Abstract Submitted
for the MAR14 Meeting of
The American Physical Society

Enhanced control of THz optical conductivity in graphene via optimal extraordinary optical transmission electrode design[1] SARA AREZOOMANDAN, BERARDI SENSALE-RODRIGUEZ, University of Utah — Terahertz (THz) technology has recently arisen much attention for a wide range of applications. One of the major challenges in semiconductor-based THz devices is how to enhance and, therefore more efficiently tune, the material optical conductivity. Graphene due to its extraordinary properties has been extensively used for reconfigurable THz devices. By gating graphene, one can control its electrical thus THz properties. Several gating mechanisms have been proposed, including: Si-substrate, ion-gel, and extraordinary optical transmission (EOT) electrode. However, the optical conductivity swings in CVD graphene are typically limited to the 0.15-1.0mS range. Here we propose a simple device structure consisting of EOT electrode-gated graphene that can effectively achieve an enhancement of its effective optical conductivity swing, e.g. 3.8X effective conductivity enhancement at 2THz and 0.9mS. We accomplished this by optimizing the width/spacing of the metal stripes as well as the separation between graphene and the EOT electrode. The proposed structure does not require the addition of other epitaxially stacked electromagnetic structures (such as additional periodic metallic structures). This configuration shows promise as the active element in low-cost compact THz optoelectronics.

[1]NSF MRSEC program at the University of Utah under Grant # DMR 1121252.

Sara Arezoomandan
University of Utah

Date submitted: 15 Nov 2013 Electronic form version 1.4