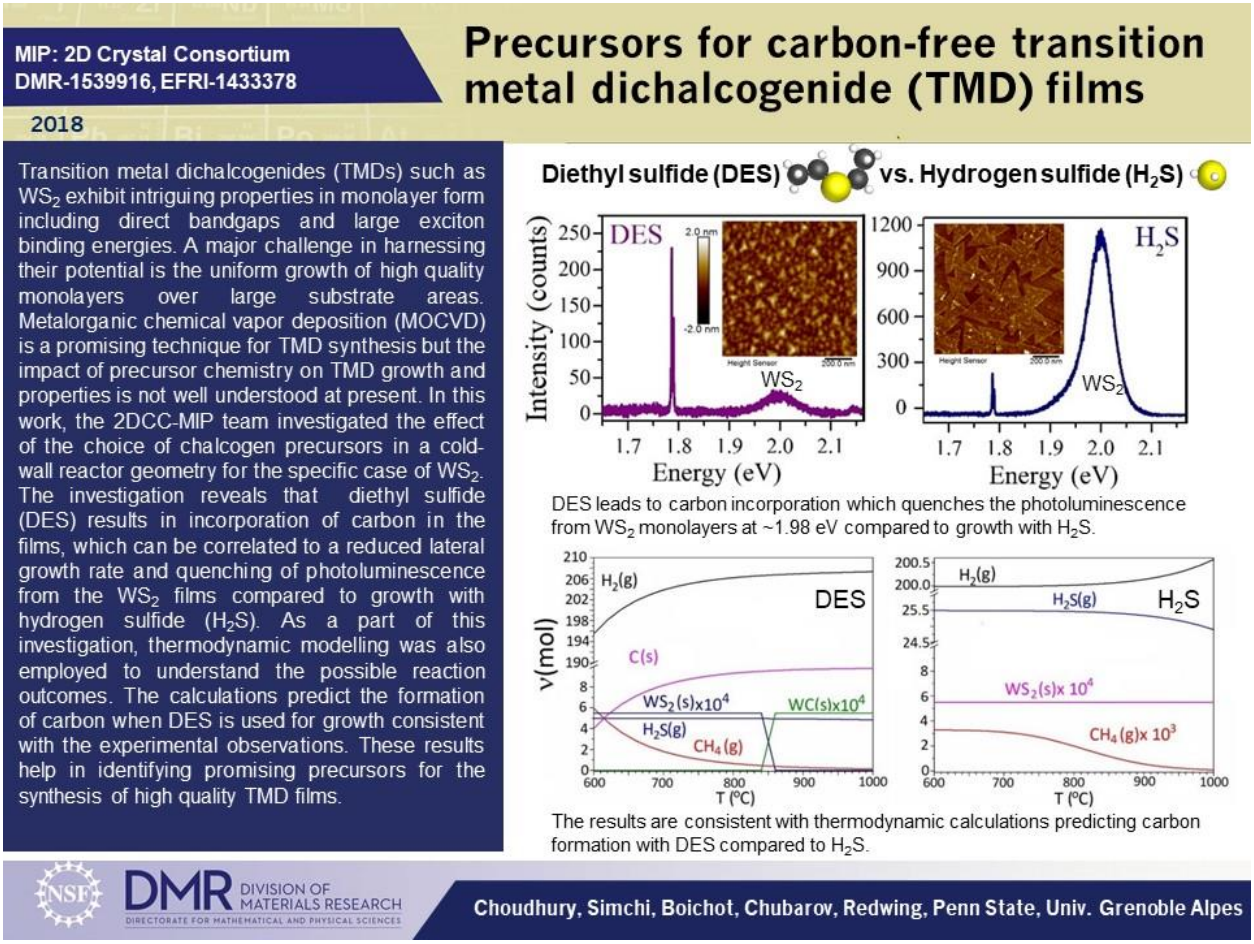
The Pennsylvania State University, N-338 Millennium Science Complex, University Park, PA 16802



What Has Been Achieved: The study investigated the growth of WS2 films by MOCVD comparing the properties of monolayers grown with diethyl sulfide (DES) versus hydrogen sulfide. The results show considerable carbon incorporation in WS2 when DES is used which prohibits lateral growth of domains and significantly reduces the photoluminescence intensity from the layers.

Importance of Achievement: Large scale growth of epitaxial TMDs is a major hurdle in the application of these novel materials. Large scale reliable growth by MOCVD requires understanding the effect of precursor chemistry on film properties. This work was directed at identifying the effect of using different sulfur-based precursors on the growth and properties of WS_2.

Unique Features of the MIP That Enabled Project: The project utilized the chalcogenide MOCVD system in the 2DCC-MIP which is one of the few systems world-wide that is set up to use toxic hydride precursors such as H_2S.

Publications:

T. H. Choudhury, H. Simchi, R. Boichot, M. Chubarov, S. E. Mohney, and J. M. Redwing , “Chalcogen Precursor Effect on Cold-Wall Gas-Source Chemical Vapor Deposition Growth of WS_2”, Cryst. Growth Des. 2018, 18, 8, 4357-4364

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