Abstract Submitted
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Femtosecond spectroscopy of multiferroic $BiFeO_3$ thin films[1] J. ZHANG, Boston University, E. ABREU, J.R. SCHNECK, Boston University, D.S. RANA, I. KAWAYAMA, M. TONOUCHI, Osaka University, L. ZIEGLER, R.D. AVERITT, Boston University — $BiFeO_3$ is a multiferroic material characterized by a room temperature antiferromagnetic and ferroelectric phase and a 2.6eV bandgap. Terahertz emission from $BiFeO_3$ thin films following excitation above bandgap by UV femtosecond pulses has been observed [1]. The THz emission is related to ultrafast depolarization of the ferroelectric order in the film as observed from the hysteresis of the amplitude of the emitted THz signal as a function of a biasing electric field. Experiments probing the electronic and lattice dynamics with sub-picosecond resolution are an essential step towards identifying the intrinsic mechanism responsible for depolarization and THz emission in $BiFeO_3$. In this study we investigate the carrier dynamics of epitaxial $BiFeO_3$ thin films using degenerate pump-probe spectroscopy at 400 nm with sub-50 fs pulses. We have observed a 5 THz coherent optical phonon oscillation consistent with the A_1 phonon mode as observed in Raman spectroscopy [2]. In this talk, the relation of the observed dynamics to the THz emission will be discussed. [1] D.S. Rana, et al., Advanced Materials 21, 2881 (2009). [2] S. Kamba, et al, Phys. Rev. B 75, 024403 (2007).

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