

Abstract Submitted  
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**High Spatial and Temporal Resolution Optical Probes of Ferroelectric Thin Films**<sup>1</sup> HONGZHOU MA, JEREMY LEVY, Department of Physics and Astronomy, University of Pittsburgh, MIKE D. BIEGALSKI, DARRELL G. SCHLOM, SUSAN TROLIER-MCKINSTRY, Department of Materials Science and Engineering, the Pennsylvania State University, WON-JEONG KIM, JAMES S. HORWITZ, Naval Research Laboratory — Optical probes can provide unique insight into the local ferroelectric properties of thin films. We will describe two techniques that provide sensitive measures of domain structure and dynamics with high spatial and/or temporal resolution: (1) confocal scanning optical microscopy (CSOM), which measures in-plane domain structure of ferroelectric films, and (2) GHz apertureless near-field scanning optical microscopy (GHz-ANSOM) which probes ferroelectric domain dynamics with high spatial resolution ( $<50$  nm) and temporal resolution ( $\sim$ ps). The electro-optic effect, measured using CSOM on strained SrTiO<sub>3</sub> films, shows clear hysteresis at room temperature, indicating the existence of ferroelectric domains below the diffraction limit. The microwave dynamics of such nanoscale domains can be revealed using GHz-ANSOM.

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