

Poster-1-25

Large area exfoliation of monolayer transition metal dichalcogenides for scanning probe microscopy

Ishita Pushkarna, Árpád Pásztor, and Christoph Renner

Department of Quantum Matter Physics, University of Geneva, 24 Quai Ernest-Ansermet 1211 Geneva, Switzerland

Scanning tunneling microscopy and spectroscopy experiments of transition metal dichalcogenides (TMDs), exfoliated down to monolayers using mechanical exfoliation of bulk crystal, hold promise to reveal interesting physical properties of these materials. Gold is an attractive substrate for exfoliation, owing to the strong chemical interaction with chalcogens and an alternative to silicon-oxide substrates which often fail to give large thin flakes of materials with strong interlayer coupling. As a proof of principle, we demonstrate the exfoliation of large area monolayer molybdenum disulphide on ultra-flat template stripped gold substrates and show preliminary STM and STS experiments on this system. These measurements provide new insight into the unresolved spectroscopic anomalies observed in the molybdenum disulphide-gold heterostructure [1,2].

[1] M. Velický et al. Strain and Charge Doping Fingerprints of the Strong Interaction between Monolayer MoS₂ and Gold. *J. Phys. Chem. Lett.* 11, 6112- 6118 (2020).

[2] E. Pollmann, Large-Area, Two-Dimensional MoS₂ Exfoliated on Gold: Direct Experimental Access to the Metal-Semiconductor Interface. *ACS omega*, 6(24), 15929-15939 (2021).