

Abstract Submitted
for the MAR11 Meeting of
The American Physical Society

Effect of irradiation by electron-beam and oxygen plasma on graphene studied with Raman spectroscopy and electronic transport ROMANEH JALILIAN, NaugaNeedles, ISAAC CHILDRES, LUIS A. JAUREGUI, Purdue University, MICHAEL FOXE, Penn State, JIFA TIAN, Purdue University, IGOR JOVANOVIC, Penn State, YONG P. CHEN, Purdue University — We report a study of the effects of electron-beam irradiation and oxygen plasma etching on graphene and graphene field-effect transistors (GFET). For both types of exposure, Raman spectra show a characteristic evolution with increasing irradiation-induced disorder. Electron-beam exposure causes a down-shifting in the charge-neutral point (CNP), interpreted as due to a hole-doping in the substrate. Oxygen plasma etching causes an up-shifting of the CNP, interpreted as due to hole-doping molecules adsorbed on the plasma-induced defects. Both types of exposure decrease the carrier mobilities and minimum conductivity of graphene. Additionally, weak localization and the quantum Hall effect are characterized in exposed devices. Our findings are valuable for understanding the effects of irradiation damage on graphene and the physics of disordered graphene through artificially generated defects.

Romaneh Jalilian
Purdue University

Date submitted: 27 Nov 2010

Electronic form version 1.4