

# Asymmetry of the Junction Line Defect Distribution in WS<sub>2</sub>-WSe<sub>2</sub> Lateral / Vertical Heterostructures Revealed by TERS Imaging

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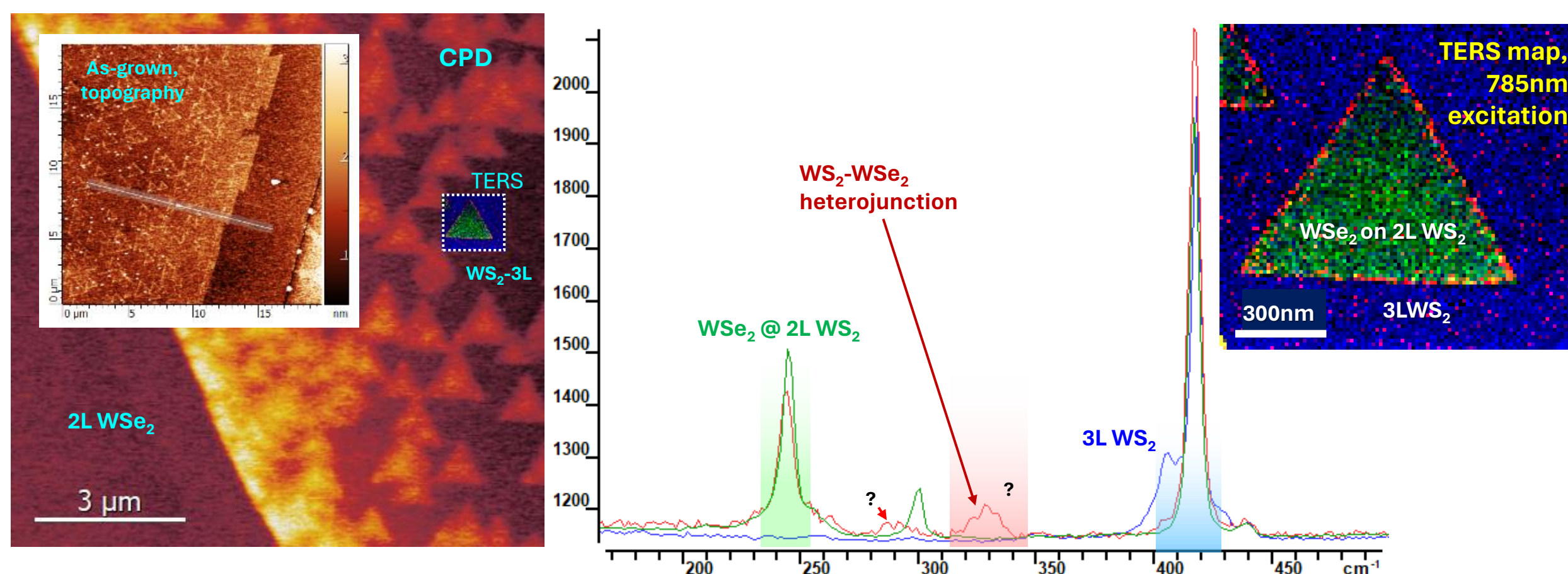
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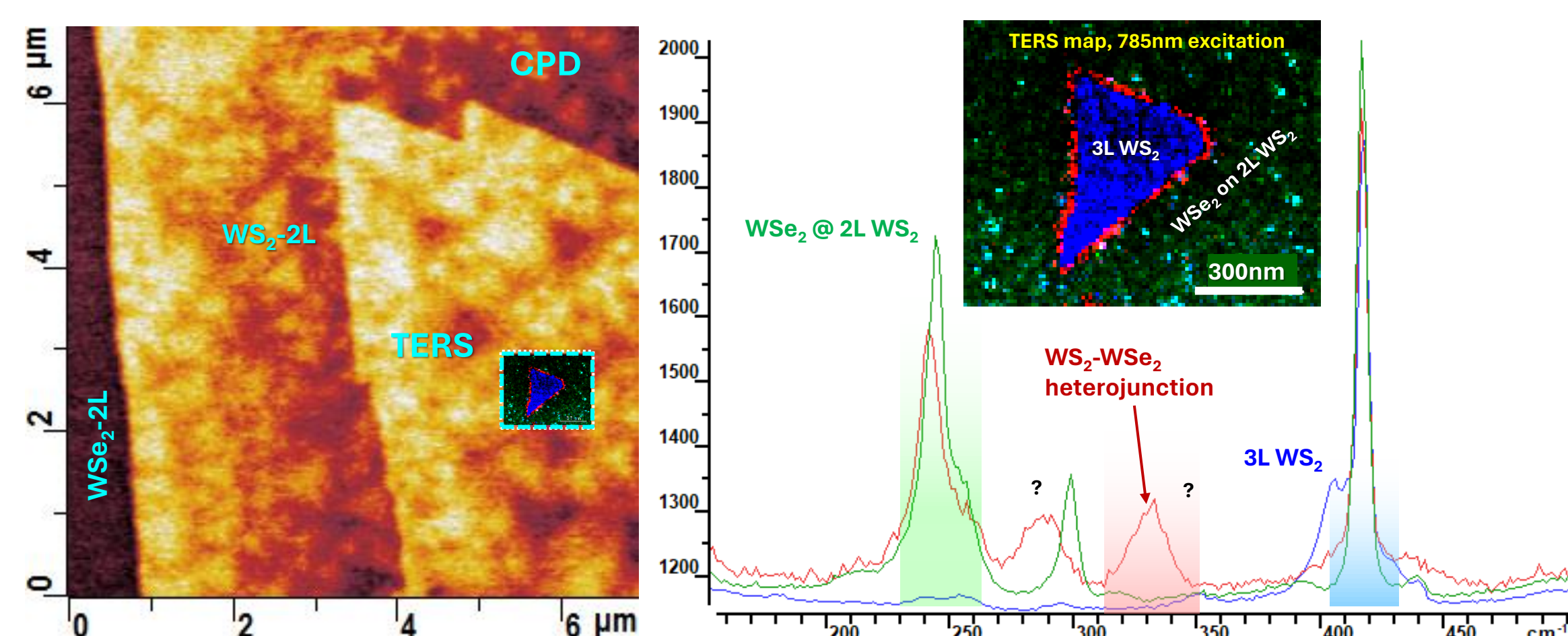


## Cross-correlation of the AFM and Raman data at Nanoscale

Properties of the heterojunction in WSe<sub>2</sub>-WS<sub>2</sub> on 2L WS<sub>2</sub>

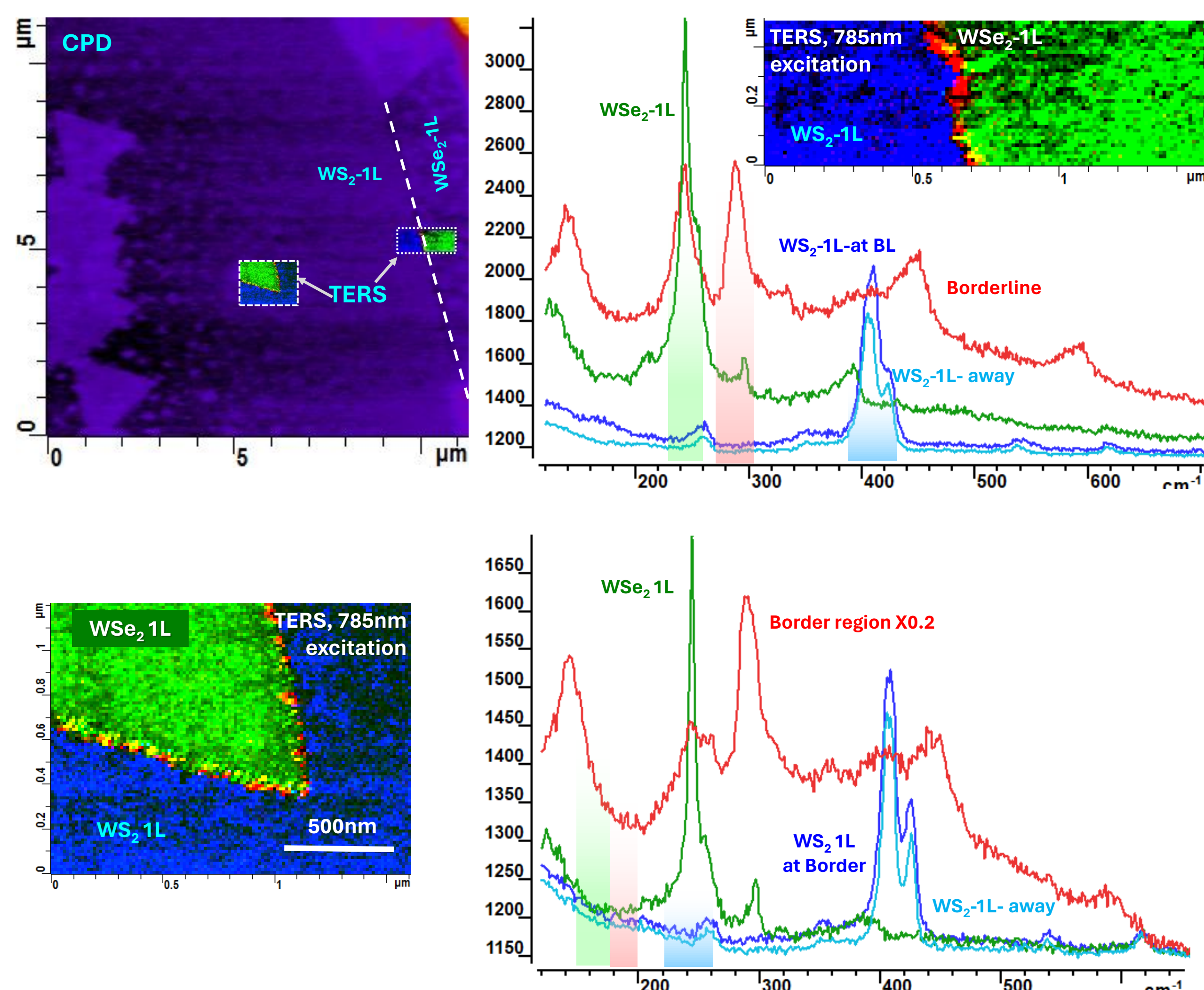


## The junction consistently shows chemical differences

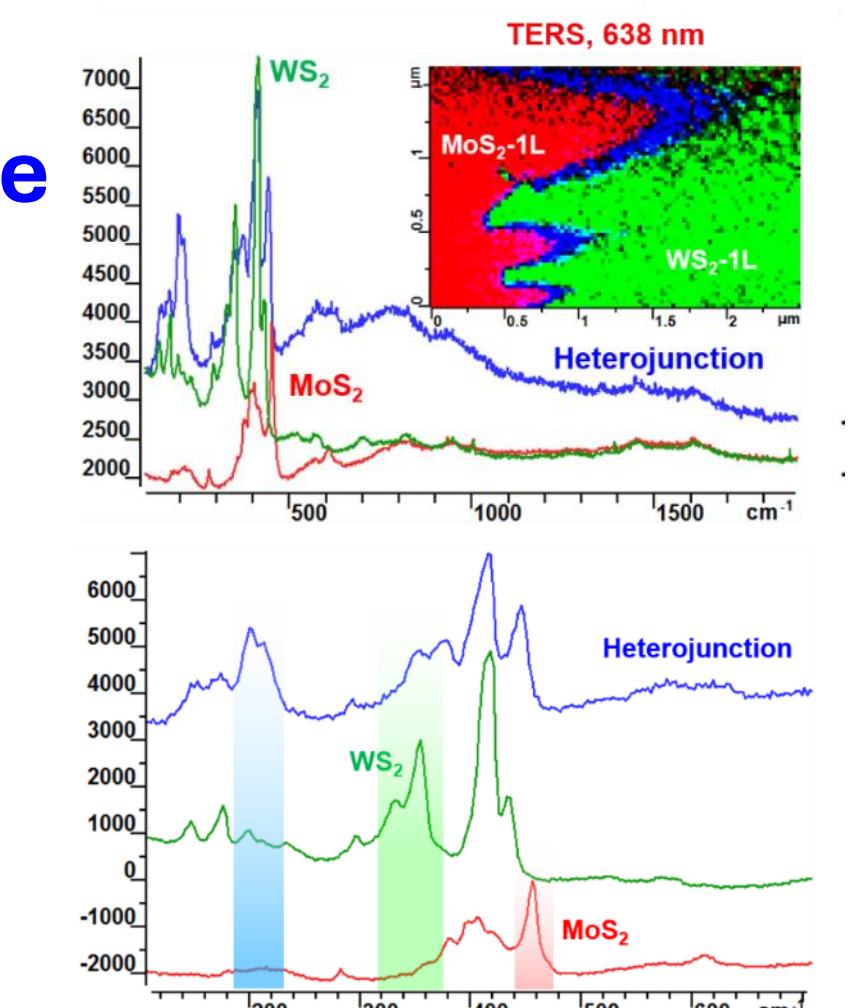
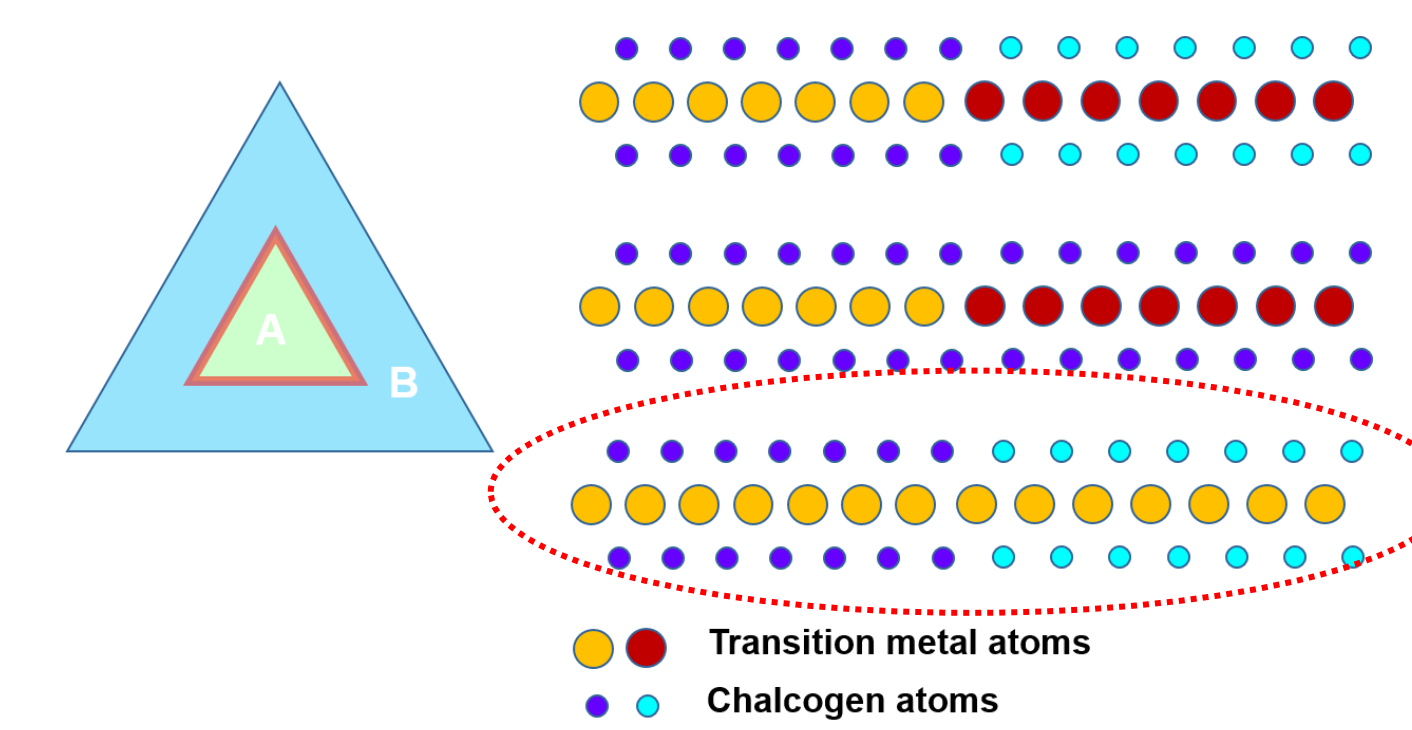


## Asymmetric distribution of junction-specific Raman bands

Properties of the junction line in heteromonolayer

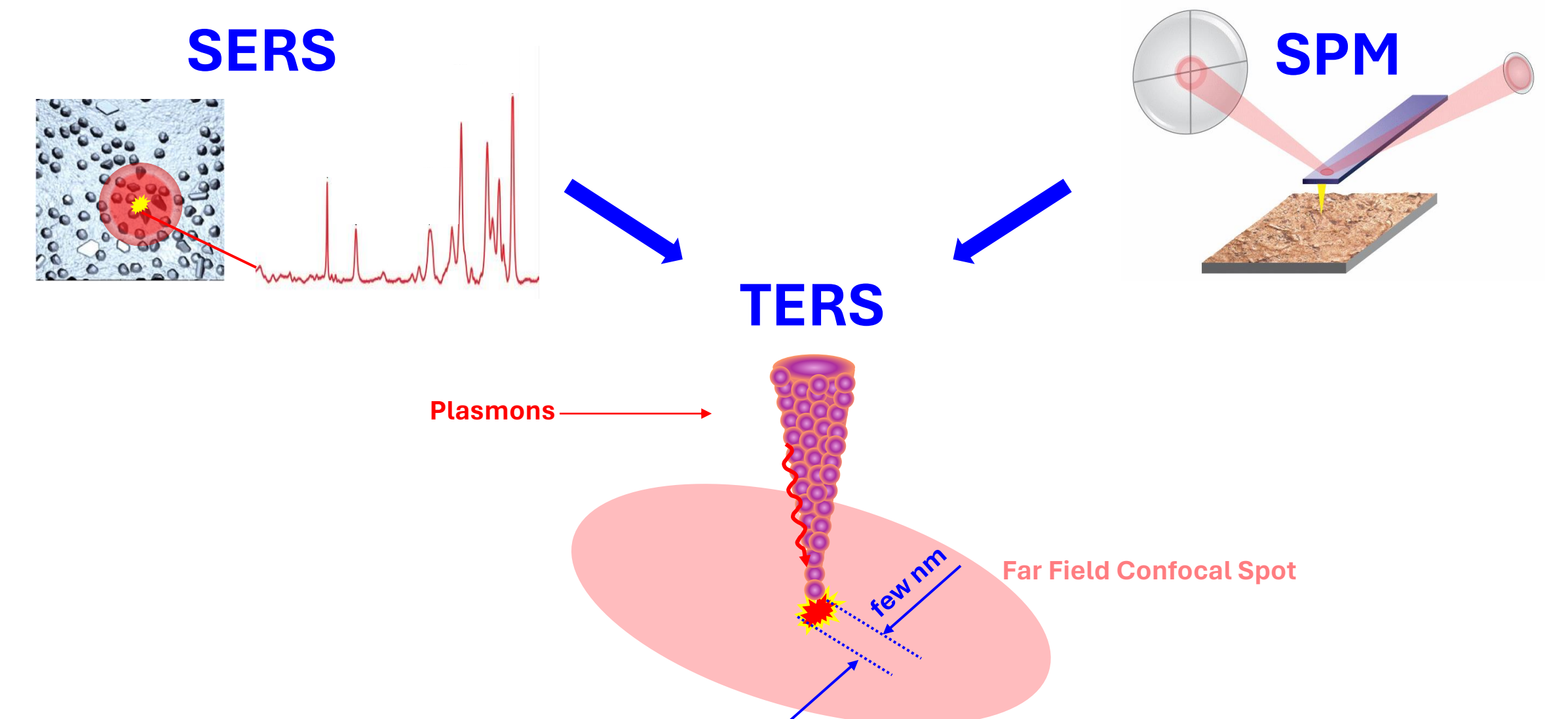


## Three types of lateral heterostructure

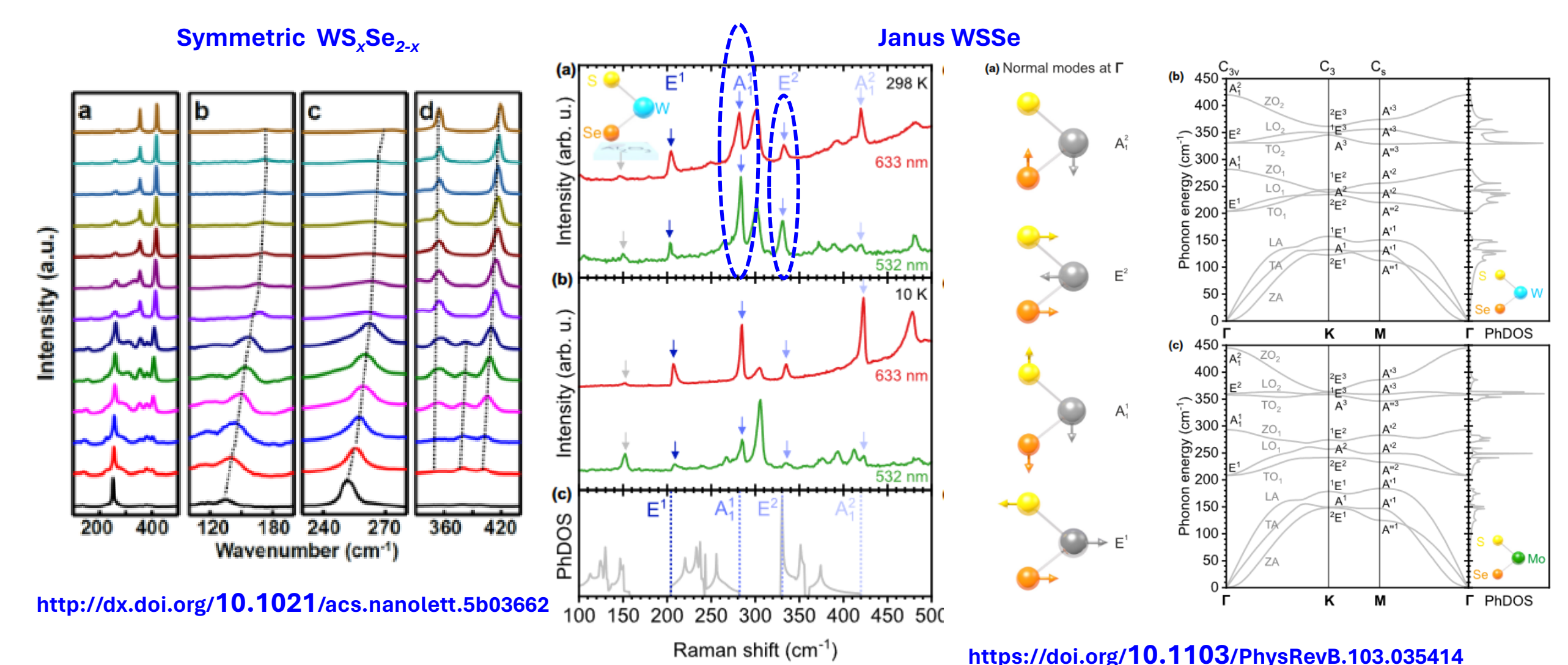


<https://doi.org/10.1021/acsnano.1c06595>

## Tip Enhanced Raman Scattering



## Comparative Raman spectra of symmetric and Janus WSSe



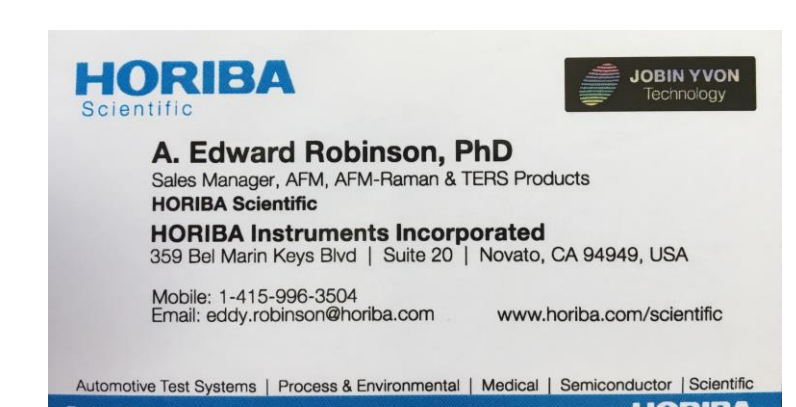
<http://dx.doi.org/10.1021/acs.nanolett.5b03662>

<https://doi.org/10.1103/PhysRevB.103.035414>

Cross-correlation of the AFM and TERS data is a powerful method for characterisation of nanoscale features and defects in 2D semiconductors and their lateral and vertical heterostructures.

In order to successfully integrate two-dimensional materials into semiconductor process, it will be necessary to engineer the composition of contacts, heterojunctions and defects at scales well below the diffraction limit.

No other existing technique can do this.



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