Abstract Submitted
for the MAR14 Meeting of
The American Physical Society

Graphene/MoS_2 Schottky diodes and their integration for metal base transistors AMELIA BARREIRO, Columbia University, New York, NY 10027, USA, JASON SEOL, Department of Electrical and Computer Engineering, University of Florida, Gainesville, Florida 32611, USA, CHUL-HO LEE, INANC MERIC, Columbia University, New York, NY 10027, USA, ELTON SANTOS, School of Engineering and Applied Sciences, Harvard University, Cambridge, Massachusetts 02138, USA, LEI WANG, Columbia University, New York, NY 10027, USA, EFTHIMIOS KAXIRAS, School of Engineering and Applied Sciences, Harvard University, Cambridge, Massachusetts 02138, USA, JAMES HONE, KEN SHEPARD, Columbia University, New York, NY 10027, USA, JING GUO, Department of Electrical and Computer Engineering, University of Florida, Gainesville, Florida 32611, USA, PHILIP KIM, Columbia University, New York, NY 10027, USA —

In this contribution we present an experimental and theoretical investigation of graphene/MoS2 Schottky diodes and MoS2/graphene/MoS2 metal base transistors. We observe that the Schottky barrier height can be modulated by the chemical potential of the graphene and MoS2 layers with the back gate and tuned in the range of 0-450 meV. To extract further information regarding the quality of the graphene/MoS2 interfaces and the conduction mechanism across them, we analyze the ideality factor as a function of temperature and find it can vary from n=3 at 270 K to n=12.9 at 100 K. We attribute this strong temperature dependence to a spatial variation of the Schottky barrier, caused by 2D electrostatic effects. Moreover, we have fabricated MoS2/graphene/MoS2 metal base transistors that work as a permeable base transistors.

Amelia Barreiro
Columbia University, New York, NY 10027, USA

Date submitted: 14 Nov 2013 Electronic form version 1.4