Abstract Submitted
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Sensitive bolometry using hot-electron thermoelectric effect in graphene devices[1] XINGHAN CAI, Center for Nanophysics and Advanced Materials (CNAM)-University of Maryland (UMD), RYAN J. SUESS, Inst. for Research in Electronics and Applied Physics (IREAP)-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 — Due to the weak electron-phonon coupling and strong electron-electron interaction in graphene, the hot-electron thermoelectric effect provides a highly sensitive detection mechanism for heat absorbed in the electronic system, either by radiation or Joule heating. We have fabricated graphene devices using mechanically exfoliated single layer graphene contacted by two dissimilar metal electrodes (chromium and gold) in order to generate an asymmetry in the device and a net thermoelectric response to heating. We measure the thermoelectric response to Joule heating by an AC 2^{nd} harmonic method, and compare to the thermoelectric response due to optical excitation in the near infrared and at THz frequencies. We find a sensitivity exceeding 100 V/W at room temperature. We also demonstrate that the sensitivity can be significantly enhanced by patterning the graphene sheet into nanoribbon arrays. The transport measurements indicate that graphene is a promising candidate for sensitive broadband photo detectors at room temperature. Related work by our group showing that ultra-broadband detection of light can be realized in such devices will be presented in other talks at this meeting.

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