Abstract Submitted
for the MAR16 Meeting of
The American Physical Society

Fermi Level Pinning at the Interface of Molybdenum Based Chalcogenides and Metals INYONG MOON, CHANGSIK KIM, Samsung-SKKU Graphene Center, SKKU Advanced Institute of Nano-Technology, Sungkyunkwan University, 2066, Seobu-ro, Jangan-gu, Suwon-si, Korea, SEUNGGEOL NAM, YEONCHOO CHO, HYEON-JIN SHIN, SEONGJUN PARK, Device System Research Center, Samsung Advanced Institute of Technology (SAIT), 130 Samsung-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do 443-803, Korea, WON JONG YOO, Samsung-SKKU Graphene Center, SKKU Advanced Institute of Nano-Technology, Sungkyunkwan University, 2066, Seobu-ro, Jangan-gu, Suwon-si, Korea — MoS_2 and $MoTe_2$ as the layered two dimensional materials have a sizable band gap suitable for future semiconductor application. However, their Schottky/ohmic contact engineering is found difficult to perform when varying contact metals due to Fermi level pinning at their metal interface. In this work, we investigate Schottky barrier heights at the interfaces formed between mono- or bi-layer MoS_2, $MoTe_2$ and Ti, Cr, Au, Pd. By varying temperature in the range from 200 to 500 K, we obtained their current – voltage and hysteresis characteristics so as to determine accurate Schottky barrier heights. It is found that the Pd contact with MoS_2 and $MoTe_2$ shows the most pronounced Fermi level pinning; -0.8 and -1.2 eV respectively. Furthermore, the pinned energy level is found to be located near the conduction band edge for MoS_2 whereas it is near the intrinsic level for $MoTe_2$. These results are found to be crucial to understand the Fermi level pinning mechanism of two dimensional materials, which can be used for developing future MoS_2 and $MoTe_2$ based transistor devices.

Samsung-SKKU Graphene Center, SKKU Advanced Institute of Nano-Technology, Sungkyunkwan University, 2

Date submitted: 05 Nov 2015 Electronic form version 1.4