colorado at Boulder | **PS-WeM12** Linear Magnetron Magnet Pack for High Power Pulsed Magnetron Sputtering, ***Jake McLain,*** *P. Raman, I.A. Shchelkanov,* University of Illinois at Urbana Champaign; *J. Hrebik,* Kurt J. Lesker Company; *B. Jurczyk, R. Stubbers,* Starfire Industries; *D.N. Ruzic,* University of Illinois at Urbana-Champaign |
| 12:00pm | **PS+TF-WeM13** Thermal Atomic Layer Etching of Crystalline Aluminum Nitride Using Sequential, Self-Limiting HF and $Sn(acac)_2$ Reactions and Enhancement by $H_2$ and Ar Plasmas, ***Nicholas Johnon,*** *H. Sun, K. Sharma, S.M. George,* University of Colorado at Boulder | |

# Wednesday Morning, November 9, 2016

| | **Advanced Surface Engineering**<br>**Room 101C - Session SE+TR-WeM**<br>**Protective Coatings for Tribological Applications in Surface Engineering**<br>**Moderators:** Andrey Voevodin, University of North Texas, Michael Stueber, Karlsruhe Institute of Technology, Germany | **Scanning Probe Microscopy Focus Topic**<br>**Room 104A - Session SP+SS+TF-WeM**<br>**Probing Electronic Properties**<br>**Moderator:** Carl Ventrice, Jr., SUNY Polytechnic Institute |
|---|---|---|
| 8:00am | **SE+TR-WeM1** Correlative Theoretical and Experimental Investigation of the Formation of $AlYB_{14}$ and Competing Phases, ***Oliver Hunold***, *Y.T. Chen, D. Music,* RWTH Aachen University, Germany; *P.O.A. Persson,* Linköping University, Sweden; *D. Primetzhofer,* Uppsala University, Sweden; *M. to Baben,* GTT-Technologies; *J. Achenbach, P. Keuter, J.M. Schneider,* RWTH Aachen University, Germany | **INVITED: SP+SS+TF-WeM1** Local Probe Investigation of 1D Structures and Interfaces in 2D Materials, ***Chenggang Tao,*** Virginia Tech |
| 8:20am | **SE+TR-WeM2** Investigation of Friction and Wear for the Oxide-Oxide Contact in the Piston Ring–liner System, *P. Ernst, P. Luethy, Ch. Bohnheio,* Oerlikon Metco AG, Wohlen, Switzerland; *F. Seibert, B. Widrig,* ***Jürgen Ramm,*** Oerlikon Balzers, Oerlikon Surface Solutions AG, Liechtenstein | Invited talk continues. |
| 8:40am | **INVITED: SE+TR-WeM3** Local Characterization Tools as the Key for Optimized Performance of Hard Coatings, ***Christian Mitterer,*** Montanuniversität Leoben, Austria | **SP+SS+TF-WeM3** Investigation of Electronic Structures from Monolayers to Multilayers in Charge Transfer Complex, TTF-TCNQ using Low-temperature Scanning Tunneling Microscopy/Spectroscopy, ***Seokmin Jeon,*** *P. Maksymovych,* Oak Ridge National Laboratory |
| 9:00am | Invited talk continues. | **SP+SS+TF-WeM4** Investigation of Initial Stages of Oxidation of Ni-Cr and Ni-Cr-Mo Alloys by Scanning Tunneling Microscropy/Spectroscopy (STM/STS), ***Gopalakrishnan Ramalingam,*** *P. Reinke,* University of Virginia |
| 9:20am | **SE+TR-WeM5** High Temperature Oxidation in Pure Steam Environment of HIPIMS Deposited CrN/NbN Nanostructured Coatings, ***Papken Hovsepian,*** *A.P. Ehiasarian, Y. Purandare,* Sheffield Hallam University, UK; *F.J. Perez, M.I. Lasanta, M.T. de Miguel, A. Illana,* Universidad Complutense de Madrid, Spain; *J. Juez-Lorenzo,* Fraunhofer Instititute fur Chemische Technologie ICT, Germany; *A. Aguero,* Instituto Nacional de Tecnica Aeroespecial (INTA), Spain | **INVITED: SP+SS+TF-WeM5** Au(111) Characterization, Single Atom Manipulation and Si(100):H Surface Imaging by LT-UHV-4 STM, ***Corentin Durand,*** *D. Sordes, C. Joachim,* CNRS, France |
| 9:40am | **SE+TR-WeM6** Improved Thermo-Mechanical Properties and Oxidation Resistance of Ti-Al-N Coatings by Alloying Ta and Modifying the Coating Architecture, ***Christian Martin Koller,*** *A. Kirnbauer,* Technische Universität Wien, Austria; *H. Bolvardi,* Oerlikon Balzers, Liechtenstein; *P. Polcik,* Plansee Composite Materials GmbH, Germany; *P.H. Mayrhofer,* Technische Universität Wien, Austria | Invited talk continues. |
| 10:00am | **BREAK - Complimentary Coffee in Exhibit Hall** | **BREAK - Complimentary Coffee in Exhibit Hall** |
| 10:20am | **BREAK - Complimentary Coffee in Exhibit Hall** | **BREAK - Complimentary Coffee in Exhibit Hall** |
| 10:40am | **BREAK - Complimentary Coffee in Exhibit Hall** | **BREAK - Complimentary Coffee in Exhibit Hall** |
| 11:00am | **INVITED: SE+TR-WeM10** Tribochemistry between Graphene and Fe, $Fe_2O_3$, and $Fe_3C$ Surfaces, ***J. David Schall,*** Oakland University | **SP+SS+TF-WeM10** Heterochiral to Homochiral Transition in Pentahelicene 2D Crystallization induced by 2nd-layer Nucleation, ***Anaïs Mairena,*** Universität Zürich, Switzerland |
| 11:20am | Invited talk continues. | **SP+SS+TF-WeM11** Two-stage Chiral Selectivity in the Molecular Self-Assembly of Tryptophan, ***Nathan Guisinger,*** Argonne National Laboratory; *B. Kiraly,* Northwestern University; *R. Rankin,* Villanova University |
| 11:40am | **SE+TR-WeM12** Tribological Testing of Leather Treated with $Ag/TiO_2$ Nanoparticles for Footwear Industry, *M. Rebelo de Figueiredo,* Montanuniversität Leoben, Austria; *I. Carvalho, S. Carvalho,* Universidade do Minho, Portugal; *C. Gaidau,* Leather and Footwear Research Institute, Romania; ***Robert Franz,*** Montanuniversität Leoben, Austria | **SP+SS+TF-WeM12** Mask Free Approach to Selective Growth of Transition Metal Dichalcogenides Heterostructures enabled with Scanning Probe based Nanolithography, *R. Dong, L. Moore, N. Aripova, C. Williamson, R. Schurz,* Saint Louis University; *L.E. Ocola,* Argonne National Laboratory; ***Irma Kuljanishvili,*** Saint Louis University |
| 12:00pm | **SE+TR-WeM13** Phase Formation of Cathodic Arc Evaporated $Al_xCr_{1-x}$ and $Al_xCr_{1-x}O_\delta$ Thin Films, ***Valentin Dalbauer,*** CDL AOS TU Wien, Austria; *J. Ramm,* Oerlikon Balzers, Oerlikon Surface Solution AG, Liechtenstein; *S. Kolozsvári,* Plansee Composite Materials GmbH, Germany; *C.M. Koller,* CDL AOS TU Wien, Austria; *P.H. Mayrhofer,* Vienna University of Technology, Austria | **SP+SS+TF-WeM13** Non-Destructive Electrical Depth Profiling across Nanometric $SiO_2$ Layers, ***Hagai Cohen,*** Weizmann Institute of Science, Israel; *A. Givon,* Tel Aviv University, Israel |

| | **Surface Science**<br>**Room 104D - Session SS+2D-WeM**<br>**Synthesis, Characterization, and Surface Science of Novel Materials and Interfaces**<br>**Moderator:** Talat Rahman, University of Central Florida | **Surface Science**<br>**Room 104E - Session SS+AS-WeM**<br>**Environmental Interfaces, Ambient Surfaces, and In-Operando Studies**<br>**Moderator:** R. Scott Smith, Pacific Northwest National Lab. |
|---|---|---|
| 8:00am | **SS+2D-WeM1** Early Stages of the Thermal-Induced Mobility of Ag in SiC, ***Daniel Velázquez,*** *R. Seibert, J. Terry,* Illinois Institute of Technology | **INVITED: SS+AS-WeM1** In-situ Electron Microscopy of Synthesis, Chemistry and Self-assembly of Colloidal Nanostructures, ***Eli Sutter,*** University of Nebraska - Lincoln |
| 8:20am | **SS+2D-WeM2** Quantitative Chemical State base on XPS Energy Scan Image Applied to Ni Fe corroded Samples, ***Vincent Fernandez,*** *J. Keraudy,* Université de Nantes, France*; N. Fairley,* Casa Software Ltd, UK*; P.Y. Jouan,* Université de Nantes, France | Invited talk continues. |
| 8:40am | **SS+2D-WeM3** Novel Approaches to Form Organic-Inorganic Interfaces: Parallels between Coupling and Surface Modification Schemes in Vacuum and in Wet Chemistry, ***Andrew Teplyakov,*** University of Delaware | **SS+AS-WeM3** Low Energy Electron Microscopy at Near Ambient Pressures, ***Andreas Thissen,*** SPECS Surface Nano Analysis GmbH, Germany |
| 9:00am | **SS+2D-WeM4** Adsorption of Hetero-bifunctional Urea on Ge(100)-2x1 Surface, ***Tania Sandoval,*** *S.F. Bent, A.M. Crow,* Stanford University | **SS+AS-WeM4** Probing Liquid-Vapor Interfaces of Ionic Solutions with Lab-based APXPS, ***John Newberg,*** *C. Arble, Y. Khalifa, A. Broderick, S. Rani,* University of Delaware |
| 9:20am | **SS+2D-WeM5** Electronic Structure of Ferroelectric Nanodomains, ***Erie Morales,*** *C. Perez, M. Brukman, D. Bonnell,* The University of Pennsylvania | **SS+AS-WeM5** Effect of Surface Passivation on Stability of Methylammonium Lead Iodide Perovskite, *Q. Peng,* ***Xiaozhou(Joe) Yu,*** University of Alabama |
| 9:40am | **SS+2D-WeM6** Using Data Analytics and Informatics in Understanding Enhanced Conductivity, Mobility, and Transparency in ITO Bearing $ZrO_2$ and reduced $SnO_2$, ***Timothy Peshek,*** Case Western Reserve University*; J.M. Burst, T. Coutts, T.A. Gessert,* National Renewable Energy Laboratory | **SS+AS-WeM6** STM Reveals the Formation of Near-Ideal Self Assembled Monolayers on $TiO_2$ in Air and Solution, ***William DeBenedetti,*** *M.A. Hines, E.S. Skibinski, A. Song, A. Ortoll-Bloch,* Cornell University |
| 10:00am | **BREAK - Complimentary Coffee in Exhibit Hall** | **BREAK - Complimentary Coffee in Exhibit Hall** |
| 10:20am | **BREAK - Complimentary Coffee in Exhibit Hall** | **BREAK - Complimentary Coffee in Exhibit Hall** |
| 10:40am | **BREAK - Complimentary Coffee in Exhibit Hall** | **BREAK - Complimentary Coffee in Exhibit Hall** |
| 11:00am | **INVITED: SS+2D-WeM10** Surface Composition and Atomic Structure of Topological Insulator Materials, ***Jory Yarmoff,*** *W. Zhou, H. Zhu,* University of California - Riverside | **SS+AS-WeM10** Study of the Electrical Double Layer of Calcium Carbonate Minerals, ***Yijue Diao,*** *R.M. Espinosa-Marzal,* University of Illinois at Urbana-Champaign |
| 11:20am | Invited talk continues. | **SS+AS-WeM11** Observation of Water Adsorption Structures on Ultrathin ZnO/Au(111), ***Junseok Lee,*** *D.C. Sorescu, X. Deng,* National Energy Technology Laboratory |
| 11:40am | **SS+2D-WeM12** Impact Collision Ion Scattering Spectroscopy of $Bi_2Se_3$ and Bi/$Bi_2Se_3$, ***Weimin Zhou,*** *H. Zhu, J.A. Yarmoff,* University of California - Riverside | **SS+AS-WeM12** Surface and Bulk Crystallization Kinetics of Amorphous Solid Water Nanoscale Films, ***Chunqing Yuan,*** *R.S. Smith, B.D. Kay,* Pacific Northwest National Laboratory |
| 12:00pm | **SS+2D-WeM13** Feature Scale Simulation for Materials Processing, ***Paul Moroz,*** TEL Technology Center, America, LLC*; D.J. Moroz,* University of Pennsylvania | **SS+AS-WeM13** Capture of Hyperthermal Atoms and Molecules by Amorphous Water Ice via Ballistic Embedding, ***Grant Langlois***[*†]*, S.J. Sibener,* University of Chicago |

[*] **Morton S. Traum Award Finalist**
[†] **National Student Award Finalist**

# Wednesday Morning, November 9, 2016

| | **Thin Film**<br>**Room 105A - Session TF+MI+NS-WeM**<br>**ALD and Nanostructures**<br>**Moderators:** Sean King, Intel Corporation, Mariadriana Creatore, Eindhoven University of Technology, Netherlands | **Vacuum Technology**<br>**Room 101D - Session VT-WeM**<br>**Vacuum Technology – History and Innovation (8:20-10:00 am)/Transfer and Manipulation (11:00 am-12:20 pm)**<br>**Moderators:** Jay Hendricks, National Institute of Standards and Technology, Gerardo Alejandro Brucker, MKS Instruments, Inc. |
|---|---|---|
| 8:00am | **INVITED: TF+MI+NS-WeM1** Scalable Manufacturing of Nanostructured Materials by Gas-Phase Deposition Techniques, ***Ruud van Ommen***, Delft University of Technology, Netherlands | |
| 8:20am | Invited talk continues. | **VT-WeM2** A New Approach to Vacuum Technology Education at a Distance, ***Del Smith***, *N. Louwagie,* Normandale Community College |
| 8:40am | **TF+MI+NS-WeM3** Surface Passivation of InP Nanowires by Atomic Layer Deposition, ***Lachlan Black***, *Y. Cui, A. Cavalli, M.A. Verheijen, E.P.A.M. Bakkers, W.M.M. Kessels,* Eindhoven University of Technology, Netherlands | **INVITED: VT-WeM3** It's All Because of the Vacuum..., ***H. Frederick Dylla***, American Institute of Physics |
| 9:00am | **TF+MI+NS-WeM4** Selectivity and Nucleation Effects in Atomic Layer Deposition of Copper for Plasmonic Nanostructures, ***Jie Qi***, *B.G. Willis,* University of Connecticut | Invited talk continues. |
| 9:20am | **TF+MI+NS-WeM5** Metal Oxide Aerogel Patterning by $CO_2$ Laser Etching of ALD-coated Carbon Nanotube Macro-Structures, *C. Aksu, P.D. Bradford,* ***Jesse Jur***, North Carolina State University | **INVITED: VT-WeM5** The Next Generation Quantum-based Metrology for Miniaturized Sensors and Standards, ***Gregory F. Strouse***, National Institute of Standards and Technology |
| 9:40am | **TF+MI+NS-WeM6** Tungsten ALD in Porous Carbon Nanotube Forests, *K. Hinton, N. Hollingworth, D.D. Allred,* ***Richard Vanfleet***, Brigham Young University | Invited talk continues. |
| 10:00am | **BREAK - Complimentary Coffee in Exhibit Hall** | **BREAK - Complimentary Coffee in Exhibit Hall** |
| 10:20am | **BREAK - Complimentary Coffee in Exhibit Hall** | **BREAK - Complimentary Coffee in Exhibit Hall** |
| 10:40am | **BREAK - Complimentary Coffee in Exhibit Hall** | **BREAK - Complimentary Coffee in Exhibit Hall** |
| 11:00am | **TF+MI+NS-WeM10** Rational Design of Hyperbranched ZnO Nanowire Systems for Superomniphobic Surfaces Enabled by ALD, ***Ashley Bielinski***, *M. Boban,* University of Michigan, Ann Arbor; *Y. He,* Pacific Northwest National Laboratory; *E. Kazyak,* University of Michigan, Ann Arbor; *C. Wang,* Pacific Northwest National Laboratory; *A. Tuteja, N.P. Dasgupta,* University of Michigan, Ann Arbor | **INVITED: VT-WeM10** Vacuum Transport for Realization and Dissemination of the Redefined Kilogram at NIST, ***Eric Benck***, *E. Mulhern,* NIST |
| 11:20am | **TF+MI+NS-WeM11** Bio-Templated *Morpho* Butterfly Wings by ALD for Photocatalysis, ***Robin E. Rodriguez***, *D. Das, S.P. Agarwal,* University of Michigan, Ann Arbor; *W. Shang, T. Deng,* Shanghai Jiao Tong University, China; *N.P. Dasgupta,* University of Michigan, Ann Arbor | Invited talk continues. |
| 11:40am | **INVITED: TF+MI+NS-WeM12** Atomic Layer Deposition of Nanoscale Superconductors, ***Jeffrey A. Klug***, Argonne National Laboratory | **VT-WeM12** Handling, Transfer ,Storage, and Shipping of Commercial Thin Film Hydride Disk Target Samples, ***James Provo***, J. L. Provo, Consulting |
| 12:00pm | Invited talk continues. | **VT-WeM13** Evaluation of the Oxidation of Air Sensitive Materials from Exposure to Trace Levels of Oxidants During their Environmental Transfer from a Glove Box to a Surface Analysis UHV Chamber, *K. Ohlinger,* ***Hugo Celio***, University of Texas at Austin |

# Wednesday Lunch, November 9, 2016

**Exhibitor Technology Spotlight**
**Room Hall C - Session EW-WeL**
**Exhibitor Technology Spotlight Session**
**Moderator:** Chris Moffitt, Kratos Analytical Limited

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|---|---|---|
| 12:20pm | | |
| 12:40pm | **EW-WeL2** Ceramic-To-Metal Joint Design in Demanding and Harsh Environmental Applications, ***Jim Moore,*** MDC Vacuum Products, LLC | |
| 1:00pm | **EW-WeL3** Why Test Inks Cannot Tell the Full Truth About Surface Free Energy, ***Thomas Willers,*** *M. Jin,* KRUSS | |
| 1:20pm | **EW-WeL4** A Vacuum Species Sensor using Remote Plasma Emission Spectroscopy for Direct Monitoring of Vacuum Processes, ***Joseph Brindley,*** *D. Benoit, V. Bellido-Gonzalez,* Gencoa Limited, UK | |
| 1:40pm | **EW-WeL5** Raman Imaging of Samples with Complex surface Topographies Using Renishaw's inVia Qontor, ***Tim Prusnick,*** RENISHAW, INC. | |
| 2:00pm | **EW-WeL6** Ampoules and Bubblers 101, ***William Kimmerle,*** *K.S. Kimmerle,* NSI | |

# Wednesday Afternoon, November 9, 2016

| | **2D Materials Focus Topic**<br>**Room 103B - Session 2D+NS-WeA**<br>**Nanostructures including Heterostructures made of 2D Materials**<br>**Moderators:** Charlie Johnson, University of Pennsylvania, Arkady Krasheninnikov, Helmholtz Zentrum Dresden-Rossendorf, Germany | **Actinides and Rare Earths Focus Topic**<br>**Room 103C - Session AC+MI-WeA**<br>**Actinide and Rare Earth Theory (2:20-3:40 pm)/Nuclear Power, Waste Remediation and Applications (4:20-6:20 pm)**<br>**Moderators:** Paul Bagus, University of North Texas, Leon Petit, Daresbury Laboratory, UK, Alexander I. Landa, Lawrence Livermore National Laboratory, Melissa Denecke, University of Manchester, UK, David Geeson, AWE, UK, Stefan Minasian, Lawrence Berkeley National Laboratory (LBNL) |
|---|---|---|
| 2:20pm | **2D+NS-WeA1** Single- and Few-Layer $WTe_2$ Nanosheets: New Raman Fingerprints, Nanomechanical Resonances, and Environmental Instability Studies, ***Fan Ye,*** *J. Lee,* Case Western Reserve University*; J. Hu, Z.-Q. Mao, J. Wei,* Tulane University*; P.X.-L. Feng,* Case Western Reserve University | **INVITED: AC+MI-WeA1** Multiplets and f-Bands: Theory of Racah Materials, *A.B. Schick, J. Kolorenc,* Institute of Physics of the AS CR, Czech Republic*; M.I. Katsnelson,* Radboud University, The Netherlands*;* ***A.I. Lichtenstein,*** Institute for Theoretical Physics, University of Hamburg, Germany |
| 2:40pm | | Invited talk continues. |
| 3:00pm | **INVITED: 2D+NS-WeA3** Laser-based Synthesis and Processing of Two-dimensional Monolayers and Heterostructures, ***Masoud Mahjouri-Samani,*** *C. M. Rouleau, A.A. Puretzky, D.B. Geohegan,* Oak Ridge National Laboratory | **INVITED: AC+MI-WeA3** First-Principle Calculations of Magnetic Properties of Actinide Complexes, ***Hélène Bolvin,*** IRSAMC, Université de Toulouse III |
| 3:20pm | Invited talk continues. | Invited talk continues. |
| 3:40pm | **BREAK** | **BREAK** |
| 4:00pm | **BREAK** | **BREAK** |
| 4:20pm | **2D+NS-WeA7** Pulsed Laser Deposition of Single Layer, Hexagonal Boron Nitride on Fiber-oriented Ag(111)/$SrTiO_3$(001), ***Jeff Terry,*** *D. Velazquez, R. Seibert, L. Spentzouris,* Illinois Institute of Technology | **INVITED: AC+MI-WeA7** Observations of Actinide-mineral Precipitation in Solution by *In Situ* Electron Microscopy, ***Edgar Buck,*** *M.A. Conroy, J.A. Soltis,* Pacific Northwest National Laboratory |
| 4:40pm | **2D+NS-WeA8** Fracture Toughness Measurements of Graphene Oxide, ***Tobin Filleter,*** *C. Cao,* University of Toronto, Canada*; J.Y. Howe,* Hitachi High Technologies Canada Inc., Canada*; D. Perovic,* University of Toronto, Canada*; Y. Sun,* Univeristy of Toronto, Canada | Invited talk continues. |
| 5:00pm | **INVITED: 2D+NS-WeA9** Strain, Solitons, and Bimorphs with 2D Materials, ***Paul McEuen,*** Cornell University | **INVITED: AC+MI-WeA9** A Thin Film Approach to Modelling Nuclear Fuels, ***Ross Springell,*** University of Bristol, UK |
| 5:20pm | Invited talk continues. | Invited talk continues. |
| 5:40pm | **2D+NS-WeA11** Strain-Engineered Graphene Grown on Boron Nitride and Hexagonal Boron Nitride Grown on Graphite using High-Temperature Molecular Beam Epitaxy, ***Alex Summerfield,*** *A. Davies, T.S. Cheng, V.V. Korolkov, Y. Cho, C.J. Mellor, E.F. Smith, C.T. Foxon, A.N. Khlobystov,* University of Nottingham, UK*; K. Watanabe, T. Taniguchi,* National Institute for Materials Science (NIMS), Japan*; L. Eaves, S.V. Novikov, P. Beton,* University of Nottingham, UK | **AC+MI-WeA11** PES Study of Surface Passivation in U-Zr Alloys, ***Ladislav Havela,*** *M. Paukov,* Charles University, Prague, Czech Republic*; F. Huber, T. Gouder,* European Commission, Joint Research Centre (JRC), Institute for Transuranium Elements |
| 6:00pm | **2D+NS-WeA12** Metallic Edges in Atomically Thin $WSe_2$, ***Rafik Addou,*** *C.M. Smyth,* The University of Texas at Dallas*; Y.-C. Lin,* The Pennsylvania State University*; J. Noh,* The University of Texas at Dallas*; S.M. Eichfeld,* The Pennsylvania State University*; K.J. Cho,* The University of Texas at Dallas*; J.A. Robinson,* The Pennsylvania State University*; R.M. Wallace,* The University of Texas at Dallas | **AC+MI-WeA12** XPS and SIMS Study of the Surface and Interface of Aged $C^+$Implanted Uranium, ***Art Nelson,*** *S. Donald, J. Siekhaus,* Lawrence Livermore National Laboratory |

| | **Applied Surface Science**<br>**Room 101B - Session AS-WeA**<br>**Multiple Technique Approaches for Real-World Industrial Problem Solving**<br>**Moderators:** Kateryna Artyushkova, University of New Mexico, Xia Dong, Eli Lilly and Company | **Electronic Materials and Photonics**<br>**Room 102A - Session EM+NS+SP+SS-WeA**<br>**Nanoscale Imaging of Metals and Compound Semiconductor based Nanostructures, Surfaces and Interfaces**<br>**Moderators:** Yohannes Abate, Georgia State University, Andy Antonelli, Nanometrics |
|---|---|---|
| 2:20pm | **AS-WeA1** Integrated XPS/ Raman Spectroscopy for Comprehensive Structural, Molecular and Chemical Surface Analysis, ***Christopher Deeks***, *P. Mack, T.S. Nunney, J.P.W. Treacy, M. Meyer, N. Hibbard,* Thermo Fisher Scientific, UK | **INVITED: EM+NS+SP+SS-WeA1** The Importance of Contact Engineering for 2D Devices, ***Saptarshi Das***, Pennsylvania State University |
| 2:40pm | **AS-WeA2** Extended Molecular Identification with TOF-SIMS Imaging MS/MS, ***John Hammond***, *G.L. Fisher, S.R. Bryan,* Physical Electronics*; S. Iida, T. Miyayama,* ULVAC-PHI, Japan | Invited talk continues. |
| 3:00pm | **INVITED: AS-WeA3** Practical Aspects of Multiple Technique Problem-Solving: Making it Work, ***Kathryn Lloyd***, DuPont Corporate Center for Analytical Sciences | **EM+NS+SP+SS-WeA3** Imaging Stress-Directed Compositional Patterning in Silicon Germanium with μ-Raman Spectroscopy, ***Brian Rummel***, *S.M. Han,* University of New Mexico |
| 3:20pm | Invited talk continues. | **EM+NS+SP+SS-WeA4** Atomic-scale Characterization of III-V Nanowire Heterostructures and Devices, *J. Knutsson, S. McKibbin, M. Hjort, J. Colvin, S. Yngman, A. Troian, O. Persson, A. Mikkelsen,* ***Rainer Timm***, Lund University, Sweden |
| 3:40pm | **BREAK** | **BREAK** |
| 4:00pm | **BREAK** | **BREAK** |
| 4:20pm | **AS-WeA7** Adhesion Aspects of Polymeric Methylene Diphenyl Diisocyanate on Different Steel Surfaces by XPS and ToF-SIMS, ***Jorge Bañuls Ciscar***, *M.L. Abel, J.F. Watts,* University of Surrey, UK | **INVITED: EM+NS+SP+SS-WeA7** Revealing Optical Properties of Reduced-Dimensionality Materials at Relevant Length Scales using Nanospectroscopic Imaging, ***P. James Schuck***, The Molecular Foundry, Berkeley Lab |
| 4:40pm | **AS-WeA8** Migration of Erucamide in Polyethylene Films, ***Michaeleen Pacholski***, *R. Sharma, J. Ngunjiri, K. Laughlin, M. Kapur, V. Kalihari,* The Dow Chemical Company | Invited talk continues. |
| 5:00pm | **AS-WeA9** Probing the Impact of Process and Materials Variability of Medical Device Components with Surface Characterization, ***Jeffrey Fenton***, *L. Nygren, B. Tischendorf, R. Jahnke, J. Heffelfinger,* Medtronic plc | **EM+NS+SP+SS-WeA9** Polarizability Mapping of Nanolayers Based on Near-Field Edge Fringes, ***Viktoriia Babicheva***, *V.S. Yakovlev, S. Gamage, M.I. Stockman, Y. Abate,* Georgia State University |
| 5:20pm | **AS-WeA10** Multi-technique Characterization of PtNi Extended Surface Catalysts for Improvement of Electrocatalytic Activity and Durability, *S. Shulda, C. Ngo,* Colorado School of Mines*; S. Alia,* National Renewable Energy Laboratory*; J. Nelson Weker,* SLAC National Accelerator Laboratory*; B. Pivovar,* National Renewable Energy Laboratory*;* ***Svitlana Pylypenko***, Colorado School of Mines | **EM+NS+SP+SS-WeA10** Wedding Cake Growth Mechanism in One-Dimensional and Two-Dimensional Nanostructure Evolution, ***Xin Yin***[*], University of Wisconsin-Madison*; J. Shi,* Rensselaer Polytechnic Institute*; X. Niu,* Northeastern University*; D. Geng,* University of Wisconsin-Madison*; H. Huang,* Northeastern University*; X.D. Wang,* University of Wisconsin-Madison |
| 5:40pm | **AS-WeA11** Compositional Analysis for Additive Manufacturing, ***Michael Brumbach***, *N. Argibay, D. Susan, J. Rodelas, J. Reich, B.L. Boyce, A. Roach,* Sandia National Laboratories | **INVITED: EM+NS+SP+SS-WeA11** Detecting the Invisible - The Atomic Structure of Radiation Sensitive Nano-Materials, ***Christian Kisielowski***, Molecular Foundry, Lawrence Berkeley National Laboratory*; P. Specht,* University of California Berkeley |
| 6:00pm | **AS-WeA12** Ambient Mass Spectrometry for the Analysis of Organic Monolayers, ***Han Zuilhof***, Wageningen University, Netherlands | Invited talk continues. |

[*] **NSTD Student Award Finalist**

| | **Fundamental Discoveries in Heterogeneous Catalysis Focus Topic**<br>**Room 103A - Session HC+NS+SS-WeA**<br>**Nanoscale Surface Structures in Heterogeneously Catalyzed Reactions**<br>**Moderator:** Arthur Utz, Tufts University | **Advanced Ion Microscopy Focus Topic**<br>**Room 104A - Session HI-WeA**<br>**10 Years of GFIS Microscopy**<br>**Moderators:** Gregor Hlawacek, Helmholtz-Zentrum Dresden Rossendorf, Germany<br>Richard Livengood, Intel Corporation |
|---|---|---|
| 2:20pm | **INVITED: HC+NS+SS-WeA1** Ceria Nanoclusters on Graphene/Ru(0001): A New Model Catalyst System, *Z. Novotny,* Pacific Northwest National Laboratory; *F.P. Netzer,* Karl-Franzens University, Austria; ***Zdenek Dohnalek,*** Pacific Northwest National Laboratory | **INVITED: HI-WeA1** A Spectacular Collision of Entrepreneurial Spirit and a Doomed Technology… Transforming the Impossible into the Helium Ion Microscope, ***Bill Ward,*** Entrepreneur, Scientist, Inventor, and Consultant |
| 2:40pm | Invited talk continues. | Invited talk continues. |
| 3:00pm | **HC+NS+SS-WeA3** Lowering the Barrier to C-H Activation using Pt/Cu Single Atom Alloys, ***Matthew Marcinkowski,*** *M. El Soda, F.R. Lucci, E.C.H. Sykes,* Tufts University | **HI-WeA3** Recent Developments of the Gas Field Ion Source, ***John A. Notte,*** Carl Zeiss Microscopy, LLC |
| 3:20pm | **HC+NS+SS-WeA4** Formation, Migration and Reactivity of Au-CO Complexes on Gold-Surfaces, ***Jun Wang,*** Oak Ridge National Laboratory; *M. McEntee, W. Tang, M. Neurock,* University of Virginia; *A.P. Baddorf, P. Maksymovych,* Oak Ridge National Laboratory; *J.T. Yates, Jr.,* University of Virginia | **HI-WeA4** Monte-Carlo Simulations of Ion Beam Milling in Compound Targets, ***Kyle Mahady,*** *P.D. Rack,* University of Tennessee; *S. Tan, R.H. Livengood, Y. Greenzweig, A. Raveh,* Intel Corporation |
| 3:40pm | **BREAK** | **BREAK** |
| 4:00pm | **BREAK** | **BREAK** |
| 4:20pm | **INVITED: HC+NS+SS-WeA7** Sulfur-Metal Complexes on Surfaces of Copper, Silver, and Gold, ***Patricia A. Thiel,*** Iowa State University; *H. Walen,* RIKEN Surface and Interface Science Laboratory, Wako, Saitama, Japan; *D.-J. Liu,* Ames Laboratory, Ames, IA; *J. Oh,* RIKEN Surface and Interface Science Laboratory, Wako, Saitama, Japan; *H.J. Yang,* University College London, UK; *Y. Kim,* RIKEN Surface and Interface Science Laboratory, Wako, Saitama, Japan | **HI-WeA7** Characterization of Structural Changes During HIM and SEM Imaging of Organic Films, ***Shinichi Ogawa,*** National Institute of Advanced Industrial Science and Technology (AIST), Japan; *T. Ohashi, S. Oyama,* Nissan Chemical Industries, Ltd. |
| 4:40pm | Invited talk continues. | **HI-WeA8** Laser-Assisted Focused Helium and Neon Beam Induced Processing, *M.G. Stanford,* The University of Tennessee Knoxville; *S. Tan, R.H. Livengood,* Intel Corporation; *B.B. Lewis,* University of Tennessee Knoxville; *J.D. Fowlkes,* Center for Nanophase Materials Sciences, Oak Ridge National Lab; ***Philip D. Rack,*** The University of Tennessee Knoxville |
| 5:00pm | **HC+NS+SS-WeA9** Titania/Gold Inverse Model Catalysts for Acetaldehyde Formation from Ethanol, ***Ashleigh Baber,*** *D.T. Boyle, W. Andahazy, V. Lam, D. Schlosser, N. Tosti, J. Wilke,* James Madison University | **INVITED: HI-WeA9** Imaging and Lithography of Two-Dimensional Nanostructures with Helium Ions, ***André Beyer,*** Bielefeld University, Germany |
| 5:20pm | **HC+NS+SS-WeA10** Shape and Support Interaction of Size Selected Pt Nanoparticles in Presence of $H_2$, ***Mahdi Ahmadi,*** *F. Behafarid,* University of Central Florida; *B. Roldan Cuenya,* Ruhr-University Bochum, Germany | Invited talk continues. |
| 5:40pm | **INVITED: HC+NS+SS-WeA11** Single Atom Alloys as a Strategy for Selective Heterogeneous Hydrogenation and Dehydrogenation Reactions, ***Charles Sykes,*** Tufts University | **HI-WeA11** High Resolution Elemental Imaging on the Helium Ion Microscope, ***David Dowsett,*** *J.-N. Audinot, F. Vollnhals, T. Wirtz,* Luxembourg Institute of Science and Technology (LIST), Luxembourg |
| 6:00pm | Invited talk continues. | |

| | **In-Situ and Operando Spectroscopy and Microscopy for Catalysts, Surfaces, & Materials Focus Topic**<br>**Room 101C - Session IS+HC-WeA**<br>**Ambient Pressure XPS Studies of Surface and Chemistry of Catalysts**<br>**Moderators:** Franklin (Feng) Tao, University of Kansas, Anatoly Frenkel, Yeshiva University | **MEMS and NEMS**<br>**Room 102B - Session MN+NS-WeA**<br>**Optomechanics, Photonics, and Quantum Nanosystems**<br>**Moderators:** Leonidas Ocola, Argonne National Laboratory, Robert Ilic, National Institute of Standards and Technology, Center for Nanoscale Science and Technology |
|---|---|---|
| 2:20pm | **INVITED: IS+HC-WeA1** The Electronic Structure of Electrochemically Active Interfaces, *V. Pfeifer,* Fritz-Haber-Institut der Max-Planck-Gesellschaft and Helmholtz-Zentrum Berlin, Germany; *J.J. Velasco-Velez,* Max-Planck-Institut für Chemische Energiekonversion, Germany; *R. Arrigo,* Diamond Light Source Ltd., UK; *T.E. Jones,* Fritz-Haber-Institut der Max-Planck-Gesellschaft, Germany; *M. Hävecker,* Max-Planck-Institut für Chemische Energiekonversion, Germany; *E. Stotz,* Fritz-Haber-Institut der Max-Planck-Gesellschaft, Germany; *R. Schlögl,* Fritz-Haber-Institut der Max-Planck-Gesellschaft and Max-Planck-Institut für chemische Energiekonversion, Germany; ***Axel Knop-Gericke,*** Fritz-Haber-Institut der Max-Planck-Gesellschaft, Germany | **INVITED: MN+NS-WeA1** Transducing between Microwaves and Light using Mechanics, ***Andrew Cleland,*** University of Chicago |
| 2:40pm | Invited talk continues. | Invited talk continues. |
| 3:00pm | **IS+HC-WeA3** In situ AP-XPS and NEXAFS Studies on CO Oxidation and $CO_2$ Dissociation on Copper Surfaces, *B. Eren,* ***Christian Heine,*** *G.A. Somorjai, M.B. Salmeron,* Lawrence Berkeley National Laboratory (LBNL) | **MN+NS-WeA3** Single Laser Modulated Drive and Detection of a Nano-Optomechanical Cantilever, ***Vincent Sauer,*** *J.N. Bachman, Z. Diao, M.R. Freeman, W.K. Hiebert,* University of Alberta and The National Institute for Nanotechnology, Canada |
| 3:20pm | **IS+HC-WeA4** Alcohol Adsorption and Reaction on $La_{0.7}Sr_{0.3}MnO_3$(100) by APXPS, ***David Mullins,*** *T.Z. Ward, S.H. Overbury,* Oak Ridge National Laboratory | **MN+NS-WeA4** Optomechanical Limit Cycle Oscillations in Metallic Nanowires, ***Roberto De Alba,*** *T.S. Abhilash, R.H. Rand, J.M. Parpia,* Cornell University |
| 3:40pm | **BREAK** | **BREAK** |
| 4:00pm | **BREAK** | **BREAK** |
| 4:20pm | **INVITED: IS+HC-WeA7** Bridging the Material and Pressure Gaps in Synchrotron Based Photoelectron *In Situ/Operando* Studies, ***Luca Gregoratti,*** *M. Amati, H. Sezen,* Elettra - Sincrotrone Trieste SCpA, Italy | **MN+NS-WeA7** Transducer Array with Optomechanical Read-out and Integrated Actuation for Simultaneous High Sensitivity force Detection, ***Thomas Michels****, Ilmenau University of Technology, Germany; *B.R. Ilic, V. Aksyuk,* National Institute of Standards and Technology; *I.W. Rangelow,* Ilmenau University of Technology, Germany |
| 4:40pm | Invited talk continues. | **INVITED: MN+NS-WeA8** Magnetic Resonance Spectroscopy with Torsional Optomechanics, ***Mark Freeman,*** University of Alberta and The National Institute for Nanotechnology, Canada |
| 5:00pm | **INVITED: IS+HC-WeA9** *In situ* Spectroscopy for Catalyst Design, ***Rosa Arrigo,*** Diamond Light Source, Oxfordshire, UK | Invited talk continues. |
| 5:20pm | Invited talk continues. | |
| 5:40pm | **INVITED: IS+HC-WeA11** *In Situ* and *Operando* Characterization of Model Metal Nanoparticle Catalysts: Size, Shape, and Chemical State Effects, ***Beatriz Roldan Cuenya,*** Ruhr-University Bochum, Germany | |
| 6:00pm | Invited talk continues. | |

* **NSTD Student Award Finalist**

# Wednesday Afternoon, November 9, 2016

| | Plasma Science and Technology<br>Room 104B - Session PS+TF-WeA<br>Plasma Deposition and Plasma Assisted ALD<br>**Moderators:** Noemi Leick, Colorado School of Mines, Adrie Mackus, Eindhoven University, Netherlands | Plasma Science and Technology<br>Room 104C - Session PS-WeA<br>Atomic Layer Etching and Low Damage Processing<br>**Moderator:** Eric Joseph, IBM Research Division, T.J. Watson Research Center |
|---|---|---|
| 2:20pm | **INVITED: PS+TF-WeA1** High Quality Film and Interface Formation using Appropriate Reaction Species, ***Akinobu Teramoto,*** Tohoku University, Japan | **PS-WeA1** Plasma-Based Removal of Native Oxide Layers on Si and SiGe Substrates While Minimizing Surface Residues, *D. Metzler,* ***Chen Li,*** University of Maryland, College Park; *C.S. Lai, E.A. Hudson,* Lam Research Corporation; *G.S. Oehrlein,* University of Maryland, College Park |
| 2:40pm | Invited talk continues. | **PS-WeA2** Electrical Characterization of SiN Modified by Hydrogen and Helium Plasma for New Atomic Layer Etching Processes, ***Florentin Chambettaz,*** *L. Vallier, O. Joubert,* Univ. Grenoble Alpes, France |
| 3:00pm | **PS+TF-WeA3** The Synergy of Diamond-like Carbon Film PECVD Systems: Plasma Diagnostics and Film Properties, ***Tara Van Surksum,*** *E.R. Fisher,* Colorado State University | **PS-WeA3** Electron Beam Generated Plasmas Produced in Fluorine-Containing Gases, ***David Boris,*** *G.M. Petrov, Tz.B. Petrova, S.C. Hernandez, S.G. Walton,* Naval Research Laboratory |
| 3:20pm | **PS+TF-WeA4** ULK Film Dielectric Constant Restoration through Enhanced Organic Plasma Treatment, ***Zhiguo Sun,*** *J. Shu, P. Mennell, Q. Yuan, A. Madan, S. Molis, J. Mody, Y. Zhang, J. Shepard Jr,* GLOBALFOUNDRIES | **PS-WeA4** Plasma-Enhanced Germanium Atomic Layer Etching (ALE), ***Wenbing Yang,*** *S. Tan, K. Kanarik, R. Arghavani, T.B. Lill, Y. Pan,* Lam Research Corp. |
| 3:40pm | **BREAK** | **BREAK** |
| 4:00pm | **BREAK** | **BREAK** |
| 4:20pm | **PS+TF-WeA7** Understanding of Low Temperature ALD of Silicon Nitride, *H.C.M. Knoops,* Oxford Instruments Plasma Technology, UK; *R.H.E.C. Bosch, T. Faraz, M. van Drunen, L.E. Cornelissen, M. Creatore,* ***Erwin Kessels,*** Eindhoven University of Technology, Netherlands | **INVITED: PS-WeA7** Damage Monitoring of GaN Film for Material Processing, ***Daisuke Ogawa,*** *Y. Banno, Y. Nakano, K. Nakamura,* Chubu University, Japan |
| 4:40pm | **PS+TF-WeA8** Plasma Assisted Atomic Layer Deposition of $SiC_xN_y$ Films with Methylamine as the Carbon Source, ***Rafaiel Ovanesyan,*** *N. Leick, R.J. Gasvoda,* Colorado School of Mines; *K.M. Kelchner, D.M. Hausmann,* Lam Research Corporation; *S. Agarwal,* Colorado School of Mines | Invited talk continues. |
| 5:00pm | **INVITED: PS+TF-WeA9** Plasma Enhanced Atomic Layer Deposition in the Semiconductor Industry, ***Adrien LaVoie,*** Lam Research Corporation | **PS-WeA9** Neutral Beam Etching of Germanium Microstructure for Ge Fin-FET Devices, *E.T. Lee,* ***Shuichi Noda,*** Tohoku University, Japan; *W. Mizubayashi,* AIST; *K. Endo,* AiST; *S. Samukawa,* Tohoku University, Japan |
| 5:20pm | Invited talk continues. | **PS-WeA10** Selective Trimming of Surface Oxygenated Groups through Vacuum Ultraviolet Light Irradiation in an Evacuated Environment, ***Ahmed Soliman,*** *T. Utsunomiya, T. Ichii,* Kyoto University, Japan; *H. Sugimura,* Kyoto University, Japan |
| 5:40pm | **PS+TF-WeA11** Substrate Biasing during Remote Plasma-ALD On Planar and 3D Substrates, ***Tahsin Faraz,*** Eindhoven University of Technology, The Netherlands; *H.C.M. Knoops,* Oxford Instruments Plasma Technology, UK; *D.M. Hausmann, J. Henri,* Lam Research Corporation; *W.M.M. Kessels,* Eindhoven University of Technology, The Netherlands | **PS-WeA11** Transistor Performance Improvement Through Low-Damage Plasma-Enhanced ALD Metal Gates, ***Christopher Brennan,*** *C. Neumann, S. Vitale,* MIT Lincoln Laboratory |
| 6:00pm | **PS+TF-WeA12** A Novel ABC-type ALD Process for Cobalt using $CoCp_2$ and $N_2$ and $H_2$ Plasmas, ***Martijn Vos,*** *N.F.W. Thissen, A.J. Mackus, W.M.M. Kessels,* Eindhoven University of Technology, Netherlands | **PS-WeA12** *In situ* Optical Diagnostics during Atomic Layer Etching of $SiO_2$ using Alternating Cycles of $C_4F_8$ and Ar Plasma, *N. Leick,* ***Ryan Gasvoda,*** Colorado School of Mines; *A. van de Steeg,* Eindhoven University of Technology, Netherlands; *R.A. Ovanesyan,* Colorado School of Mines; *R. Bhowmick, E.A. Hudson,* Lam Research Corporation; *S. Agarwal,* Colorado School of Mines |

| | **Advanced Surface Engineering**<br>**Room 101D - Session SE+2D+EM-WeA**<br>**Multifunctional Thin Films and Coatings**<br>**Moderators:** Jolanta Klemberg-Sapieha, Ecole Polytechnique de Montreal, Canada, Hana Barankova, Uppsala University, Sweden | **Surface Science**<br>**Room 104D - Session SS+AS+EM-WeA**<br>**Semiconductor Surfaces and Interfaces**<br>**Moderator:** Andrew Gellman, Carnegie Mellon University |
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| 2:20pm | **SE+2D+EM-WeA1** Investigation of $H_2S$ Poisoning Process on Composite Material Made of Metal Oxides and Carbon Nanotubes, ***Yichen Duan***, *A.V. Teplyakov,* University of Delaware | **SS+AS+EM-WeA1** Adsorption of Triethylenediamine on Si(100)-2×1 Surface via N-Si Dative Bonding and C-N Dissociation, ***Jing Zhao***, *M. Madachik,* University of Delaware; *K. O'Donnell,* Curtin University, Australia; *O. Warschkow,* University of Sydney, Australia; *L. Thomsen,* Australian Synchrotron, Australia; *G. Moore, S. Schofield,* University College London; *A.V. Teplyakov,* University of Delaware |
| 2:40pm | **SE+2D+EM-WeA2** Graphene-family Nanomaterials Co-assembled with Nanostructured Cobalt Oxide Polymorphs as Hybrid Supercapacitive Electrodes and Enzymeless Glucose Detection Platforms, ***Sara Carrizosa***, *B. McDonald, S. Gupta,* Western Kentucky University | **SS+AS+EM-WeA2** Chemoselective Adsorption of Functionalized Cyclooctynes on Silicon, *M. Reutzel, N. Munster, M.A. Lipponer,* Philipps-Universität Marburg, Germany; *C. Langer,* Justus Liebig University Giessen, Germany; *U. Hofer, U. Koert,* Philipps-Universität Marburg, Germany; ***Michael Durr***, Justus Liebig University Giessen, Germany |
| 3:00pm | **SE+2D+EM-WeA3** Cross-Bonding between Silicon, Silica and III-V Surfaces at the Nano-Scale Using Energy Analysis via Three Liquid Contact Angle Analysis (3LCAA) to achieve Hermetic Wet NanoBonding™, ***Ashley Mascareno***, SiO2 NanoTech LLC/Arizona State University Physics Dpt; *N.X. Herbots,* SiO2 NanoTech LLC; *C.F. Watson,* SiO2 NanoTech LLC/Arizona State University Physics Dpt | **INVITED: SS+AS+EM-WeA3** Compositions, Structures, and Electronic Properties of Grain Boundaries of Cu(InGa)$Se_2$, ***Xudong Xiao***, Chinese University of Hong Kong |
| 3:20pm | **SE+2D+EM-WeA4** Porous Materials for Solid Phase Microextraction by Sputtering and Chemical Vapor Deposition, ***Tuhin Roychowdhury***, *A. Diwan, B. Singh, M. Kaykhaii, M.R. Linford,* Brigham Young University | Invited talk continues. |
| 3:40pm | **BREAK** | **BREAK** |
| 4:00pm | **BREAK** | **BREAK** |
| 4:20pm | **SE+2D+EM-WeA7** Ferroelectric Thin Films for Memory Applications, ***Joyprokash Chakrabartty***, Institut national de la recherche scientifique (INRS), Canada | **SS+AS+EM-WeA7** Thermal Self-limiting CVD Silicon and ALD Silicon Nitride Containing Control Layers on $In_{0.53}Ga_{0.47}As$(001)-(2x4), $Si_{0.5}Ge_{0.5}$(110), and $Si_{0.7}Ge_{0.3}$(001), ***Steven Wolf***, *M. Edmonds, T. Kent, K. Sardashti,* University of California at San Diego; *M. Chang, J. Kachian,* Applied Materials; *R. Droopad,* Texas State University; *E. Chagarov, A.C. Kummel,* University of California at San Diego |
| 4:40pm | **SE+2D+EM-WeA8** Thermoelectric and Optical Properties of Advanced Thermoelectric Devices from Ni/$Bi_2Te_3$/Ni and Ni/$Sb_2Te_3$/Ni Thin Films, ***Satilmis Budak***, *Z. Xiao, J. Cole, A. Kassu, D. Price, T. Davis, T. Strong, J. Gray,* Alabama A&M University | **SS+AS+EM-WeA8** Formation of Atomically Ordered and Chemically Selective Si-O-Ti Monolayer on $Si_{0.5}Ge_{0.5}$(110) for a MIS Structure via $H_2O_2$(g) Functionalization, ***SangWook Park***, *J.Y. Choi,* University of California, San Diego; *E. Chagarov,* Univeristy of California, San Diego; *B. Sahu, S. Siddiqui,* GLOBALFOUNDRIES; *N. Yoshida, J. Kachian,* Applied Materials; *A.C. Kummel,* University of California, San Diego |
| 5:00pm | **SE+2D+EM-WeA9** Effects of Composition and Strain on Band Gaps of Pseudomorphic $Ge_{1-x-y}Si_xSn_y$ on Ge, ***Nalin Fernando***, New Mexico State University; *R. Hickey, J. Hart, R. Hazbun, D. Zhang, J. Kolodzey,* University of Delaware; *S. Zollner,* New Mexico State University | **SS+AS+EM-WeA9** The Effect of Ultrasonic Treatment (UST) on the Defect Structure of the Si–$SiO_2$ System, ***Daniel Kropman***, *T. Laas,* Tallinn University, Estonia |
| 5:20pm | **SE+2D+EM-WeA10** MBE Growth of Hexagonal Boron Nitride for use in Novel Electronic Devices, ***Adam Barton***, *R. Yue, C.M. Smyth, R. Addou, L. Cheng, R.M. Wallace, J. Kim, M. Kim, J. Hsu, K.J. Cho,* The University of Texas at Dallas; *L. Colombo,* Texas Instruments; *C.L. Hinkle,* The University of Texas at Dallas | **SS+AS+EM-WeA10** Adsorption of $C_{60}$ Buckminster Fullerenes on a Carbon-free Hydrazine-modified Silicon Surface, ***Fei Gao***[*], *A.V. Teplyakov,* University of Delaware |
| 5:40pm | **SE+2D+EM-WeA11** Passivation of Interfaces Between High-k Dielectrics and SiGe: *Ex Situ* Wet Sulfur Clean vs. *In Situ* Plasma Nitridation, ***Kasra Sardashti***[†], *M.S. Clemons,* UC San Diego; *M. Yakimov,* SUNY College of Nanoscale Science and Engineering; *K. Tang,* Stanford University; *S. Oktyabrsky,* SUNY College of Nanoscale Science and Engineering; *P.C. McIntyre,* Stanford University; *L. Dong, N. Yoshida,* Applied Materials, Inc.; *A.C. Kummel,* UC San Diego | **SS+AS+EM-WeA11** Passivation of SiGe Surfaces with Aqueous Ammonium Sulfide, ***Stacy Heslop***, *A.J. Muscat,* University of Arizona |
| 6:00pm | **SE+2D+EM-WeA12** Enhanced Voltage Control of Perpendicular Magnetic Anisotropy in Magnetic Tunnel Junctions Using Ultrathin PZT Composite Oxide Tunneling Barriers, ***Kevin Fitzell***, *X. Li, K. Wong, G. Yu, S. Robbennolt, S.H. Tolbert, P.K. Amiri, K.L. Wang, J.P. Chang,* University of California at Los Angeles | **SS+AS+EM-WeA12** Novel Electrical Circuit Model for the Design of InGaAs/GaAs (001) Strained-Layer-Super-Lattice, ***Tedi Kujofsa***, *J.E. Ayers,* University of Connecticut |

[*] **Morton S. Traum Award Finalist**

[†] **National Student Award Finalist**

| | **Thin Film**<br>**Room 105A - Session TF+EM+MI-WeA**<br>**Thin Films for Microelectronics**<br>**Moderators:** Paul Poodt, Holst Centre / TNO, Netherlands, Christophe Vallee, LTM, Univ. Grenoble Alpes, CEA-LETI, France | **Thin Film**<br>**Room 104E - Session TF+MI-WeA**<br>**Thin Films for Magnetic and Optical Applications**<br>**Moderator:** Subhadra Gupta, University of Alabama |
|---|---|---|
| 2:20pm | **TF+EM+MI-WeA1** Impact of ALD $VO_2$ Film Thickness on the Electrical and Optical Properties of the Metal-Insulator Phase Transition, ***Virginia Wheeler,*** *B.P. Downey, J. Roussos, M. Currie, A. Giles, C. Ellis, J. Tischler, J. Caldwell, D.J. Meyer, C.R. Eddy Jr.,* U.S. Naval Research Laboratory | **TF+MI-WeA1** Tuning Static and Dynamic Magnetic Properties of FeGa/NiFe Multilayer Heterostructures via Magnetic anisotropy Dispersion, ***Colin Rementer,*** *Q. Xu, P. Nordeen, G.P. Carman, Y. Wang, J.P. Chang,* University of California Los Angeles |
| 2:40pm | **TF+EM+MI-WeA2** Study of Ru Silicidation with and without Sub-nm ALD TiN and TaN Barrier/nucleation Layers for Ru Interconnect Applications, ***Sonal Dey,*** SUNY College of Nanoscale Science and Engineering*; K.-H. Yu, S. Consiglio, K. Tapily, C.S. Wajda, G.J. Leusink,* TEL Technology Center, America, LLC*; J. Jordan-Sweet, C. Lavoie,* IBM T.J. Watson Research Center*; A.C. Diebold,* SUNY College of Nanoscale Science and Engineering | **TF+MI-WeA2** Magnetic Anisotropy of $CoFe_2O_4$ Nanotubes Synthesized by Radical-Enhanced ALD, ***Puilam(Cyrus) Cheung,*** *J. Chang,* University of California Los Angeles |
| 3:00pm | **INVITED: TF+EM+MI-WeA3** 2D - Material and Process Challenges of the Ultimate Thin Films in Nanoelectronics, ***Stefan de Gendt,*** KU Leuven, IMEC, Belgium*; S. Brems, D. Chiape,* IMEC, Belgium*; M. Heyne, K. Verguts,* KU Leuven, IMEC, Belgium*; R. Philipson,* KU Leuven, Belgium*; C. Lockhart de la Rosa, A. Delabie,* KU Leuven, IMEC, Belgium*; S. De Feyter,* KU Leuven, Belgium*; C. Huyghebaert,* IMEC, Belgium | **INVITED: TF+MI-WeA3** Magnetic Anisotropy and Relaxation in Spintronic Materials, ***Claudia Mewes,*** *T. Mewes, J. Beik Mohammadi, A. Farrar, K. Cole,* The University of Alabama |
| 3:20pm | Invited talk continues. | Invited talk continues. |
| 3:40pm | **BREAK** | **BREAK** |
| 4:00pm | **BREAK** | **BREAK** |
| 4:20pm | **TF+EM+MI-WeA7** Optimizing the Ductility and the Fracture Properties of Amorphous Metallic Thin Films on Polyimide, ***Hai Tran,*** *W. Cai,* University of South Florida | **TF+MI-WeA7** Vacuum Furnace Annealing Block Copolymers for Bit Patterned Advanced Media, ***Allen Owen,*** *S. Gupta,* University of Alabama |
| 4:40pm | **TF+EM+MI-WeA8** Atomic Layer Deposition of Stoichiometric $TaSi_2$ on Si(001), ***JongYoun Choi,*** *S.W. Park,* University of California San Diego*; R. Hung,* Applied Materials Inc. | **TF+MI-WeA8** Atomic Layer Deposition Enabled Synthesis of Miltiferroic Composite Nanostructures, ***Jeffrey Chang,*** *A. Buditama,* University of California at Los Angeles*; A. Rosenberg,* Stanford University*; L. Kornblum,* Yale University*; S.H. Tolbert,* University of California at Los Angeles*; K.A. Moler,* Stanford University*; C.H. Ahn,* Yale University*; J.P. Chang,* University of California at Los Angeles |
| 5:00pm | **TF+EM+MI-WeA9** Different Approaches for Enhancing the Thermal Stability of $Ge_2Sb_2Te_5$ Thin Films by Carbon Addition, ***David Adams,*** *K. Childs, T. Gurrieri, W. Rice,* Sandia National Laboratories | **INVITED: TF+MI-WeA9** Thin Film Challenges for High Performance Ir Plasmon Enhanced Photodiodes: from Simulation to Focal Plane Array Integration and Characterization, ***François Boulard,*** Univ. Grenoble Alpes, France*; O. Gravrand,* Univ. Grenoble Alpes,France*; D. Fowler,* Univ. Grenoble Alpes, France*; G. Badano,* Univ. Grenoble Alpes, France*; P. Ballet,* Univ. Grenoble Alpes, France*; M. Duperron,* Univ. Grenoble Alpes, France*; L. Adelmini, R. Espiau de Lamaestre,* Univ. Grenoble Alpes, France |
| 5:20pm | **TF+EM+MI-WeA10** Comparison of Electromigration and Resistivity in On-chip Co and Cu Damascene Nanowires, ***C.-K. Hu,*** *J. Kelly, J.H-C. Chen, H. Huang, Y. Ostrovski, R. Patlolla, B. Peethala, P. Adusumilli, T. Spooner,* IBM Research Division, Albany*; L. Gignac, S. Cohen,* IBM Research Division, T.J. Watson Research Center*; R. Long, G. Hornicek, T. Kane, G. Lian, M. Ali,* IBM Systems*; V.M. Kamineni, F. Mont, S. Siddiqui,* GLOBALFOUNDRIES | Invited talk continues. |
| 5:40pm | **TF+EM+MI-WeA11** UV/VUV Curing Process for Low-k Organosilicate Dielectrics, ***Huifeng Zheng,*** *X. Guo, D. Pei, W. Li, J. Blatz, K. Hsu, D. Benjamin,* University of Wisconsin-Madison*; Y. Lin, H. Fung, C. Chen,* National Synchrotron Radiation Research Center, Taiwan, Republic of China*; Y. Nishi,* Stanford University*; J.L. Shohet,* University of Wisconsin-Madison | **TF+MI-WeA11** Tuning the Transition Temperature of Vanadium Oxide Films for Smart Window Application, ***Ravi Ranjan Pandey,*** *J. Sharma, C. Kant, K. Saini,* CSIR-National Physical Laboratory, India |
| 6:00pm | **TF+EM+MI-WeA12** Effects of Cesium Ion Implantation on the Mechanical and Electrical Properties of Organosilicate Low-k Films, ***Weiyi Li,*** *D. Pei, X. Guo, M.-K. Cheng, S. Lee,* University of Wisconsin-Madison*; Q. Lin,* IBM Research Division, T.J. Watson Research Center*; S.W. King,* Intel Corporation*; J.L. Shohet,* University of Wisconsin-Madison | **TF+MI-WeA12** Watching Thin-film Aluminum Oxidize, ***David Allred,*** *M. Miles, S. Thomas, S. Willett, M.J. Greenburg, A. Vance, R.S. Turley,* Brigham Young University |

**Tribology Focus Topic**
**Room 101A - Session TR+AS+NS+SS-WeA**
**Nanoscale Wear: Applications to Nanometrology and Manufacturing**
**Moderators:** Tevis Jacobs, University of Pittsburgh, Filippo Mangolini, University of Leeds, UK

| | | |
|---|---|---|
| 2:20pm | **INVITED: TR+AS+NS+SS-WeA1** A Multi-Bond Model of Single-Asperity Wear at the Nano-Scale, *Y. Shao,* Johns Hopkins University; *T.D.B. Jacobs,* University of Pittsburgh; ***Michael L. Falk,*** Johns Hopkins University | |
| 2:40pm | Invited talk continues. | |
| 3:00pm | **INVITED: TR+AS+NS+SS-WeA3** Surface Chemical and Tribological Studies of Solid Lubricants for Space, ***Jeffrey Lince,*** The Aerospace Corporation | |
| 3:20pm | Invited talk continues. | |
| 3:40pm | **BREAK** | |
| 4:00pm | **BREAK** | |
| 4:20pm | **INVITED: TR+AS+NS+SS-WeA7** Molecular Control of Friction, ***Roland Bennewitz,*** INM - Leibniz Institute for New Materials, Germany; *J. Blass, BL. Bozna,* INM - Leibniz Institute for New Materials; *M. Albrecht, G. Wenz,* Saarland University | |
| 4:40pm | Invited talk continues. | |
| 5:00pm | **INVITED: TR+AS+NS+SS-WeA9** Plasticity Controlled Friction and Wear in Single-Asperity Contacts, ***Izabela Szlufarska,*** *L. Zhao, A. Li, C. Tangpatjaroen, D. Grierson,* University of Wisconsin - Madison | |
| 5:20pm | Invited talk continues. | |
| 5:40pm | **TR+AS+NS+SS-WeA11** Applying Analytical Roughness Models to Real Surfaces: Reconstructing the Power Spectral Density from Surface Topography Measurements, ***Tevis Jacobs,*** *A. Gujrati, S.R. Khanal,* University of Pittsburgh; *T. Junge, L. Pastewka,* Karlsruhe Institute of Technology (KIT), Germany | |
| 6:00pm | **TR+AS+NS+SS-WeA12** Universal Ageing Mechanism for Static and Sliding Friction of Metallic Nanoparticles, *M. Feldmann,* ***Dirk Dietzel,*** *A. Schirmeisen,* Institute of Applied Physics, Justus-Liebig-University Giessen, Germany | |

# Anticipated Schedule Thursday, November 10, 2016

## Anticipated Schedule Thursday Morning, November 10

8:00 AM _____
8:20 AM _____
8:40 AM _____
9:00 AM _____
9:20 AM _____
9:40 AM _____
10:00 AM _____
10:20 AM _____
10:40 AM _____
11:00 AM _____
11:20 AM _____
11:40 AM _____
12:00 PM _____

## Anticipated Schedule Thursday Lunch, November 10

When _____
Where _____
With _____

## Anticipated Schedule Thursday Afternoon, November 10

1:00 PM _____
1:20 PM _____
1:40 PM _____
2:00 PM _____
2:20 PM _____
2:40 PM _____
3:00 PM _____
3:20 PM _____
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5:00 PM _____
5:20 PM _____
5:40 PM _____
6:00 PM _____

# Special Events Thursday

| | |
|---|---|
| 7:30 AM | Membership Comm. Meeting & Breakfast/Commerce Street Grille, Renaissance Nashville (by invitation) |
| 8:00 AM | ASED Business Meeting/Ryman, Renaissance Nashville |
| 12:20 PM | Exhibit Finale & Refreshments/Hall C |
| 12:20 PM | PSTD Coburn and Winters Award Ceremony/104B |
| 12:20 PM | Surface Science Division Mort Traum Awards Ceremony/104D |
| 12:30 PM | 2017 Program Committee Chairs' Meeting & Lunch/108 (by invitation) |
| 12:30 PM | AVS Business Meeting/Boardroom 5th Avenue, Music City Center |
| 6:00 PM | Thursday Poster Session/Hall D |
| 6:30 PM | 2016/2017 Program Committee Reception and Dinner/Belmont, Renaissance Nashville (by invitation) |
| 7:00 PM | *SSS* Editorial Board Dinner/Music City Ballroom, Renaissance Nashville (by invitation) |

## Short Courses Thursday

| | |
|---|---|
| 8:30 am | Fundamentals of Vacuum Technology |

LOCATION: All AVS Short Courses will be held at Music City Center

COURSE HOURS: All AVS Short Courses Hours: 8:30 a.m.–5:00 p.m. — with 1.5 hour break for Lunch (Lunch not included)

# Thursday Morning, November 10, 2016

| | 2D Materials Focus Topic<br>Room 103B - Session 2D+MI-ThM<br>Properties of 2D Materials including Electronic, Magnetic, Optical, Mechanical, Thermal Properties<br>**Moderators:** Paul Sheehan, US Naval Research Laboratory, Zhaohui Zhong, University of Michigan, Ann Arbor | Actinides and Rare Earths Focus Topic<br>Room 103C - Session AC+AS+SA-ThM<br>Chemistry and Physics of the Actinides and Rare Earths<br>**Moderators:** David Shuh, Lawrence Berkeley National Laboratory,<br>Art Nelson, Lawrence Livermore National Laboratory |
|---|---|---|
| 8:00am | **2D+MI-ThM1** Mechanics and Fracture of 2D Materials with Defects and Grain Boundaries, ***Zhao Qin,*** *G.S. Jung,* Massachusetts Institute of Technology*; S. Wang,* University of Oxford, UK*; F.J. Martin-Martinez,* Massachusetts Institute of Technology*; J.H. Warner,* University of Oxford, UK*; M.J. Buehler,* Massachusetts Institute of Technology | **INVITED: AC+AS+SA-ThM1** Covalency in Oxidized Uranium, ***James G. Tobin,*** University of Wisconsin-Oshkosh |
| 8:20am | **2D+MI-ThM2** Effects of Non-local Screening and Effective Mass Anisotropy on Excitons in 2D Materials, *I.I. Oleynik,* ***Joseph Gonzales,*** University of South Florida | Invited talk continues. |
| 8:40am | **INVITED: 2D+MI-ThM3** 2D Materials: A New Platform for Strong Light-Matter Interactions, ***Ajit Srivastava,*** Emory University | **AC+AS+SA-ThM3** An In Situ X-ray Diffraction Study of Plutonium Oxidation, ***Paul Roussel,*** *W. Lake,* AWE, UK |
| 9:00am | Invited talk continues. | **AC+AS+SA-ThM4** Advanced Applications of Synchrotron Sources to Describe Water Soluble Plutonium Colloids, ***Thomas Dumas,*** CEA, France*; E. Dalodière, M. Virot,* ICSM Marcoule*; V. Morosini,* CEA Marcoule*; T. Chave,* ICSM Marcoule*; C. Hennig,* Helmholtz Zentrum Dresden-Rossendorf*; T. Wiss,* European Commission, Joint Research Centre (JRC), Institute for Transuranium Elements*; D.K. Shuh, T. Tyliszcaak,* Lawrence Berkeley National Laboratory*; P. Moisy,* CEA Marcoule*; I. Nikitenko,* ICSM Marcoule |
| 9:20am | **2D+MI-ThM5** Electronic Transport and Localization in Nitrogen-Doped Graphene Devices Using Hyperthermal Ion Implantation, ***Adam Friedman,*** *C.D. Cress,* Naval Research Laboratory*; S.W. Schmucker,* National Research Council postdoc working at Naval Research Laboratory*; J.T. Robinson, O.M.J. van 't Erve,* Naval Research Laboratory | **AC+AS+SA-ThM5** *In Pristinum* Observation of Plutonium Hydride, ***Martin Brierley,*** *J.P. Knowles,* AWE |
| 9:40am | **2D+MI-ThM6** Metal Contacts to Transition Metal Dichalcogenide Films: Understanding and Avoiding the Formation of a Schottky-like Barrier, *M. Gomez, J. Martinez, M. Valentin, E. Preciado, V. Klee, C. Merida,* ***Ludwig Bartels,*** University of California - Riverside | **AC+AS+SA-ThM6** Evidence for f- and d-orbital Mixing in Lanthanide and Actinide Dialuminides, $MAl_2$ (M = Ce, Sm, Eu, Yb, Lu, U, Pu), ***Stefan Minasian,*** Lawrence Berkeley National Laboratory (LBNL)*; A.B. Altman, J. Arnold,* University of California at Berkeley*; E.D. Bauer,* Los Alamos National Laboratory*; C.H. Booth, J.I. Pacold, C.D. Pemmaraju, D.G. Prendergast, D.K. Shuh, T. Tyliszczak,* Lawrence Berkeley National Laboratory (LBNL) |
| 10:00am | **BREAK - Complimentary Coffee in Exhibit Hall** | **BREAK - Complimentary Coffee in Exhibit Hall** |
| 10:20am | **BREAK - Complimentary Coffee in Exhibit Hall** | **BREAK - Complimentary Coffee in Exhibit Hall** |
| 10:40am | **BREAK - Complimentary Coffee in Exhibit Hall** | **BREAK - Complimentary Coffee in Exhibit Hall** |
| 11:00am | **2D+MI-ThM10** Multilayer Graphene Suspension Over Millimeter Size Openings and Mechanical Testing, ***Joseph Rowley,*** *R.F. Davis, R.R. Vanfleet,* Brigham Young University*; J. Abbott,* Moxtek, Inc. | **AC+AS+SA-ThM10** Comparative Analysis of Uranium Oxide Films, ***Miguel Santiago Cordoba,*** Los Alamos National Laboratory |
| 11:20am | **2D+MI-ThM11** Modeling Excitons in Transition-Metal Dichalcogenides, *F. Tseng,* NRC Research Associate*; E. Simsek,* George Washington University*;* ***Daniel Gunlycke,*** Naval Research Laboratory | **AC+AS+SA-ThM11** Soft X-ray Spectroscopy of Actinide Materials, ***David Shuh,*** *S.G. Minasian, C. Pemmaraju, A. Canning, D.G. Prendergast,* Lawrence Berkeley National Laboratory*; T. Tyliszczak,* Lawrence Berkeley Lab, University of California, Berkeley*; A. Modin, S. Butorin, J. Nordgren, L. Werme, P. Oppeneer,* Uppsala University, Sweden |
| 11:40am | **INVITED: 2D+MI-ThM12** Characterization of Collective Ground States in Single-layer $NbSe_2$, ***Miguel M. Ugeda,*** CIC nanoGUNE, Spain*; A.J. Bradley,* University of California at Berkeley*; Y. Zhang,* Advanced Light Source, Lawrence Berkeley National Laboratory*; S. Onishi, W. Ruan, Y. Chen, C. Ojeda-Aristizabal,* University of California at Berkeley*; H. Ryu,* Advanced Light Source, Lawrence Berkeley National Laboratory*; M.T. Edmonds, H.Z. Tsai, A. Riss,* University of California at Berkeley*; S.K. Mo,* Advanced Light Source, Lawrence Berkeley National Laboratory*; D. Lee, A. Zettl,* University of California at Berkeley*; Z. Hussain,* Advanced Light Source, Lawrence Berkeley National Laboratory*; Z.X. Shen,* Stanford Institute for Materials and Energy Sciences, SLAC National Accelerator Laboratory*; M.F. Crommie,* University of California at Berkeley | **INVITED: AC+AS+SA-ThM12** The Quantum Phase of Tunneling Polarons in O- and Photo-Doped $UO_{2(+x)}$: Loss of the Mott Gap and Formation of a Superthermal Metal, ***Steven Conradson,*** Institute Josef Stefan, Slovenia |
| 12:00pm | Invited talk continues. | Invited talk continues. |

| | **Applied Surface Science**<br>**Room 101B - Session AS+SS-ThM**<br>**Depth Profiling, Buried Interfaces, and 3D Analyses**<br>**Moderators:** Gregory Fisher, Physical Electronics USA, Karen Gaskell, University of Maryland, College Park | **Biomaterial Interfaces**<br>**Room 101A - Session BI+AS+SA-ThM**<br>**Synthesis and Processing of Biomaterials/Biologically Inspired Materials**<br>**Moderators:** Daniel Barlow, US Naval Research Laboratory, Lara Gamble, University of Washington |
|---|---|---|
| 8:00am | **AS+SS-ThM1** Pushing the Limits of Bonded Multi-Wafer Stack Heights while Maintaining High Precision Alignment, ***Alireza Narimannezhad***, *J. Jennings, M.H. Weber, K.G. Lynn,* Washington State University | **BI+AS+SA-ThM1** Response of PC 12 Cells to Mesoporous Substrates with and without DC Bias, *F. Sabri,* University of Memphis; ***Kyle Lynch***, Universtiy of Memphis; *O. Skalli,* University of Memphis |
| 8:20am | **AS+SS-ThM2** Porous Si Stack Analysis by Model Based Infrared Reflectometry (MBIR), ***Sukti Chatterjee***, *L. Scudder, P. Narwankar,* Applied Materials Inc. | **BI+AS+SA-ThM2** Collagen Functionalized with ALD-$TiO_2$: A Novel Biomaterial for Bone Grafting, ***ArghyaKamal Bishal***, *C. Sukotjo, C.G. Takoudis,* University of Illinois at Chicago |
| 8:40am | **INVITED: AS+SS-ThM3** Applications of Atom Probe Tomography on 3D Semiconductor Devices, ***AjayKumar Kambham***, *D. Flatoff, P.A.W. van der Heide,* GLOBALFOUNDRIES U.S. Inc. | **BI+AS+SA-ThM3** Nanostructure Formation on Biomaterials by Directed Irradiation Synthesis (DIS) for Tissue Regeneration and Maximize Corrosion Resistance, ***Jean Paul Allain***, *A.R. Shetty,* University of Illinois at Urbana-Champaign; *S. Arias, A. Barnwell,* University of Illinois at Urbana Champaign; *F. Echeverria, L.F. Berrio,* University of Antioquia, Colombia |
| 9:00am | Invited talk continues. | **BI+AS+SA-ThM4** Controlled Peptide Surfaces of Various Ratios that Guide Neural Stem Cell Differentiation, ***HalaShakib Dhowre***, *M. Zelzer, H. Sahaf, C. Towlson, N.A. Russell,* University of Nottingham, UK |
| 9:20am | **AS+SS-ThM5** Analysis of ALD/CVD Thin Film Conformality using Lateral High Aspect Ratio (LHAR) Structures: Experimental Characteristics and Proposed Classifications, ***Riikka Puurunen***, VTT Technical Research Centre of Finland; *J. Dendooven, V. Cremers, C. Detavernier,* Ghent University, Belgium | **INVITED: BI+AS+SA-ThM5** Biofunctional Hydrogels for Tissue Repair, ***Andres Garcia***, Georgia Institute of Technology |
| 9:40am | **AS+SS-ThM6** *In Situ* Liquid SIMS Investigation of Chemical Components of the Solid-Electrolyte Interface in Li Ion Batteries, ***Zihua Zhu***, *C. Wang, Y. Zhou, D.R. Baer, W. Xu, R. Cao, X. Yu, P. Yan, R. Zhao,* Pacific Northwest National Laboratory | Invited talk continues. |
| 10:00am | **BREAK - Complimentary Coffee in Exhibit Hall** | **BREAK - Complimentary Coffee in Exhibit Hall** |
| 10:20am | **BREAK - Complimentary Coffee in Exhibit Hall** | **BREAK - Complimentary Coffee in Exhibit Hall** |
| 10:40am | **BREAK - Complimentary Coffee in Exhibit Hall** | **BREAK - Complimentary Coffee in Exhibit Hall** |
| 11:00am | **AS+SS-ThM10** Electronic and Physical Changes to Soft Materials Caused by Gas Cluster Sputtering, ***Christopher Goodwin***, *Z.E. Voras, T.P. Beebe, Jr.,* University of Delaware | **BI+AS+SA-ThM10** Nanoscale Domain Formation Induced by Partial Polymerization Creates Planar Supported Lipid Bilayers that are Fluid and Stable, ***N.Malithi Fonseka***, *B. Liang, K.S. Orosz, C.A. Aspinwall, S.S. Saavedra,* University of Arizona |
| 11:20am | **AS+SS-ThM11** FIB-TOF Characterization of Organic and Organic/Inorganic Structures, ***David Carr***, *G.L. Fisher, S.R. Bryan,* Physical Electronics; *S. Iida, T. Miyayama,* ULVAC-PHI, Japan | **BI+AS+SA-ThM11** Stabilization of Lipid Films by Hyaluronic Acid and Polymeric Substitutes in a Joint Model System, ***Felicitas Schwoerer***, Universität Heidelberg, Germany; *M. Trapp, R. Steitz,* Helmholtz-Zentrum Berlin für Materialien und Energie GmbH; *R. Dahint,* Universität Heidelberg |
| 11:40am | **AS+SS-ThM12** Molecular Depth Profiling with a New Hybrid 3D SIMS instrument for Improved Molecular Identification, ***Alexander Pirkl***, *R. Moellers, H.F. Arlinghaus,* ION-TOF GmbH, Germany; *N.J. Havercroft,* ION-TOF USA; *E. Niehuis,* ION-TOF GmbH, Germany; *A.A. Makarov, S. Horning,* Thermo Fisher Scientific; *R. Havelund, M.K. Passarelli, A.G. Shard, I.S. Gilmore,* National Physical Laboratory, UK | **INVITED: BI+AS+SA-ThM12** New Substrates and Patterning Methods for Supported Lipid Bilayers, ***Sally McArthur***, *L. Askew,* Swinburne University of Technology, Australia |
| 12:00pm | **AS+SS-ThM13** 3-D Analysis of Binding-Medium Degradation as Related to Renaissance-Era Artwork, ***Zachary Voras***, *C.M. Goodwin,* University of Delaware; *J.L. Mass,* Rijksmuseum; *K.R. DeGhetaldi,* Winterthur Museum; *T.P. Beebe, Jr.,* University of Delaware | Invited talk continues. |

# Thursday Morning, November 10, 2016

| | **Electronic Materials and Photonics**<br>**Room 102A - Session EM+AC+SS+TF-ThM**<br>**Radiation Detection Materials and Devices**<br>**Moderators:** Sean King, Intel Corporation, Michelle Paquette, University of Missouri-Kansas City | **Fundamental Discoveries in Heterogeneous Catalysis Focus Topic**<br>**Room 103A - Session HC+SS-ThM**<br>**Dynamics of Gas-surface Interactions in Heterogeneous Catalysis**<br>**Moderator:** Daniel Killelea, Loyola University Chicago |
|---|---|---|
| 8:00am | **INVITED: EM+AC+SS+TF-ThM1** Novel High Energy Resolution Scintillator Detectors, ***Arnold Burger***, *E. Rowe, L. Matei, P. Bhattacharya, M. Groza,* Fisk University; *K. Stassun,* Vanderbilt University; *A. Stowe,* Consolidated Nuclear Security Y-12; *N. Cherepy, S. Payne,* Lawrence Livermore National Laboratory | **HC+SS-ThM1** Adsorption and Hydrogenation of Acrolein on Ru(001), ***Dominic Esan***, *Y.D. Ren,* University of Illinois at Chicago; *I.B. Waluyo,* Brookhaven National Laboratory; *M. Trenary,* University of Illinois at Chicago |
| 8:20am | Invited talk continues. | **HC+SS-ThM2** Dynamics of Formate Synthesis from $CO_2$ and Formate Decomposition on Cu Surfaces, *J. Quan, T. Kozarashi, T. Ogawa, T. Kondo,* ***Junji Nakamura***, University of Tsukuba, Japan |
| 8:40am | **EM+AC+SS+TF-ThM3** Improved p–n Heterojunction Device Performance Induced by Irradiation in Amorphous Boron Carbide Films, ***George Peterson***, *Q. Su,* University of Nebraska - Lincoln; *Y. Wang,* Los Alamos National Laboratory; *P.A. Dowben, M. Nastasi,* University of Nebraska - Lincoln | **HC+SS-ThM3** Step-Type Selective Oxidation on Pt Surfaces, ***Rachael Farber***, Loyola University Chicago; *C. Badan,* Leiden Institute of Chemistry, The Netherlands; *H. Heyrich,* Leiden Institute of Chemistry; *L.B.F. Juurlink,* Leiden Institute of Chemistry, The Netherlands; *D.R. Killelea,* Loyola University Chicago |
| 9:00am | **EM+AC+SS+TF-ThM4** Amorphous Hydrogenated Boron Carbide for Direct-Conversion Solid-State Neutron Detection, ***Gyanendra Bhattarai***, *T.D. Nguyen, S. Dhungana, A.N. Caruso, M.M. Paquette,* University of Missouri-Kansas City | **HC+SS-ThM4** Vibrational Symmetry Effects in the Dissociative Chemisorption of $CH_2D_2$ on Ni(111), ***Arthur Utz***, *N. Chen, E.H. High,* Tufts University |
| 9:20am | **EM+AC+SS+TF-ThM5** Radiation Damage of Low-κ Interlayer Dielectrics Studied with Electrically Detected Magnetic Resonance, ***Michael Mutch***, *P.M. Lenahan,* Pennsylvania State University; *S.W. King,* Intel Corporation | **INVITED: HC+SS-ThM5** Elementary Steps in Surface Reactions: Mechanisms, Kinetics and Thermodynamics, ***Swetlana Schauermann***, Christian-Albrechts-Universität Kiel, Germany |
| 9:40am | **EM+AC+SS+TF-ThM6** Modeling Unit Displacement Damage in Amorphous Silicon Oxycarbides, ***Hepeng Ding***, *M. Demkowicz,* MIT | Invited talk continues. |
| 10:00am | **BREAK - Complimentary Coffee in Exhibit Hall** | **BREAK - Complimentary Coffee in Exhibit Hall** |
| 10:20am | **BREAK - Complimentary Coffee in Exhibit Hall** | **BREAK - Complimentary Coffee in Exhibit Hall** |
| 10:40am | **BREAK - Complimentary Coffee in Exhibit Hall** | **BREAK - Complimentary Coffee in Exhibit Hall** |
| 11:00am | **INVITED: EM+AC+SS+TF-ThM10** Position-Sensitive 3D CZT Gamma-Ray Detectors with Thickness Up to 50 mm, ***Ralph James***, *A.E. Bolotnikov, G.S. Camarda, Y. Cui, G. De Geronimo, J. Fried, A. Hossain, G. Mahler, U. Roy, E. Vernon, G. Yang,* Brookhaven National Laboratory | **HC+SS-ThM10** $CO_2$ Hydrogenation on Rhodium: Comparative Study using Field Emission Techniques and 1-D Atom Probe, ***Sten Lambeets***, Université Libre de Bruxelles, Belgium; *C. Barroo,* Harvard University; *S. Owczarek, N. Gilis,* Université Libre de Bruxelles, Belgium; *N. Kruse,* Washington State University; *T. Visart de Bocarmé,* Université Libre de Bruxelles, Belgium |
| 11:20am | Invited talk continues. | **HC+SS-ThM11** State-resolved Reactivity of Methane on Ir(110)-(1x2), ***Eric Peterson***, *E. Nicotera, E.K. Dombrowski, A.L. Utz,* Tufts University |
| 11:40am | **EM+AC+SS+TF-ThM12** Understanding the Electrical Properties of $U_3O_8$ for Direct Conversion Neutron Detectors, ***Brandon Shaver***, *S. Lawson, B. Musicó,* The University of Tennessee Knoxville; *S. Dhungana, G. Bhattarai, M.M. Paquette, A.N. Caruso,* University of Missouri-Kansas City; *T. Meek,* The University of Tennessee Knoxville | **INVITED: HC+SS-ThM12** Curved Single Crystals As Tools to Study Structure Dependences in Surface Science and Gas-Surface Reactions Dynamics, ***Ludo Juurlink***, Leiden University, Netherlands |
| 12:00pm | **EM+AC+SS+TF-ThM13** Radiation Damage in 4H SiC nMOSFETs Detected by Electrically Detected Magnetic Resonance, ***Ryan Waskiewicz***, *M.A. Anders, P.M. Lenahan,* Pennsylvania State University; *A.J. Lelis,* U.S. Army Research Laboratory | Invited talk continues. |

# Thursday Morning, November 10, 2016

| | **Advanced Ion Microscopy Focus Topic**<br>**Room 104A - Session HI+NS-ThM**<br>**Fundamentals of Ion Beam Microscopy**<br>**Moderators:** Armin Gölzhäuser, Bielefeld University, Germany, Philip D. Rack, The University of Tennessee Knoxville | **In-Situ and Operando Spectroscopy and Microscopy for Catalysts, Surfaces, & Materials Focus Topic**<br>**Room 101C - Session IS-ThM**<br>**In-situ and Operando Spectroscopy and Microscopy with Infrared Absorption Spectroscopy**<br>**Moderators:** Franklin (Feng) Tao, University of Kansas, Judith Yang, University of Pittsburgh |
|---|---|---|
| 8:00am | **HI+NS-ThM1** Generation of Hydrogen Beams using Single Atom and Trimer Nanotips, ***Radovan Urban,*** University of Alberta and The National Institute for Nanotechnology, Canada; *K. Nova,* University of Alberta, Canada; *M. Salomons,* National Institute for Nanotechnology, Canada; *R.A. Wolkow,* University of Alberta and The National Institute for Nanotechnology, Canada; *J.L. Pitters,* National Institute for Nanotechnology, Canada | **INVITED: IS-ThM1** In-situ and Operando Characterization of Catalytic Reactions with Infrared Absorption Spectroscopy, ***Francisco Zaera,*** University of California, Riverside |
| 8:20am | **HI+NS-ThM2** High-brightness Xenon Gas Field Ion Source from a Single-Atom Tip, ***Ing-Shouh Hwang,*** Institute of Physics, Academia Sinica, Taipei, Taiwan, Taiwan, Republic of China; *W.T. Chang, W.C. Lai, P.-C. Li,* Institute of Physics, Academia Sinica, Taipei, Taiwan; *T.Y. Fu,* Department of Physics, National Taiwan Normal University, Taipei, Taiwan; *T.T. Tsong,* Institute of Physics, Academia Sinica, Taipei, Taiwan | Invited talk continues. |
| 8:40am | **INVITED: HI+NS-ThM3** New Ion Source for Nanofabrication and Microscopy, ***Adam Steele,*** *B. Knuffman, A. Schwarzkopf,* zeroK NanoTech Corporation; *J.J. McClelland,* National Institute of Standards and Technology (NIST) | **INVITED: IS-ThM3** Studying Birth, Life and Death of Catalytic Solids with In-situ and Operando Spectroscopy, ***Bert Weckhuysen,*** Utrecht University, Netherlands |
| 9:00am | Invited talk continues. | Invited talk continues. |
| 9:20am | **INVITED: HI+NS-ThM5** Recent Liquid Metal Ion Source developments for Improving Focused Ion Beam Machines, ***Jacques Gierak,*** LPN-CNRS, Route de Nozay France; *L. Bischoff,* Helmholtz-Zentrum Dresden-Rossendorf, Institute of Ion Beam Physics and Materials Research, Germany; *P. Mazarov, L. Bruchhaus,* Raith GmbH, Germany; *P. Lozano, C. Perez Martinez,* Massachusetts Institute of Technology | **INVITED: IS-ThM5** Direct Observation of CVD Graphene Growth and the Dynamics of Active Catalysts by *In situ* Scanning and Transmission Electron Microscopy, *Z-J. Wang, J. Cao, R. Farra, R. Schlögl,* ***Marc Georg Willinger,*** Fritz Haber Institute of the Max Planck Society, Germany |
| 9:40am | Invited talk continues. | Invited talk continues. |
| 10:00am | **BREAK - Complimentary Coffee in Exhibit Hall** | **BREAK - Complimentary Coffee in Exhibit Hall** |
| 10:20am | **BREAK - Complimentary Coffee in Exhibit Hall** | **BREAK - Complimentary Coffee in Exhibit Hall** |
| 10:40am | **BREAK - Complimentary Coffee in Exhibit Hall** | **BREAK - Complimentary Coffee in Exhibit Hall** |
| 11:00am | **HI+NS-ThM10** Elucidating the Directed Nanoscale Transformations when Building with Ions in Liquid, *A. Ievlev, V. Iberi, J. Jakowski, M.J. Burch, H. Hysmith, A. Belianinov, R.R. Unocic,* ***Olga Ovchinnikova,*** Oak Ridge National Laboratory | **INVITED: IS-ThM10** Characterizing Working Catalysts with Correlated Electron and Photon Probes, ***Eric Stach,*** Brookhaven National Laboratory; *Y. Li,* Yeshiva University; *S. Zhao,* University of Illinois at Urbana Champaign; *A. Gamalski,* Brookhaven National Laboratory; *D. Liu, R. Nuzzo,* University of Illinois at Urbana Champaign; *J.G. Chen,* Columbia University/Brookhaven National Laboratory; *A.I. Frenkel,* Yeshiva University |
| 11:20am | **HI+NS-ThM11** Determination of an Upper Limit of Ionization Probability during SIMS Experiments using Laser Post-ionization, ***Nicholas Popczun,*** *L. Breuer,* Pennsylvania State University; *A. Wucher,* University of Duisburg-Essen, Germany; *N. Winograd,* Pennsylvania State University | Invited talk continues. |
| 11:40am | **HI+NS-ThM12** Studying Gas Cluster Ion Beam Sputter Yields and Surface Topography in the Helium Ion Microscope, ***Anders Barlow,*** *N. Sano, J.F. Portoles, P.J. Cumpson,* Newcastle University, UK | **IS-ThM12** Tracking Atoms and Charges in Metal Catalysts under Reaction Conditions, ***Anatoly Frenkel,*** Yeshiva University |
| 12:00pm | | **IS-ThM13** STEM Imaging of Catalysts to the Single-Atom Level, via Closed-Cell *In Situ* Gas Reaction Technology, ***Lawrence Allard,*** Oak Ridge National Laboratory; *S. Duan, J. Liu,* Arizona State University |

# Thursday Morning, November 10, 2016

| | **MEMS and NEMS**<br>**Room 102B - Session MN+BI-ThM**<br>**'Fantastic Voyage' – the New Micro/Nano/Bio Systems Frontiers**<br>**Moderators:** Reza Ghodssi, University of Maryland, College Park, Christian Zorman, Case Western Reserve University | **Plasma Science and Technology**<br>**Room 104C - Session PS1-ThM**<br>**Modeling of Plasmas and Plasma-Surface Interactions**<br>**Moderator:** Sumit Agarwal, Colorado School of Mines |
|---|---|---|
| 8:00am | **INVITED: MN+BI-ThM1** Living Micromachines, ***M. Taher Saif,*** *B. Williams,* University of Illinois at Urbana Champaign | **PS1-ThM1** The role of the Singlet Metastables and Energy-dependent Secondary Electron Emission Yields in Capacitively Coupled Oxygen Discharges, ***Jon Gudmundsson,*** *H. Hannesdottir,* University of Iceland |
| 8:20am | Invited talk continues. | **PS1-ThM2** A Computational Model for Magnetron Sputtering Devices using VSim, ***James McGugan,*** *C.D. Zhou,* Tech-X Corp.*; J.D. Smith,* Tech-X UK Ltd.*; C.M. Roark, A.Y. Pankin, P.H. Stoltz,* Tech-X Corp. |
| 8:40am | **MN+BI-ThM3** Inertial Imaging with Nanoelectromechanical Systems, ***Selim Hanay,*** Bilkent University, Turkey | **PS1-ThM3** Three Dimensional Monte Carlo Simulation of Surface Charging on a Contact Hole during Pulsed Plasma Etching, ***Yugo Osano,*** *Y. Higuchi, Y. Nishizawa,* Samsung R&D Institute Japan*; M.H. Cha,* Samsung Electronics, Republic of Korea*; H. Kubotera,* Samsung R&D Institute Japan*; K.H. Lee,* Samsung Electronics, Republic of Korea |
| 9:00am | **MN+BI-ThM4** Dynamic Patterning of Breast Cancer Cells Using Silicon Nitride Multimode Membrane Resonators, ***Hao Jia****, *H. Tang, P.X.-L. Feng,* Case Western Reserve University | **PS1-ThM4** Characteristics of Capacitively Coupled Plasmas Excited by Tailored Voltage Waveforms, ***Ankur Agarwal,*** *S. Rauf, K.S. Collins,* Applied Materials Inc. |
| 9:20am | **INVITED: MN+BI-ThM5** Smart Drug Delivery through Gut, *W. Yu, R. Rahimi, M. Ochoa,* ***Babak Ziaie,*** Purdue University | **PS1-ThM5** Multi-zone Equilibrium of ICP Discharge for Plasma Processing. Mechanism of Plasma Heating, ***Vladimir Nagorny,*** Mattson Technology |
| 9:40am | Invited talk continues. | **PS1-ThM6** Characterization of Transients in Pulsed Capacitively Coupled Plasmas, ***Wei Tian,*** *A. Agarwal, S. Rauf, K.S. Collins,* Applied Materials Inc. |
| 10:00am | **BREAK - Complimentary Coffee in Exhibit Hall** | **BREAK - Complimentary Coffee in Exhibit Hall** |
| 10:20am | **BREAK - Complimentary Coffee in Exhibit Hall** | **BREAK - Complimentary Coffee in Exhibit Hall** |
| 10:40am | **BREAK - Complimentary Coffee in Exhibit Hall** | **BREAK - Complimentary Coffee in Exhibit Hall** |
| 11:00am | **INVITED: MN+BI-ThM10** Biopsy with Untethered Microgrippers, ***David Gracias,*** Johns Hopkins University | **INVITED: PS1-ThM10** Modeling and Simulation of Nonequilibrium Atmospheric Pressure Plasma Flows, ***Juan Trelles,*** University of Massachusetts Lowell |
| 11:20am | Invited talk continues. | Invited talk continues. |
| 11:40am | **MN+BI-ThM12** Bacterial Biofilms on 3D-printed Implant Materials, ***Ryan Huiszoon****, *S. Subramanian, T.E. Winkler†,* University of Maryland, College Park*; H.O. Sintim,* Purdue University*; W.E. Bentley, R. Ghodssi,* University of Maryland, College Park | **PS1-ThM12** Multiscale Approach for Deep Silicon Etching Simulation under Bosch Process using $SF_6$ and $C_4F_8$ Plasma Chemistry, ***Guillaume Le Dain,*** *A. Rhallabi,* Institut des Matériaux Jean Rouxel – Université de Nantes, France*; M. Boufnichel, F. Roqueta,* ST Microelectronics, France |
| 12:00pm | | **PS1-ThM13** Molecular Dynamics Simulation of Ni Etching by CO Plasmas, ***Akito Kumamoto,*** *N. Mauchamp, M. Isobe, K. Mizotani, H. Li, T. Ito, K. Karahashi, S. Hamaguchi,* Osaka University, Japan |

* **MEMS/NEMS Best Paper Award Finalist**

† **National Student Award Finalist**

# Thursday Morning, November 10, 2016

| | **Plasma Science and Technology**<br>**Room 104B - Session PS2-ThM**<br>**Plasma Processing of Challenging Materials**<br>**Moderator:** David Ruzic, University of Illinois at Urbana-Champaign | **Surface Science**<br>**Room 104D - Session SS-ThM**<br>**Chirality and Enantioselectivity on Surfaces; Ionic Liquid Interfaces**<br>**Moderator:** Eddy Tysoe, University of Wisconsin-Milwaukee |
|---|---|---|
| 8:00am | **INVITED: PS2-ThM1** Epitaxy of Doped Diamond for Electronics and Energy Applications Using Microwave Plasma CVD, ***Robert Nemanich***, *F.A. Koeck,* Arizona State University | **INVITED: SS-ThM1** Self-assembly and Dynamics for Chiral Conformational Switches on Surfaces Studied by UHV-STM, ***Trolle Linderoth***, Aarhus University, Denmark |
| 8:20am | Invited talk continues. | Invited talk continues. |
| 8:40am | **PS2-ThM3** Magnetic Degradation of Perpendicular CoFeB Film caused by Hydrogen Plasma, ***Masaki Yamada***, Hitachi High-Technologies Corporation, Japan; *M. Satake,* Hitachi High-Technologies Corporation | **SS-ThM3** Chiral Recognition among Non-planar Aromatic Hydrocarbons on Metal Surfaces, *A. Mairena,* Empa, Swiss Federal Laboratories for Materials Science and Technology; *M. Parschau,* ***Karl-Heinz Ernst***, Empa, Swiss Federal Laboratories for Materials Science and Technology, Switzerland |
| 9:00am | **PS2-ThM4** Roughness and Selectivity Trade Off during Patterning using Next Generation Resist, ***Vinayak Rastogi***, *A. Ranjan,* TEL Technology Center, America, LLC | **SS-ThM4** Competing Forces in Chiral Surface Chemistry: Enantiospecificity versus Enantiomer Disproportionation, ***Andrew Gellman***, *Y. Yun,* Carnegie Mellon University |
| 9:20am | **PS2-ThM5** Fabrication of Large Superhydrophobic Surfaces with Hierarchical Structures on Polymer Films – Influence of the Roughening and the Fluorination, ***Jérôme Durret***, *N. Frolet, C. Gourgon,* CNRS - LTM, France | **SS-ThM5** Probing Individual Binding Sites around Individual Chiral Molecules on a Metal Surface: Chemisorption and Non-Covalent Bonding in Heterogeneous Asymmetric Hydrogenation, ***Peter McBreen***, Laval University, Canada; *B. Hammer,* Aarhus University, Denmark; *M. Goves,* Aarhus University; *J.-C. Lemay, Y. Dong,* Laval University, Canada |
| 9:40am | **PS2-ThM6** Chlorine-based Etching of InP Laser : Effect of Plasma Chemistry on Sidewall Roughness and Damages, ***Guillaume Gay***, *E. Pargon, C. Petit-Etienne,* LTM - CEA/LETI, France; *M. Brihoum, S. Barnola,* CEA, LETI, MINATEC Campus, France; *S. Labau, S. Arnaud,* LTM - CEA/LETI, France | **SS-ThM6** Enhanced Hydrogenation Activity and Diastereomeric Interactions of Methyl Pyruvate Co-adsorbed with R-1-(1-Naphthylethylamine) on Pd(111), ***Mausumi Mahapatra***, *W.T. Tysoe,* University of Wisconsin-Milwaukee |
| 10:00am | **BREAK - Complimentary Coffee in Exhibit Hall** | **BREAK - Complimentary Coffee in Exhibit Hall** |
| 10:20am | **BREAK - Complimentary Coffee in Exhibit Hall** | **BREAK - Complimentary Coffee in Exhibit Hall** |
| 10:40am | **BREAK - Complimentary Coffee in Exhibit Hall** | **BREAK - Complimentary Coffee in Exhibit Hall** |
| 11:00am | **PS2-ThM10** Using a Dielectric Barrier Discharge (DBD) Device to Produce Proton Exchange Membranes at Atmospheric Pressure for PEMFC Technology, ***Joffrey Baneton***, *D. Merche,* Université Libre de Bruxelles, Belgium; *G. Caldarella, N. Job,* Université de Liège, Belgium; *F. Reniers,* Université Libre de Bruxelles, Belgium | **INVITED: SS-ThM10** Structural Transitions of Ionic Liquids at Nanoconfined Interfaces, ***Rosa M. Espinosa-Marzal***, University of Illinois at Urbana-Champaign |
| 11:20am | **PS2-ThM11** Laser-Enhanced Plasma Etching of Semiconductors and Metals, ***Jason Peck***, *G.A. Panici, I.A. Shchelkanov, S. Hammouti, D.N. Ruzic,* University of Illinois at Urbana-Champaign | Invited talk continues. |
| 11:40am | **PS2-ThM12** Highly Selective Isotropic Etching of Silicon in Preference to Germanium, ***Christopher Ahles***, *A.C. Kummel,* University of California, San Diego | **SS-ThM12** Ionic Liquid Ordering at a Model Electrode Interface: 1-butyl-3-methylimidazolium Tetrafluoroborate, [C4C1Im][BF4], Interaction with the Anatase TiO2 (101) Surface, ***Michael Wagstaffe***, University of Manchester, UK |
| 12:00pm | **PS2-ThM13** Thermodynamic Prediction and Experimental Verification of Etch Selectivity for EUV Mask Materials, ***Luke Minardi***, *N.D. Altieri, E.L. Chen, J.P. Chang,* University of California Los Angeles | **SS-ThM13** In-Situ Photocurrent Measurements in Liquid-Phase Molecular Layer Deposition (LP-MLD), ***Shi Bai***, Tokyo University of Technology, Japan<br><br>**12:20 PM SSD MORTON TRAUM AWARDS CEREMONY** |

# Thursday Morning, November 10, 2016

| | Thin Film<br>Room 104E - Session TF1-ThM<br>Control and Modeling of Thin Film Growth and Film Characterization<br>**Moderators:** Berc Kalanyan, National Institute of Standards and Technology (NIST), Richard Vanfleet, Brigham Young University | Thin Film<br>Room 105A - Session TF2-ThM<br>Area-selective Deposition and Sequential Infiltration Synthesis<br>**Moderator:** Giovanna Scarel, James Madison University |
|---|---|---|
| 8:00am | **INVITED: TF1-ThM1** Adventures in Group IV Ordering: Super-periodicities at the Atomic/Nano/Meso/scale, ***Jerrold Floro***, *J. Amatya, C. Duska, C.W. Petz,* University of Virginia*; D. Yang, J. Levy,* University of Pittsburgh | **TF2-ThM1** Area Selective Deposition from an Aqueous Fog, *N. Murari, R.H. Mansergh, Y. Huang, D.A. Keszler,* ***John F. Conley, Jr.,*** Oregon State University |
| 8:20am | Invited talk continues. | **TF2-ThM2** "Patterned-by-Printing" ZnO Vertical TFTs, ***Carolyn Ellinger***, *S.F. Nelson,* Eastman Kodak Company |
| 8:40am | **TF1-ThM3** Combinatorial Fabrication of Cu-$Fe_2O_3$ Composite Nanostructures by Oblique Angle Co-Deposition, *S. Larson, W.J. Huang,* ***Yiping Zhao,*** University of Georgia | **INVITED: TF2-ThM3** Area-selective Atomic Layer Deposition of Metal and Magnetic Films, ***John Ekerdt***, *H. Nallan, Z. Zhang, S. Chopra,* University of Texas at Austin |
| 9:00am | **TF1-ThM4** Structural and Electronic Properties of Titanium Doped $Ga_2O_3$ Thin Films, ***Sandeep Manandhar***, *E. Rubio, C.V. Ramana,* The University of Texas at El Paso | Invited talk continues. |
| 9:20am | **TF1-ThM5** Characterizing Patterns and Order in Self-Assembled Langmuir Films of Quantum Dots, ***Zachary Whitfield***, *J.J. Weimer,* University of Alabama in Huntsville | **TF2-ThM5** Selective Area Epitaxy of Magnesium Oxide Thin Films on Gallium Nitride Surfaces, ***Mark Losego,*** Georgia Institute of Technology*; J-P. Maria,* North Carolina State University*; E.A. Paisley,* Sandia National Laboratories |
| 9:40am | **TF1-ThM6** Radical-Based MBE Growth, Structure, Defects and Transport in High-Mobility Epitaxial La-doped $BaSnO_3$ Films, *A. Prakash, P. Xu, J. Dewey,* ***Bharat Jalan,*** University of Minnesota | **TF2-ThM6** Sequential Infiltration Synthesis (SIS) and its Applications in Nanofabrication, ***Qing Peng,*** University of Alabama |
| 10:00am | **BREAK - Complimentary Coffee in Exhibit Hall** | **BREAK - Complimentary Coffee in Exhibit Hall** |
| 10:20am | **BREAK - Complimentary Coffee in Exhibit Hall** | **BREAK - Complimentary Coffee in Exhibit Hall** |
| 10:40am | **BREAK - Complimentary Coffee in Exhibit Hall** | **BREAK - Complimentary Coffee in Exhibit Hall** |
| 11:00am | **TF1-ThM10** Reduction of Extended Defects in SiC Epilayers Grown on 2° Offcut Substrates, ***Rachael Myers-Ward,*** *N. Mahadik, R. Stahlbush, P. Klein, K.M. Daniels, A. Boyd, K. Gaskill,* Naval Research Laboratory | **TF2-ThM10** Understanding Growth of Infiltrated ZnO an Atomic Step at a Time, ***Leonidas Ocola,*** *D.J. Gosztola, A. Yanguas-Gil,* Argonne National Laboratory*; A. Connolly,* Vassar College |
| 11:20am | **TF1-ThM11** Modeling the Structure and Medium Range order of ALD Amorphous Oxide Thin Films, ***Angel Yanguas-Gil***, *J.W. Elam,* Argonne National Laboratory | **TF2-ThM11** Investigation of Vapor Phase Infiltration Kinetics: Infusing Metalorganic Vapors in Polymer Thin Films, ***Collen Leng****, *M.D. Losego,* Georgia Institute of Technology |
| 11:40am | **TF1-ThM12** From Nano-porosity to Macro-scale Defects: Ellipsometric Porosimetry and Electrochemical Impedance Spectroscopy Characterization of Thin Inorganic Films, ***Alberto Perrotta****, *W.M.M. Kessels, M. Creatore,* Eindhoven University of Technology, Netherlands | **TF2-ThM12** Pyrolysis of Organic-Inorganic Hybrid Materials Formed by Sequential Organometallic Vapor Infiltration, ***Halil Akyildiz,*** Uludag University, Turkey*; P.D. Bradford, J.S. Jur,* North Carolina State University |
| 12:00pm | **TF1-ThM13** Thermal Conductivity and Mechanical Properties of AlN-based Thin Films, ***Vincent Moraes***, *H. Riedl,* Technische Universität Wien, Austria*; H. Bolvardi,* Oerlikon Balzers, Liechtenstein*; S. Kolozsvári,* Plansee Composite Materials GmbH, Germany*; M. Ikeda, L. Prochaska, S. Paschen, P.H. Mayrhofer,* Technische Universität Wien, Austria | **TF2-ThM13** Carbon Nanofibers Derived from a Cellulosic Polymer Enabled by Vapor Infiltration of Diethyl Zinc for Carbon Based Supercapacitors, ***Wenyi Xie,*** *O.J. Rojas, S. Khan, G.N. Parsons,* North Carolina State University |

* **TFD James Harper Award Finalist**

| | **2D Materials Focus Topic**<br>**Room 103B - Session 2D-ThA**<br>**Surface Chemistry, Functionalization, Bio and Sensor Applications of 2D Materials**<br>**Moderator:** Li Tao, The University of Texas at Austin | **Applied Surface Science**<br>**Room 101B - Session AS-ThA**<br>**Advances for Complicated Sample Preparation Strategies and Complex Systems**<br>**Moderators:** Christopher R. Anderton, Pacific Northwest National Laboratory,<br>Michaeleen Pacholski, The Dow Chemical Company |
|---|---|---|
| 2:20pm | **INVITED: 2D-ThA1** Nanoelectronic Heterodyne Sensor: A New Electronic Sensing Paradigm, ***Zhaohui Zhong,*** University of Michigan, Ann Arbor | **INVITED: AS-ThA1** Measuring Nanoparticle Properties: Are We High and Dry or All at Sea?, ***Caterina Minelli,*** National Physical Laboratory (NPL), UK |
| 2:40pm | Invited talk continues. | Invited talk continues. |
| 3:00pm | | **AS-ThA3** The Secret Life of Nanoparticles: Often Ignored Characteristics of Nano-Objects That Limit Reproducibility and an Approach to Improving Data Collection and Reporting to Address the Challenges, ***Donald Baer,*** Pacific Northwest National Laboratory |
| 3:20pm | **2D-ThA4** Study of the Photoresponse and Transport Properties of Photoexcited Carriers in $MoS_2$ Nanoflakes for Sensing Applications, ***Sourav Garg****, J. Waters, A. Shahab, M. Singla, S. Kim, P. Kung,* University of Alabama | **AS-ThA4** Combined XPS/ISS/UPS Study of Ultra-thin $HfO_2$ films on $SiO_2$/Si Substrateso, ***Paul Mack,*** Thermo Fisher Scientific, UK |
| 3:40pm | **BREAK** | **BREAK** |
| 4:00pm | **INVITED: 2D-ThA6** Surface Engineering with Chemically Modified Graphene and other 2D Materials, ***Paul Sheehan****, SC. Hangarter, W.K. Lee, S.P. Mulvaney, J.T. Robinson, S.D. Tsoi, K.E. Whitener,* US Naval Research Laboratory | **AS-ThA6** A Novel Method for Matrix Application in Matrix Enhanced SIMS Imaging, ***Matthias Lorenz****, A.G. Shard, J.-L. Vorng, I.S. Gilmore,* National Physical Laboratory, UK |
| 4:20pm | Invited talk continues. | **AS-ThA7** ToF-SIMS Imaging of Bee Brain Tissue – Comparing Lipid Distributions and Varying Sample Preparation Methodologies, ***Jordan Lerach****, E. Amsalem, C.M. Grozinger,* The Pennsylvania State University |
| 4:40pm | **2D-ThA8** Passivation of Transition Metal Chalcogenide Surface *via* Sulfur Layer to Enhanced Metal Contact, ***JunHong Park,*** Univeristy of California, San Diego*; A. Rai,* University of Texas at Austin*; I.J. Kwak,* Univeristy of California, San Diego*; S. Bhattacharjee, K. Ganapathi, N. Bhat,* Indian Institute of Science, Bangalore*; S.K. Banerjee,* University of Texas at Austin*; A.C. Kummel,* University of California, San Diego | **AS-ThA8** Understanding Matrix Effects in Mass Spectrometry, ***Amy Walker****, L.D. Gelb,* University of Texas at Dallas |
| 5:00pm | **2D-ThA9** Development of Aptamer/Graphene Oxide FRET Biosensor for Ultrasensitive Detection of Bisphenol A and Analogues, *S. Gupta,* ***Rebecca Wood,*** Western Kentucky University | **AS-ThA9** Reducing Matrix Effects in Organic Secondary Ion Mass Spectrometry, ***Lars Breuer****, H. Tian, N.J. Popczun,* The Pennsylvania State University*; A. Wucher,* University of Duisburg-Essen, Germany*; N. Winograd,* The Pennsylvania State University |
| 5:20pm | **2D-ThA10** Substrate Effects in CVD Synthesized Monolayer $WS_2$, ***Kathleen McCreary****, A.T. Hanbicki,* Naval Research Laboratory*; G. Kioseoglou,* University of Crete*; M. Currie, B.T. Jonker,* Naval Research Laboratory | **AS-ThA10** Image Fusion for Improving the Visualization of Elemental and Isotopic Distributions in SIMS, ***Jay Tarolli****, B. Naes, B. Garcia, A. Fischer, D. Willingham,* Pacific Northwest National Laboratory |
| 5:40pm | **2D-ThA11** Driving Mechanochemical Wear on Graphene Using Local Stress and Heat, *S. Raghuraman,* ***Jonathan Felts,*** Texas A&M University | **AS-ThA11** Evaluating the Utility of Uranium-Molybdenum Foils as Nuclear Fuels via Elemental and Isotopic Imaging, ***David Willingham****, J. Tarolli, B. Naes, M. Rhodes, M. Dahl, A. Guzman, D. Burkes,* Pacific Northwest National Laboratory |
| 6:00pm | **2D-ThA12** Functionalized Metallic Island Films as Enhancement Substrates for Raman and IR Microscopic Biosensing, *C. Kratz,* Leibniz-Institut für Analytische Wissenschaften - ISAS - e.V., Germany*; D. Gkogkou, F. Rösicke,* Humboldt-Universität zu Berlin, School of Analytical Sciences Adlershof (SALSA), Germany*; T. Shaykhutdinov, T. Oates, A. Furchner,* Leibniz-Institut für Analytische Wissenschaften - ISAS - e.V., Germany*; J. Rappich,* Helmholtz-Zentrum Berlin für Materialien und Energie GmbH, Germany*;* ***Karsten Hinrichs,*** Leibniz-Institut für Analytische Wissenschaften - ISAS - e.V., Germany | **AS-ThA12** Investigation of the Interaction Between a High Poly Vinylpyrrolidone Content Silicone Hydrogel Contact Lens and a Natural Humectant using Surface Imaging Techniques, ***Katarzyna Wygladacz****, D.J. Hook,* Bausch + Lomb |

| | **Spectroscopic Ellipsometry Focus Topic**<br>**Room 104C - Session EL+AS+BI+EM+TF-ThA**<br>**Optical Characterization of Nanostructures and Metamaterials (2:20-3:40 pm)/Application of Spectroscopic Ellipsometry for the Characterization of Thin Films (4:00-6:00 pm) and Biological Materials Interfaces**<br>**Moderators:** Tino Hofmann, University of North Carolina at Charlotte, Stefan Zollner, New Mexico State University, Heidemarie Schmidt, Technische Universität Chemnitz, Germany | **Electronic Materials and Photonics**<br>**Room 102A - Session EM+SS+TF-ThA**<br>**Materials and Interfaces for Energy Storage**<br>**Moderators:** Michelle Paquette, Univ. of Missouri-Kansas City, Lee Walsh, University of Texas at Dallas |
|---|---|---|
| 2:20pm | **INVITED: EL+AS+BI+EM+TF-ThA1** Optical Properties of (Self-assembled) Nanostructured Surfaces Studied by Spectroscopic Mueller Matrix Ellipsometry and Local Direct Imaging Techniques, ***Morten Kildemo***, Norwegian University of Science and Technology, Norway | **EM+SS+TF-ThA1** Strain Engineering of Ultrathin Metal Oxide Coatings Deposited using Atomic Layer Deposition for Controlled Electrochemical Energy Storage, ***Nitin Muralidharan***, *R.E. Carter, A.P. Cohn, L. Oakes, C.L. Pint,* Vanderbilt University |
| 2:40pm | Invited talk continues. | **EM+SS+TF-ThA2** Probing Li-Ion Transport in All-Solid-State Batteries through Electron Transparent Electrodes, ***Alexander Yulaev***, Center for Nanoscale Science and Technology, NIST, Gaithersburg, MD, USA; *A.A. Talin,* Sandia National Laboratories; *M.S. Leite,* University of Maryland; *A. Kolmakov,* NIST/CNST |
| 3:00pm | **EL+AS+BI+EM+TF-ThA3** Optical Properties of Nanocrystalline $Si_3N_4$:TiN Thin Films, ***Neil Murphy***, Air Force Research Laboratory; *L. Sun,* General Dynamics Information Technology; *J.G. Jones,* Air Force Research Laboratory; *J.T. Grant,* Azimuth Corporation | **INVITED: EM+SS+TF-ThA3** Thin Film Battery Materials for Fundamental Studies and Applications, ***Nancy Dudney***, *K. Kercher, M. Veith,* Oak Ridge National Laboratory |
| 3:20pm | **EL+AS+BI+EM+TF-ThA4** The Effect of Aluminum Content on Properties of Al-doped Zinc Oxide Thin Films Grown at Room Temperature, ***Lirong Sun***, General Dynamics Information Technology; *N.R. Murphy,* Air Force Research Laboratory; *J.T. Grant,* Azimuth Corporation; *J.G. Jones,* Air Force Research Laboratory | Invited talk continues. |
| 3:40pm | **BREAK** | **BREAK** |
| 4:00pm | **INVITED: EL+AS+BI+EM+TF-ThA6** Optical Monitoring of Growth (and Death) of Thin Film Materials for Solar Cells, ***Nikolas Podraza***, *K. Ghimire, M.M. Junda, A.A. Ibdah, P. Koirala,* University of Toledo; *S. Marsillac,* Old Dominion University; *R.W. Collins, Y. Yan,* University of Toledo | **EM+SS+TF-ThA6** Silicon Compatible Pseudocapacitors Based on Nickel Hydroxide Functionalization of Carbonized Porous Silicon, ***Joshua Fain***, *J.W. Mares, S.M. Weiss,* Vanderbilt University |
| 4:20pm | Invited talk continues. | **EM+SS+TF-ThA7** In-situ Raman of Sodium Ion Cointercalation into Highly Crystalline Few-Layered Graphene, ***Adam Cohn***, *C.L. Pint,* Vanderbilt University |
| 4:40pm | **EL+AS+BI+EM+TF-ThA8** Monitoring Nanometer-Thin Film Formation using Ellipsometry, ***Bert Müller***, *F.M. Weiss, T. Töpper, B. Osmani,* University of Basel, Switzerland | **EM+SS+TF-ThA8** Using X-ray Reflectivity to Measure the Vacuum Ultraviolet Absorption Spectrum in Low-k Dielectrics, ***Faraz Choudhury***, *H.M. Nguyen, W. Li,* University of Wisconsin-Madison; *Y. Nishi,* Stanford University; *J.L. Shohet,* University of Wisconsin-Madison |
| 5:00pm | **EL+AS+BI+EM+TF-ThA9** Optical Determination of Electrical Response for Thin Film Transparent Conductors: Spectral Range Dependence, ***Prakash Uprety***, *M.M. Junda, K. Lambright, R. Khanal, A. Phillips, M. Heben, D. Giolando, N.J. Podraza,* University of Toledo | **EM+SS+TF-ThA9** On-chip [$^{18}$F]fluoride Concentration for Microfluidic PET Tracer Synthesis, ***Xin Zhang***, *J. Buck, M. Nickels, C. Manning, L. Bellan,* Vanderbilt University |
| 5:20pm | **EL+AS+BI+EM+TF-ThA10** Spectroscopic Ellipsometry Studies of CdS-CdSe-CdTe Alloys: Applications in Thin Film Solar Cells, ***Maxwell Junda***, *C.R. Grice, Y. Yan, N.J. Podraza,* University of Toledo | **EM+SS+TF-ThA10** Dependence of Electrical Conductivity on Observed Microstructure of Sintered $U_3O_8$, ***Seth Lawson***, *B.C. Shaver, B. Musicó,* The University of Tennessee Knoxville; *S. Dhungana, G. Bhattarai, M.M. Paquette, A.N. Caruso,* University of Missouri-Kansas City; *T. Meek,* The University of Tennessee Knoxville |
| 5:40pm | **EL+AS+BI+EM+TF-ThA11** Development of Growth Evolution Diagrams for RF Sputtered Nanocrystalline Hydrogenated Silicon Thin Films via Real Time Spectroscopic Ellipsometry, ***Dipendra Adhikari***, *M. M. Junda, N. J. Podraza,* University of Toledo | **EM+SS+TF-ThA11** The Role of Electron-Beam Deposition Rate in Controlling Properties of the Titanium/Semiconductor Interface, ***Keren Freedy***, *A. Giri, B.M. Foley,* University of Virginia; *J. Bogan, R. O'Conner,* Dublin City University, Ireland; *P.E. Hopkins, S. McDonnell,* University of Virginia |
| 6:00pm | | **EM+SS+TF-ThA12** Single Crystal Study of Layered $U_nRhIn_{3n+2}$ Materials: Case of the Novel $U_2RhIn_8$ Compound, ***Attila Bartha***, *M. Kratochvílová,* Charles University, Czech Republic; *M. Dušek,* Institute of Physics ASCR, Czech Republic; *M. Diviš, J. Custers, V. Sechovský,* Charles University, Czech Republic |

| | **Fundamental Discoveries in Heterogeneous Catalysis Focus Topic**<br>**Room 103A - Session HC+SS-ThA**<br>**Advances in Theoretical Models and Simulations of Heterogeneously-catalyzed Reactions**<br>**Moderator:** Donna Chen, University of South Carolina | **Advanced Ion Microscopy Focus Topic**<br>**Room 104A - Session HI+MI+NS-ThA**<br>**Ion Beam Based Imaging and Nanofabrication**<br>**Moderators:**<br>Jacques Gierak, LPN-CNRS, Shinichi Ogawa, AIST, Japan |
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| 2:20pm | **HC+SS-ThA1** Theoretical Pathways to Predict (meta-)stability of Gas Phase Metal Oxide Clusters: Beyond the Static Mono-Structure Description, ***Saswata Bhattacharya,*** Indian Institute of Technology Delhi, India; *L.M. Ghiringhelli,* Fritz-Haber-Institut der Max-Planck-Gesellschaft; *N. Marom,* Tulane University | **INVITED: HI+MI+NS-ThA1** Mask Repair Technology using Gas Field Ion Source, ***Anto Yasaka,*** *F. Aramaki, T. Kozakai, O. Matsuda,* Hitachi High-Tech Science Corporation, Japan |
| 2:40pm | **HC+SS-ThA2** Role of Oxygen at the Surface and Subsurface during Catalytic Oxidation by Silver, ***Sharani Roy,*** University of Tennessee | Invited talk continues. |
| 3:00pm | **INVITED: HC+SS-ThA3** Using Theory and Computation to Understand Plasma Enhanced Dry Reforming on Nickel Catalysts, ***George Schatz,*** Northwestern University | **HI+MI+NS-ThA3** Application of an Advanced Bi Cluster LMIS for TOF-SIMS Analysis at the Nano-scale, *F. Kollmer, W. Paul, D. Rading, R. Moellers,* ION-TOF GmbH, Germany; *N.J. Havercroft,* ION-TOF USA; *E. Niehuis,* ***Julia Zakel,*** ION-TOF GmbH, Germany |
| 3:20pm | Invited talk continues. | **HI+MI+NS-ThA4** Nanoscale Imaging and Characterization of Interface Driven Assembly of Soft Materials via He-Ion Beam Microscopy, ***Matthew Burch,*** *A. Belianinov, D. Chang, Y. Luo, K. Hong, O.S. Ovchinikova,* Oak Ridge National Laboratory |
| 3:40pm | **BREAK** | **BREAK** |
| 4:00pm | **HC+SS-ThA6** The Impact of Structure on the Catalytic Behavior of $Cu_2O$ Supported Pt Atoms, ***Andrew Therrien****, Tufts University Department of Chemistry; *E.C.H. Sykes,* Tufts University | **HI+MI+NS-ThA6** Advances in *Ex Situ* Lift Out and Manipulation Techniques for FIB Applications, ***Lucille Giannuzzi,*** EXpressLO LLC |
| 4:20pm | **HC+SS-ThA7** Energetics of Water Dissociative Adsorption on NiO(111)-2x2, ***Wei Zhao,*** University of Washington; *M. Bajdich,* Stanford University; *S. Carey,* University of Washington; *M. Hoffmann, A. Vojvodic, J. Nørskov,* Stanford University; *C.T. Campbell,* University of Washington | **HI+MI+NS-ThA7** Helium Ion Microscopy Imaging of Carbon Nanofoams from Hydrothermal Carbonization of Sucrose, ***Natalie Frese,*** Bielefeld University, Germany; *S.T. Mitchell, A. Bowers, K. Sattler,* University of Hawaii; *A. Gölzhäuser,* Bielefeld University, Germany |
| 4:40pm | **INVITED: HC+SS-ThA8** Challenges in the First-Principles Description of Reactions in Electrocatalysis, ***Axel Groß,*** Ulm University, Germany | **HI+MI+NS-ThA8** Nanofabrication Limits in Layered Ferroelectric Semiconductors via He-ion Beam, ***Alexei Belianinov,*** *A. Ievlev, V. Iberi, H. Hysmith, M.A. Susner, M. McGuire, S. Jesse, S.V. Kalinin, O.S. Ovchinnikova,* Oak Ridge National Laboratory |
| 5:00pm | Invited talk continues. | **HI+MI+NS-ThA9** Focused Ion Beam Technology Challenges for Circuit Edit, ***Yuval Greenzweig,*** *Y. Drezner, A. Raveh,* Intel Corporation |
| 5:20pm | **HC+SS-ThA10** Beyond the 2D Lattice Gas and 2D Ideal Gas Models for Adsorbates: The Hindered Translator / Hindered Rotor Model, ***Liney Arnadottir,*** *L.H. Sprowl,* Oregon State University; *C.T. Campbell,* University of Washington | **HI+MI+NS-ThA10** Ion-milling of Graphene Nanostructures While Supported and Unsupported: Considerations of Graphene Contamination, Substrate Scattering and Beam Tailing, *J. Swett,* Lockheed Martin Space Systems Company; *V. Iberi, D. Cullen,* ***Adam Rondinone,*** Oak Ridge National Laboratory |
| 5:40pm | **HC+SS-ThA11** Methanol Partial Oxidation Catalyzed by Singly-dispersed Pd on ZnO($10\bar{1}0$), ***Takat B. Rawal***†, *S.R. Acharya, S. Hong, T.S. Rahman,* University of Central Florida | **HI+MI+NS-ThA11** Interaction of Gas Field Ionized Nitrogen with Silicon, ***Marek Schmidt,*** *Y. Oshima, L.T. Anh, X. Zhang, T. Kanzaki, M. Akabori,* Japan Advanced Institute of Science and Technology, Japan; *A. Yasaka,* Hitachi High-Tech Science Corporation, Japan; *M. Muruganathan, T. Shimoda, H. Mizuta,* Japan Advanced Institute of Science and Technology, Japan |
| 6:00pm | **HC+SS-ThA12** Simulations of Surface Induced Dissociation, Soft Landing, and Reactive Landing in Collisions of Protonated Peptide Ions with Organic Surfaces, ***William Hase,*** *S. Pratihar,* Texas Tech University | **HI+MI+NS-ThA12** Spatially Controlled Ripple Formation in the HIM using Low Voltages and High Temperatures, ***Gregor Hlawacek,*** *L. Sottili, M. Engler, S. Facsko,* Helmholtz-Zentrum Dresden Rossendorf, Germany |

* **Morton S. Traum Award Finalist**
† **National Student Award Finalist**

| | **In-Situ and Operando Spectroscopy and Microscopy for Catalysts, Surfaces, & Materials Focus Topic**<br>**Room 101C - Session IS-ThA**<br>**Ambient Pressure Photoelectron Spectroscopy and Scanning Probe Techniques**<br>**Moderator:** Xiao-Ying Yu, Pacific Northwest National Laboratory | **MEMS and NEMS**<br>**Room 102B - Session MN+2D+NS-ThA**<br>**Focused Session on Atomic Layer Nanomechanics and 2D MEMS**<br>**Moderators:** Wayne Hiebert, National Institute of Nanotechnology & University of Alberta, Canada, Max Zenghui Wang, Case Western Reserve University |
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| 2:20pm | **IS-ThA1** The Influence of Oxygen on the Catalytic Interaction between $CO_2$ and Copper studied by High Pressure X-ray Photoelectron Spectroscopy, *A. Regoutz, G. Kerherve, I. Villar-Garcia, C.K. Williams,* ***David Payne,*** Imperial College London, UK | **INVITED: MN+2D+NS-ThA1** Exploring New Degrees of Freedom by Reducing Dimensions, ***Lincoln Lauhon,*** Northwestern University |
| 2:40pm | **IS-ThA2** Graphene Membranes for Atmospheric Pressure Photoelectron Spectroscopy, ***Robert Weatherup,*** *B. Eren, Y. Hao, H. Bluhm, M.B. Salmeron,* Lawrence Berkeley National Laboratory (LBNL) | Invited talk continues. |
| 3:00pm | **INVITED: IS-ThA3** Development of Graphene Environmental Cells for Atmospheric Pressure Photoelectron Spectroscopy and Microscopy, ***Andrei Kolmakov,*** Center for Nanoscale Science and Technology, NIST | **INVITED: MN+2D+NS-ThA3** Manipulating Nonlinearities in 2D NEMS, ***Akshay Naik,*** Indian Institute of Science, India |
| 3:20pm | Invited talk continues. | Invited talk continues. |
| 3:40pm | **BREAK** | **BREAK** |
| 4:00pm | **INVITED: IS-ThA6** Probing Surface Structural and Chemical Evolutions at Atomic Scale in Bi-metallic Catalysts using *In Situ* STEM, ***Miaofang Chi,*** Oak Ridge National Laboratory*; C. Wang,* Johns Hopkins University*; K. More,* Oak Ridge National Laboratory*; Y. Xia,* Georgia Institute of Technology | **MN+2D+NS-ThA6** Wide Bandgap β-$Ga_2O_3$ Nanomechanical Resonators, ***Xu-Qian Zheng,*** *S. Rafique, J. Lee, L. Han, C.A. Zorman, H. Zhao, P.X.-L. Feng,* Case Western Reserve University |
| 4:20pm | Invited talk continues. | **MN+2D+NS-ThA7** Nonlinear Mode Coupling and Internal Resonances in $MoS_2$ Nanoelectromechanical System, ***Chandan Samanta,*** *P. Gangavarapu, A.K. Naik,* Indian Institute of Science, India |
| 4:40pm | **IS-ThA8** Calculations of Electron Inelastic Mean Free Paths for Liquid Water at Energies from 50 eV to 30 keV, *H. Shinotsuka, B. Da, S. Tanuma, H. Yoshikawa,* National Institute for Materials Science (NIMS), Japan*;* ***Cedric Powell,*** *DR. Penn,* National Institute of Standards and Technology | **MN+2D+NS-ThA8** Very-High-Frequency (VHF) Molybdenum Disulfide ($MoS_2$) Nanomechanical Resonators Operating in Liquid, *H. Jia,* ***Rui Yang,*** *P.X.-L. Feng,* Case Western Reserve University |
| 5:00pm | **IS-ThA9** Structural Response of Compact Copper Surfaces to CO Adsorption and its Effects of Reactivity, ***Baran Eren,*** *G.A. Somorjai, M.B. Salmeron,* Lawrence Berkeley National Laboratory (LBNL) | |
| 5:20pm | **IS-ThA10** Using a Novel In-situ/Operando Chemical Cell to investigate Surface Reactions such as the Reduction of Oxygen and Surface Oxides, ***Philipp Kerger,*** *D. Vogel, M. Rohwerder,* Max-Planck-Institut fuer Eisenforschung, Germany | |
| 5:40pm | **IS-ThA11** Monitoring of Electrochemical Reactions on Metal Surfaces with Sub-monolayer Sensitivity by Means of Polarization Optical Spectroscopy and EC-STM, ***Christoph Cobet,*** *M.-H. Chien, R. Sharif, V. Solokha, Gh. Barati, K. Hingerl,* Johannes Kepler University, Austria | |
| 6:00pm | **IS-ThA12** A Liquid-Jet AP-XPS Study of $TiO_2$ Nanoparticles in an Aqueous Electrolyte Solution, ***Randima Galhenage,*** *M.J. Makowski, J.M. Langford, J.C. Hemminger,* University of California, Irvine | |

| | **Nanometer-scale Science and Technology**<br>**Room 101D - Session NS+BI-ThA**<br>**Applied Nanoscale Microscopy Techniques/Biomaterial Interfaces – New Advances**<br>**Moderators:** Stephanie Allen, The University of Nottingham, UK, Leonidas Ocola, Argonne National Laboratory | **Plasma Science and Technology**<br>**Room 104B - Session PS-ThA**<br>**Plasma Chemistry and Plasma Surface Interactions**<br>**Moderator:** Steven Vitale, MIT Lincoln Laboratory |
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| 2:20pm | | **INVITED: PS-ThA1** Nonthermal Plasma Driven Power to Gas, ***Tomohiro Nozaki,*** Tokyo Institute of Technology, Japan |
| 2:40pm | **NS+BI-ThA2** Advancing the Development of Nanocrystal Emitters *via* Advanced Electron Microscopy Techniques, ***James McBride,*** *K.R. Reid, S.J. Rosenthal,* Vanderbilt University | Invited talk continues. |
| 3:00pm | **NS+BI-ThA3** Demonstration of Electron Mirror for Quantum Electron Microscopy, ***Navid Abedzadeh,*** *C.S. Kim, R.G. Hobbs, K.K. Berggren,* MIT | **INVITED: PS-ThA3** Plasma-based $CO_2$ Conversion: Experiments and Modeling, *A. Bogaerts,* ***Ramses Snoeckx,*** University of Antwerp, Belgium |
| 3:20pm | **NS+BI-ThA4** Nanoscale Chemical Imaging by Photo-induced Force Microscopy, ***Ryan Murdick,*** Molecular Vista | Invited talk continues. |
| 3:40pm | **BREAK** | **BREAK** |
| 4:00pm | **NS+BI-ThA6** Strong Coupling of Localized Surface Plasmon Resonances to Light-Harvesting Complexes from Plants and Bacteria, *A. Tsargorodska, M. Cartron, C. Vasilev,* University of Sheffield, UK*; G. Kodali,* University of Pennsylvania*; J. Baumberg,* University of Cambridge, UK*; PL. Dutton,* University of Pennsylvania*; CN. Hunter,* University of Sheffield, UK*; P. Torma,* University of Aalto*;* ***Graham Leggett,*** University of Sheffield, UK | **PS-ThA6** Revisiting HgCdTe Etching Mechanism in High Density $CH_4$-$H_2$ Plasmas in Terms of Langmuir Adsorption Kinetics and Taking into Account Etching Inhibition, ***Christophe Cardinaud,*** *A. Pageau,* CNRS - IMN, France*; L. Le Brizoual,* IETR - Univ. Rennes, France*; F. Boulard, J. Baylet,* CEA, LETI, MINATEC Campus, France |
| 4:20pm | **NS+BI-ThA7** Microfluidic Device For Aptamer-Based Cancer Cell Capture And Genetic Mutation Detection, ***Sarah Reinholt,*** *H.G. Craighead,* Cornell University | **PS-ThA7** Temporal Evolution of Surface Chemistry in Ion and Radical Dominated Etch of Hydrocarbon Polymers, ***Barton Lane,*** *P. Ventzek, N. Eibagi,* Tokyo Electron America, Inc.*; A. Ranjan, V. Rastogi,* TEL Technology Center, America, LLC |
| 4:40pm | **NS+BI-ThA8** Molecular Processes in an Electrochemical Clozapine Sensor, ***Thomas Winkler,*** University of Maryland, College Park*; S.L. Brady,* East Carolina University*; E. Kim,* University of Maryland, College Park*; H. Ben-Yoav,* Ben-Gurion University of the Negev, Israel*; D.L. Kelly,* University of Maryland, Baltimore*; G.F. Payne, R. Ghodssi,* University of Maryland, College Park | **PS-ThA8** Etching Mechanisms of Transparent Conducting Oxides by Hydrocarbon Plasmas, ***Hu Li,*** Osaka University, Japan*; P. Friederich, K. Fink,* Karlsruhe Institut for Technology (KIT)*; K. Karahashi,* Osaka University*; M. Fukasawa, K. Nagahata, T. Tatsumi,* Sony Corporation, Japan*; W. Wenzel,* Karlsruhe Institut for Technology (KIT)*; S. Hamaguchi,* Osaka University, Japan |
| 5:00pm | **NS+BI-ThA9** Quantitative Quartz Crystal Microbalance Measurements across Transients Produced by Switching Fluid Properties, *V. Mugnaini,* ***Dmitri Petrovykh,*** International Iberian Nanotechnology Laboratory, Portugal | **PS-ThA9** The Role of the Dense Amorphous Carbon (DAC) Overlayer in Photoresist Etching, ***Adam Pranda,*** *Z. Tomova, S. Gutierrez Razo, J.T. Fourkas, G.S. Oehrlein,* University of Maryland, College Park |
| 5:20pm | **NS+BI-ThA10** ToF-SIMS/XPS Characterization of Frozen-Hydrated Hydrogels, ***Michael Taylor,*** *M.R. Alexander,* The University of Nottingham, UK*; M. Zelzer,* National Physical Laboratory, UK | **PS-ThA10** Transport Mechanism on Reactive Species in Downflow Reactors for F-based Etch, ***Kenji Ishikawa,*** *T. Tsutsumi, Y. Zhang, M. Sekine, T. Hayashi, M. Hori,* Nagoya University, Japan*; Y. Horiike,* Tsukuba University, Japan |
| 5:40pm | **NS+BI-ThA11** GCIB-SIMS for Studying Bacterial Surfaces, ***John Stephen Fletcher,*** *P. Wehrli,* University of Gothenburg, Sweden*; A. Farewell,* University of Gothenburg, Seweden*; T.B. Angerer, J. Gottfries,* University of Gothenburg, Sweden | **PS-ThA11** Surface Reactions of Magnetic Materials by CO Cluster Beams, ***Kazuhiro Karahashi,*** Osaka University, Japan*; T. Seki, J. Matsuo,* Kyoto University, Japan*; K. Mizotani, K. Kinoshita, S. Hamaguchi,* Osaka University, Japan |
| 6:00pm | | **PS-ThA12** A Method to Accelerate Creation of Plasma Etch Recipes Using Physics and Bayesian Statistics, ***Meghali Chopra,*** *R.T. Bonnecaze,* The University of Texas at Austin |

| | **Surface Science**<br>**Room 103C - Session SS+AS-ThA**<br>**Celebrating a Life in Surface Science: A Symposium in Honor of JOHN T. YATES, JR.**<br>**Moderators:** John Russell, Jr., Naval Research Laboratory, Vincent Smentkowski, General Electric Global Research Center | **Thin Film**<br>**Room 104E - Session TF+BI-ThA**<br>**Thin Films for Bio-related Applications**<br>**Moderator:** Angel Yanguas-Gil, Argonne National Laboratory |
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| 2:20pm | **SS+AS-ThA1** Introductory Remarks About Prof. John T Yates Jr. and his Scientific Legacy, *V. Smentkowski,* General Electric Global Research Center*; **John Russell,*** US Naval Research Laboratory | **TF+BI-ThA1** Self-healing Antifouling Fluorinated Monolayers and Polymer Brushes: One Fluorine Goes a Long Way!, ***Zhanhua Wang**, H. Zuilhof,* Wageningen University, Netherlands |
| 2:40pm | **SS+AS-ThA2** JOHN T. YATES, JR. - The Energizer Bunny (Invited Talk), ***J. William Gadzuk,*** NIST | **TF+BI-ThA2** Sensitivity Enhancement in Grating Coupled Bloch Surface Wave Resonance by Azimuthal Control, ***Vijay Koju**, W.M. Robertson,* Middle Tennessee State University |
| 3:00pm | **SS+AS-ThA3** Polymer Precursors Studied by Mass Spectrometry, Ion Mobility and Computational Strategies (Invited Talk), ***David M. Hercules,*** Vanderbilt University | **INVITED: TF+BI-ThA3** Biofunctional Coatings and Patterns with Special Wettability, ***Pavel Levkin,*** Karlsruhe Institute of Technology (KIT), Germany |
| 3:20pm | **SS+AS-ThA4** From Symmetry to Applications: One of Many Journeys Touched by John Yates (Invited Talk), ***Ellen Williams,*** Advanced Research Projects Agency - Energy | Invited talk continues. |
| 3:40pm | **BREAK** | **BREAK** |
| 4:00pm | **SS+AS-ThA6** A Tribute to John T. Yates Jr. and His Pioneering Work with Graphitic Surfaces (Invited Talk), ***Patricia A. Thiel,*** Ames Laboratory | **INVITED: TF+BI-ThA6** Thin Film Technologies for Biomedical Devices-Current State of Art and Future Opportunities, ***Mallika Kamarajugadda,*** Medtronic plc |
| 4:20pm | **SS+AS-ThA7** Surface Science influenced by Dopants (Invited Talk), ***Hajo Freund,*** Fritz Haber Institute of the Max Planck Society, Germany | Invited talk continues. |
| 4:40pm | **SS+AS-ThA8** Desorption: Out of the Vacuum, into the Liquid (Invited Talk), ***Michael Grunze,*** KIT, Germany*; H.J. Kreuzer,* Dalhousie University, Canada | **INVITED: TF+BI-ThA8** Preparation and Characterization of Amino Coatings for Peptide Arrays, ***Gaurav Saini**, L. Howell, M. Greving, P. Walsh, D. Smith,* HealthTell Inc. |
| 5:00pm | **SS+AS-ThA9** Infrared Spectroscopy in Surface Science: The Legacy of John T. Yates, Jr. (Invited Talk), ***Michael Trenary,*** University of Illinois at Chicago | Invited talk continues. |
| 5:20pm | **SS+AS-ThA10** From Surface Science to New Catalysts (Invited Talk), ***Ib Chorkendorff,*** Technical University of Denmark | **TF+BI-ThA10** Electronic Characterization of SWCNT/Block Copolymer-based Nanofiber for Biosensor Application, ***Amrit Sharma,*** Clark Atlanta University |
| 5:40pm | **SS+AS-ThA11** Activation of Carbon Dioxide on Metal and Carbide Surfaces (Invited Talk), ***Jingguang Chen,*** Columbia University | **THIN FILM FLASH NETWORKING SESSION:** **MOHAMED HAFEZ**, National Inst. of Laser Enhanced Sciences, Cairo Univ., Egypt (TF-ThP8**);** **THOMAS GREHL,** ION-TOF GmbH, Germany **(**TF-ThP19); **MICHAEL LEE,** Northern Arizona Univ. (TF-ThP29); **MONIRUZZAMAN SYED**, Lemoyne Owen College **(**TF-ThP17**);** **PENG XU,** Univ of Minnesota**, (**TF-ThP7); **ZHONGSHAN ZHENG**, Inst. of Micro. of Chinese Academy of Sciences, China **(**TF-ThP26); **MIDORI KAWAMURA**, Kitami Institute of Technology, Japan **(**TF-ThP9); **HA NGUYEN,** University of Wisconsin–Madison **(**TF-ThP32); **NOBUYUKI KAWAKAMI,** Kobe Steel, Ltd., Japan **(**TF-ThP33); **SALAHUD DIN**, Kurt J. Lesker Company, UK **(**TF-ThP44**);** **FRANK GREER,** Jet Propulsion Lab/California Institute of Technology **(**TF-ThP46) |
| 6:00pm | **SS+AS-ThA12** Thermodynamic Control of TTF-TCNQ Molecular Layers on Metallic Surfaces (Invited Talk), ***Petro Maksymovych,*** Oak Ridge National Laboratory | |

# Thursday Afternoon, November 10, 2016

| | **Thin Film**<br>**Room 105A - Session TF-ThA**<br>**Self-assembled Monolayers and Organic/Inorganic Interface Engineering**<br>**Moderators:** Matthew Linford, Brigham Young University, Adrienne Stiff-Roberts, Duke University | **Tribology Focus Topic**<br>**Room 101A - Session TR+BI+SE+TF-ThA**<br>**Materials Tribology**<br>**Moderator:** Michael Chandross, Sandia National Laboratories |
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| 2:20pm | **INVITED: TF-ThA1** Surface Affinity Control by Polymer Brushes for Direct Self-Assembly, *R. Tiron, A. Gharbi,* ***Maxime Argoud,*** *F. Delachat, P. Pimenta Barros,* CEA-LETI, MINATEC, France*; X. Chevalier,* ARKEMA FRANCE*; S. Bouanani,* STMicroelectronics, France*; G. Claveau, C. Lapeyre,* CEA-LETI, MINATEC*; G. Chamiot-Maitrala,* CEA-LETI, France*; C. Monget, V. Farys,* STMicroelectronics, France*; C. Nicolet, C. Navarro,* ARKEMA FRANCE | **INVITED: TR+BI+SE+TF-ThA1** Reaction Pathways and Tribofilm Formation Kinetics at a Solid-Solid Interface*, H.L. Adams,* University of Wisconsin-Milwaukee*; A. Martini,* University of California Merced*;* ***Wilfred Tysoe,*** University of Wisconsin-Milwaukee |
| 2:40pm | Invited talk continues. | Invited talk continues. |
| 3:00pm | **TF-ThA3** Measuring the Rate of Organic Reactions on Surfaces*,* ***Rickdeb Sen****, J. Escorihuela, M.M.J. Smulders, H. Zuilhof,* Wageningen University, Netherlands | **TR+BI+SE+TF-ThA3** Nanotribology of Graphene Revisited: The Influence of Contact Size and Substrate Topography*, A. Balkanci,* Bilkent University, Turkey*; Z. Ye, A. Martini,* University of California Merced*;* ***Mehmet Z. Baykara,*** Bilkent University, Turkey |
| 3:20pm | | **TR+BI+SE+TF-ThA4** Iron-Doped Diamond-Like Carbon Coatings (Fe-DLCs): Synthesis, Characterization, and Tribology--Seminal Results*,* ***Parag Gupta,*** Northwestern University/Argonne National Lab.*; M.E. Graham,* Northwestern University |
| 3:40pm | **BREAK** | **BREAK** |
| 4:00pm | **TF-ThA6** *Operando* Investigation of Chemical Bonding at Hybrid Interfaces: the Effect of Humidity on Polymer/metal Oxide Bonds*,* ***Sven Pletincx,*** Vrije Universiteit Brussel, Belgium*; L. Trotochaud, A.R. Head, O. Karslıoğlu,* Lawrence Berkeley Lab, University of California, Berkeley*; L.I. Fockaert, J.M.C. Mol,* TU Delft, Netherlands*; H. Bluhm,* Lawrence Berkeley Lab, University of California, Berkeley*; H. Terryn, T. Hauffman,* Vrije Universiteit Brussel, Belgium | **INVITED: TR+BI+SE+TF-ThA6** Tribo-Rheometry of Soft Matter*, J. Kim,* ***Alison Dunn,*** University of Illinois at Urbana-Champaign |
| 4:20pm | **TF-ThA7** Integration of Redox-Active Diruthenium-based Molecular Layer onto Electrodes for Memory Device Applications*,* ***Sujitra Pookpanratana,*** National Institute of Standards and Technology (NIST)*; H. Zhu,* George Mason University*; J.W.F. Robertson,* NIST*; S.N. Natoli,* Purdue University*; E.G. Bittle, C.A. Richter,* NIST*; T. Ren,* Purdue University*; Q. Li,* George Mason University*; C.A. Hacker,* NIST | Invited talk continues. |
| 4:40pm | **INVITED: TF-ThA8** Fabrication Methods of Organic-Inorganic Hybrids Based on Atomic Layer Deposition*,* ***Myung Mo Sung,*** Hanyang University, Korea | **TR+BI+SE+TF-ThA8** Friction Coefficient Lowering in High-hardness Boron Nitride Films Under Ultra-high Vacuum*,* ***Masao Noma,*** Shinko Seiki Co., Ltd, Japan*; K. Eriguchi,* Kyoto University, Japan*; M. Yamashita,* Hyogo Prefectural Institute of Technology, Japan*; S. Hasegawa,* Osaka University, Japan |
| 5:00pm | Invited talk continues. | **TR+BI+SE+TF-ThA9** Nanoscale Friction Properties of Water Intercalated Graphene on Mica and its Isotope Effects*,* ***Hyunsoo Lee,*** Institute for Basic Science (IBS) & Korea Advanced Institute of Science and Technology (KAIST)*; J.-H. Ko,* KAIST, Republic of Korea*; J.S. Choi,* Electronics and Telecommunications Research Institute, Republic of Korea*; J.H. Hwang,* IBS & KAIST, Republic of Korea*; Y.-H. Kim,* KAIST, Republic of Korea*; M.B. Salmeron,* Lawrence Berkeley National Laboratory (LBNL)*; J.Y. Park,* IBS & KAIST, Republic of Korea |
| 5:20pm | | **TR+BI+SE+TF-ThA10** The Remarkable Friction Behavior of Copper at Cryogenic Temperatures*,* ***Andrew Kustas,*** Sandia National Laboratories*; J. Curry,* Lehigh University*; T. Babuska, M. Chandross, P. Lu, T.A. Furnish, N. Argibay,* Sandia National Laboratories |
| 5:40pm | | **TR+BI+SE+TF-ThA11** Understanding Friction in MoS2, Part 1: Stress, Time and Temperature*,* ***Tomas Babuska,*** Sandia National Laboratories*; J. Curry,* Lehigh University*; M. Chandross, M.T. Dugger,* Sandia National Laboratories*; B. Krick,* Lehigh University*; N. Argibay,* Sandia National Laboratories |
| 6:00pm | | **TR+BI+SE+TF-ThA12** Understanding Friction in MoS2, Part 2: Water, Oxidation and Run- in*,* ***John Curry,*** Lehigh University*; M. Chandross, T. Babuska,* Sandia National Laboratories*; N.C. Strandwitz, H. Luftman,* Lehigh University*; M.T. Dugger, N. Argibay,* Sandia National Laboratories*; B. Krick,* Lehigh University |

## 2D Materials Focus Topic
## Room Hall D - Session 2D-ThP
## 2D Materials Poster Session
## 6:00pm

**2D-ThP1** Vacuum Properties and Operation Stability of the RFQ Accelerator in J-PARC Linac, ***Takatoshi Morishita,*** Japan Atomic Energy Agency, Japan

**2D-ThP2** Inkjet Printing Of Liquid-Exfoliated, Highly Conducting Graphene Nanosheets, *J. Desai, M. Michel, C. Biswas, R. Hossain,* ***Jorge Catalan,*** *A.B. Kaul,* University of Texas at El Paso

**2D-ThP3** Electronic Transport Properties of Hybrid Graphene-C60 Structures, *S. Chugh, C. Biswas,* ***Avra S. Bandophadyay,*** *G. Lara, L. Echegoyen, A.B. Kaul,* University of Texas at El Paso

**2D-ThP4** Comparative Study of the Optical and Electrical Properties of Fluorine-doped Tin Oxide Films Obtained by Spray Pyrolysis Techniques, ***Karim Monfil-Leyva,*** *R.C. Ambrosio-Lázaro, J.A. Luna-López,* Benemerita Universidad Autónoma de Puebla, Mexico; *A.L. Muñoz-Zurita,* Universidad Politécnica Metropolitana de Puebla, Mexico

**2D-ThP5** Selective Molecular attachment for 3D Printing of 2D Circuits, *A.T. Juhl, N.R. Glavin, G.M. Leuty, R.J. Berry, R.R. Naik, M.F. Durstock, E.M. Heckman, R.S. Aga, E.B. Kreit,* Air Force Research Laboratory; ***Wenbi Lai,*** *C. Muratore,* University of Dayton

**2D-ThP6** Image Potential State of Graphene on Iridium Modulated by Oxygen Dosing, ***Yi Lin,*** *Y.Z. Li, J. Dadap, R. Osgood,* Columbia University

**2D-ThP7** Raman Spectroscopy and Optical Characterization of Thermoelectric Devices From Ni/$Bi_2Te_3$/$Sb_2Te_3$/Ni Thin Films, ***Aschalew Kassu,*** *S. Budak, Z. Xiao, R. Hammond, X. Crutcher, A. Sharma,* Alabama A&M University

**2D-ThP8** Thermoelectric Generators from $SiO_2$/$SiO_2$+Au Thin Films For Energy Harvesting, *S. Budak, Z. Xiao, M. Curley,* ***Justin Cole,*** *C. Birchfield, M. Howard, B. Rodgers, T. Strong,* Alabama A&M University

**2D-ThP9** Advanced Thermoelectric Devices from Ni/$Bi_2Te_3$/$Sb_2Te_3$/Ni Thin Films for Energy Harvesting, *S. Budak, Z. Xiao, M. Curley,* ***Cody Birchfield,*** *J. Cole, M. Howard, B. Rodgers, T. Strong,* Alabama A&M University

**2D-ThP10** VUV-photoassisted Chemical Doping on Graphene Oxide, ***Masahiro Soga,*** *Y. Tu, T. Utsunomiya, T. Ichii, H. Sugimura,* Kyoto University, Japan

**2D-ThP11** Tungsten Diselenide Nanoribbons Formed by Focused Helium Ion Beam Induced Etching, ***Michael G. Stanford,*** *P.R. Pudasaini, A.T. Wong, A. Hoffman, D.G. Mandrus, P.D. Rack,* The University of Tennessee Knoxville

**2D-ThP12** Tuning the Electronic Structure of Metallic Single Crystal Surfaces through Ultra Thin Hetero-Junctions for Photocathode Applications, ***ZhengRong Lee,*** *R. Seibert, D. Velázquez, L. Spentzouris, J. Terry,* Illinois Institute of Technology

**2D-ThP13** Electronic Structure of Bulk $WSe_2$ and Multilayer $WS_2$, ***Iori Tanabe,*** University of Nebraska-Lincoln; *T. Komesu,* University of Nebraska - Lincoln; *E.F. Schwier,* Hiroshima Synchrotron Radiation Center; *M. Gomez, L. Bartels,* University of California - Riverside; *M. Zheng, Y. Kojima,* Hiroshima University; *E.M. Echeverria,* University of Nebraska-Lincoln; *A.V. Barinov, S.K. Balijepalli, V. Kandyba,* Elettra - Sincrotrone Trieste; *K. Shimada,* Hiroshima Synchrotron Radiation Center; *P.A. Dowben,* University of Nebraska - Lincoln

## Spectroscopic Ellipsometry Focus Topic
## Room Hall D - Session EL+AS+EM+TF-ThP
## Spectroscopic Ellipsometry Poster Session
## 6:00pm

**EL+AS+EM+TF-ThP1** FTIR Ellipsometry Studies of Thermally Grown $GeO_2$ on Ge, ***Jaime Moya,*** *T.N. Nunley, N.S. Fernando, N. Samarasingha, S. Zollner,* New Mexico State University

**EL+AS+EM+TF-ThP2** Anisotropic Bruggeman Effective Medium Approach for Modeling Spectroscopic Ellipsometry Data of Porous Samples, ***Stefan Schöeche,*** *J. VanDerslice, J.A. Woollam,* J.A. Woollam Co., Inc.

**EL+AS+EM+TF-ThP3** Optical Constants of M2-phase $VO_2$ Measured by Spectroscopic Ellipsometry, ***SamuelT. White,*** *R.F. Haglund, K. Hallman,* Vanderbilt University

## Electronic Materials and Photonics
## Room Hall D - Session EM-ThP
## EMPD Poster Session
## 6:00pm

**EM-ThP1** The Effects of VUV Radiation on Low-k Organosilicate Glass (SiCOH) as Measured with Electron-Spin Resonance, ***Panpan Xue,*** *W. Li,* University of Wisconsin-Madison; *J. de Marneffe, M. Baklanov,* IMEC, KU Leuven Belgium; *V. Afanas'ev,* Catholic University of Leuven, Belgium; *Y. Nishi,* Stanford University; *J.L. Shohet,* University of Wisconsin-Madison

**EM-ThP2** Effect of Initial Substrate Conditioning on Structural and Optoelectronic Properties of $In_xGa_{1-x}N$ Grown by MEPA-MOCVD, ***Indika Senevirathna,*** *D. Seidlitz, A. Fali, Y. Abate, N. Dietz,* Georgia State University

**EM-ThP3** An In-Depth Study of $Cu_2ZnSnS_4$ Films Synthesized by Sulfurization of Stacked Metallic Layers, *A. Alvarez Barragan, S.A. Exarhos,* ***Lorenzo Mangolini,*** University of California Riverside

**EM-ThP4** Optical and Magneto-Optical Properties of $ZnO/Zn_{1-x}Co_xO$ Thin Films Grown by Pulsed Laser Deposition, ***Da-Ren Liu,*** *C.J. Weng,* Instrument Technology Research Center, National Applied Research Laboratories

**EM-ThP5** A bi-functional Bolometer with Sensitivity to IR Radiation and Hot Air Induced Temperature Variation, ***Evgenia Vaganova,*** The Hebrew University of Jerusalem, Israel

**EM-ThP6** Proton-Induced Effects on HfOx-Based Resistive Random Access Memory, *K. Hsu, T. Chang,* University of Wisconsin-Madison; *L. Zhao, Z. Wang,* Stanford University; *R. Agasie, T. Betthauser, J. Nickles, J. Chang,* University of Wisconsin-Madison; *Y. Nishi,* Stanford University; *Z. Ma,* ***J. Leon Shohet,*** University of Wisconsin-Madison

**EM-ThP7** $SiGe_x$ (100) (x=0.25, 0.5, 0.75) and Ge (100) MOSCaps with Aqueous Ammonium Sulfide Passivation, ***Lauren Peckler,*** *S.L. Heslop, A.J. Muscat,* University of Arizona

**EM-ThP8** Investigating $U_3O_8$ for Solid-State Direct-Conversion Neutron Detection Applications, ***Shailesh Dhungana,*** *G. Bhattarai,* University of Missouri-Kansas City; *B.C. Shaver, S. Lawson, B. Musicó, T. Meek,* The University of Tennessee Knoxville; *M.M. Paquette, A.N. Caruso,* University of Missouri-Kansas City

**EM-ThP9** Investigation of Electro-Optical and Chemical properties InN epilayer grown on Ga-face GaN by RF-MOMBE, *W.-C. Chen,* ***Chien-Nan Hsiao,*** Instrument Technology Research Center, National Applied Research Laboratories, Taiwan, Republic of China

**EM-ThP10** *Soft Nitridation of Thin Films of Silicon Oxide and Hafnium Oxide,* *J.A. Torres-Ochoa,* ***Orlando Cortazar-Martinez,*** *Y.L. Chipatecua-Godoy, Z. Montiel-Gonzalez,* Cinvestav-Unidad Queretaro, Mexico; *A. Herrera-Gomez,* CINVESTAV-Queretaro, Mexico

**EM-ThP11** Low Energy Solvothermal Deposition of Graphene on Ni foams for Electrochemical Supercapacitor Applications, ***Zhypargul Abdullaeva,*** Kumamoto University, Japan

**EM-ThP12** Temperature-Resistance Effect of Carbon Black / Polydimethylsiloxane Composite, ***Jing Xu,*** *L.Z. Ouyang,* Tennessee State University

## Advanced Ion Microscopy Focus Topic
## Room Hall D - Session HI-ThP
## Aspects of Advanced Ion Microscopy Poster Session
## 6:00pm

**HI-ThP1** Gas Field Ion Sources from Single-Atom Tips, ***W.T. Chang,*** *C.Y. Lin, W.C. Lai, Y.F. Yu,* Institute of Physics, Academia Sinica, Taipei, Taiwan, Taiwan, Republic of China; *T.Y. Fu,* National Taiwan Normal University, Taipei, Taiwan, Taiwan, Republic of China; *T.T. Tsong, I.S. Hwang,* Institute of Physics, Academia Sinica, Taipei, Taiwan, Taiwan, Republic of China

## In-Situ and Operando Spectroscopy and Microscopy for Catalysts, Surfaces, & Materials Focus Topic
## Room Hall D - Session IS-ThP
## In-Situ and Operando Spectroscopy and Microscopy for Catalysts, Surfaces, & Materials Poster Session
## 6:00pm

**IS-ThP1** Laser Diagnostics for Studies of Heterogeneous Catalysis, ***Jianfeng Zhou,*** *S. Blomberg, J. Gustafson, E. Lundgren, J. Zetterberg,* Lund University, Sweden

**IS-ThP3** Challenges and Current Progress in Characterizing the Solid Electrolyte Interface in Lithium-Sulfur Batteries, ***Manjula Nandasiri,*** *A.M. Schwarz, V. Shutthanandan,* Pacific Northwest National Laboratory*; P. Kandasamy,* Pusan National University, Republic of Korea*; S.A. Thevuthasan,* Qatar Environment and Energy Research Institute*; V. Murugesan,* Pacific Northwest National Laboratory

**IS-ThP4** Traceable Calibration of High-Quality Pitch Standards Based on an Atomic Force Microscopy System Combined with a Piezo-Actuated Flexure Stage, ***Chien-ying Su,*** *N.N. Chu, M.H. Shiao, C.N. Hsiao, F.Z. Chen, J.A. Yeh,* Instrument Technology Research Center, National Applied Research Laboratories, Taiwan, Republic of China

**IS-ThP5** XPS Enables Visualization of Charge Screening in Metal-ionic Liquid Interfaces with Temporal- and Lateral-resolution, *M.T. Camci,* Mrs, Turkey*; P. Aydogan, B. Ulgut, C. Kocabas,* ***Sefik Suzer,*** Bilkent University, Turkey

**IS-ThP6** Ambient Pressure Photoemission Instrumental Development and Applications within the Field of Energy Related Research, ***John Åhlund,*** Scienta Omicron, Sweden

**IS-ThP7** Highly Sensitive Ion Trap Mass Spectrometer for Inline Process Control, ***Gennady (G.) Fedosenko,*** *H.-Y. Chung, M. Aliman, A. Laue, R. Reuter, V. Derpmann, M. Antoni, L. Gorkhover, T. Graber,* Carl Zeiss SMT GmbH, Germany

**IS-ThP8** Real-time State-resolved Reactivity Measurements as a Probe of Carbon Dissolution Kinetics on Ni(111), ***Eric Dombrowski,*** *E.H. High, A.L. Utz,* Tufts University

**IS-ThP9** Design and Performance of Large Surface Area Graphene Liquid Cell for in Situ Electron Spectroscopy and Microscopy, ***Hongxuan Guo,*** National Institute of Standards and Technology (NIST)*; A. Yulaev, A. Kolmakov,* National Institute of Standards and Technology

**IS-ThP10** In situ Studies of Structural Evolution of Model Catalyst Rh(110) at Atomic Scale during Catalysis, ***Franklin (Feng) Tao,*** University of Kansas

## MEMS and NEMS
## Room Hall D - Session MN-ThP
## MEMS/NEMS Poster Session
## 6:00pm

**MN-ThP1** Method for Patterning Poly-Acrylic Acid Sacrificial Layers for Use in Solder Based Self-Assembly for 3D Integration, ***Connor Smith,*** *Y. Feng, S.L. Burkett,* The University of Alabama

**MN-ThP2** An Application of Aligned Electrospun PVDF Nanofibers, ***Akira Ueda,*** *O. Ali,* Fisk University*; Y. Zhang,* Vanderbilt University*; B. Storr, A. Byrne, C.S. Carson,* Fisk University*; C. Marvinney, A.L. Cook,* Vanderbilt University*; S. Avanesyan, W.E. Collins, R. Mu,* Fisk University

## Plasma Science and Technology
## Room Hall D - Session PS-ThP
## Plasma Science and Technology Division Poster Session
## 6:00pm

**PS-ThP1** RF Assisted Reactive High Power Impulse Magnetron Sputtering Deposition of Titanium Nitride Thin Film for Plasmonic Applications, ***Ru-Jing Sun,*** National Tsing Hua University, Taiwan, Republic of China*; B.H. Liao, C.-N. Hsiao,* Instrument Technology Research Center, Taiwan, Republic of China*; K.C. Leou,* National Tsing Hua University, Taiwan, Republic of China

**PS-ThP2** Transport Line for Laser Multicharged Ion Implantation and Deposition System, ***MdHaider Shaim,*** *M.M. Rahman, O. Balki,* Old Dominion University*; A. Sarkissian,* Plasmionic Technologies*; M.L. Korwin-Pawlowski,* University Du Quebec en outaouais, Canada*; H.E. Elsayed-Ali,* Old Dominion University

**PS-ThP3** Comprehensive Study of Plasma Emission and its Relation to the Properties of $SiO_xN_y$ Thin Films during Reactive DC Magnetron Sputtering, ***Roberto Sangines,*** *N. Abundiz-Cisneros, O. Hernandez Utrera, R. Machorro, C. Diliegros-Godines,* UNAM - Center of Nanosciences and Nanotechnology, Mexico

**PS-ThP4** Monitoring and Determination of Cleaning Level of the Target Before Deposition in a Reactive DC Magnetron Sputtering, ***Oscar Hernandez Utrera,*** *N. Abundiz-Cisneros, R. Sangines, R. Machorro, C. Diliegros,* UNAM - Center of Nanosciences and Nanotechnology, Mexico

**PS-ThP5** Optimizing Process Parameters for Plasma Assisted Atomic Layer Epitaxy (PA-ALE) of Nitrides, ***Virginia Anderson,*** *D.R. Boris, N. Nepal, S.D. Johnson, A.C. Kozen,* Naval Research Laboratory*; Z. Robinson,* Boston University*; S.C. Hernandez, C.R. Eddy, Jr., S.G. Walton,* Naval Research Laboratory

**PS-ThP6** Plasma Treatment of Plated Surfaces, ***Christopher Fields,*** *M.J. Buie,* Coherent Inc

**PS-ThP7** Customizing Arrays of Microplasmas for Controlling Properties of Electromagnetic Waves, ***Chenhui Qu,*** *P. Tian, M.J. Kushner,* University of Michigan

**PS-ThP8** Optical Emission Diagnostics of a Non-equilibrium Helium Plasma Jet at 1 Atm in Ambient Air, ***Tam Nguyen,*** *E. Hernández, D.J. Economou, V.M. Donnelly,* University of Houston

**PS-ThP9** Etching Capability of Silicon Nitride using a Low Electron Temperature Plasma Source, ***Hiroyuki Miyazoe,*** *A.V. Jagtiani, S.U. Engelmann,* IBM T.J. Watson Research Center*; D.R. Boris, S.C. Hernández, E.H. Lock, S.G. Walton,* Naval Research Laboratory*; E.A. Joseph,* IBM T.J. Watson Research Center

**PS-ThP10** Deep GaAs Etching with V-shaped Trench Profile Using Inductively Coupled Plasma Technology, *T. Sugahara,* SAMCO Inc., Japan*;* ***Shogo Uehara,*** SAMCO Inc.*; M. Hiramoto,* SAMCO Inc., Japan

**PS-ThP11** Poly-Si Planarization by ICP Plasma Etch at FinFET Technology, ***Yan Wang,*** *Q. Han, H. Zhang,* Semiconductor Manufacturing International Corporation

**PS-ThP12** Ion Beam Etch Process Optimization for the Patterning of High Density STTRAM Pillars, ***Vincent Ip,*** Veeco*; S. Huang,* Lam Research Corporation*; S.D. Carnevale,* Veeco*; I.L. Berry,* Lam Research Corporation*; K. Rook,* Veeco*; T.B. Lill,* Lam Research Corporation*; A.P. Paranjpe, F. Cerio,* Veeco

**PS-ThP13** Down Stream Plasma Ash Process Impact on Metal Electrode Oxidation and Nitridation for 10nm and Below Logic Technology, *B. Elliston, G. Kishko, V. Vaniapura, V.P. Nagorny,* ***Shawming Ma,*** Mattson Technology

**PS-ThP14** Atomic Layer Etching of Conventional and 2D Materials, ***Mike Cooke,*** *A.L. Goodyear, R. Sundaram, B. Halsall,* Oxford Instruments Plasma Technology, UK

**PS-ThP15** Rapid *In Situ* H Plasma Carbon and Oxygen Cleaning of $In_{0.53}Ga_{0.47}As(001)$ and $Si_{0.5}Ge_{0.5}(110)$, *S. Wolf, M. Edmonds,* University of California at San Diego*; X. Jiang,* PIE Scientific*; R. Droopad,* Texas State University*; N. Yoshida, L. Dong,* Applied Materials*; R. Galatage, S. Siddiqui, B. Sahu,* GLOBALFOUNDRIES*; A.C. Kummel,* University of California at San Diego*;* ***Mahmut Kavrik,*** University of California San Diego

**PS-ThP16** The Study on the Method to Improve the Ash Rate and Uniformity in a 450 mm Wafer Capable Ashing Chamber, ***JinKwan Lee,*** *P.Y. Lin, W.L. Collison, N. Fish, C.-M. Sun, J.H. Lim,* Global 450mm Consortium

**PS-ThP17** Backside Via Last Process Technologies for Wafer Level 3D Stacking., ***Toshiyuki Sakuishi,*** *T. Murayama, Y. Morikawa,* ULVAC Inc., Japan

**PS-ThP18** New Deep $SiO_2$ Etching Process Issues for Silicon Photonics Device Fabrications, ***Keizo Kinoshita,*** PETRA, Japan*; M. Noguchi,* PETRA*; T. Horikawa,* AIST*; T. Nakamura, T. Mogami,* PETRA

**PS-ThP19** A Study of the Transient Behavior of Pulsed Dual-frequency Capacitive Discharges, ***Byungkeun Na,*** *G.J. Park, I. Bae, H.-Y. Chang,* Korea Advanced Institute of Science and Technology (KAIST), Republic of Korea

**PS-ThP20** Modeling of Remote Plasma Sources using CFD-ACE+, ***Abhra Roy,*** *P. Shukla, K. Jain, A.N. Bhoj,* ESI US R&D Inc.

**PS-ThP21** Controllable Deposition of $TiO_2$ Films by Atmospheric Pressure Dielectric Barrier Discharge: Gas Composition Effect and Mechanism, ***Qianqian Chen,*** *A. Ozkan, S. Collette, J. Mertens, J. Baneton, M.P. Delplancke, F. Reniers,* Université Libre de Bruxelles, Belgium

**PS-ThP22** Synthesis of Acrylate Coatings with Tunable and Permanent Wettability by Atmospheric Plasma, *B. Nisol, J. Guesquière,* ***Delphine Merche,*** *N. Vandencasteele, F. Reniers,* Université Libre de Bruxelles, Belgium

**PS-ThP23** A High-flux Low-energy Hydrogen Ion Beam Using an end-Hall Ion Source, ***Jacqueline van Veldhoven,*** *E. te Sligte, J.P.B. Janssen,* TNO Technical Sciences, Netherlands*; I. Ament,* Carl Zeiss SMT GmbH, Germany

**PS-ThP24** A System of Radical Probes for Plasma Characterization, ***Dren Qerimi,*** University of Illinois at Urbana-Champaign*; I.A. Shchelkanov,* University of Illinois at Urbana Champaign*; D.N. Ruzic,* University of Illinois at Urbana-Champaign

**PS-ThP25** Using Optical Emission and Broadband Absorption Spectroscopy to Elucidate Energy Partitioning Trends Within Inductively Coupled Plasma Systems, ***Angela Hanna,*** *J.M. Blechle, E.R. Fisher,* Colorado State University

**PS-ThP27** Modeling of Electron Kinetics in rf Discharges at Low and High Pressures, ***Ananth Bhoj,*** *Z.A. Xiong,* ESI US R&D Inc.*; V.I. Kolobov,* CFD Research Corporation

**PS-ThP29** Nanoparticle Synthesis via a High Voltage Pulsed DC Atmospheric-Pressure Microplasma Jet, ***Steven Doyle***, *K.G. Xu,* University of Alabama in Huntsville

**PS-ThP30** Extending the Volume and Processing Area of Atmospheric Pressure Plasma Jets, ***Eric Gillman***, *D.R. Boris, M.H. Helle, S.C. Hernández, Tz.B. Petrova, G.M. Petrov, S.G. Walton,* Naval Research Laboratory

**PS-ThP31** Characteristics of Cutoff Probe for Magnetized Plasma Measurement, ***Jung-Hyung Kim***, Korea Research Institute of Standards and Science, Republic of Korea; *K.H. You,* Korea Research Institute of Standards and Science; *S.J. You,* Chungnam National University; *H.C. Lee, D.J. Seong,* Korea Research Institute of Standards and Science

**PS-ThP32** Development of the Gas Cherenkov Detector (GCD-3) and the Unique Engineering Challenges Associated with the ASME Boiler and Pressure Vessel Code, ***Frank Lopez***, *H.W. Herrmann, J.A. Oertel, S.H. Batha, Y.H. Kim, J.R. Griego, T.N. Archuleta, R.J. Aragonez, V.E. Fatherley, C.S. Young, A. Hsu, R.M. Malone,* Los Alamos National Laboratory

**PS-ThP33** Magnetic Tunnel Junctions Etch and Encapsulation Process Optimization for High-Density STT-MRAM Applications, ***Laurent Souriau***, *D. Radisic, S. Kundu, V. Paraschiv,* imec, Belgium; *F. Yamashita, K. Fujimoto, S. Tahara, K. Maeda,* TEL, Japan; *W. Kim, S. Rao, G. Donadio, D. Crotti, D. Tsvetanova, J. Swerts, S. Mertens, T. Lin, S. Couet, D. Piumi, G.S. Kar, A. Furnemont,* imec, Belgium

**PS-ThP34** Effect of High DC Bias on Silicon Oxide Coatings Deposited by Plasma Enhanced Chemical Vapor Deposition, ***Norihiro Jiko***, Kobe Steel, Ltd., Japan; *A. Narai,* Kobe Steel, Ltd.; *N. Kawakami, T. Okimoto,* Kobe Steel, Ltd., Japan

## Thin Film
## Room Hall D - Session TF-ThP
## Thin Films Poster Session
## 6:00pm

**TF-ThP2** Interfaces in Hybrid Structures: A 'non'-Destructive, In Situ Insight in Bonds and Failure, ***Tom Hauffman***, *S. Pletincx, K. Marcoen,* Vrije Universiteit Brussel, Belgium; *P. Kerger,* Max Planck Institut fur Eisenforschung GmbH (Düsseldorf-Germany), Germany; *L.I. Fockaert,* Technical University of Delft, Netherlands; *M. Rohwerder,* Max Planck Institut fur Eisenforschung GmbH (Düsseldorf- Germany), Germany; *J.M.C. Mol,* Technical University of Delft, Netherlands; *H. Terryn,* Vrije Universiteit Brussel, Belgium

**TF-ThP3** Nitrogen Doped ZnO Films: Structural, Morphological and Optical Studies, ***Mujdat Caglar***, Anadolu University, Turkey; *K. Gorgun,* Eskisehir Osmangazi University, Turkey; *S. Ilican, Y. Caglar,* Anadolu University, Turkey

**TF-ThP4** Ion Beam Deposition of VOx Films for Uncooled Bolometers and Their Characterization, ***David Pearson***, Oxford Instruments Plasma Technology, UK; *S.C.R. Pochon, P. Alvarez,* Oxford Instruments Plasma Technology, United Kingdom of Great Britain and Northern Ireland

**TF-ThP5** Valence Band Investigation of $Cu(In,Ga)Se_2$ Semiconductor: Improvements by Ag Alloying, ***Kevin Jones***, *R.L. Opila, F. Fang,* University of Delaware; *L. Chen, W. Shafaraman,* University of Delaware and Institute of Energy Conversion at University of Delaware

**TF-ThP6** Ultra-Low Resistivity ZnO Thin Films on Flexible Substrates Using Sol Gel Solution Deposition, *R. Kraya,* ***Nitish Thakor***, Johns Hopkins University

**TF-ThP7** Internal Charge Transfer at the MBE-Grown Complex Oxide Interface, ***Peng Xu***, University of Minnesota; *T.C. Droubay,* Pacific Northwest National Laboratory; *J.S. Jeong, K.A. Mkhoyan,* University of Minnesota; *P.V. Sushko, S.A. Chambers,* Pacific Northwest National Laboratory; *B. Jalan,* University of Minnesota

**TF-ThP8** Growth of Graphene on Cu Foil and Ni/Cu Surface by Pulsed Laser Deposition at Reduced Temperatures, ***Mohamed Hafez***, *A. Abd Elhamid,* National Institute of Laser Enhanced Sciences, Cairo University, Egypt; *A. Aboulfotouh,* Cairo University, Egypt; *I. Azzouz,* National Institute of Laser Enhanced Sciences, Cairo University, Egypt

**TF-ThP9** Preparation of a Transparent Conductive Multilayer Consists of $MoO_3$/Ag/$MoO_3$ and its Application in OLEDs, ***Midori Kawamura***, *T. Chiba, T. Kiba, Y. Abe, K.H. Kim,* Kitami Institute of Technology, Japan

**TF-ThP10** Copper Migration into and Breakdown of Low-k Organosilicate Dielectrics from Vacuum-Ultraviolet Irradiation during Plasma Processing, ***Xiangyu Guo***, University of Wisconsin-Madison; *S.W. King,* Intel Corporation; *Y. Nishi,* Stanford University; *J.L. Shohet,* University of Wisconsin-Madison

**TF-ThP11** X-Ray Analysis of Metamorphic $In_xGa_{1-x}As/In_yGa_{1-y}As$ Superlattices on GaAs (001) Substrates, ***Fahad Althowibi***, *J.E. Ayers,* University of Connecticut

**TF-ThP12** Synthesis of Novel Ta Precursor and its Application in Atomic Layer Deposition of TaN Film, *J.H. Han,* Korea Research Institute of Chemical Technology, Republic of Korea; *S.C. Lee, H.Y. Kim, T.M. Chung,* Korea Research Institute of Chemical Technology; ***ChangGyun Kim***, Korea Research Institute of Chemical Technology, Republic of Korea

**TF-ThP13** Transmission of Plasma-Generated Free Radicals through Silicon Nitride Dielectric Films, *F.A. Choudhury,* ***G. Sabat***, *M. Sussman,* University of Wisconsin-Madison; *Y. Nishi,* Stanford University; *J.L. Shohet,* University of Wisconsin-Madison

**TF-ThP14** Characterizing the Performance of Liquid Precursor Delivery Control Methods for Deposition Processes, ***James Maslar***, *W.A. Kimes,* NIST/Material Measurement Laboratory; *W. Kimmerle,* NSI; *E. Woelk,* CeeVeeTech LLC

**TF-ThP16** PEALD BSG PSG Doping Diffusion Characterization, ***Jeff Shu***, *Y. Zhang, H. Sheng, J. Liu,* GLOBALFOUNDRIES U.S. Inc.

**TF-ThP17** Low Temperature Deposition of nc-Silicon Thin Films using $SiH_4/H_2$ mixture, ***Moniruzzaman Syed***, Lemoyne Owen College; *Tong. Goh,* University of Malaya, Malaysia; *N.F.F.B. Nazarudin,* University of Malaya, Kuala Lumpur; *A. Jahangir,* University of Memphis; *Y. Hamada,* Lemoyne Owen College; *A.M. Ali,* King Khalid University, Saudi Arabia

**TF-ThP18** Elimination of Optical Artifacts from a-SiC:H Thin Film Transmission FTIR Spectra and Partial Least Squares Elemental Analysis, ***Milan Milosevic***, MeV Technologies; *S.W. King,* Intel Corporation

**TF-ThP19** Low Energy Ion Scattering (LEIS) Analysis of ALD Deposited GaSb Films on $SiO_2$, ***Thomas Grehl***, *P. Brüner,* ION-TOF GmbH, Germany; *R. ter Veen, M. Fartmann,* Tascon GmbH, Germany; *T. Blomberg, M. Tuominen,* ASM Microchemistry Ltd., Finland

**TF-ThP21** Characterization and Use of Porous Materials for Solid Phase Microextraction by Sputtering and CVD, ***Massoud Kaykhaii***, *T. Roychowdhury, A. Diwan, B. Singh, M.R. Linford,* Brigham Young University

**TF-ThP22** Simulation and Characterization of Short Channel Organic Thin Film Transistors Fabricated Using Ink-jet Printing and Imprint Process, ***Juhyun Bae***, Sungkyunkwan University, Republic of Korea; *K.H. Kim, N.Y. Kwon,* Samsung Electronics Co., LTD., South Korea; *I.S. Chung,* Sungkyunkwan University, Republic of Korea

**TF-ThP24** Toward Reliable Production of Well-Structured, Self-Assembled Thin Films of Quantum Dots for Surface Coatings, ***Cuong Nguyen***, *J.J. Weimer,* The University of Alabama in Huntsville

**TF-ThP25** *IN SITU* Spectroscopic Analysis of Perovskite/Graphene Hybrid Films for Graphene-Based Perovskite Solar Cells, ***Seth B. Darling***, Argonne National Laboratory, University of Chicago; *M.A. Acik,* Argonne National Laboratory

**TF-ThP26** Synergetic Effect of Nitrogen and Fluorine on the Total Dose Radiation Hardness of the Buried Oxide Layer in SOI Wafers, ***Zhongshan Zheng***, Institute of Microelectronics of Chinese Academy of Sciences, China

**TF-ThP27** The Effect of Vacuum Ultraviolet Irradiation on the Dielectric Constant, Leakage Currents and Time-Dependent Dielectric Breakdown of Low-k Dielectric Films, ***Dongfei Pei***, *W. Li, P. Xue,* University of Wisconsin-Madison; *S.W. King,* Intel Corp; *Y. Nishi,* Stanford University; *J.L. Shohet,* University of Wisconsin-Madison

**TF-ThP28** Fabrication of and Photovoltaic Characterization of SnS Solar Cell, ***YoungKuk Lee***, *S.G. Kang, C.G. Kim,* Korea Research Institute of Chemical Technology, Republic of Korea

**TF-ThP29** Solution Deposition of Pentacene Thin Films for Solar Cells and Organic Electronics, ***Michael Lee***, *R. Mendoza, R.T. Rodriguez, B.F. Kunzler,* Northern Arizona University

**TF-ThP30** Protected Aluminum Mirrors in the DUV Spectral Range for Astronomical applications, ***Hung-Pin Chen***, *W.H. Cho, C.-N. Hsiao,* Instrument Technology Research Center, National Applied Research Laboratories, Taiwan, Republic of China; *C.C. Lee,* National Central University, Taiwan, Republic of China

**TF-ThP31** Physical Characteristics of $TiO_x$ Thin Films Obtained by DC Reactive Sputtering, ***Victor Lima***, *I. Doi, J.A. Diniz, R.R. César,* State University of Campinas, Brazil

**TF-ThP32** Modification of the Vacuum-ultraviolet Absorption Spectrum during Plasma Exposure of Low-k Dielectrics: A Time-dependent Density Functional Theory Analysis, ***Ha Nguyen***, *F.A. Choudhury, J.L. Shohet,* University of Wisconsin - Madison

**TF-ThP33** High Moisture-Barrier Films using Roll-to-Roll-Plasma CVD grown $SiO_x$ on Room-Temperature ALD treated PEN Substrates, ***Nobuyuki Kawakami,*** *N. Jiko, T. Okimoto,* Kobe Steel, Ltd., Japan*; K. Kanomata, F. Hirose,* Yamagata University, Japan

**TF-ThP34** Determination of the Characteristic Times of Surface Coverage of $HfO_2$ in Si Substrates by ALD, ***PierreGiovanni Mani-Gonzalez,*** UACJ, Mexico*; M.M.M. Contreras-Turrubiartes,* UASLP, Mexico*; P.E. Garcia-Casillas, H. Leos-Mendez,* UACJ, Mexico*; H. Hernandez-Arriaga,* UASLP, Mexico*; J.A. Hernandez-Marquez, J.L. Enriquez-Carrejo,* UACJ, Mexico*; M. Melendez-Lira,* CINVESTAV-IPN, Mexico*; E. Lopez-Luna,* UASLP, Mexico

**TF-ThP35** Nanostructured Electrocatalysts Synthesized using Atomic Layer Deposition for Lithium- and Sodium-Oxygen Batteries, ***Yu Lei,*** University of Alabama in Huntsville*; J. Lu,* Argonne National Laboratory

**TF-ThP36** High Quality ALD of Silicon Nitride Films Via Microwave Plasma, ***Kihyun Kim,*** Samsung Electronics Co., LTD., South Korea, Republic of Korea

**TF-ThP37** Linear Scanning Magnetron for Solar Cell PVD Applications, ***Vladimir Kudriavtsev,*** *A. Riposan, L. Mandrell, C.W. Smith, T.M. Bluck,* Intevac

**TF-ThP38** Elastic Fields of Buried Hexagonal Dislocation Networks Adapted to Order the Epitaxial Bonding of Semiconductor Nanostructures, ***Outtas Toufik,*** *M. Salah,* University of Batna, Algeria

**TF-ThP39** Chemical Vapor Deposition of Manganese Nitride from bis(2,2,6,6 tetramethylpiperidido) Manganese (II), $Mn(tmp)_2$, and Ammonia, *E. Mohimi, B. Trinh,* ***Shaista Babar,*** *G.S. Girolami, J.R. Abelson,* University of Illinois at Urbana Champaign

**TF-ThP40** Effect of Substrate Temperature and Pulse Frequency on the Properties of SiC Film on Si (111) Deposited by Pulsed dc Magnetron Sputtering, *H.-P. Chen, C.-T. Lee, P.-K. Chiu, D. Chiang,* ***Wei-Chun Chen,*** ITRC, National Applied Research Laboratories, Taiwan, Republic of China*; S.-L. Ou,* Da-Yeh University, Taiwan, Republic of China

**TF-ThP41** Reactive Magnetron Sputtering of Epitaxial Scandium Nitride for High Performance Electronics, ***Amber Reed,*** Air Force Research Laboratory, Wright Patterson Air Force Base*; D.C. Look, V. Vasilyev,* Air Force Research Laboratory, Wright-Patterson Air Force Base*; H.M. Jeon, H.A. Smith, M.R. Schmitt,* Air Force Research Laboratory, Wright Patterson Air Force Base*; J.S. Cetnar,* Air Force Research Laboratory, Wright-Patterson Air Force Base*; B.M. Howe,* Air Force Research Laboratory, Wright Patterson Air Force Base

**TF-ThP42** Amorphous Phase Content Determination in $TiO_2$ Thin Films on Glass Substrates using the PONKCS Approach, *T. Malek,* ***Stanislav Danis,*** Charles University in Prague, Czech Republic*; L. Matejova,* Technical University of Ostrava, Czech Republic*; M. Cerhova,* Czech Academy of Sciences, Czech Republic

**TF-ThP43** The Atomic Layer Deposited $SrTiO_3$Films using Thin Seed Layer and their Improvement of Dielectric Properties for DRAM Capacitor, ***Sang Hyeon Kim,*** Samsung Electronics, Republic of Korea*; C.S. Hwang,* Seoul National University, Republic of Korea

**TF-ThP44** Water Cooled Low Temperature Evaporation (LTE) Source for Thin Film Organic Semiconducting Materials, ***Salahud Din,*** Kurt J. Lesker Company, UK

**TF-ThP45** Reactive RF Magnetron Sputtering of Vanadium Oxides: Substrate Bias Issues, ***Sergey Jr. Maklakov,*** *V.I. Polozov, I.A. Ryzhikov, V.N. Kisel,* Institute for Theoretical and Applied Electromagnetics RAS, Russian Federation

**TF-ThP46** Development of TiN/VN ALD Nanolaminates for Astronomy Applications, ***Frank Greer,*** *L. Baker, P. Day, B. Eom, H. Leduc,* Jet Propulsion Laboratory/California Institute of Technology

**TF-ThP47** Corrosion Behavior Of Transition Metal Nitrides Deposited By HIPIMS And DCMS With Synchronized Substrate Bias, ***YuriLizbeth Chipatecua-Godoy,*** Cinvestav-Unidad Queretaro, Mexico*; O. Tengstrand,* Linköping University, Sweden*; J.J. Olaya-Florez,* Universidad Nacional de Colombia*; G. Greczynski,* Linköping University, Sweden*; J.E. Greene, I. Petrov,* University of Illinois at Urbana-Champaign*; A. Herrera-Gomez,* CINVESTAV-Queretaro, Mexico

**TF-ThP48** Optical, Structural, and Magnetic Properties of Ti doped ZnO Grown by RF/DC Magnetron Sputtering, ***M. Baseer Haider,*** *M.F. Al-Kuhaili,* King Fahd University of Petroleum & Minerals, Saudi Arabia*; I. Roqan, V. Singaravelu,* King Abdullah University of Science and Technology (KAUST), Saudi Arabia

## Tribology Focus Topic
## Room Hall D - Session TR-ThP
## Tribology Poster Session
## 6:00pm

**TR-ThP1** Wear Behavior of Nitrided Cast Iron D6510 and Cast Steel S0050A under Normal Sliding and Inclined Sliding Conditions, ***Chen Zhao,*** *J. Zhang, X. Nie,* University of Windsor, Canada

# Anticipated Schedule Friday, November 11, 2016

## Anticipated Schedule Friday Morning, November 11

8:20 AM _____

8:40 AM _____

9:00 AM _____

9:20 AM _____

9:40 AM _____

10:00 AM _____

10:20 AM _____

10:40 AM _____

11:00 AM _____

11:20 AM _____

11:40 AM _____

12:00 PM _____

## Anticipated Schedule Friday Lunch, November 11

When _____

Where _____

With _____

# NOTES

| | **2D Materials Focus Topic**<br>**Room 103B - Session 2D+NS-FrM**<br>**2D Materials: Device Physics and Applications**<br>**Moderator:** Miguel M. Ugeda, CIC nanoGUNE, Spain | **Spectroscopic Ellipsometry Focus Topic**<br>**Room 104C - Session EL+AS+EM+MI+TF-FrM**<br>**Spectroscopic Ellipsometry: Novel Applications and Theoretical Approaches**<br>**Moderators:** Morten Kildemo, Norwegian University of Science and Technology, Nikolas Podraza, University of Toledo |
|---|---|---|
| 8:20am | **2D+NS-FrM1** Direct Writing of 2D Flexible Electronic Devices via Illumination-based Techniques, *M.E. McConney, N.R. Glavin, A.T. Juhl,* Air Force Research Laboratory; *J.E. Bultman, J.J. Hu,* University of Dayton Research Institute/Air Force Research Laboratory; *M.F. Durstock,* Air Force Research Laboratory; *A.A. Voevodin,* University of North Texas; ***Christopher Muratore,*** University of Dayton | **INVITED: EL+AS+EM+MI+TF-FrM1** Magnetoopticalproperties of Metals, Half-Metals, and Garnets Probed by Vector-Magneto-Optical Generalized Ellipsometry, ***Heidemarie Schmidt,*** Technische Universität Chemnitz, Nano-Spintronics Group, Germany |
| 8:40am | **2D+NS-FrM2** Resolving and Tuning Mechanical Anisotropy in Black Phosphorus Nanoelectromechanical Resonators, ***Zenghui Wang,*** *H. Jia, P.X.-L. Feng,* Case Western Reserve University | Invited talk continues. |
| 9:00am | **INVITED: 2D+NS-FrM3** 2D Devices for Flexible and Topological Nanoelectronics, ***Li Tao,*** *W. Zhu, D. Akinwande,* The University of Texas at Austin | **EL+AS+EM+MI+TF-FrM3** *In Situ* Terahertz Optical Hall Effect Measurements of Ambient Doping Effects in Epitaxial Graphene, ***Sean Knight,*** University of Nebraska-Lincoln; *C. Bouhafs, N. Armakavicius, P. Kühne, V. Stanishev, R. Yakimova,* Linköping University, Sweden; *S. Wimer, M. Schubert,* University of Nebraska-Lincoln; *V. Darakchieva,* Linköping University, Sweden; *T. Hofmann,* University of North Carolina at Charlotte |
| 9:20am | Invited talk continues. | **EL+AS+EM+MI+TF-FrM4** Excitons at Interfaces in Ellipsometric Spectra, ***Nuwanjula Samarasingha,*** *C. Rodriguez, J.M. Moya, N.S. Fernando, S. Zollner,* New Mexico State University; *P. Ponath, K. Kormondy, A. Demkov,* University of Texas at Austin; *D. Pal, A. Mathur, A. Singh, S. Dutta, J. Singhal, S. Chattopadhyay,* Indian Institute of Technology Indore, India |
| 9:40am | **2D+NS-FrM5** Optical Detectors Based on Bismuth Telluride Nanowire Arrays Capped by Graphene, ***Tito Huber,*** *T. Brower, O. Abana,* Howard University | **EL+AS+EM+MI+TF-FrM5** Infrared and Visible Dielectric Properties of $(LaAlO_3)_{0.3}(Sr_2AlTaO_6)_{0.35}$, ***Jacqueline Cooke,*** *N.T. Nunley, T. Willett-Gies, S. Zollner,* New Mexico State University |
| 10:00am | **2D+NS-FrM6** Graphene Nanoelectromechanical Resonators with Eletrothermal Excitation and Tuning, *F. Ye,* ***Jaesung Lee,*** *P.X.-L. Feng,* Case Western Reserve University | **EL+AS+EM+MI+TF-FrM6** A New Constant of Product of Electronic Scattering Time and Resistivity in Thin Silver Refractive Index Calculation from Ellipsometry and Resistivity Measurements, ***Guowen Ding,*** *C. Clavero, D. Schweigert, M. Le,* Intermolecular, Inc. |
| 10:20am | **INVITED: 2D+NS-FrM7** Pushing the Performance Limit of 2D Semiconductor Transistors, ***Xiangfeng Duan,*** California Nanosystems Institute, University of California, Los Angeles | **EL+AS+EM+MI+TF-FrM7** Realization of an *In Situ* Mueller-matrix Imaging Ellipsometer for the Real Time Observation of Surface Properties in an Ultra-high Vacuum EUV Facility, ***Pim Muilwijk,*** *N.B. Koster, F.T. Molkenboer, E. Sligte, te, A.F. Deutz, P. Walle, van der,* TNO Technical Sciences, Netherlands |
| 10:40am | Invited talk continues. | **EL+AS+EM+MI+TF-FrM8** Conducting, Semi-Conducting and Insulating 2D-Materials Characterized by Spectroscopic Imaging Ellipsometry, ***Matthias Duwe,*** *S. Funke,* Accurion GmbH, Germany; *U. Wurstbauer,* Technical University of Munich, Germany; *A. Matkovic,* University of Belgrade, Serbia; *A. Green,* SUNY College of Nanoscale Science and Engineering; *A. Molina-Mendoza,* Universidad Autonoma de Madrid, Spain; *A. Castellanos-Gomez,* IMDEA Nanoscience, Spain; *P.H. Thiesen,* Accurion GmbH, Germany |
| 11:00am | **2D+NS-FrM9** Low Temperature $Al_2O_3$ ALD on 2D Semiconductors, ***Il Jo Kwak,*** *J.H. Park, A.C. Kummel,* University of California at San Diego | |
| 11:20am | **2D+NS-FrM10** Atomic Layer Deposition of High-k Dielectrics on $WSe_2$ for High Performance Electronic Devices, ***Pushpa Raj Pudasaini,*** *M.G. Stanford, A. Hoffman,* The University of Tennessee Knoxville; *T.Z. Ward,* Oak Ridge National Laboratory; *D.G. Mandrus, P.D. Rack,* The University of Tennessee Knoxville | |
| 11:40am | **2D+NS-FrM11** Layer-dependent Measurements of Electronic Band Alignment for Individual $MoS_2$ Flakes Supported on $SiO_2$ using Photoemission Electron Microscopy (PEEM) with Deep Ultraviolet Illumination, ***Morgann Berg,*** Sandia National Laboratories; *K. Keyshar,* Rice University; *I. Bilgin, F. Liu,* Northeastern University, Los Alamos National Laboratory; *H. Yamaguchi,* Los Alamos National Laboratories; *R. Vajtai,* Rice University; *C. Chan,* Sandia National Laboratories; *G. Gupta,* Los Alamos National Laboratories; *S. Kar,* Northeastern University; *P. Ajayan,* Rice University; *T. Ohta,* Sandia National Laboratories; *A. Mohite,* Los Alamos National Laboratories | |
| 12:00pm | **2D+NS-FrM12** Visualizing Light Scattering in Silicon Waveguides with few-layer Black Phosphorous Photodetectors, ***Tianjiao Wang,*** *S. Hu,* Vanderbilt University; *B. Chamlagain, Z. Zhou,* Wayne State University; *S.M. Weiss, Y. Xu,* Vanderbilt University | |

| | **Electronic Materials and Photonics**<br>**Room 102A - Session EM-FrM**<br>**Late Breaking News on Electronic Materials and Devices**<br>**Moderator:** Nikolaus Dietz, Georgia State University | **In-Situ and Operando Spectroscopy and Microscopy for Catalysts, Surfaces, & Materials Focus Topic**<br>**Room 101C - Session IS-FrM**<br>**In situ Characterization of Nanomaterials**<br>**Moderators:** Stephen Nonnenmann, University of Massachusetts - Amherst,<br>Xiao-Ying Yu, Pacific Northwest National Laboratory |
|---|---|---|
| 8:20am | **EM-FrM1** Phase Change Memory Properties of Arsenic Doped $Ge_2Sb_2Te_5$ alloys, ***Vinod Erkkara Madhavan,*** Qatar Environment and Energy Research Institute, Hamad Bin Khalifa University, Qatar Foundation, Qatar; *K. K. S.,* Indian Institute of Science, Bangalore, India | **INVITED: IS-FrM1** In-situ High-Energy X-ray Scattering for Probing Colloidal Nanoparticles in Solution, ***Yugang Sun,*** Temple University |
| 8:40am | **EM-FrM2** Pulsed Laser Deposition of $In_2O_3$-$SnO_2$: From Films to Nanowires, ***Davide Del Gaudio,*** *C. Reese, C. Boone, S. Yarlagadda, J.T. Heron,* University of Michigan, Ann Arbor; *I. Shalish,* Ben-Gurion University of the Negev, Beersheba, Israel; *R.S. Goldman,* University of Michigan, Ann Arbor | Invited talk continues. |
| 9:00am | **EM-FrM3** $ZnSnN_2$: Band Gap Engineering Through Cation Disorder, *R. Makin,* Western Michigan University; *N. Senabulya, J.P. Mathis, R. Clarke,* University of Michigan; *T. Veal,* University of Liverpool; ***Steven Durbin,*** Western Michigan University | **INVITED: IS-FrM3** Microfluidics Applied to Ultrafast Spectroscopy, ***Adrien Chauvet,*** University of Sheffield, UK |
| 9:20am | **EM-FrM4** Role of Single Dopants in Inter-Band Current Enhancement of Nano-*pn* Tunnel Diodes: An Atomistic Study, ***Manoharan Muruganathan,*** Japan Advanced Institute of Science and Technology, Japan; *D. Moraru, M. Tabe,* Research Institute of Electronics, Shizuoka University; *H. Mizuta,* Japan Advanced Institute of Science and Technology, Japan | Invited talk continues. |
| 9:40am | **EM-FrM5** CVD growth of Hexagonal Boron Nitride Films on Cu-Ni Alloys, ***Karthik Sridhara,*** Texas A&M University; *B.N. Feigelson, J.K. Hite, V. Anderson, A. Nath, F. Kub,* US Naval Research Laboratory; *L.O. Nyakiti,* Texas A&M University Galveston | **IS-FrM5** Adsorbate-Induced Structural Changes Precious Metal Nano Catalysts, ***Zheng Lu,*** *Y. Lei,* University of Alabama in Huntsville |
| 10:00am | **EM-FrM6** p-GaAs/AlGaAs Heterostructures with a Current Blocking Barrier for Mid-infrared Detection, ***Dilip Chauhan,*** *A.G.U. Perera,* Georgia State University; *L.H. Li, L. Chen, E.H. Linfield,* University of Leeds, United Kingdom | **IS-FrM6** Understanding the Role of Atmospheric Surface Adsorbates on the Chemical Reactivity of Zirconium Hydroxide Nanopowders using *Operando* Vibrational Spectroscopy, ***Robert Balow,*** NRC/NRL Postdoctoral Fellow; *W. Gordon,* Edgewood Chemical Biological Center; *D.E. Barlow,* Naval Research Laboratory; *I. Iordanov, C. Knox,* Edgewood Chemical Biological Center; *V. Bermudez, J. Lundin, J. Wynne,* Naval Research Laboratory; *G.W. Peterson, C. Karwacki,* Edgewood Chemical Biological Center; *P.E. Pehrsson,* Naval Research Laboratory |
| 10:20am | **EM-FrM7** SSI-LEDs - 20,000 Hrs of Lifetime and Failure Mechanism Study, ***Yue Kuo,*** *S. Zhang,* Texas A&M University | **IS-FrM7** *In Situ* Molecular Characterization of the Solid-Electrolyte Interface on Lithium Metal Anode, *Y. Zhou,* ***Xiaofei Yu,*** *R. Cao, W. Xu, M. Su, Z. Xu, D.R. Baer, C. Wang, Z. Zhu,* Pacific Northwest National Laboratory |
| 10:40am | | **IS-FrM8** *In Situ* DRIFTS of $TiO_2$ Nanoparticles, ***Michelle Foster,*** University of Massachusetts, Boston |
| 11:00am | | **IS-FrM9** In situ Characterization of Green Rust Synthesized in Ionic Liquids by Liquid ToF-SIMS and SALVI, ***Juan Yao,*** *X. Sui, D. Lao, J. Weisenfeld, Y. Zhou, S. Nune, D. Heldebrant, Z. Zhu, X.-Y. Yu,* Pacific Northwest National Laboratory |
| 11:20am | | **IS-FrM10** Direct Observation of the Growth and Dissolution Process of $SnO_2$ Nanowires, ***Bethany Hudak,*** *Y.-J. Chang,* University of Kentucky; *L.F. Allard,* Oak Ridge National Laboratory; *B.S. Guiton,* University of Kentucky |
| 11:40am | | **IS-FrM11** Probing Glyoxal Aqueous Surface Chemistry by In Situ Molecular Imaging, ***Fei Zhang,*** *Y. Zhou, X. Sui,* Pacific Northwest National Laboratory; *J. Chen,* Shandong University; *Z. Zhu, X.-Y. Yu,* Pacific Northwest National Laboratory |
| 12:00pm | | **IS-FrM12** Bridging the Pressure Gap in Scanning Electron Microscopy: Imaging Charge Transport in Nanowires under Atmospheric Pressures, ***Ana Stevanovic,*** NIST CNST/ University of Maryland; *A. Kolmakov,* NIST/CNST; *J. Velmurugan,* NIST CNST/ University of Maryland; *F. Yi, D. LaVAn,* NIST |

# Friday Morning, November 11, 2016

| | MEMS and NEMS<br>Room 102B - Session MN+MS-FrM<br>Radiation Effect in Emerging Micro/Nano Structures, Devices, and Systems<br>**Moderators:** Michael Alles, Vanderbilt University, Philip Feng, Case Western Reserve University | Surface Science<br>Room 104E - Session SS+HC-FrM<br>Deposition and Analysis of Complex Interfaces<br>**Moderators:** Bruce D. Kay, Pacific Northwest National Laboratory, Daniel Killelea, Loyola University Chicago |
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| 8:20am | **MN+MS-FrM1** Radiation Effects in Emerging MEMS/NEMS Devices, ***Jacob Calkins,*** Defense Threat Reduction Agency | **SS+HC-FrM1** A Quantitative, Experimentally Supported Model for Surface Energy (SE) as a Function of Surface Defect Density (DD): the SEDD Model - Comparison with Three Liquid Contact Angle Analysis and AFM, ***Abijith Krishnan,*** Arizona State University/BASIS HS Scottsdale/SiO2 Innovates LLC; *N.X. Herbots,* Arizona State University/SiO2 Innovates LLC; *Y.W. Pershad,* Arizona State University/BASIS HS Scottsdale/SiO2 Innovates LLC; *S.D. Whaley,* SiO2 Innovates LLC/Arizona State University; *R.J. Culbertson, R.B. Bennett-Kennett,* Arizona State University |
| 8:40am | **INVITED: MN+MS-FrM2** Effect of Top Electrode Material on Radiation-Induced Degradation of Ferroelectric Thin Films, ***Nazanin Bassiri-Gharb,*** *S.J. Brewer, C.Z. Deng, C.P. Callaway,* Georgia Institute of Technology; *M.K. Paul,* Woodward Academy; *K.J. Fisher,* Riverwood International Charter School; *J.E. Guerrier, J.L. Jones,* North Carolina State University; *R.Q. Rudy, R.G. Polcawich,* Army Research Laboratory; *E.R. Glaser, C.D. Cress,* Naval Research Laboratory | **SS+HC-FrM2** Ab initio Analysis of Elementary Reactions during ALD Tungsten Nucleation on Selective Substrates, ***Mariah King,*** *G.N. Parsons,* North Carolina State University |
| 9:00am | Invited talk continues. | **SS+HC-FrM3** Design and Synthesis of Nanofence Cerium Oxide Coated Platinum Catalysts via Facet-selective Atomic Layer Deposition, ***Kun Cao,*** *J.M. Cai,* State Key Laboratory of Digital Manufacturing Equipment and Technology, Huazhong University of Science and Technology, China; *R. Chen,* State Key Laboratory of Digital Manufacturing Equipment and Technology, School of Mechanical Science and Engineering, School of Optical and Electronic Information, Huazhong University of Science and Technology, China |
| 9:20am | **INVITED: MN+MS-FrM4** Radiation Survivability of MEMS Microelectronic Circuits with CNT Field Emitters, ***Jason Amsden,*** *E.J. Radauscher, T. von Windheim,* Duke University; *K.H. Gilchrist,* RTI International; *S.T. Di Dona, Z.E. Russell,* Duke University; *L.Z. Scheick,* Jet Propulsion Laboratory, California Institute of Technology; *J.R. Piascik,* RTI International; *C.B. Parker,* Duke University; *B.R. Stoner,* RTI International; *J.T. Glass,* Duke University | **SS+HC-FrM4** Dehydrogenation and Rehybridization of ZnTPP on Ag(100) and Ag(111), *C. Ruggieri, S. Rangan,* ***Robert Bartynski,*** Rutgers, the State University of New Jersey; *E. Galoppini,* Rutgers - Newark |
| 9:40am | Invited talk continues. | **SS+HC-FrM5** A Case Study of the SMSI Effects: CO Oxidation on the $TiO_x$/Pt(111) Model Surfaces, ***Mingshu Chen,*** *H. Li, X.F. Weng, H. Zhang, H.L. Wan,* Xiamen University, China |
| 10:00am | **INVITED: MN+MS-FrM6** Radiation Effects in Integrated Photonics and Nano-OptoMechanical Systems, *Q. Du,* Massachusetts Institute of Technology; *B Li,* University of Minnesota; *D. Ma, A. Agarwal,* ***Juejun Hu,*** Massachusetts Institute of Technology; *M. Li,* University of Minnesota | **SS+HC-FrM6** Toluene and Benzyl Radical Formation during Deoxygenation of Phenylmethanol on Rutile $TiO_2$(110), ***Long Chen,*** *R.S. Smith, B.D. Kay, Z. Dohnalek,* Pacific Northwest National Laboratory |
| 10:20am | Invited talk continues. | |
| 10:40am | **INVITED: MN+MS-FrM8** Radiation Effects in 2D Materials and Nano Electrical Mechanical Devices, ***Michael Alles,*** *K.I. Bolotin,* Vanderbilt University; *A. Zettl,* University of California at Berkeley; *B. Homeijer,* Sandia National Laboratories; *J.L. Davidson, R.D. Schrimpf, R.A. Reed, R.A. Weller, D.M. Fleetwood, W. Liao, R.J. Nicholl,* Vanderbilt University | |
| 11:00am | Invited talk continues. | |
| 11:20am | **INVITED: MN+MS-FrM10** Influence of Radiation on MEMS Oscillators, ***Bruce Alphenaar,*** University of Louisville; *M.L. Alles, H. Gong,* Vanderbilt University; *P. Deb Shurva, J.T. Lin,* University of Louisville; *J.L. Davidson,* Vanderbilt University; *S. McNamara, K. Walsh,* University of Louisville; *W. Liao, R.A. Reed,* Vanderbilt University | |
| 11:40am | Invited talk continues. | |
| 12:00pm | **MN+MS-FrM12** Radiation Effects on Silicon Carbide (SiC) Nanomechanical Devices, ***Philip Feng,*** Case Western Reserve University | |

**Thin Film**
**Room 105A - Session TF-FrM**
**CVD, ALD and Film Characterization**
**Moderators:** David Adams, Sandia National Laboratories, Halil Akyildiz, North Carolina State University

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| 8:20am | **TF-FrM1** Assessing the Role of Temperature and Pressure on the Tungsten ALD Selectivity Window on Si/$SiO_2$ Substrates, ***Paul Lemaire***, *G.N. Parsons,* North Carolina State University | |
| 8:40am | **TF-FrM2** X-ray Absorption Spectroscopy Study of Nanocomposite Thin Films Grown by Atomic Layer Deposition, ***Anil Mane***, *S. Babar, A. Yanguas-Gil,* Argonne National Laboratory; *A. O'Mahony,* Incom, Inc.; *T. Wu, J.W. Elam,* Argonne National Laboratory | |
| 9:00am | **TF-FrM3** A Fundamental Study of Thermal Conductivity in ALD-deposited Amorphous Oxide Thin Films of Varying Density, ***Brandon Piercy***, Georgia Institute of Technology; *K.E. Meyer, P.E. Hopkins,* University of Virginia; *M.D. Losego,* Georgia Institute of Technology | |
| 9:20am | **TF-FrM4** The Development of ALD Barrier Layers for Harsh Environment Applications, ***Ankit Singh***, Georgia Institute of Technology; *A. Perrotta,* Eindhoven University of Technology, Netherlands; *S. Graham,* Georgia Institute of Technology | |
| 9:40am | **TF-FrM5** Conformal CVD Growth of $HfB_xC_y$ and $HfB_xAl_y$ Hard Coatings with Low Coefficient of Friction and High Oxidation Resistance, ***Elham Mohimi***, *T. Ozkan, S. Babar, Z. Zhang, S. Liu, G.S. Girolami, A.A. Polycarpou, J.R. Abelson,* University of Illinois at Urbana Champaign | |
| 10:00am | **TF-FrM6** Chemical Vapor Deposition of Silanes for Surface Modification, ***Brian Johnson***, *M.R. Linford,* Brigham Young University | |
| 10:20am | **TF-FrM7** Iron CVD from Iron Pentacarbonyl: Growth Inhibition by CO Dissociation and Use of Ammonia to Restore Constant Growth, *P. Zhang, E. Mohimi, T. Talukdar, G.S. Girolami,* ***John Abelson***, University of Illinois at Urbana Champaign | |
| 10:40am | **TF-FrM8** New Insights on the Structure and Chemistry of the Tin Oxide-emitter Interface in CdTe Solar Cells as revealed by Thermomechanical Cleavage and Electron Spectroscopy, ***Craig Perkins***, *C. Beall, J.M. Burst, A. Kanevce, M.O. Reese, T.M. Barnes,* National Renewable Energy Laboratory | |
| 11:00am | **TF-FrM9** Defect Tolerance in Methylammonium Lead Triiodide Perovskite, ***Xerxes Steirer***, *P. Schulz, G. Teeter, V. Stevanovic, M. Yang, K. Zhu, J.J. Berry,* National Renewable Energy Laboratory | |
| 11:20am | **TF-FrM10** Non Uniform Deposition Rate Profile during the Growth of $SiO_2$ Films Deposited by Atmospheric Pressure PECVD, ***Anna Meshkova***, FOM Institute DIFFER, Netherlands; *F.M. Elam, S.A. Starostin,* FUJIFILM Manufacturing Europe, Netherlands; *M.C.M. van de Sanden,* FOM Institute DIFFER, Netherlands; *H.W. de Vries,* FOM institute DIFFER, Netherlands | |
| 11:40am | **TF-FrM11** X-Ray Diffraction from Pseudomorphic GaAs/$In_{0.3}Ga_{0.7}As$ Superlattice High Electron Mobility Transistor Heterostructures on GaAs (001) Substrates, ***Fahad Althowibi***, *J.E. Ayers,* University of Connecticut | |
| 12:00pm | **TF-FrM12** Flexible CIGS Nanorod Array Photodetectors, ***Emad Badradeen***, *M. Brozak, K.M. Al-Mayalee, F. Keles, T. Karabacak,* University of Arkansas at Little Rock | |

# Author Index

## Bold page numbers indicate presenter

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# NOTES

# AVS-63
# EXHIBIT PROGRAM

Exhibit Hall Special Events • Exhibitor Profiles • Exhibitor Product Locator • Exhibit Schedule
Sponsors • Corporate Members • Free Attractions

# EXHIBIT HALL EVENTS

## EXHIBIT HALL SCHEDULE

| | | |
|---|---|---|
| Nov. 8 | Tuesday | 10am - 5:00pm |
| Nov. 9 | Wednesday | 10am - 4:30pm |
| Nov. 10 | Thursday | 10am - 2:30pm |


## TABLE OF CONTENTS



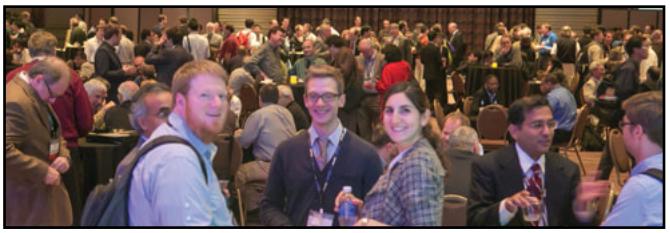
## EXHIBIT HALL ATTRACTIONS

- Instrumentation,Equipment & Services
- Technology Spotllight Sessions
- Journals/Books/Publishers/Consulting
- Professional Literature
- AVS Store: Gifts/Souvenirs
- Career Center / Employment Services
- AVS Membership & Education Booth
- Free Morning Coffee & Lunch
- Free Afternoon Refreshments
- Art Zone Display & Competition
- Caricatures
- Daily Raffle Drawings
- Grand Prize Raffle during Exibit Finale
- Ask The Experts - Vacuum Technology
- E-Mail Pavilion with Printing Capabilities

# Special Events & Attractions

## Welcome Mixer - Monday 5:30pm - 7:30pm

**Convention Center Davidson Ballrooms B & C**



**Monday, November 7 5:30 - 7:30**

**NETWORKING at its best!** The Welcome Mixer offers food and refreshments and the opportunity to casually interface with fellow AVS attendees and exhibitors from around the world. Everyone is welcome at the Mixer! **Sponsored in part by AIP Journal of Applied Physics.**

## Ask The Experts (ATE) BOOTH 544

Hosted by the AVS Vacuum Technology Division. An unbiased, open forum staffed by experts in various aspects of vacuum technology to discuss and help solve vacuum related issues. Challenge our experts and receive a free souvenir while supplies last!!

**Sponsored by: SAES Getters, MKS Instruments and Kimball Physics**

## Career Center BOOTH 126

Make the right connections at AVS. Post job openings or search available positions. The AVS Career Center provides the opportunity for attendees and exhibitors to find a perfect match.
Sponsored by Ion-Tof.

Interview Rooms Available


## 6th Annual Foosball Tournament

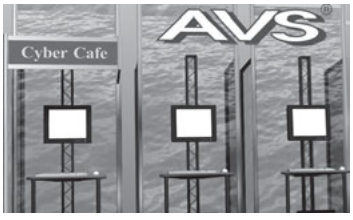
Join the competition in Booth 342. Great Prizes!! Sign up begins at Tuesday morning, October 20 in the Exhibit Hall at booth 342. Hosted and Sponsored by Gamma Vacuum.

**1st Place Takes Home the Grand Prize !!**

## Daily Raffle Prizes


Find your raffle tickets in your registration kit. Enter your ticket into the raffle drum in **Booth 745** in the Exhibit Hall Tuesday, Wednesday and Thursday mornings. Come back in the afternoon to see if you are a winner! The Grand Prize Raffle drawing will take place on Thursday at the Exhibit Finale. Make sure you get your ticket stamped at the R.D. Mathis booth before you drop your ticket in the drum! Great prizes including FitBits, BlueTooth Speakers, Head Phones and so much more!

## E-Mail Pavilion BOOTH 122




A convenient place for attendees to keep in touch with the outside world. Check your e-mail, flights, print boarding passes, etc.

**Generously sponsored by**
**Specs Surface Nano Analysis, Inc.**

# Special Events & Attractions

## Caricaturists BOOTH 245

Visit the Special Events booth for your FREE AVS-63 Souvenir. Our caricature artists will be available during all Exhibit Hall hours. You will find your ticket in your registration kit. Ticket must be validated by our generous sponsor Shimadzu in booth 245.

## AVS Store BOOTH 645

Membership Information - learn about the many advantages of AVS Membership, also browse through Educational Materials and AVS logo items.

- **Videos**
- **Books**
- **Monographs**
- **Membership Services**
- **AVS Logo Items**

## ART ZONE CONTEST BOOTH 727

See graphic designs in the form of art from fellow AVS attendees who will compete in our annual art contest. Take a look at this amazing display and don't forget to vote! Prizes will be announced at the Exhibit Finale on Thursday. **CASH PRIZES !!!**

## Exhibitor Technology Spotlight Sessions BOOTH 116

Keep up with the latest technology! Exhibitors showcase new products, services and applications. Sessions are scheduled during the technical session breaks in the stage area in the exhibit hall.


## EXHIBITOR TECHNOLOGY SPOTLIGHT SESSION PARTICIPANTS

CS Clean Solutions, Inc.
Gencoa
ION-TOF USA
Kratos Analytical
Kruss USA
MDC Vacuum Products, LLC
NSI
Physical Electronics
Prevac sp. z o.o.
Renishaw, Inc.
SPECS Surface Nano Analysis, Inc.

# Sponsors & Corporate Members

AVS wishes to thank the following companies for their generous support

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AIP - Applied Physics Letters
AIP - Review of Scientific Instruments
Applied Materials
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Duniway Stockroom Corp.
Elsevier
Gamma Vacuum
Heidelberg Instruments, Inc.
Impedans Ltd.
Ionoptica
Ion-Tof USA
Kimball Physics Inc.
Kratos Analytical
Kurt J. Lesker Company
Lam Research Corporation
MKS Instruments
Nanoscribe
PHPK Technologies
Physical Electronics
Physics Today
Physics World
R.D. Mathis Company
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RF VII Inc.
RHK Technology Inc.
SAES Group
Scientific Instrument Services, Inc.
Semicore Equipment, Inc.
Shimadzu Scientific Instruments
SPECS Surface Nano Analysis, Inc.
Super Conductor Materials
Synergy Systems Corporation
UC Components
University of Virginia
Vanderbilt University

## 2016 CORPORATE MEMBERS

Accu-Glass Products, Inc.
Advanced Energy Industries Inc.
AJA International, Inc.
American Institute of Physics
Applied Vacuum Technology, LLC
BellowsTech, LLC
Capitol Vacuum Parts
CeramTec North America
Denton Vacuum LLC
Duniway Stockroom Corp
EP Laboratories, Inc.
FMG Enterprises, Inc.
Gamma Vacuum
Helium Leak Testing, Inc.
Hine Automation LLC
HVA, LLC
Innovative Vacuum Solutions, Inc.
INTELLIVATION LLC
ION-TOF USA Inc.
J.B. Anderson & Son, Inc.
Kaufman & Robinson, Inc.
Kratos Analytical
Kurt J. Lesker Company
MKS Instruments Inc
Nor-Cal Products
Nordiko Technical Services Limited
Pfeiffer Vacuum Technology
Physical Electronics
Plasmaterials Inc
Plasma-Therm
Precision Plus Vacuum Parts
Process Materials Inc
R.D. Mathis Company
RBD Instruments, Inc.
Reynard Corporation
RF VII Inc.
RHK Technology Inc.
SAES Getters USA, Inc.
Seren Industrial Power Systems, Inc.
Solid Sealing Technology
SPECS Surface Nano Analysis GmbH
SPI Supplies
Staib Instruments, Inc.
Super Conductor Materials Inc
Thermo Fisher Scientific
UC Components Inc
Vacuum Research Corp.
VAT Inc
XEI Scientific, Inc.

# Exhibitor Quick Reference Guide

| Booth | Company |
|---|---|
| 441 | A&N Corporation |
| 316 | Accurion GmbH |
| 719 | Ace Glass, Inc. |
| 700 | AdValue Technology |
| 314 | Avantes, Inc. |
| **538** | **Agilent Technologies, Vacuum Products Division** |
| **433** | **AIP Publishing** |
| **109** | **AJA International, Inc.** |
| **436** | **American Institute of Physics** |
| 708 | Amuneal Mfg Corporation |
| 119 | Anderson Dahlen Vacuum/ Applied Vacuum Tech |
| **119** | **Applied Vacuum Technology, LLC.** |
| **322** | **Asylum Research an Oxford Instruments Company** |
| 104 | Atlas Technologies |
| 314 | Avantes, Inc. |
| 544 | AVS - ASK THE EXPERTS Vacuum Technology Division |
| 727 | AVS ART ZONE & CONTEST |
| 138 | AVS CAREER CENTER |
| 122 | AVS E-MAIL PAVILION |
| 800 | AVS Exhibitor Technology Sessions |
| 422 | AVS Foosball Tournament |
| 644 | AVS Future Sites |
| 430 | AVS Publications |
| 745 | AVS RAFFLE ZONE |
| 245 | AVS SPECIAL EVENTS BOOTH |
| 645 | AVS STORE & MEMBERSHIP |
| 431 | AVS/AIPP eSpectra: Surface Science |
| **418** | **BellowsTech, LLC** |
| 327 | Blue Wave Semiconductors, Inc. |
| 337 | Brooks Automation |
| **315** | **CeramTec North America** |
| 716 | Clark Industries Inc. |
| 704 | ColdQuanta, Inc. |
| 702 | CONAX TECHNOLOGIES |
| 519 | COSMOTEC, Inc. |
| 411 | CRC Press/Taylor & Francis Group |
| 506 | CS Clean Solutions, Inc. |
| **511** | **Denton Vacuum LLC** |
| **507** | **Duniway Stockroom Corp.** |
| 516 | Eagle Instrument Services |
| 414 | Ebara Technologies |
| 426 | Edwards Vacuum |
| 701 | Electron Microscopy Sciences |
| 717 | Evey Vacuum Service, LLC / Lixin Vacuum |

| Booth | Company |
|---|---|
| 341 | Extrel |
| 508 | Ferrotec (USA) Corporation |
| 408 | Filmetrics |
| **424** | **Gamma Vacuum** |
| 513 | Geib Refining Corp |
| 409 | Gencoa |
| 606 | Glas-Col, LLC |
| 214 | HeatWave Labs Inc. |
| **412** | **Heidelberg Instruments, Inc.** |
| 429 | Heraeus Noblelight America LLC |
| 417 | Hiden Analytical, Inc. |
| **624** | **Hine Automation** |
| 528 | Horiba Scientific |
| 311 | Huntington Mechanical Labs |
| **215** | **HVA, LLC** |
| **438** | **Impedans Ltd.** |
| 522 | INFICON |
| 525 | Inland Vacuum Industries, Inc. |
| 216 | InstruTech, Inc. |
| 236 | Intel Corporation |
| 415 | International Ceramic Engineering |
| 331 | Intlvac Thin Film |
| **217** | **ION-TOF USA** |
| 517 | IOP Publishing, Inc. |
| 307 | J.A. Woollam Co., Inc. |
| 218 | Kashiyama-USA Inc. |
| **100** | **Kimball Physics Inc.** |
| **301** | **Kratos Analytical** |
| 510 | Kruss USA |
| **201** | **Kurt J. Lesker Company** |
| 118 | Kyungwon Tech Co., Ltd. |
| 446 | LDS Vacuum Products, Inc. |
| 622 | Leybold USA Inc. |
| 207 | MANTIS Deposition, Inc. |
| 623 | McAllister Technical Services, Inc. |
| 208 | MDC Vacuum Products, LLC |
| 333 | MeiVac, Inc. |
| 615 | Micro Photonics |
| 137 | Micron Technology, Inc. |
| **445** | **MKS Instruments** |
| 605 | Modion Vacuum (J.B. Anderson & Son, Inc.) |
| 410 | MPF Products Inc |
| 313 | NiCoForm, Inc. |
| 102 | NIST/CNST |
| 407 | Nonsequitur Technologies |
| **618** | **Nor-Cal Products, Inc.** |
| 705 | NSI |
| 607 | OCI Vacuum Microengineering, Inc. |
| 530 | Omley Industries, Inc. |

| Booth | Company |
|---|---|
| 120 | Osaka Vacuum USA, Inc. |
| 324 | Oxford Instruments |
| 108 | Park Systems, Inc. |
| **406** | **Pfeiffer Vacuum Technology, Inc.** |
| **523** | **PHPK Technologies** |
| **101** | **Physical Electronics** |
| **144** | **Physics Today Exhibitor Lounge** |
| 616 | Phytron, Inc. |
| 718 | Picosun Oy |
| **328** | **Plasmaterials, Inc.** |
| 212 | Precision Ceramics USA, Inc. |
| 640 | Precision Plus Vacuum Parts |
| 318 | Prevac sp. z o.o. |
| **423** | **R.D. Mathis Company** |
| **222** | **RBD Instruments, Inc.** |
| 306 | Refining Systems |
| 111 | Renishaw, Inc. |
| **617** | **RF VII Inc.** |
| **501** | **RHK Technology Inc.** |
| 722 | Ricor USA, Inc. |
| 524 | Rocky Mountain Vacuum Tech., Inc. |
| **541** | **SAES Group** |
| 723 | Scienta Omicron, Inc. |
| **518** | **Scientific Instrument Services, Inc.** |
| 310 | Scientific Instruments, Inc. |
| **628** | **Semicore Equipment, Inc.** |
| 439 | Semilab SDI LLC |
| 301 | Shimadzu Industrial Equipment |
| **301** | **Shimadzu Scientific Instruments** |
| 207 | Sigma Surface Science GmbH |
| **224** | **Solid Sealing Technology, Inc.** |
| **317** | **SPECS Surface Nano Analysis, Inc.** |
| **601** | **SPI Supplies** |
| **229** | **Staib Instruments** |
| **514** | **Super Conductor Materials** |
| 231 | Surface Analysis Consulting |
| **211** | **Synergy Systems Corporation** |
| 233 | T&C Power Conversion, Inc. |
| 515 | TDK-Lambda Americas |
| 226 | Tech-X Corporation |
| 114 | Telemark |
| 223 | Thermo Fisher Scientific |
| 308 | Trillium US, Inc. |
| **323** | **UC Components** |
| 201 | UHV Design Ltd. |
| 603 | Ultratech/Cambridge NanoTech |
| 703 | United Mineral and Chemical Corp. |
| **529** | **Vacuum Research Corporation** |
| **201** | **VAT** |
| 609 | Yugyokuen Ceramics Co., Ltd. |
| 213 | Zeon Chemicals L.P. |

***This listing includes participants as of September 2016***

# Exhibit Hall Floor Plan

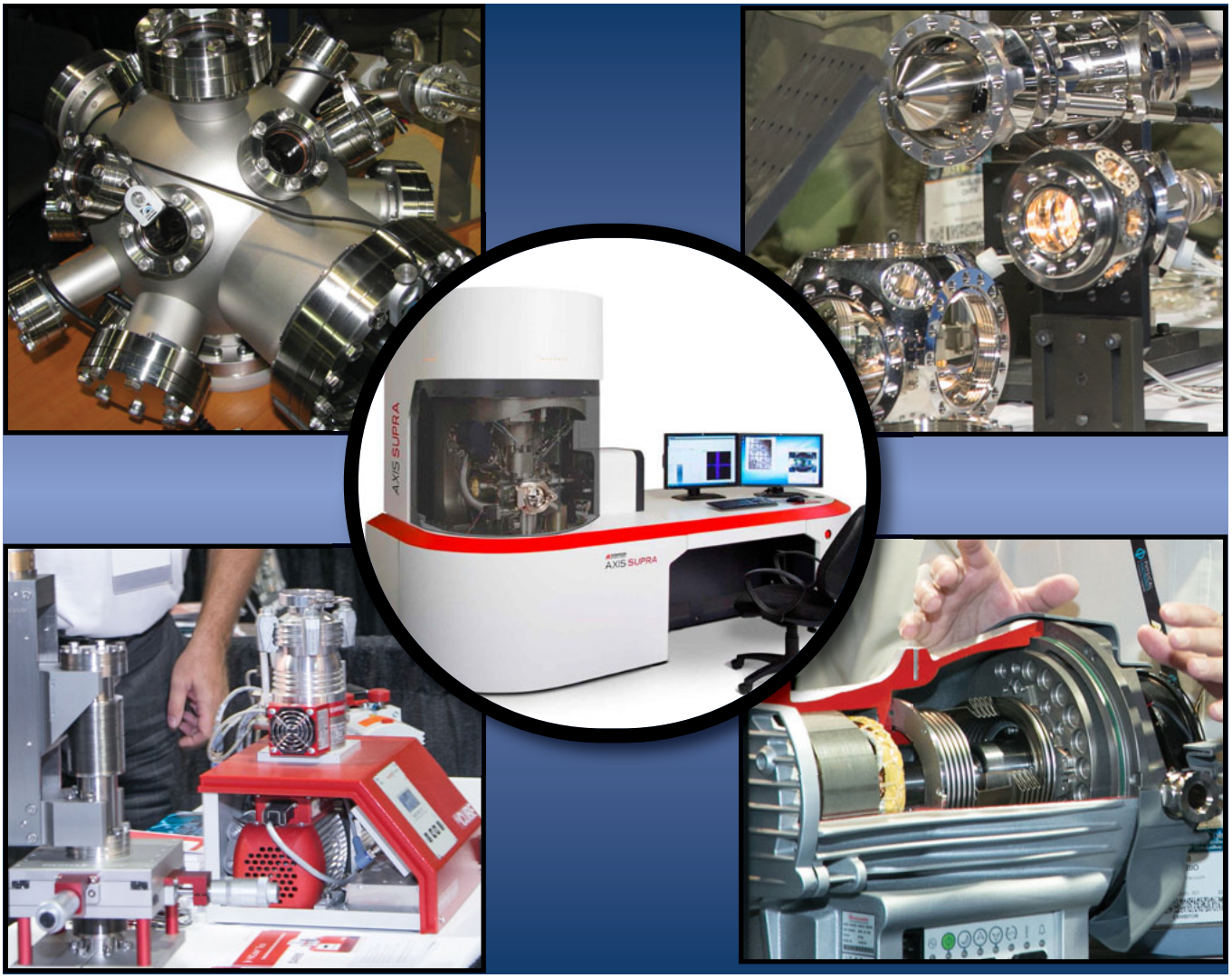
## LUNCH SERVICE & DINING TABLES


ENTRANCE

# PRODUCT LOCATOR

## Not sure what company offers what you're looking for?

**The Product Locator will help you find the vendors you need. Product categories are listed alphabetically followed by the supplier(s) and their corresponding booth location.**



*Continued...*

| Bellows: Miniature Metal | Booth |
|---|---|
| BellowsTech, LLC | 418 |
| MDC Vacuum Products, LLC | 208 |
| NiCoForm, Inc. | 313 |
| UHV Design Ltd. | 201 |

| Bonding Techniques | Booth |
|---|---|
| ColdQuanta, Inc. | 704 |
| Kurt J. Lesker Company | 201 |
| NIST/CNST | 102 |
| Omley Industries, Inc. | 530 |
| Plasmaterials, Inc. | 328 |
| Scientific Instrument Services, Inc. | 518 |
| Solid Sealing Technology, Inc. | 224 |
| Super Conductor Materials | 514 |
| Yugyokuen Ceramics Co., Ltd. | 609 |

| Calibration Services | Booth |
|---|---|
| CONAX TECHNOLOGIES | 702 |
| Impedans Ltd. | 438 |
| LDS Vacuum Products, Inc. | 446 |
| MKS Instruments | 445 |
| Scientific Instruments, Inc. | 310 |
| Semicore Equipment, Inc. | 628 |

| Chemical: Surface Treating Services | Booth |
|---|---|
| NIST/CNST | 102 |
| Scientific Instrument Services, Inc. | 518 |

| Chillers, Cooling Systems | Booth |
|---|---|
| Ace Glass, Inc. | 719 |
| Brooks Automation | 337 |
| RF VII Inc. | 617 |
| Ricor USA, Inc. | 722 |
| Scientific Instruments, Inc. | 310 |
| Synergy Systems Corporation | 211 |
| Telemark | 114 |

| Cleaning Services | Booth |
|---|---|
| Clark Industries Inc. | 716 |
| Ebara Technologies | 414 |
| Geib Refining Corp | 513 |
| Scientific Instrument Services, Inc. | 518 |
| Synergy Systems Corporation | 211 |

| Consulting | Booth |
|---|---|
| Amuneal Mfg Corporation | 708 |
| Anderson Dahlen Vacuum | 119 |
| Applied Vacuum Technology, LLC. | 119 |
| AVS - Ask the Experts - Vacuum Technology | 544 |
| ColdQuanta, Inc. | 704 |
| Gencoa | 409 |
| Impedans Ltd. | 438 |
| ION-TOF USA | 217 |
| Kruss USA | 510 |
| McAllister Technical Services, Inc. | 623 |
| NIST/CNST | 102 |
| PHPK Technologies | 523 |
| Semicore Equipment, Inc. | 628 |
| Surface Analysis Consulting | 231 |
| Synergy Systems Corporation | 211 |
| Tech-X Corporation | 226 |

| Couplings: Flexible Shaft | Booth |
|---|---|
| Anderson Dahlen Vacuum | 119 |
| Applied Vacuum Technology, LLC. | 119 |
| BellowsTech, LLC | 418 |
| Kurt J. Lesker Company | 201 |
| MDC Vacuum Products, LLC | 208 |
| NiCoForm, Inc. | 313 |
| UHV Design Ltd. | 201 |

| Custom Vacuum Systems | Booth |
|---|---|
| A&N Corporation | 441 |
| Ace Glass, Inc. | 719 |
| Agilent Technologies, Vacuum Products Division | 538 |
| AJA International, Inc. | 109 |
| Anderson Dahlen Vacuum | 119 |
| Applied Vacuum Technology, LLC. | 119 |
| Atlas Technologies | 104 |
| CeramTec North America | 315 |
| ColdQuanta, Inc. | 704 |
| COSMOTEC, Inc. | 519 |
| Edwards Vacuum | 426 |
| Extrel | 341 |
| HeatWave Labs Inc. | 214 |
| Heraeus Noblelight America LLC | 429 |
| Hiden Analytical, Inc. | 417 |
| Hine Automation | 624 |
| HVA, LLC | 215 |
| Impedans Ltd. | 438 |
| Intlvac Thin Film | 331 |
| Kimball Physics Inc. | 100 |
| Kurt J. Lesker Company | 201 |
| LDS Vacuum Products, Inc. | 446 |

*Continued...*

| Custom Vacuum Systems | Booth |
|---|---|
| Leybold USA Inc. | 622 |
| MANTIS Deposition, Inc. | 207 |
| McAllister Technical Services, Inc. | 623 |
| MDC Vacuum Products, LLC | 208 |
| MeiVac, Inc. | 333 |
| MKS Instruments | 445 |
| Modion Vacuum (J.B. Anderson & Son, Inc.) | 605 |
| Nor-Cal Products, Inc. | 618 |
| NSI | 705 |
| OCI Vacuum Microengineering, Inc. | 607 |
| Omley Industries, Inc. | 530 |
| PHPK Technologies | 523 |
| Prevac sp. z o.o. | 318 |
| RF VII Inc. | 617 |
| RHK Technology Inc. | 501 |
| Ricor USA, Inc. | 722 |
| Rocky Mountain Vacuum Tech., Inc. | 524 |
| Scienta Omicron, Inc. | 723 |
| Semicore Equipment, Inc. | 628 |
| Staib Instruments | 229 |
| Synergy Systems Corporation | 211 |

| Detectors / Multipliers | |
|---|---|
| Extrel | 341 |
| Hiden Analytical, Inc. | 417 |
| Horiba Scientific | 528 |
| Micro Photonics | 615 |
| RBD Instruments, Inc. | 222 |
| Scientific Instrument Services, Inc. | 518 |
| SPECS Surface Nano Analysis, Inc. | 317 |
| SPI Supplies | 601 |

| E-Beam Gun Power Supplies | |
|---|---|
| INFICON | 522 |
| International Ceramic Engineering | 415 |
| Kimball Physics Inc. | 100 |
| Kurt J. Lesker Company | 201 |
| MANTIS Deposition, Inc. | 207 |
| MeiVac, Inc. | 333 |
| Micro Photonics | 615 |
| Prevac sp. z o.o. | 318 |
| Staib Instruments | 229 |
| Telemark | 114 |

| E-Beam Gun Sweeps | Booth |
|---|---|
| Impedans Ltd. | 438 |
| Kimball Physics Inc. | 100 |
| MeiVac, Inc. | 333 |
| Prevac sp. z o.o. | 318 |
| Telemark | 114 |

| E-Beam Guns | |
|---|---|
| HeatWave Labs Inc. | 214 |
| Kimball Physics Inc. | 100 |
| Kurt J. Lesker Company | 201 |
| MANTIS Deposition, Inc. | 207 |
| McAllister Technical Services, Inc. | 623 |
| MeiVac, Inc. | 333 |
| Micro Photonics | 615 |
| Prevac sp. z o.o. | 318 |
| Staib Instruments | 229 |
| Super Conductor Materials | 514 |
| Telemark | 114 |
| Yugyokuen Ceramics Co., Ltd. | 609 |

| Electroforming Services | |
|---|---|
| BellowsTech, LLC | 418 |
| NiCoForm, Inc. | 313 |

| Electroforms: Custom | |
|---|---|
| BellowsTech, LLC | 418 |
| NiCoForm, Inc. | 313 |

| Employment Services / Recruiting | |
|---|---|
| AVS E-MAIL PAVILION | 122 |

| Equipment, Used | |
|---|---|
| Blue Wave Semiconductors, Inc. | 327 |
| Duniway Stockroom Corp. | 507 |
| Eagle Instrument Services | 516 |
| Ebara Technologies | 414 |
| Hine Automation | 624 |
| LDS Vacuum Products, Inc. | 446 |
| Pfeiffer Vacuum Technology, Inc. | 406 |
| RBD Instruments, Inc. | 222 |
| RF VII Inc. | 617 |
| Semicore Equipment, Inc. | 628 |
| Synergy Systems Corporation | 211 |
| Trillium US, Inc. | 308 |

| Fittings, Gaskets, Flanges, Seals | Booth |
|---|---|
| A&N Corporation | 441 |
| Ace Glass, Inc. | 719 |
| Anderson Dahlen Vacuum | 119 |
| Applied Vacuum Technology, LLC. | 119 |
| Atlas Technologies | 104 |
| BellowsTech, LLC | 418 |
| CeramTec North America | 315 |
| Clark Industries Inc. | 716 |
| CONAX TECHNOLOGIES | 702 |
| COSMOTEC, Inc. | 519 |
| Duniway Stockroom Corp. | 507 |
| Ebara Technologies | 414 |
| HVA, LLC | 215 |
| INFICON | 522 |
| International Ceramic Engineering | 415 |
| Kimball Physics Inc. | 100 |
| Kurt J. Lesker Company | 201 |
| LDS Vacuum Products, Inc. | 446 |
| Leybold USA Inc. | 622 |
| McAllister Technical Services, Inc. | 623 |
| MDC Vacuum Products, LLC | 208 |
| MKS Instruments | 445 |
| Nonsequitur Technologies | 407 |
| Nor-Cal Products, Inc. | 618 |
| Omley Industries, Inc. | 530 |
| Pfeiffer Vacuum Technology, Inc. | 406 |
| Precision Plus Vacuum Parts | 640 |
| RBD Instruments, Inc. | 222 |
| Scientific Instrument Services, Inc. | 518 |
| Solid Sealing Technology, Inc. | 224 |
| Trillium US, Inc. | 308 |
| UC Components | 323 |
| Yugyokuen Ceramics Co., Ltd. | 609 |

| FT-IR | |
|---|---|
| MKS Instruments | 445 |
| Prevac sp. z o.o. | 318 |
| Renishaw, Inc. | 111 |
| Ricor USA, Inc. | 722 |
| Shimadzu Scientific Instruments | 301 |
| Thermo Scientific | 223 |

| Gas Control Systems | Booth |
|---|---|
| Ace Glass, Inc. | 719 |
| Anderson Dahlen Vacuum/ AVT | 119 |
| CeramTec North America | 315 |
| COSMOTEC, Inc. | 519 |
| Hiden Analytical, Inc. | 417 |
| MDC Vacuum Products, LLC | 208 |
| MKS Instruments | 445 |
| NSI | 705 |

| Gauges, Tubes | |
|---|---|
| A&N Corporation | 441 |
| Ace Glass, Inc. | 719 |
| Agilent Technologies, Vacuum Products Division | 538 |
| Clark Industries Inc. | 716 |
| Duniway Stockroom Corp. | 507 |
| Edwards Vacuum | 426 |
| Hiden Analytical, Inc. | 417 |
| INFICON | 522 |
| Instrutech, Inc. | 216 |
| International Ceramic Engineering | 415 |
| Kurt J. Lesker Company | 201 |
| MDC Vacuum Products, LLC | 208 |
| MKS Instruments | 445 |
| Pfeiffer Vacuum Technology, Inc. | 406 |
| Precision Plus Vacuum Parts | 640 |
| RBD Instruments, Inc. | 222 |
| Scienta Omicron, Inc. | 723 |
| Scientific Instrument Services, Inc. | 518 |
| Vacuum Research Corporation | 529 |

| GC-MS / LC-MS | |
|---|---|
| Hiden Analytical, Inc. | 417 |
| INFICON | 522 |
| Scientific Instrument Services, Inc. | 518 |
| Shimadzu Scientific Instruments | 301 |
| Yugyokuen Ceramics Co., Ltd. | 609 |

| Glassware | |
|---|---|
| A&N Corporation | 441 |
| Ace Glass, Inc. | 719 |
| AdValue Technology | 700 |
| ColdQuanta, Inc. | 704 |
| Electron Microscopy Sciences | 701 |
| International Ceramic Engineering | 415 |
| RBD Instruments, Inc. | 222 |
| Scientific Instrument Services, Inc. | 518 |

| Glove Boxes | |
|---|---|
| Glas-Col, LLC | 606 |

| Ion / Electron Guns | Booth |
|---|---|
| COSMOTEC, Inc. | 519 |
| Gencoa | 409 |
| HeatWave Labs Inc. | 214 |
| Hiden Analytical, Inc. | 417 |
| Intlvac Thin Film | 331 |
| ION-TOF USA | 217 |
| Kimball Physics Inc. | 100 |
| Kratos Analytical | 301 |
| Kurt J. Lesker Company | 201 |
| MANTIS Deposition, Inc. | 207 |
| Micro Photonics | 615 |
| NIST/CNST | 102 |
| Nonsequitur Technologies | 407 |
| OCI Vacuum Microengineering, Inc. | 607 |
| Prevac sp. z o.o. | 318 |
| RBD Instruments, Inc. | 222 |
| Scienta Omicron, Inc. | 723 |
| SPECS Surface Nano Analysis, Inc. | 317 |
| Staib Instruments | 229 |
| Telemark | 114 |
| Yugyokuen Ceramics Co., Ltd. | 609 |

| Ion Beam Deposition Systems/Guns | |
|---|---|
| AJA International, Inc. | 109 |
| CeramTec North America | 315 |
| COSMOTEC, Inc. | 519 |
| HeatWave Labs Inc. | 214 |
| Hiden Analytical, Inc. | 417 |
| Impedans Ltd. | 438 |
| Intlvac Thin Film | 331 |
| Kurt J. Lesker Company | 201 |
| MANTIS Deposition, Inc. | 207 |
| McAllister Technical Services, Inc. | 623 |
| Micro Photonics | 615 |
| NIST/CNST | 102 |
| Oxford Instruments | 324 |
| Rocky Mountain Vacuum Tech., Inc. | 524 |
| Semicore Equipment, Inc. | 628 |


| Leak Detectors | Booth |
|---|---|
| A&N Corporation | 441 |
| Agilent Technologies, Vacuum Products Division | 538 |
| Duniway Stockroom Corp. | 507 |
| Hiden Analytical, Inc. | 417 |
| INFICON | 522 |
| LDS Vacuum Products, Inc. | 446 |
| Leybold USA Inc. | 622 |
| MKS Instruments | 445 |
| Pfeiffer Vacuum Technology, Inc. | 406 |
| Ricor USA, Inc. | 722 |
| Scientific Instrument Services, Inc. | 518 |
| Shimadzu Industrial Equipment | 301 |
| Synergy Systems Corporation | 211 |
| Yugyokuen Ceramics Co., Ltd. | 609 |

| Lithography Systems | |
|---|---|
| Heidelberg Instruments, Inc. | 412 |
| NIST/CNST | 102 |
| Scienta Omicron, Inc. | 723 |

| Machining (Bulk and Special) | |
|---|---|
| Anderson Dahlen Vacuum | 119 |
| Applied Vacuum Technology, LLC. | 119 |
| Atlas Technologies | 104 |
| ColdQuanta, Inc. | 704 |
| International Ceramic Engineering | 415 |
| Kurt J. Lesker Company | 201 |
| McAllister Technical Services, Inc. | 623 |
| MDC Vacuum Products, LLC | 208 |
| Modion Vacuum (J.B. Anderson & Son, Inc.) | 605 |
| Precision Ceramics USA, Inc. | 212 |
| Scientific Instrument Services, Inc. | 518 |
| Super Conductor Materials | 514 |
| UC Components | 323 |

| Machining (Repair, Refurb, Mods) | |
|---|---|
| Anderson Dahlen Vacuum | 119 |
| Applied Vacuum Technology, LLC. | 119 |
| Atlas Technologies | 104 |
| Clark Industries Inc. | 716 |
| International Ceramic Engineering | 415 |
| LDS Vacuum Products, Inc. | 446 |
| McAllister Technical Services, Inc. | 623 |
| Modion Vacuum (J.B. Anderson & Son, Inc.) | 605 |
| Precision Ceramics USA, Inc. | 212 |
| Precision Plus Vacuum Parts | 640 |
| Scientific Instrument Services, Inc. | 518 |
| Super Conductor Materials | 514 |

| Ovens, Vacuum | Booth |
|---|---|
| Ace Glass, Inc. | 719 |
| Anderson Dahlen Vacuum | 119 |
| Applied Vacuum Technology, LLC. | 119 |
| Blue Wave Semiconductors, Inc. | 327 |
| Electron Microscopy Sciences | 701 |
| Glas-Col, LLC | 606 |
| HeatWave Labs Inc. | 214 |
| Heraeus Noblelight America LLC | 429 |
| Hiden Analytical, Inc. | 417 |
| Prevac sp. z o.o. | 318 |
| Rocky Mountain Vacuum Tech., Inc. | 524 |

| Particle Monitoring | |
|---|---|
| Horiba Scientific | 528 |

| Planar Magnetron Cathods | |
|---|---|
| AJA International, Inc. | 109 |
| Gencoa | 409 |
| Kurt J. Lesker Company | 201 |
| MeiVac, Inc. | 333 |
| NIST/CNST | 102 |
| Refining Systems | 306 |
| Super Conductor Materials | 514 |

| Process Controllers/Monitors | |
|---|---|
| Blue Wave Semiconductors, Inc. | 327 |
| Extrel | 341 |
| Gencoa | 409 |
| Glas-Col, LLC | 606 |
| Horiba Scientific | 528 |
| Impedans Ltd. | 438 |
| INFICON | 522 |
| Kurt J. Lesker Company | 201 |
| MeiVac, Inc. | 333 |
| MKS Instruments | 445 |
| Scientific Instruments, Inc. | 310 |
| Telemark | 114 |

| Publishers | |
|---|---|
| AIP Publishing | 433 |
| American Institute of Physics | 436 |
| AVS Publications | 430 |
| AVS Surface Science Spectra Data Browser | 431 |
| CRC Press/Taylor & Francis Group | 411 |
| IOP Publishing, Inc. | 517 |
| Physics Today | 144 |

| Pumps, Equipment, Services & Supplies | Booth |
|---|---|
| Ace Glass, Inc. | 719 |
| Agilent Technologies, Vacuum Products Division | 538 |
| Anderson Dahlen Vacuum | 119 |
| Applied Vacuum Technology, LLC. | 119 |
| Brooks Automation | 337 |
| Clark Industries Inc. | 716 |
| ColdQuanta, Inc. | 704 |
| CS Clean Solutions, Inc. | 506 |
| Duniway Stockroom Corp. | 507 |
| Eagle Instrument Services | 516 |
| Ebara Technologies | 414 |
| Edwards Vacuum | 426 |
| Electron Microscopy Sciences | 701 |
| Extrel | 341 |
| Gamma Vacuum | 424 |
| Glas-Col, LLC | 606 |
| HeatWave Labs Inc. | 214 |
| Inland Vacuum Industries, Inc. | 525 |
| International Ceramic Engineering | 415 |
| Kashiyama-USA Inc. | 218 |
| Kurt J. Lesker Company | 201 |
| LDS Vacuum Products, Inc. | 446 |
| Leybold USA Inc. | 622 |
| Modion Vacuum (J.B. Anderson & Son, Inc.) | 605 |
| Omley Industries, Inc. | 530 |
| Pfeiffer Vacuum Technology, Inc. | 406 |
| PHPK Technologies | 523 |
| Precision Plus Vacuum Parts | 640 |
| RBD Instruments, Inc. | 222 |
| Ricor USA, Inc. | 722 |
| SAES Group | 541 |
| Scientific Instrument Services, Inc. | 518 |
| Semicore Equipment, Inc. | 628 |
| Shimadzu Industrial Equipment | 301 |
| SPI Supplies | 601 |
| Synergy Systems Corporation | 211 |
| Trillium US, Inc. | 308 |
| Vacuum Research Corporation | 529 |

| Purification Systems | |
|---|---|
| CS Clean Solutions, Inc. | 506 |
| R.D. Mathis Company | 423 |

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|---|---|
| Horiba Scientific | 528 |
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| Renishaw, Inc. | 111 |
| Shimadzu Scientific Instruments | 301 |
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| Recruiter/Job Placement/Career Services | Booth |
|---|---|
| American Institute of Physics | 436 |
| American Vacuum Society | 138 |
| Intel Corporation | 236 |
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| RF Systems/Generators/Power Supplies | |
|---|---|
| Extrel | 341 |
| Impedans Ltd. | 438 |
| International Ceramic Engineering | 415 |
| Kurt J. Lesker Company | 201 |
| MANTIS Deposition, Inc. | 207 |
| MeiVac, Inc. | 333 |
| Micro Photonics | 615 |
| MKS Instruments | 445 |
| Modion Vacuum (J.B. Anderson & Son, Inc.) | 605 |
| RF VII Inc. | 617 |
| Semicore Equipment, Inc. | 628 |
| SPI Supplies | 601 |
| T&C Power Conversion, Inc. | 233 |
| TDK-Lambda Americas | 515 |

| Sample Manipulation & Heating | |
|---|---|
| AdValue Technology | 700 |
| Anderson Dahlen Vacuum/AVT | 119 |
| Blue Wave Semiconductors, Inc. | 327 |
| Glas-Col, LLC | 606 |
| International Ceramic Engineering | 415 |
| Kurt J. Lesker Company | 201 |
| McAllister Technical Services, Inc. | 623 |
| MDC Vacuum Products, LLC | 208 |
| UHV Design Ltd. | 201 |

| Scanning Probe Microscopy Systems | |
|---|---|
| Asylum Research an Oxford Instruments Company | 322 |
| ION-TOF USA | 217 |
| Prevac sp. z o.o. | 318 |
| RHK Technology Inc. | 501 |
| Ricor USA, Inc. | 722 |
| Scienta Omicron, Inc. | 723 |
| Sigma Surface Science GmbH | 207 |
| SPECS Surface Nano Analysis, Inc. | 317 |

| Software | |
|---|---|
| Ace Glass, Inc. | 719 |
| Impedans Ltd. | 438 |
| MKS Instruments | 445 |
| RBD Instruments, Inc. | 222 |
| Scientific Instrument Services, Inc. | 518 |
| Surface Analysis Consulting | 231 |
| Tech-X Corporation | 226 |

| Spectrometer Accessories | Booth |
|---|---|
| CeramTec North America | 315 |
| COSMOTEC, Inc. | 519 |
| Extrel | 341 |
| Hiden Analytical, Inc. | 417 |
| Horiba Scientific | 528 |
| RBD Instruments, Inc. | 222 |
| Ricor USA, Inc. | 722 |
| SAES Group | 541 |
| Scientific Instrument Services, Inc. | 518 |
| Shimadzu Industrial Equipment | 301 |
| Thermo Scientific | 223 |

| Sputtering Deposition System | |
|---|---|
| AJA International, Inc. | 109 |
| Blue Wave Semiconductors, Inc. | 327 |
| Brooks Automation | 337 |
| CeramTec North America | 315 |
| COSMOTEC, Inc. | 519 |
| Electron Microscopy Sciences | 701 |
| Hiden Analytical, Inc. | 417 |
| Impedans Ltd. | 438 |
| International Ceramic Engineering | 415 |
| Intlvac Thin Film | 331 |
| Kurt J. Lesker Company | 201 |
| Leybold USA Inc. | 622 |
| MANTIS Deposition, Inc. | 207 |
| McAllister Technical Services, Inc. | 623 |
| MDC Vacuum Products, LLC | 208 |
| MeiVac, Inc. | 333 |
| Micro Photonics | 615 |
| NIST/CNST | 102 |
| Nor-Cal Products, Inc. | 618 |
| RF VII Inc. | 617 |
| Ricor USA, Inc. | 722 |
| Rocky Mountain Vacuum Tech., Inc. | 524 |
| Scienta Omicron, Inc. | 723 |
| Semicore Equipment, Inc. | 628 |
| SPECS Surface Nano Analysis, Inc. | 317 |
| SPI Supplies | 601 |

| Temperature Sensors | |
|---|---|
| Ace Glass, Inc. | 719 |
| CONAX TECHNOLOGIES | 702 |

| Thickness Monitors/Measurement | Booth |
|---|---|
| A&N Corporation | 441 |
| Accurion GmbH | 316 |
| Filmetrics | 408 |
| Hiden Analytical, Inc. | 417 |
| Horiba Scientific | 528 |
| INFICON | 522 |
| J.A. Woollam Co., Inc. | 307 |
| Kurt J. Lesker Company | 201 |
| Micro Photonics | 615 |
| NIST/CNST | 102 |
| Prevac sp. z o.o. | 318 |
| RBD Instruments, Inc. | 222 |
| SPI Supplies | 601 |
| Telemark | 114 |

| Thin Film Vacuum Coating | |
|---|---|
| AdValue Technology | 700 |
| Blue Wave Semiconductors, Inc. | 327 |
| CeramTec North America | 315 |
| ColdQuanta, Inc. | 704 |
| COSMOTEC, Inc. | 519 |
| Electron Microscopy Sciences | 701 |
| Gencoa | 409 |
| Hiden Analytical, Inc. | 417 |
| Hine Automation | 624 |
| Impedans Ltd. | 438 |
| Intlvac Thin Film | 331 |
| Kurt J. Lesker Company | 201 |
| Leybold USA Inc. | 622 |
| MANTIS Deposition, Inc. | 207 |
| MDC Vacuum Products, LLC | 208 |
| Micro Photonics | 615 |
| NIST/CNST | 102 |
| Nor-Cal Products, Inc. | 618 |
| OCI Vacuum Microengineering, Inc. | 607 |
| Prevac sp. z o.o. | 318 |
| RBD Instruments, Inc. | 222 |
| RF VII Inc. | 617 |
| Ricor USA, Inc. | 722 |
| Rocky Mountain Vacuum Tech., Inc. | 524 |
| Scienta Omicron, Inc. | 723 |
| SPECS Surface Nano Analysis, Inc. | 317 |
| SPI Supplies | 601 |
| Super Conductor Materials | 514 |
| Telemark | 114 |
| Ultratech/Cambridge NanoTech | 603 |

| ToF SIMS Instruments | Booth |
|---|---|
| Hiden Analytical, Inc. | 417 |
| ION-TOF USA | 217 |
| Physical Electronics | 101 |
| SPECS Surface Nano Analysis, Inc. | 317 |

| Tubing/Piping/Bellows Assemblies | |
|---|---|
| A&N Corporation | 441 |
| AdValue Technology | 700 |
| Anderson Dahlen Vacuum | 119 |
| Applied Vacuum Technology, LLC. | 119 |
| Atlas Technologies | 104 |
| BellowsTech, LLC | 418 |
| Duniway Stockroom Corp. | 507 |
| Ebara Technologies | 414 |
| International Ceramic Engineering | 415 |
| LDS Vacuum Products, Inc. | 446 |
| MDC Vacuum Products, LLC | 208 |
| MKS Instruments | 445 |
| NiCoForm, Inc. | 313 |
| Nor-Cal Products, Inc. | 618 |
| NSI | 705 |
| Omley Industries, Inc. | 530 |
| Scientific Instrument Services, Inc. | 518 |
| UHV Design Ltd. | 201 |
| Vacuum Research Corporation | 529 |

| UV VIS | |
|---|---|
| Accurion GmbH | 316 |
| AdValue Technology | 700 |
| Horiba Scientific | 528 |
| Shimadzu Scientific Instruments | 301 |
| Thermo Scientific | 223 |

| Vacuum System Accessories | Booth |
|---|---|
| A&N Corporation | 441 |
| Ace Glass, Inc. | 719 |
| Agilent Technologies, Vacuum Products Division | 538 |
| Anderson Dahlen Vacuum | 119 |
| Applied Vacuum Technology, LLC. | 119 |
| Atlas Technologies | 104 |
| BellowsTech, LLC | 418 |
| Blue Wave Semiconductors, Inc. | 327 |
| Brooks Automation | 337 |
| CeramTec North America | 315 |
| Clark Industries Inc. | 716 |
| ColdQuanta, Inc. | 704 |
| COSMOTEC, Inc. | 519 |
| CS Clean Solutions, Inc. | 506 |
| Duniway Stockroom Corp. | 507 |
| Ebara Technologies | 414 |
| Edwards Vacuum | 426 |
| Extrel | 341 |
| Glas-Col, LLC | 606 |
| HeatWave Labs Inc. | 214 |
| Heraeus Noblelight America LLC | 429 |
| Hiden Analytical, Inc. | 417 |
| Hine Automation | 624 |
| Huntington Mechanical Labs | 311 |
| HVA, LLC | 215 |
| INFICON | 522 |
| Inland Vacuum Industries, Inc. | 525 |
| Instrutech, Inc. | 216 |
| International Ceramic Engineering | 415 |
| Kimball Physics Inc. | 100 |
| Kurt J. Lesker Company | 201 |
| LDS Vacuum Products, Inc. | 446 |
| Leybold USA Inc. | 622 |
| McAllister Technical Services, Inc. | 623 |
| MDC Vacuum Products, LLC | 208 |
| Micro Photonics | 615 |
| MKS Instruments | 445 |
| Modion Vacuum (J.B. Anderson & Son, Inc.) | 605 |
| NiCoForm, Inc. | 313 |
| Nonsequitur Technologies | 407 |
| Nor-Cal Products, Inc. | 618 |
| Omley Industries, Inc. | 530 |
| Pfeiffer Vacuum Technology, Inc. | 406 |
| PHPK Technologies | 523 |
| Precision Plus Vacuum Parts | 640 |
| Prevac sp. z o.o. | 318 |
| R.D. Mathis Company | 423 |
| RBD Instruments, Inc. | 222 |
| RF VII Inc. | 617 |
| RHK Technology Inc. | 501 |
| Ricor USA, Inc. | 722 |
| Rocky Mountain Vacuum Tech., Inc. | 524 |
| SAES Group | 541 |
| Scientific Instrument Services, Inc. | 518 |
| Semicore Equipment, Inc. | 628 |
| Solid Sealing Technology, Inc. | 224 |
| SPI Supplies | 601 |
| Staib Instruments | 229 |
| Synergy Systems Corporation | 211 |
| Telemark | 114 |
| Trillium US, Inc. | 308 |
| UC Components | 323 |
| UHV Design Ltd. | 201 |
| Vacuum Research Corporation | 529 |
| Yugyokuen Ceramics Co., Ltd. | 609 |

| Vacuum System Replacement Parts | |
|---|---|
| Ace Glass, Inc. | 719 |
| Agilent Technologies, Vacuum Products Division | 538 |
| Anderson Dahlen Vacuum | 119 |
| Applied Vacuum Technology, LLC. | 119 |
| Atlas Technologies | 104 |
| BellowsTech, LLC | 418 |
| Blue Wave Semiconductors, Inc. | 327 |
| Brooks Automation | 337 |
| CeramTec North America | 315 |
| Clark Industries Inc. | 716 |
| COSMOTEC, Inc. | 519 |
| Ebara Technologies | 414 |
| Edwards Vacuum | 426 |
| Extrel | 341 |
| HeatWave Labs Inc. | 214 |
| Hine Automation | 624 |
| Huntington Mechanical Labs | 311 |
| International Ceramic Engineering | 415 |
| LDS Vacuum Products, Inc. | 446 |
| MDC Vacuum Products, LLC | 208 |
| Micro Photonics | 615 |
| Modion Vacuum (J.B. Anderson & Son, Inc.) | 605 |
| NiCoForm, Inc. | 313 |
| Nor-Cal Products, Inc. | 618 |
| Precision Plus Vacuum Parts | 640 |
| Prevac sp. z o.o. | 318 |
| R.D. Mathis Company | 423 |
| RBD Instruments, Inc. | 222 |
| RF VII Inc. | 617 |
| SAES Group | 541 |
| Scientific Instrument Services, Inc. | 518 |
| Synergy Systems Corporation | 211 |
| Trillium US, Inc. | 308 |
| UC Components | 323 |
| UHV Design Ltd. | 201 |

*Continued...*

| Valves | Booth |
|---|---|
| A&N Corporation | 441 |
| Agilent Technologies, Vacuum Products Division | 538 |
| Anderson Dahlen Vacuum/AVT | 119 |
| Duniway Stockroom Corp. | 507 |
| Ebara Technologies | 414 |
| Edwards Vacuum | 426 |
| Hiden Analytical, Inc. | 417 |
| Huntington Mechanical Labs | 311 |
| HVA, LLC | 215 |
| International Ceramic Engineering | 415 |
| Kurt J. Lesker Company | 201 |
| LDS Vacuum Products, Inc. | 446 |
| Leybold USA Inc. | 622 |
| McAllister Technical Services, Inc. | 623 |
| MDC Vacuum Products, LLC | 208 |
| MeiVac, Inc. | 333 |
| MKS Instruments | 445 |
| Nor-Cal Products, Inc. | 618 |
| Pfeiffer Vacuum Technology, Inc. | 406 |
| PHPK Technologies | 523 |
| Precision Plus Vacuum Parts | 640 |
| Scientific Instrument Services, Inc. | 518 |
| Trillium US, Inc. | 308 |
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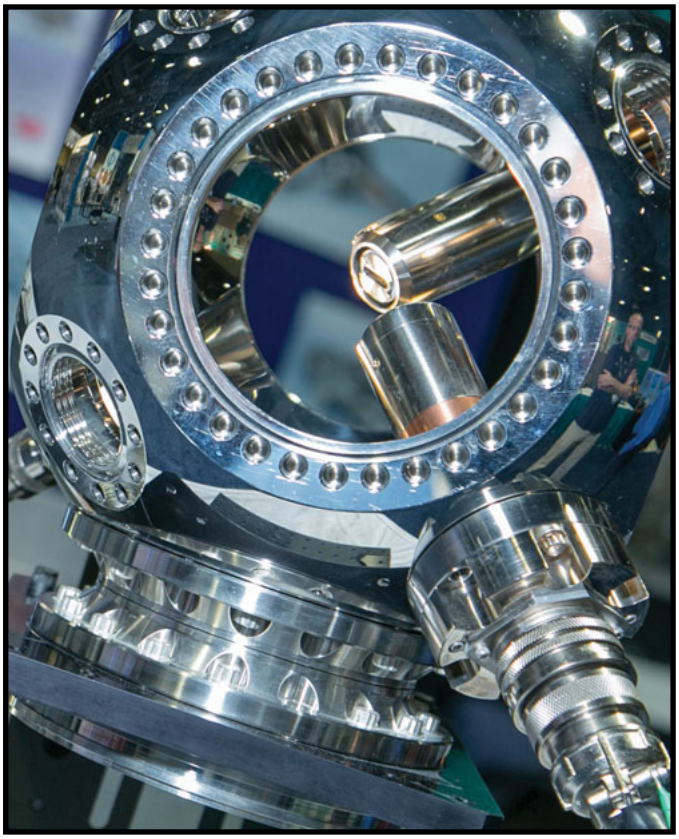
| VAT | 201 |

| X-Ray Photoelectron Spectrometers | |
|---|---|
| CeramTec North America | 315 |
| COSMOTEC, Inc. | 519 |
| Kratos Analytical | 301 |
| NIST/CNST | 102 |
| Physical Electronics | 101 |
| Prevac sp. z o.o. | 318 |
| RBD Instruments, Inc. | 222 |
| Ricor USA, Inc. | 722 |
| Scienta Omicron, Inc. | 723 |
| Sigma Surface Science GmbH | 207 |
| SPECS Surface Nano Analysis, Inc. | 317 |
| Surface Analysis Consulting | 231 |
| Thermo Scientific | 223 |



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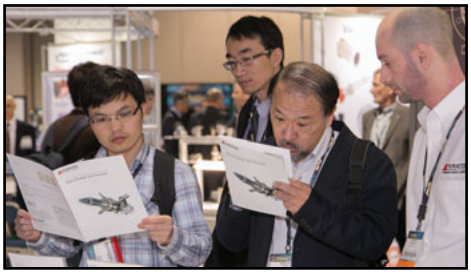

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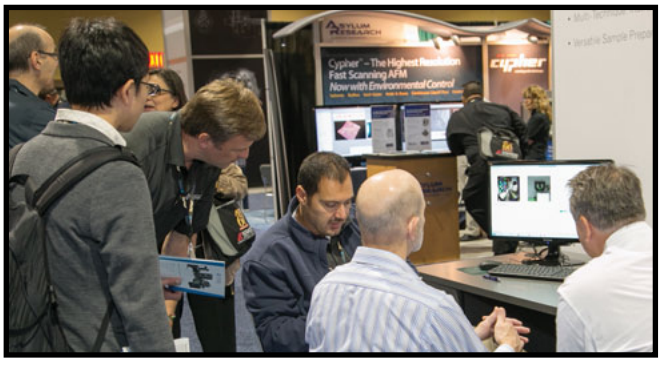

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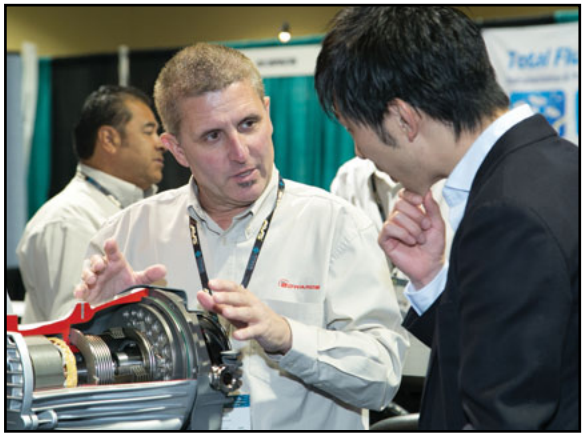

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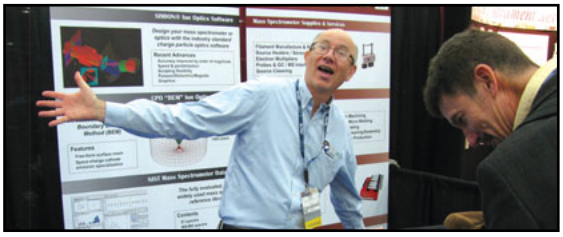

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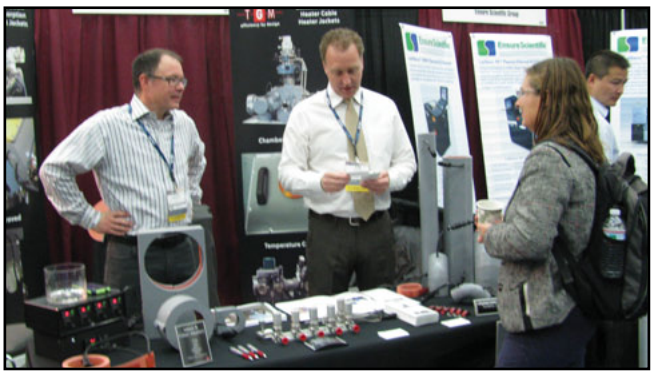

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