Abstract Submitted
for the MAR10 Meeting of
The American Physical Society

Scanning Tunneling Microscopic Studies of Dielectric Gate Materials on Graphene M.L. TEAGUE, T.-P. WU, M.W. BOCKRATH, N.-C. YEH, Dept. of Physics, Caltech, Pasadena, CA 91125, C.N. LAU, Dept. of Physics, UC Riverside, Riverside, CA 92521 — We report on scanning tunneling microscopic and spectroscopic studies of single/bi-layer graphene sheets in contact with dielectric gate materials such as SiO_2, Al_2O_3 and nitric oxide. Previous studies have shown direct correlation between the tunneling conductance and the SiO_2 substrate-induced strain field. Theoretical analysis based on a scenario of inelastic out-of-plane phonon-assisted tunneling reveals that phonon frequency increases with increasing strain from 26 meV in relaxed regions to 42 meV in strained regions, and a sudden increase at 0.5% strain may be due to a threshold coupling of the out-of-plane graphene phonon with the phonons of the underlying SiO_2 These findings suggest strong influences of the dielectric materials that came in contact with graphene. Further comparison among different dielectrics will be made to elucidate the underlying causes for these effects. Additionally, spectroscopic studies of the quality of large scale copper-mesh grown graphene will be reported. This work was supported by NSF/NRI under Caltech/CSEM.

Marcus Teague
Caltech

Date submitted: 24 Nov 2009 Electronic form version 1.4