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Fermi level pinning of Monolayer Molybdenum Dichalcogenides.[1]
CHANGSIK KIM, INYONG MOON, MIN SUP CHOI, SKKU Advanced Institute of Nano-Technology (SAINT), Sungkyunkwan University(SKKU), FAISAL AHMED, School of Mechanical Engineering, Sungkyunkwan University, XIAOCHI LIU, WON JONG YOO, SKKU Advanced Institute of Nano-Technology (SAINT), Sungkyunkwan University(SKKU) — Electrical metal contacts to two-dimensional (2D) semiconducting transition metal dichalcogenides (TMDCs) are considered as main bottleneck to the device performance due to weak metal dependences with high contact resistances (Rc), stubborn polarities and high Schottky barrier heights (SBH), indicating strong Fermi level pinning. Here, we demonstrate the first experimental results about Fermi level pinning of monolayer MoS2 and monolayer MoTe2. From our results, we quantitatively compared with theoretical calculations, in terms of the pinning factor and charge neutrality level of monolayer TMDCs. The pinning factors S were found to be 0.11 and -0.07 for monolayer MoS2 and MoTe2 respectively. These suggest much stronger Fermi level pinning effect and lower SBH than theoretical prediction. Our results further implies that metal work functions can be much weakly influential to contact properties on practical devices, overridden by the effect of defects.

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