Abstract Submitted
for the MAR13 Meeting of
The American Physical Society

Liquid-Gated Epitaxial Graphene: How Leakage Currents Affect Ionic Strength Sensing[1] MAURICIO D. BEDOYA, School of Physics, Georgia Tech, PETER J. METAXAS, School of Physics, UWA, Australia, JAN SCRIMGEOUR, YIKE HU, RUI DONG, CLAIRE BERGER, WALT A. DE HEER, JENNIFER E. CURTIS, School of Physics, Georgia Tech — Graphene is a promising material for the fabrication of miniaturized biological and chemical sensors. Epitaxial graphene is an exciting candidate due to its compatibility with standard processing techniques and its intrinsic robustness. We have fabricated liquid-gated FET-like devices based upon sub-millimeter wide epitaxial graphene strips defined using optical lithography methods. The devices exhibit a bipolar conductance versus gate voltage behavior with the minimum conductance point being dependent upon the ionic strength of a KCl solution. Measurements of the graphene conductance and gate-leakage currents during the stepping of the gate voltage demonstrate the presence of time dependent nA-scale leakage currents which limit signal stability at short times. Notably, these currents depend upon the gate voltage and the composition of the gate electrode. These and other electrode dependent effects have ramifications for graphene sensor design and implementation such as the need to limit gate voltage operating windows as and carefully design electrodes. With high transconductance and controlled doping, such devices should be able to function at low gate voltages if a full understanding of charge and charge transport at the graphene interface is obtained.

[1]NSF Grant No. DMR-0820382. PJM thanks the ANN and DIISR.

Mauricio Bedoya
School of Physics, Georgia Tech

Date submitted: 17 Nov 2012 Electronic form version 1.4