Abstract Submitted
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**Mid-Infrared Graphene Photoresponse**[1] ALLEN HSU, Massachusetts Institute of Technology, PATRICK HERRING, Harvard University, YONG CHEOL SHIN, Massachusetts Institute of Technology, KI KANG KIM, Dongguk University, JING KONG, Massachusetts Institute of Technology, CHARLIE MARCUS, Harvard University, NATHANIEL GABOR, TOMAS PALACIOS, PABLO JARILLO-HERRERO, Massachusetts Institute of Technology — Graphene is a two-dimensional (2D) material that has attracted great interest for electronic devices since its discovery in 2004. Due to its zero band gap band structure, it has a broad-band optical absorption ranging from the far-infrared all the way to the visible making it potentially useful for infrared photodetectors. Electrostatically gated p-n junctions have demonstrated photocurrents in the near-IR ($\lambda = 850$nm), primarily due to hot carrier mechanisms. In order to study these mechanisms at longer wavelengths ($\lambda = 10$ $\mu$m), high quality chemically vapor grown (CVD) graphene is necessary to fabricate electrostatically controlled p-n junctions due to the longer optical length scales. Moreover, at these low energies ($\sim 125$ meV), optical phonon scattering is suppressed and is predicted to lead to increased carrier lifetimes and enhanced photo-response. Using electrostatic gating, we are able to study the absorption mechanisms in graphene by selecting between conventional photovoltaic effects and photo-thermoelectric effects. Experiments suggest that the photocurrent signal is enhanced by electrostatic gating near the Dirac peak and reduced disorder in the graphene sample.

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