Abstract Submitted
for the MAR14 Meeting of
The American Physical Society

Effect of Remote Surface Optical Phonon Scattering in Graphene Gated by Single Crystal Ferroelectric Oxide Thin Films ZHIYONG XIAO, ANIL RAJAPITAMAHUNI, Department of Physics, University of Nebraska-Lincoln, NE 68588, STEFAN SCHOECHE, Department of Electrical Engineering, University of Nebraska-Lincoln, NE 68588, JASON HOFFMAN, CHARLES AHN, Department of Applied Physics, Yale University, New Haven, Connecticut 06520, MATHIAS SCHUBERT, Deparrtment of Electrical Engineering, University of Nebraska-Lincoln, NE 68588, XIA HONG, Department of Physics, University of Nebraska-Lincoln, NE 68588 — We have studied the effect of remote surface optical (RSO) phonon on the carrier mobility in graphene gated by a ferroelectric $Ba_{0.6}Sr_{0.4}TiO_3$ (BSTO) substrate. Single crystal 100-400nm BSTO films are grown epitaxially on Nb doped $SrTiO_3$ substrates. Graphene flakes are mechanically exfoliated onto BSTO and single and bi-layer flakes are fabricated into field effect devices via e-beam lithography. All samples exhibit resistivity hysteresis induced by ferroelectric switching at low temperature, which can be used for nonvolatile memory operations. Single layer graphene exhibits high mobility with $\mu_{Hall} \sim 10{,}000$ cm^2/Vs at carrier density of 3.5x10^{12} cm^{-2} at 10K. Above 80K, We observe a sharp rise in resistivity as a function of temperature ρ(T), which is attributed to the RSO phonon scattering form the BSTO gate. We have extracted the dominant RSO phonon mode from ρ(T) and compared it with results extracted from independent spectroscopic ellipsometry measurements. We will also discuss the temperature dependence of resistivity in bi-layer graphene gated by BSTO.

Zhiyong Xiao
Univ of Nebraska - Lincoln

Date submitted: 14 Nov 2013 Electronic form version 1.4