Abstract Submitted
for the MAR12 Meeting of
The American Physical Society

Electron phonon renormalization in N-doped graphene RAMAKRISHNA PODILA, Department of Physics, Clemson University, PAOLA AYALA, University of Vienna, JOHN SPEAR, Department of Physics, Clemson University, THOMAS PICHLER, University of Vienna, APPARAO RAO, Department of Physics, Clemson University, CLEMSON UNIVERSITY TEAM, UNIVERSITY OF VIENNA COLLABORATION — Current research efforts are aimed at controlling the electronic properties graphene sheets using electron (or hole) doping for successful device fabrication. The presence of strong coupling between electronic and vibrational properties in graphene greatly assists Raman spectroscopy in probing the dopant-induced electronic energy changes. Previously, Raman spectroscopy was employed as a tool to probe the electron and phonon renormalization in doped single-walled carbon nanotubes (SWNT). It was found that the increase in electron velocity in?uences lattice vibrations locally near a negatively charged defect. These local renormalization effects were observed to result in a new effectively downshifted (up-shifted) Raman peak below the G' peak for n-doped (p-doped) SWNTs. In case of graphene, we find that the several Raman features for CVD grown N-doped graphene vary depending upon local dopant bonding environment. For instance, non-graphitic dopants (pyridinic, pyrrolic) were observed to result in highly intense D & D'-band unlike the graphitic dopants. We explain these results in terms of the zig-zag (armchair) edges formed by graphitic (non-graphitic) bonding environment of the dopant.

Ramakrishna Podila
Department of Physics, Clemson University

Date submitted: 22 Nov 2011 Electronic form version 1.4