

Abstract Submitted
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Concurrent Chemical Vapor Deposition Synthesis of Multiple Transition Metal Disulfides¹ WEI SUN LEONG, MIT, HUI YING YANG, SUTD, JING KONG, MIT — Recently, transition metal disulfides have received tremendous attention due to their exceptional optical and electrical properties. Many techniques have been explored to obtain monolayer TMD and chemical vapor deposition synthesis using transition metal oxide and chalcogenide solid precursors is the most common method used in laboratories now. However, the quantity of solid precursors used is usually surplus giving rise to chemical reactions between precursors in each of their crucibles, as a result of precursors' diffusion at growth temperature. Hence, a CVD setup is normally dedicated for the growth of only one type of TMD to avoid cross-contamination (except for hetero-structures synthesis), and it is impossible to grow multiple monolayer TMD in one synthesis step. Here, we report a new technique to synthesize MoS₂ and WS₂ monolayer films in one CVD process. We first disperse a minuscule amount of metal oxide precursor on targeted substrates, which were then loaded to the furnace in slanting position, rather than horizontal, followed by a sulfur annealing to concurrently grow monolayer MoS₂ and WS₂ on separate substrates. The synthesized TMD films exhibit good properties as confirmed by Raman, PL, XPS, STEM analyses, and electrical measurements.

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