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Ferroelastic domain dynamics in polydomain, epitaxial $BaTiO_3$ thin films ANTHONY MEIER, BRUCE WESSELS, Northwestern University — The dynamics of 90^o-domain switching in polydomain, epitaxial barium titanate thin films were studied using the linear electro-optic effect. Co-planar electrodes were deposited on the film surface and bias was applied in the plane of the film for poling. Upon application of a bias pulse, the E-field driven electro-optic response increased to its saturation value within the 28 ns rise time of the measurement system. Upon removal of the bias pulse, a slow decay of the electro-optic response due to strain-driven relaxation of the ferroelastic domains was observed. Measured relaxation time constants ranged from 5 to 17 ms, exhibiting a power law dependence on the applied E-field amplitude given by $\tau = \mathrm{AE}^m$ with m = 0.98-1.23. X-ray diffraction measurements indicated that under a steady state in-plane bias voltage, the a-domain fraction increased while both the c- and a-domain surface normal lattice parameters increased due to the in-plane compressive strains that result from the 90^o flipping of c-domains. X-ray diffraction measurements after removal of the bias voltage were indistinguishable from those prior to application of the bias voltage indicating that the ferroelastic domains had relaxed back to their original state.

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