Abstract Submitted
for the MAR09 Meeting of
The American Physical Society

Band-gap tuning through progressive oxidation of graphene TANESH BANSAL, ADITYA MOHITE, BRUCE ALPHENAAR, JACEK JASINSKI, MAHENDRA SUNKARA, University of Louisville, IAMRE, DEPT OF CHEM ENGG COLLABORATION — Graphene has a high electron mobility at room temperature, making it attractive for device applications. Because graphene is a zero-gap semiconductor, it is challenging to modulate its conductance using a field effect gate. Oxidation of graphene opens up a band gap, transforming oxidized graphene into an insulator. However, theory also suggests that there are a range of stable oxidation states corresponding to different oxygen coverage on the surface. Here, we demonstrate that it is possible to tune the band-gap of oxidized graphene by varying the surface oxygen concentration. Commercially obtained KISH graphite was converted to graphite oxide by treatment with a mixture of sulfuric acid and nitric acid. Oxidized graphene sheets were dispersed on quartz substrates following sonication and centrifugation of the graphite oxide. Using photocurrent spectroscopy the energy gap of individual oxidized graphene flakes were observed to increase from 0.62 eV to 0.69 eV with increasing oxidation time. Band-gap measurements were correlated with the surface oxygen concentration using XPS, UPS and FTIR. *ONR N00014-06-1-0228*

Aditya Mohite
University of Louisville

Date submitted: 23 Nov 2008 Electronic form version 1.4