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Large Area Growth and Characterization of Monolayer MoS₂ PAYAM TAHERI, Physics Department, The State University of New York at Buffalo, JIEQIONG WANG, Department of Materials Science, Xian Jiaotong University, China, HUI XING, Physics Department, The State University of New York at Buffalo, JOEL DESTINO, Chemistry Department, The State University of New York at Buffalo, THOMAS SCRACE, YUTSUNG TSAI, Physics Department, The State University of New York at Buffalo, FRANK BRIGHT, Chemistry Department, The State University of New York at Buffalo, ATHOS PETROU, HAO ZENG, Physics Department, The State University of New York at Buffalo — Twodimensional transition metal dichalcogenides have garnered extensive attention due to their direct band gap with great potential in semiconductor application complementing graphene. While most of the experiments were carried out on either exfoliated films or CVD grown crystals, sample size are restricted in hundreds of micrometers. Synthesis of large-area samples were less successful. Here, we report the growth of cm^2 -scale molybdenum disulfide (MoS₂) monolayer with a facile method by sulfurizing molybdenum trioxide film on sapphire substrates. Uniformity and quality of the monolayer films were verified by Raman, PL mapping and PL efficiency. A quasi- molten phase of the precursor in the initial stage of the reaction is found to be crucial for the monolayer growth.

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