Abstract Submitted
for the MAR13 Meeting of
The American Physical Society

Electrical detection of phase changes in adsorbed neutral dipolar molecules on graphene YILIN WANG, Materials Research Science and Engineering Center (MRSEC), University of Maryland, College Park, WENZHONG BAO, SHUDONG XIAO, Department of Physics, University of Maryland, College Park, MICHAEL FUHRER, JANICE REUTT-ROBEY, Materials Research Science and Engineering Center (MRSEC), University of Maryland, College Park, MRSEC TEAM — Graphene is a very promising material for sensing application because its transport properties are highly sensitive to adsorbates on its surface. Here, we study the carrier-density-dependent resistance of bilayer graphene to neutral dipolar adsorbates under ultra-high vacuum condition. Halocarbon molecules with known dipole moment are deposited on graphene at $\sim$ 20 K. After deposition of a few monolayers of molecules, the resistance of graphene near the Dirac point is measured as a function of carrier density (tuned by gate voltage) and temperature, from 20 K to room temperature. We observe negligible shifts of the gate voltage of maximum resistance, indicating negligible charge transfer from adsorbate to graphene. In the temperature-dependent-resistance curve, a sharp step-like increase and decrease in resistance occur at $\sim$ 45 K and $\sim$ 65 K, respectively. We relate these abrupt changes in resistance to phase transitions in the adsorbate overlayer. The same molecules adsorbed on graphite are known to exhibit a complex temperature - coverage phase diagram. We will discuss the relationship between graphene resistance and the phases of molecules on graphite. This work was supported by the NSF-MRSEC at the University of Maryland, DMR 0520471

Yilin Wang
Materials Research Science and Engineering Center (MRSEC)

Date submitted: 27 Nov 2012 Electronic form version 1.4