

Abstract Submitted
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Strain Engineering of 2D Transition Metal Dichalcogenides AMBER MCCREARY, Pennsylvania State University, MATIN AMANI, Army Research Lab, Adelphi MD, AVINASH DONGARE, University of Connecticut, TERRANCE O'REGAN, Army Research Lab, Adelphi MD, MAURICIO TERRONES, Pennsylvania State University, RAJU NAMBURU, MADAN DUBEY, Army Research Lab, Adelphi MD, RUDRESH GHOSH, The University of Texas at Austin — The potential of ultrathin molybdenum disulfide (MoS_2) nanostructures for applications in electronic and optoelectronic devices requires a fundamental understanding of their electronic structure as a function of strain. The strain dependence of the electronic properties of bilayer sheets of 2H- MoS_2 has already been studied using *ab initio* simulations based on density functional theory (DFT).¹ In this work, we use CVD grown bilayer MoS_2 triangles to verify the predicted results, both through optical and electrical measurements as a function of dynamic and static strains. By transferring the MoS_2 onto a flexible substrate and performing Raman characterization as a function of uniaxial strain, it was observed that while the monolayer MoS_2 triangles were able to withstand strains of up to 1.2% before slippage, the bilayer triangles slipped at strains less than or equal to 0.5%, suggesting that it is possible the strain is distributed differently in the two layers. With this in mind, we looked at the Raman as a function of strain for vertically grown triangles of MoS_2 consisting of 1, 2, 3, 4, and >4 layers on a single triangle to study the distribution of strain in multilayered 2D materials.

¹L. Dong *et al.* *Appl. Phys. Lett.* **104**, 053107 (2014).

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