Abstract Submitted
for the MAR14 Meeting of
The American Physical Society

Highly sensitive hot electron bolometer based on disordered graphene XIAOSONG WU, State Key Laboratory for Artificial Microstructure and Mesoscopic Physics, Peking University, Beijing 100871, P. R. China, QI HAN, TENG GAO, RUI ZHANG, YI CHEN, JIANHUI CHEN, GERUI LIU, YANFENG ZHANG, ZHONGFAN LIU, DAPENG YU, Peking Univ — A bolometer is a device that makes an electrical resistive response to the electromagnetic radiation resulted from a raise of temperature due to heating. The combination of the extremely weak electron-phonon interactions along with its small electron heat capacity makes graphene an ideal material for applications in ultra-fast and sensitive hot electron bolometer. However, a major issue is that the resistance of pristine graphene weakly depends on the electronic temperature. We propose using disordered graphene to obtain a strongly temperature dependent resistance. The measured electrical responsivity of the disordered graphene bolometer reaches 6×10^6 V/W at 1.5 K, corresponding to an optical responsivity of 1.6×10^5 V/W. The deduced electrical noise equivalent power is 1.2 fW/$\sqrt{\text{Hz}}$, corresponding to the optical noise equivalent power of 44 fW/$\sqrt{\text{Hz}}$. The minimal device structure and no requirement of high mobility for graphene make a step forward towards the applications of graphene hot electron bolometers.

Xiaosong Wu
Peking Univ

Date submitted: 14 Nov 2013 Electronic form version 1.4