Abstract Submitted
for the MAR14 Meeting of
The American Physical Society

Tunable Photocurrent and Photoresponsivity of Graphene/Silicon Carbide Field Effect Photodetectors BIDDUT K. SARKER, ISAAC CHILDRES, Department of Physics, Purdue University, Indiana, USA. Birck Nanotechnology Center, Purdue University, Indiana, USA., EDWARD CAZALAS, IGOR JOVANOVIC, Department of Mechanical and Nuclear Engineering, The Pennsylvania State University, University Park, Pennsylvania, USA., YONG P. CHEN[1], Department of Physics, Purdue University, Indiana, USA. Birck Nanotechnology Center, Purdue University, Indiana, USA., QUANTUM MATTER AND DEVICES LAB COLLABORATION, JOVANOVIC GROUP COLLABORATION — Graphene is a promising material for a variety of optoelectronics applications due to its unique electronic and optical properties. In this talk, we present detailed photoresponse studies of a novel photodetector based on graphene field effect transistors on undoped silicon carbide substrates. We show that the photocurrent of our devices under 400 nm laser illumination is positive (negative) for a negative (positive) back gate-voltage and almost zero for zero gate-voltage. For a fixed gate-voltage, the photocurrent and photoresponsivity can be tuned by the power of the light, source-drain bias-voltage and the position of the laser beam on the devices. We propose that the photodetection mechanism of our devices relies on the high sensitivity of the resistivity of graphene to the local change of the electric field that can result from photoexcited carriers produced in the underlying semiconductor substrates.

[1]School of Electrical and Computer Engineering, Purdue University, Indiana, USA.

Biddut K. Sarker
Purdue University

Date submitted: 15 Nov 2013 Electronic form version 1.4