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Scanning Tunneling Microscopy study on exfoliated single-layer $MoSe_2$ XIAODONG ZHOU, ALI DADGAR, Department of Physics, Columbia University, New York, New York 10027, USA, FRANCES M. ROSS, IBM T.J.Watson Research Center, Yorktown Heights, New York 10598, USA, ABHAY N. PASUPATHY, Department of Physics, Columbia University, New York, New York 10027, USA — Monolayer transitional metal dichalcogenides (TMDs) MX_2 (M = Mo, W, Ti etc; X = S, Se, Te) are a new platform for exploring new electronic and optical phenomena and functionality. However, much remains to be understood about their chemical and local electronic properties when taken to the monolayer limit. We will discuss a scanning tunneling microscopy (STM) study on exfoliated single-layer $MoSe_2$ using a 4-probe STM system. The ability to carry out scanning electron microscopy (SEM) in our system allows us to easily locate and measure single-layer $MoSe_2$ flakes that are mechanically exfoliated on a SiO_2/Si substrate and are only a few micrometers in lateral size. Using a combination of imaging and spectroscopy, we will discuss the chemical purity and nature of defect states in this monolayer material. Using a electrostatic back gate, we will describe measurements of the single-particle electronic bandgap as a function of the chemical potential.

Xiaodong Zhou
Columbia University

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