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Surface Preparation for Improved Molybdenum Disulfide Nanoelectronics[1] SIRAK M. MEKONEN, HUGH CHURCHILL, PABLO JARILLO-HERRERO, None — Recent advances in nanoscale materials characterization and device fabrication have opened up new opportunities for two-dimensional layers of Transitional metal dichalcogenides (TMDs) in nanoelectronics and optoelectronics. TMDs are a family of materials including the layered semiconductor molybdenum disulfide (MoS_2). TMDs, such as MoS_2, have sizable bandgaps that change from indirect to direct in single layers, allowing applications such as transistors. We proposed AFM contact mode operation to clean the MoS_2 surface for improved electronic transport measurements. The project involved low-temperature measurements of electrical properties in exfoliated monolayer devices. Monolayer MoS_2 based devices were fabricated from bulk MoS_2 by micromechanical cleavage using adhesive tape, which was then applied on highly doped silicon substrates. Monolayer flakes were optically identified by light interference. Device surface topographies were determined via atomic force microscopy (AFM). Electrical contacts (1nm Ti and 50nm Au) were patterned using e-beam lithography. AFM contact mode cleaning was performed to reduce contact resistance and increase carrier mobility. Electrical transport measurements are ongoing to quantify the improvement in the cleaned devices.

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