Bridging scale and precision in 2D TMD sensors

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The rapid development of electronics for wearables and internet of things have pushed forward the need for all types of sensors to detect chemical exposure, physiological conditions, and other environmental factors. In sensor platforms, graphene and other 2D materials have become an increasingly interesting candidate due to their high surface to volume ratio, multifunctional and tunable properties. Namely, the mechanical strength and flexibility at the ultimate materials scaling limit, unique transport characteristics, tunable optical properties, controllable surface sites and the potential for facile device fabrication in contrast to 1D and 3D counterparts have captivated researchers and engineers alike. In this talk, opportunities for 2D materials in sensing platforms are discussed towards low cost and customizable laser-manufacturing approaches, impedance-based sensing modalities that enable record ultrasensitive liquid processed 2D materials, and new strategies that allow for direct synthesis of orientation-controlled TMD superlattices. A focus on the bridge between the precision of sensor requirements with scalable approaches will be discussed.