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Structural and Optical Stability of Bilayer and Few-Layer MoS_2 in Ambient Air. JOHN FEMI-OYETORO, KEVIN YAO, EVAN HATHAWAY, YAN JIANG, IBIKUNLE OJO, BRIAN SQUIRES, ARUP NEOGI, JINGBIAO CUI, USHA PHILIPOSE, JOSE PEREZ, University of North Texas, USHA PHILIPOSE GROUP TEAM, ARUP NEOGI GROUP TEAM — We investigate the stability of MoS_2 in ambient air, with a focus on monolayers, bilayers, twisted bilayers with large twist angles, and few-layers. The samples are grown using chemical vapor deposition on SiO_2 substrates and studied atomic force microscopy (AFM), and Raman and photoluminescence spectroscopy. We find that as-grown bilayers with twist angles of 0^o and 60^o are remarkably structurally stable in comparison to monolayers that significantly structurally degrade in ambient air. Bilayers with 0^o twist angles synthesized using transfer of monolayers on top of one another are also found to be stable. Few-layers with twist angles of 0^o with number of layers n = 3-6 are also stable. However, we find that transferred twisted bilayers with twist angles of about 10^o are significantly unstable in ambient air. Possible explanations for these observations will be discussed.

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