

Abstract Submitted
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Substrate dependence of Hall and Field-effect mobilities in few-layer MoS₂ field-effect transistors¹ BHIM CHAMLAGAIN, MEEGHAGE PERERA, HSUEN-JEN CHUANG, ARTHUR BOWMAN, UPENDRA RIJAL, KRAIG ANDREWS, JOSEPH KLESKO, CHARLES WINTER, ZHIXIAN ZHOU, Wayne State University — In this work, we systematically study the Hall and field-effect mobilities of few-layer MoS₂ FETs fabricated on different substrates. Hall bar devices were fabricated on SiO₂ and hBN to directly measure carrier density. Standard four-probe transport measurement and Hall effect measurement were carried out for a wide temperature range to determine the carrier mobility and understand the scattering mechanisms. By comparing field-effect and Hall mobilities, we demonstrate that the intrinsic drift mobility of multiplayer MoS₂ in the high carrier density metallic region is independent of substrate and sample thickness. While the optical-phonon scattering remains the dominant scattering mechanism in MoS₂ devices on h-BN down to ~100 K, extrinsic scattering mechanisms start to degrade the carrier mobility of MoS₂ on all other substrates below ~200 K.

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