Abstract Submitted
for the MAR09 Meeting of
The American Physical Society

**Conductivity engineering of graphene by defect formation** BIPLAB SANYAL, Uppsala University — Graphene exhibits exotic electronic properties revealed in transport measurements. The possibility to influence the electronic structure and hence control the conductivity by physisorption or doping with adatoms is crucial in view of electronics applications. Here we show that in contrast to expectation, the conductivity of graphene increases with increasing concentration of vacancy defects, with an amount of over one order of magnitude. We obtain a pronounced enhancement of the conductivity after insertion of defects by ab-initio electronic structure calculations. The theoretical results are supported by the experimental studies on carbon nano-sheets. Our finding is attributed to defect induced mid-gap states, which create a region exhibiting metallic behavior around the vacancy defects. The modification of the conductivity of graphene by implementation of stable defects is crucial for the creation of electronic junctions in graphene-based electronics.

Biplab Sanyal
Uppsala University

Date submitted: 22 Nov 2008 Electronic form version 1.4