Abstract Submitted
for the MAR12 Meeting of
The American Physical Society

Combined transport-Scanning Probe Microscopy study of reduced graphene oxide sensors CHRISTOPHER KEHAYIAS, JOSEPH RAHAMIM, Physics and Astronomy, Tufts University, SAMUEL MACNAUGHTON, SAMEER SONKUSALE, Electrical and Computer Engineering, Tufts University, CRISTIAN STAII, Physics and Astronomy, Tufts University — We present an in-depth study of the sensing properties of chemically reduced graphene oxide (rGO) based devices. Graphene oxide is an electronically hybrid material that can be controllably tuned from an insulator to a semiconductor material via reduction chemistry. Due to their chemical structure and large surface to volume ratio rGO sensors can detect gas adsorption at very low concentrations. rGO devices are created by dielectrophoretic assembly of rGO platelets onto interdigitated electrode arrays, which are lithographically pre-patterned on top of SiO2/Si wafers. The gas sensing properties of these devices are characterized using novel combined transport-Scanning Kelvin Probe Microscopy and transport-Electrostatic Force Microscopy measurements in the presence of different gas analytes. These measurements show unique, very sensitive and repeatable responses to various volatile organic compounds and other gases. Maps of the electrostatic potential and charge distribution across these circuits are used to model the dynamics of electronic transport through the rGO system.

Christopher Kehayias
Physics and Astronomy, Tufts University

Date submitted: 26 Nov 2011 Electronic form version 1.4