Resolving the Practical Issues in 2D TMD Devices:
FETs and Diode

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Abstract

Transition metal dichacogenides (TMDs) and black phosphorus (BP) are those and many of field effect transistors (FETs) have thus been reported using such 2D materials. Several attempts to fabricate 2D complementary (CMOS) logic inverters and van der Waals (vdW) junction PN diodes have been made, too. But practical and important issues remain, to be resolved. Here, we display some improvements of those issues in three cases of different devices based on p-WSe₂, p-MoTe₂ and n-MoS₂ nanosheets: [1]. P-to-N conversion by H-doping in Homogeneous-MoTe2 for CMOS inverters. [2]. Threshold voltage adjustment in p-and n-channel FETs using organic small molecules on channels. [3]. Contact resistance improving in Schottky devices

References

[2] Y Cho, JH Park, M Kim, Y Jeong, S Yu, JY Lim, Y Yi, S Im, Nano letters (2019), DOI: 10.1021/acs.nanolett.9b00019
[2] Im et al, unpublished

Figures

Figure 1: Organic Molecule-Induced Charge Transfer on Operating Voltage Control of Both n-MoS₂ and p-MoTe₂ Transistors

Figure 2: Homogeneous 2D MoTe₂ p–n Junctions and CMOS Inverters formed by Atomic-Layer-Deposition-Induced Doping