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Unraveling the growth mechanism of single-domain molybdenum disulfide on Au(111) — ●MORITZ EWERT^{1,2,3}, LARS BUSS^{1,3}, PAOLO MORAS⁴, JENS FALTA^{1,2}, and JAN INGO FLEGE^{1,2,3}
— ¹Institute of Solid State Physics, University of Bremen, Germany
— ²MAPEX Center for Materials and Processes, University of Bremen, Germany — ³Applied Physics and Semiconductor Spectroscopy, Brandenburg University of Technology Cottbus-Senftenberg, Germany — ⁴Istituto di Struttura della Materia del Consiglio Nazionale delle Ricerche, Sincrotrone Trieste SCpA, Italia

As a transition metal dichalcogenide single-layer molybdenum disulfide (MoS₂) is a heavily investigated system. Due to its direct band gap, the electronic properties of single-layer MoS₂ have been subject to several surface science methods. A well-known model system is MoS₂ on Au(111).

We present in situ low-energy electron microscopy (LEEM) and microdiffraction (LEED) observations of MoS₂ growth on Au(111) at elevated temperature using two distinctly different deposition rates. Our investigations reveal similar but different expansion mechanisms of the MoS₂ islands changing a balanced distribution of the two mirror domains towards a single domain distribution. Structural characterization by I(V)-LEEM and investigations of the electronic bandstructure using angle-resolved photoelectron spectroscopy both confirm single-layer nature of the MoS₂ islands. We could identify step pushing of the growing MoS₂ being responsible for this phenomena.

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Topic: 2D Materials beyond graphene: Growth, structure and substrate interaction
Email: mewert@ifp.uni-bremen.de