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**TMD 2D Materials: Defects, Passivation, Functionalization and Device Impact<sup>1</sup>**

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Transition metal dichalcogenides (TMDs) such as MoS<sub>2</sub> have become popular in “beyond CMOS” device concepts and research due to their band structure in two-dimensional layers – viz. a significant band gap. Various device demonstrations have been reported utilizing exfoliated and synthesized single/few layer TMDs for possible electronic and photonic applications. The performance of such devices will also necessarily depend upon the TMD layer quality. The impact of defects and impurities on device transport characteristics is of interest, as well as methods to passivate and minimize their effects. The interaction of the TMDs with component materials, such as dielectrics and contacts, is also an important aspect. This talk will present our recent work using in-situ and ex-situ methods to understand the physics and chemistry of TMDs and their associated interfaces.

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