Abstract Submitted
for the MAR13 Meeting of
The American Physical Society

Protein coronas of Graphene and Carbon Nanotubes RAMAKRISHNA PODILA, PU CHUN KE, Department of Physics, Clemson University, Clemson, SC 29634, JARED BROWN, Brody School of Medicine, East Carolina University, Greenville, NC 27834, APPARAO RAO, Department of Physics, Clemson University, Clemson, SC 29634, CLEMSON PHYSICS TEAM, EAST CAROLINA UNIVERSITY TEAM — We explored the effects of protein coating on the optical and vibrational properties of single-walled carbon nanotubes (SWCNTs) and bi- and few layer graphene nanosheets using micro-Raman spectroscopy, UV-visible absorption and electron microscopy. We found that bovine serum albumin (BSA) forms a hard corona on the surfaces of both graphene and SWCNTs. Our results suggest that the BSA hard corona acted as a weak acceptor to facilitate charge transfer from the carbon nanostructures. Notably, we observed that charge transfer occurred only in the case of SWNTs possibly due to their sharp and discrete electronic density of states. On the contrary, we find that graphene did not show a similar charge transfer due to its continuous energy dispersion. Furthermore, the nanostructures induced significant changes in the secondary structure of the BSA by relaxing their external ?-helices. These results are expected to guide controlled nanostructure-biomolecule interactions and prove beneficial in developing benign nanomaterials.

Ramakrishna Podila
Department of Physics, Clemson University, Clemson, SC 29634

Date submitted: 27 Nov 2012 Electronic form version 1.4