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Ultrafast Anisotropic Optical Response and Coherent Acoustic Phonon Generation in Polycrystalline BaTiO₃-BiFeO₃¹ B. A. MAGILL, G. A. KHODAPARAST, M. GYU KANG, Y. ZHOU, H-C SONG, S. PRIYA, Virginia Tech — Ultrafast optical spectroscopy can provide insight into fundamental microscopic interactions, dynamics and the coupling of several degrees of freedom. Pump/probe studies can reveal the answer to questions like What are the achievable switching speeds in multiferroics?, What is the influence of the crystallographic orientation and domain states on the available switching states?, and What is the effect of the hetrostructure on promoting the coupling between the varying field excitations?. In this presentation, we report on two color (400/800nm) ultrafast pump-probe differential reflectance spectroscopy of *BiFeO₃ – BaTiO₃* structures. The (001)–*BiFeO₃–BaTiO₃* thin films were prepared using pulsed laser deposition on vicinal *SrTiO₃* substrates using LSMO bottom electrodes. Crystal orientation and topography were analyzed by x-ray diffraction and atomic force microscopy. The films were found to exhibit perovskite phase and in our study, we introduce the first observation of photoexcited strain waves, with the frequencies in the GHz range.

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