Atomic Layer Deposited Semimetallic TiSx for Hole Injection into WSe_2

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Semimetal contacts have recently emerged as promising candidates due to their remarkably low contact resistance in n-FETs. However, their efficacy as hole injectors in two- dimensional semiconductors remains a key bottleneck, hindering the practical application of 2D channel materials in advanced logic nodes. In this study, we investigate the utilization of atomic layer deposition (ALD) to fabricate high-work function semimetallic TiSx thin films for efficient hole injection into WSe_2, a 2D semiconductor of considerable interest due to their potential for next-generation electronics, which requires device scaling. The TiSx thin films were deposited via ALD to precisely control film thickness and composition, and uniformity was examined by employing various characterization techniques, including Raman spectroscopy and atomic force microscopy. 1L WSe_2 pFET demonstrated an on-state current of ~25 μA/μm at $|V_D|$=1 V, indicating the potential of WSe_2 for CMOS.