Ultrafast photoconductive response of LaAlO$_3$/SrTiO$_3$ nanoscale photodetectors$^1$ YANJUN MA, CHENG CEN, University of Pittsburgh, CHUNG WUNG BARK, CHAD M. FOLKMAN, CHANG-BEOM EOM, University of Wisconsin-Madison, JEREMY LEVY, University of Pittsburgh — Conducting AFM lithography can be used to create nanoscale field effect transistors at the LaAlO$_3$/SrTiO$_3$ interface.$^{2,3}$ Such devices exhibit gateable photoconductive response, which spans from visible to near-infrared regime.$^4$ By implementing the pump-probe measurement with a home-built femtosecond laser, we observe an ultrafast nonlinear optical response of these nanoscale photodetectors. We explore the feasibility of these devices for molecular-scale THz spectroscopy applications.

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$^4$P. Irvin et al., Nature Photonics advanced online publication, 14 Nov.2010 (DOI 10.1038/nphoton.2010.238)