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**Synthesis and Heterostructures of Metal Dichalcogenides Monolayer** XIN-QUAN ZHANG, KUAN-CHANG CHIU, TUNG-HAN YANG, JENN-MING WU, YI-HSIEN LEE, National Tsing Hua University — Recently, monolayers of layered transition metal dichalcogenides (TMD), such as $MX_2$ (M=Mo, W and X=S, Se), have been reported to exhibit excellent optoelectronic performances. Monolayers in this class of materials offered a burgeoning field in fundamental physics, energy harvesting, electronics and optoelectronics. However, most studies to date are hindered by great challenges on the synthesis and transfer of high quality TMD monolayers. Hence, a feasible synthetic process and transfer techniques to overcome the challenges are essential. Here, we demonstrate the growth of high-quality TMD monolayers using chemical vapor deposition (CVD) with the seeding of aromatic molecules. The growth of monolayer TMD single crystals is achieved on various surfaces and its growth behavior has been discussed. We also demonstrate a robust technique in transferring the TMD monolayers to diverse surfaces, which may stimulate the progress on the class of materials and open a new route toward the synthesis of various novel hybrid structures with TMD monolayers.

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