Abstract Submitted
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In-situ x-ray diffraction studies of the epitaxial growth of $BaTiO_3/SrTiO_3$ superlattices[1] BENJAMIN BEIN, JOHN SINSHEIMER, SARA CALLORI, HSIANG-CHUN HSING, MOHAMMED HUMED YUSUF, Stony Brook University, PRIYA CHINTA, RANDALL HEADRICK, University of Vermont, MATTHEW DAWBER, Stony Brook University — The growth of $BaTiO_3/SrTiO_3$ superlattices on $SrTiO_3$ substrates using off axis RF magnetron sputtering was monitored by in-situ x-ray diffraction at X21 at the National Synchrotron Light Source at Brookhaven National Laboratory. The $(00\frac{1}{2})$ surface reflection was used to measure the growth rates of $BaTiO_3$ and $SrTiO_3$. By rocking the sample in front of an area detector, reciprocal space maps around the (001) and (101) peaks can be rapidly acquired during the growth of the superlattice. This allows the evolution of the materials lattice parameters and the superlattice structure to be continually monitored during the growth of these structures. An interesting observation is that despite the elevated deposition temperature, ferroelectric stripe domains appear, and the evolution of these with superlattice thickness was also monitored during the growth process. The eventual relaxation of the superlattices above a critical thickness was also monitored and can be compared to post-deposition atomic force microscopy measurements of film morphology. These studies provide insight into the evolution of ferroelectric properties during the growth of highly strained epitaxial ferroelectric heterostructures.

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