Abstract Submitted for the MAR10 Meeting of The American Physical Society

Piezoelectric response of epitaxial ferroelectric heterostructures JI YOUNG JO, REBECCA SICHEL, Dept. of Materials Science and Engineering and Materials Science Program, Univ. of Wisconsin-Madison, HO NYUNG LEE, Materials Science and Technology Division, Oak Ridge National Lab., SERGE NAKHMANSON, Materials Science Division, Argonne National Lab., ERIC DUFRESNE, Advanced Photon Source, Argonne National Lab., PAUL G. EVANS, Dept. of Materials Science and Engineering and Materials Science Program, Univ. of Wisconsin-Madison — The electromechanical response of epitaxial oxide heterostructures can be used to probe novel properties arising from nanoscale structural confinement. To resolve the layer-by-layer origin of piezoelectric responses of ferroelectric/dielectric superlattices, we performed time-resolved x-ray microdiffraction studies of a  $2(BaTiO_3)/4(CaTiO_3)$  superlattice in an applied electric field. The contributions of individual components to the overall piezoelectric response are deduced using kinematic x-ray diffraction calculations. We found that the dielectric  $CaTiO_3$  component has an equal piezoelectric response and remnant polarization to the ferroelectric BaTiO<sub>3</sub> component, in good agreement with predictions of piezoelectric coefficient ( $\sim 50 \text{ pm/V}$ ) and local polarization distribution based on density functional theory calculations.

Chi Yong Cho

Date submitted: 21 Nov 2009

Electronic form version 1.4