Abstract Submitted
for the MAR13 Meeting of
The American Physical Society

Ultrafast photoresponse of oxide nanostructures[1] LU CHEN, YANJUN MA, MENGCHEN HUANG, University of Pittsburgh, SANGWOO RYU, CHUNG WUNG BARK, CHANG-BEOM EOM, University of Wisconsin-Madison, JEREMY LEVY, University of Pittsburgh — Photoconductivity has been demonstrated for nanostructures at the interface of $LaAlO_3/SrTiO_3$ and spectral response shows signatures of in-gap states being responsible for photoresponse[2]. However, as a wide bandgap material, $SrTiO_3$ shows large nonlinear optical coefficients. Here we discuss time-resolved measurements for exploring the nonlinearity of photoconductivity in the oxide nanostructures. It is found that a nonresonant $\chi^{(3)}$ process results in the observed tunable localized ultrafast response, as well as optical rectification, which can principally lead to the generation and detection of THz radiation. Due to the nanoscale nature of our device, these results foreshadow the control of THz field at single molecule scales.

[1]This work is supported by AFOSR - FA9550-12-1-0268 (J. L.), AFOSR FA9550-12-1-0342 (C. -B. E.) and the National Science Foundation through grants DMR-1104191 (J. L.) and DMR-1234096 (C. -B. E.).
[2]Irvin, P. et al. Rewritable Nanoscale Oxide Photodetector. Nature Photon. 4, 849-852 (2010).

Lu Chen
University of Pittsburgh

Date submitted: 11 Dec 2012 Electronic form version 1.4