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

Seongil Im
Sung Jin Yang, June Yeong Lim, Yongjae Cho

Van der Waals Research Center, Yonsei University, Seoul, Korea

semicon@yonsei.ac.kr

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-WSe_2, p-$MoTe_2$ and n-MoS_2 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

[1] JY Lim et al, Adv. Mater. 29, (2017), 1701798
[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[2] Im et al, unpublished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

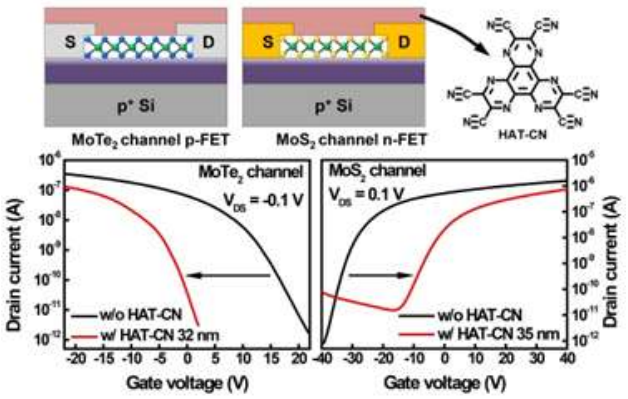

Figure 1: Organic Molecule-Induced Charge Transfer on Operating Voltage Control of Both n-MoS_2 and p-$MoTe_2$ Transistors

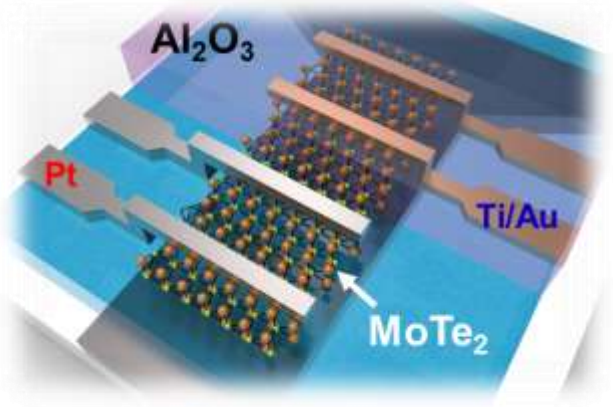

Figure 2: Homogeneous 2D MoTe2 p–n Junctions and CMOS Inverters formed by Atomic-Layer-Deposition-Induced Doping