Abstract Submitted
for the MAR13 Meeting of
The American Physical Society

Transport properties of graphene devices transferred to STO substrates[1] RAYMOND SACHS, PATRICK ODENTHAL, ROLAND KAWAKAMI, JING SHI, University of California, Riverside — The effect of substrate on graphene transport properties can help us understand the scattering mechanisms relevant to its carrier mobility. Single-layer graphene is easily located on the surface of Silicon with 300nm SiO_2 using optical microscopy. We have developed a technique for wet-etching the SiO_2, peeling the device with metallic leads from the surface, and transferring it to any substrate. This technique eliminates the need to locate the graphene flake on the target substrate for aligning and patterning. A direct comparison can be made between the transport properties of graphene on SiO_2 and the target substrate. A device has been transferred to 500um and 200um thick Strontium Titanate (STO) substrates as well as 250nm thick layer of STO that has been grown epitaxially on Nb-doped STO via Pulsed Laser Deposition. The STO layer, with a higher dielectric constant than SiO_2, has a higher capacitance and produces a more effective graphene FET. A higher mobility is expected for a device on the surface of a material with a higher dielectric constant if charged impurity scattering is a primary limiting factor. The devices transferred to STO display a gate voltage dependent hysteresis in both the longitudinal and Hall resistances. However, the mobility obtained from these measurements remains the same as that of the device on SiO_2. Possible reasons for the absence of the high dielectric substrate effect on graphene carrier mobility and hysteretic behavior will be discussed.

[1]Research was supported in part by NSF/NEB and DOE.

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Date submitted: 13 Nov 2012 Electronic form version 1.4