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Effects of Strain on CVD-Grown Few-Layered Terrace Structures of MoS_2[1] AMBER MCCREARY, Penn State University, R. GHOSH, Univ. Texas at Austin, M. AMANI, U.S. Army Research Lab, J. WANG, Univ. of Connecticut, K.-A. DUERLOO, Stanford Univ., A. SHARMA, K. JARVIS, Univ. of Texas at Austin, E. REED, Stanford Univ., A. DONGARE, Univ. of Connecticut, S.K. BANERJEE, Univ. of Texas at Austin, M. TERRONES, Penn State Univ., R. NAMBURU, M. DUBEY, U.S. Army Research Lab — In this report, we used CVD-grown terrace MoS_2 layers to study how the number and size of the layers affected the physical properties under uniaxial and biaxial tensile strain. Interestingly, we observed significant shifts in both the Raman in-plane mode (as high as -5.2 cm^{-1}) and photoluminescence (PL) energy (as high as -88 meV) for the few-layered MoS_2 under approximately 1.5% applied uniaxial tensile strain. The observed results were compared to monolayers and few-layers of MoS_2 previously reported. We also observed slippage between the layers which resulted in a hysteresis of the Raman and PL spectra during further applications of strain. Through DFT calculations, we contended that this random layer slippage was due to defects present in CVD-grown materials. This work demonstrates that the properties of CVD-grown few-layered MoS_2 studied here can be tuned under strain as well as, if not better than, it's exfoliated monolayered counterpart.

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