Advanced CVD Technology for Emerging Transition Metal Di-chalcogenides

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Transition metal di-chalcogenides (TMDCs) such as MoS_2, $MoSe_2$, WS_2 and WSe_2 have become a noteworthy complimentary material to graphene sharing many of its properties. They may however offer properties that are unattainable in graphene since TMDCs offer a tunable bandgap through both composition and number of layers. This has led to use of TMDCs in applications such as transistors, photodetectors, electroluminescent and bio-sensing devices. In addition, chalcogenide thin films such as $CuInGaSe_2$ and CdTe have been commercialized for photovoltaic application, however the search for low cost, non-toxic and earth abundant high efficiency absorbing materials remains under investigation. Sn-S, a p-type semiconductor with a band gap of ~1.3 eV and the sort after aforementioned properties, has attracted great interest recently. Chemical vapour deposition (CVD) technology has the advantage of offering conformal, scalable, and controllable thin film growth on a variety of different substrates. In this talk we describe our recent development in TMDCs materials using CVD technology and discuss their potential applications.