Solution-Processed Thin films of Two-Dimensional Transition Metal Dichalcogenides for Electronic Application

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With the advancement of electronic and optoelectronic materials, two-dimensional (2D) transition metal dichalcogenides (TMD) have emerged as promising candidates for the various devices. Among them solution processed thin layers of od 2D materials exfoliated via liquid phase assisted technique present a unique platform for exploring electron-matter interactions in the transistor or photodetector. Such interaction is widely studied in chemical vapour deposition (CVD) grown semiconductors but relatively unexplored in Liquid phase exfoliated (LPE) solution processed 2D materials. This research aims to investigate the electronic behaviour of thin films fabricated from solution-processed 2D materials using layer-by-layer (LbL) deposition, with an emphasis on their structure-property relationships and potential applications in electronics(Carey et al., 2023; Liu et al., 2025).
An outstanding performance of 2D thin layer of TMD, tungsten Diselenide (WSe_2) provide an ample scope for various device application through its interesting transport properties. Stable dispersion of layered WSe_2 prepared via LPE and controlled deposition via LBL and post deposition thermal annealing was employed to improve inter-flake connectivity structural and morphological characterization performed to confirm the phase purity and few layer thickness and continuous film formation. This study upbring the electrical behaviour in field effect transistor, photodetectors etc. and the influence on thin film transport properties, carrier mobility and trap assisted mobility. The compatibility of the process establishes solution processing as a viable technique for scalable fabrication of thin film device.

References

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Figures

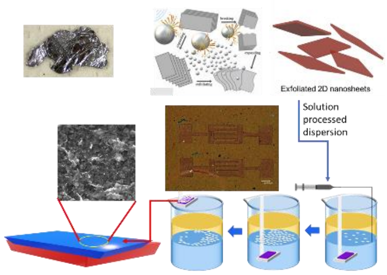

Figure 1: Schematic of Solution processed Device fabrication