Abstract Submitted
for the MAR13 Meeting of
The American Physical Society

Temporal characterization of hot-electron thermoelectric effect in monolayer graphene devices[1] RYAN J. SUESS, Inst. for Research in Electronics and Applied Physics (IREAP)-University of Maryland (UMD), XINGHAN CAI, Center for Nanophysics and Advanced Materials (CNAM)-UMD, ANDREI SUSHKOV, GREG JENKINS, M.-H. KIM, CNAM-UMD, JUN YAN, Dept. of Physics, University of Mass.-Amherst, H. DENNIS DREW, CNAM-UMD, THOMAS E. MURPHY, IREAP-UMD, MICHAEL S. FUHRER, CNAM-UMD — Graphene's unique electronic and optical properties have made it an attractive candidate material for photonics applications such as broadband optical detection. We report the temporal response of a monolayer graphene device with dissimilar metal electrodes in which optically induced hot-electrons are detected via a thermoelectric voltage induced between the electrodes. Measurements are carried out with a pulsed laser system (60 fs pulse width) at the telecom wavelength of 1.5 μm using an asynchronous optical sampling pulse coincidence technique. Graphene's weak electron-phonon coupling and our compact device geometry (comparable to the thermal diffusion length) result in a fast 10 - 20 ps non-linear thermal response that is nearly independent of temperature over the measured range of 15 - 150 K. Sensitivity of the devices response to optical power will also be discussed. These results are a follow-on to other talks reported by our group at this conference in which the fabrication, operating principal, and broad wavelength (THz to near IR) response of the graphene-based hot-electron bolometer are described.

[1]Supported by IARPA and ONR-MURI

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Date submitted: 27 Nov 2012 Electronic form version 1.4