

Defects in WSe₂ and WSe₂/metal heterostructures investigated by Quasi-Particle Interference mapping and STM/STS

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Defects in transition metal dichalcogenides (TMDs) are local atomic modifications which can affect the electronic and magnetic properties of the material. Here we focus on WSe₂ which is one of the semiconducting TMDs and has great potential in both spintronics and valleytronics.

We studied defects in WSe₂ crystals and monolayers by scanning tunnelling microscopy and spectroscopy (STM/STS), coupled with quasi-particle interference (QPI) mapping, at 4K and 77K. Among a large variety of defect configurations, we identified a few that based on QPI appear to support spin-flip processes. We have also studied monolayers of WSe₂ on atomically flat metallic surfaces and used QPI from defects to characterize such heterostructures and band structure modifications.