Abstract Submitted
for the MAR12 Meeting of
The American Physical Society

Reversible and Robust Carrier Doping in Graphene *via* Mechanical Actuation of Tethered Azobenzene PHONG NGUYEN, VIKAS BERRY, NIHAR MOHANTY, KABEER JASUJA, Kansas State University, VIVEK SHENOY COLLABORATION — machines – molecules capable of responding to external stimuli - have gained great interest due to their applications in molecular actuation nanodevices. In this talk, we demonstrate that ultrathin graphene exhibits high-sensitivity to orientation, surface-vicinity, electronegativity, and density-of-states of interfaced molecules. This enables the realization of reversible doping of graphene *via* molecular mechanics on its surface. Here, few-layer-graphene (FLG) sheets were functionalized with electronegative and isomerizable azobenzene-molecules. The optical transformation of these azo-molecules from their *trans* conformation to *cis* conformation dopes 7.5 X 10^3 holes/μm^2 in the underlying graphene. This corresponds to $\sim$20 azobenzene molecules producing 1 hole (hole-mobility of 301 μm^2/V/s) in the azobenzene-FLG (AFLG) device. Further, we demonstrate the facile fabrication of the AFLG device and the mechanism of electrical modulation due to molecular mechanics. We also compare the response of the AFLG device with an FLG device directly doped with electronegative perylene tetracarboxylic acid, which led to $\sim$3 fold increase in the hole density. -abstract-

Phong Nguyen
None

Date submitted: 11 Nov 2011 Electronic form version 1.4