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Measurements of Schottky barrier heights formed from metals and 2D transition metal dichalcogedides CHANGSIK KIM, INYONG MOON, Sungkyunkwan university Advanced Institute of Nano-Technology (SAINT), SEUNGGEOL NAM, YEONCHOO CHO, HYEON-JIN SHIN, SEONGJUN PARK, Device System Research Center, Samsung Advanced Institute of Technology (SAIT), WON JONG YOO, Sungkyunkwan university Advanced Institute of Nano-Technology (SAINT) — Schottky barrier height (SBH) is an important parameter that needs to be considered for designing electronic devices. However, for two dimensional (2D) materials based devices, SBH control is limited by 2D structure induced quantum confinement and 2D surface induced Fermi level pinning. In this work, we explore differences in measuring SBH between 2D and 3D materials. Recently, low temperature I-V measurement has been reported to extract SBH based on thermionic emission equation for Schottky diode. However, 2D devices are not real Schottky diode in that both source and drain metal electrodes make Schottky contact. According to our experimental results, SBH extracted from linear slope of ln ($I/T^{3/2}$) against 1/T show widely diverse values, dependent on applied voltage bias and tested temperature which affect carrier transport including tunneling or thermionic emission across the metal-2D material interface. In this work, we wish to demonstrate the method to determine SBH and Fermi level pinning which are attributed to 2D transition metal dichalcogedides, differently from conventional 3D materials. .

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