Abstract Submitted
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Novel in-situ x-ray diffraction measurement of ferrroelectric superlattice properties during growth[1] BENJAMIN BEIN, HSIANG-CHUN HSING, SARA J. CALLORI, JOHN SINSHEIMER, MATTHEW DAWBER, Physics and Astronomy, Stony Brook University — Ferroelectric domains, surface termination, average lattice parameter and bilayer thickness were monitored by in-situ x-ray diffraction during the growth of $BaTiO_3$/$SrTiO_3$ (BTO/STO) superlattices by off-axis RF magnetron sputtering. A new x-ray diffraction technique was employed which makes effective use of the custom growth chamber, pilatus detector and synchrotron radiation available at beamline X21, NSLS, BNL. The technique allows for scan times substantially faster than the growth of a single layer of material, allowing continuous monitoring of multiple structural parameters as the film grows. The effect of electric boundary conditions was investigated by growing the same superlattice alternatively on STO substrates and 20nm $SrRuO_3$ (SRO) thin films grown on STO substrates. Besides the fundamental knowledge gained from these studies, being able to monitor the structural parameters of a growing ferroelectric superlattice at this level of detail provides numerous insights which can guide the growth of higher quality ferroelectric superlattices in general.

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