

Abstract Submitted
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Two-Dimensional Transition Metal Dichalcogenides: Controlled Synthesis and Optical Characterization ZHONG LIN, The Pennsylvania State University, YONGJI GONG, GONGLAN YE, GANG SHI, Rice University, MICHAEL THEE, ANA LAURA ELIAS, NESTOR PEREA-LOPEZ, SIMIN FENG, YU LEI, CHANJING ZHOU, KAZUNORI FUJISAWA, VICTOR CAROZO, The Pennsylvania State University, ROBERT VAJTAI, Rice University, HUMBERTO TERRONES, Rensselaer Polytechnic Institute, ZHENG LIU, Nanyang Technological University, PULICKEL AJAYAN, Rice University, MAURICIO TERRONES, The Pennsylvania State University — Chemical vapor deposition (CVD) is a bottom-up approach suitable for the synthesis of MoS₂ and WS₂ monolayers. In order to extend the application of CVD, we modified the precursors used during the deposition. We show that by using mixed transition metal precursors of MoS₂/WO₃ powders, alloyed monolayers of Mo_xW_{1-x}S₂ islands can be synthesized exhibiting a compositional gradient and a tunable optical band gap, as confirmed by Raman and photoluminescence measurements. We further show that adding tellurium powders into the transition metal precursors can lead to a 200 °C reduction in the synthesis temperature for MoS₂ and WS₂ monolayers. The materials synthesized at a reduced temperature maintain a high degree of crystallinity and optical properties.

Zhong Lin
The Pennsylvania State University

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