TT-P072

High Temperature Electrical Behavior of 2D Multilayered MoS2

이연성, 정철승, 백종열, 김선국

경희대학교 국제캠퍼스 전자정보대학 전자전파공학과 나노바이오연구실

We demonstrate the high temperature-dependent electrical behavior at 2D multilayer MoS2 transistor. Our previous reports explain that the extracted field-effect mobility of good device was inversely proportional to the increase of temperature. Because scattering mechanism is dominated by phonon scattering at a well-designed MoS2 transistor, having, low Schottky barrier. However, mobility at an immature our MoS_2 transistor (μ_m <10 $cm^2V^{-1}s^{-1}$) is proportional to the increase temperature. The existence of a big Schottky barrier at MoS_2-Ti junction can reduce carrier transport and lead to lower transistor conductance. At high temperature (380K), the field-effect mobility of multilayer MoS_2 transistor increases from 8.93 to 16.9 $cm^2V^{-1}sec^{-1}$, which is 2 times higher than the value at room temperature. These results demonstrate that carrier transport at an immature MoS_2 with a high Schottky barrier is mainly affected by thermionic emission over the energy barrier at high temperature.

Keywords: 2D layered semiconductor, MoS_2, High temperature, Thermionic emission

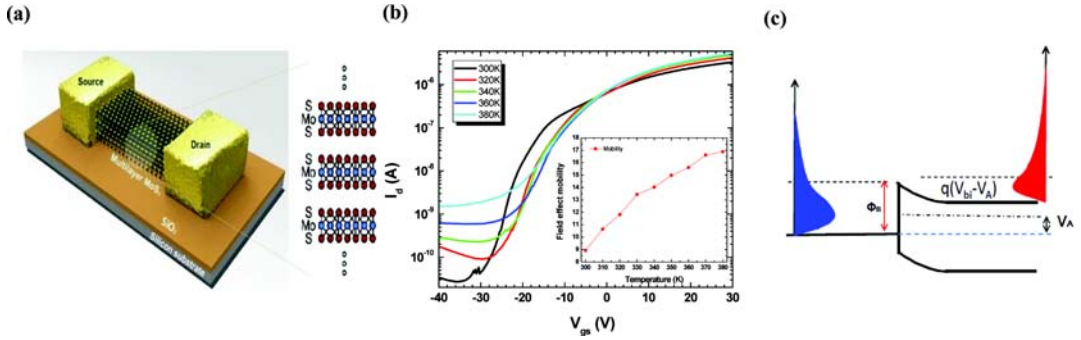

Fig. 1. (a) Cross-sectional view of multilayer MoS_2 TFTs with SiO_2 gate insulator. (b) The I_d-V_{gs} characteristics of a representative device. (inset) temperature dependent field-effect mobility from 300 K to 380 K as a step of 10 K. (c) Imaging of Schottky barrier of MoS_2-Ti junction.