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Non-linear second harmonic generation (SHG) studies of $BaTiO_3/SrTiO_3$ superlattices EFTIHIA VLAHOS, CHE-HUI LEE, PING-PING WU, The Pennsylvania State University, CHUNG WUNG BARK, HO WON JANG, CHAD FOLKMAN, SEUNG HYUB BAEK, J. W. PARK, University of Wisconsin-Madison, MIKE BIEGALSKI, Oak Ridge National Lab, DMITRI TENNE, Boise State University, DARRELL SCHLOM, Cornell University, LONG-QING CHEN, The Pennsylvania State University, CHANG-BEOM EOM, University of Wisconsin-Madison, VENKATRAMAN GOPALAN, The Pennsylvania State University — Theoretical phase-field simulations predict that certain types of superlattices consisting of alternating $(BaTiO_3)_n/(SrTiO_3)_n$layers have novel vortex domain wall configurations which give rise to exceptionally high polarization tunability combined with negligible polarization hysteresis. Optical second harmonic generation (SHG) was used to probe the phase and transition temperatures of multilayer $(BaTiO_3)_m/(SrTiO_3)_n$ superlattices, as a function of epitaxial strain. In addition, in-plane electro-optic measurements were carried out. The experimental results are in excellent agreement both with theoretical predictions, as well as the temperature-strain phase diagram obtained experimentally from UV Raman studies. The ferroelectric, in-plane SHG signal, from the tensile strained $SrTiO_3$ layers reveals an *mm2* point group symmetry, whereas the point group symmetry of the compressively strained $BaTiO_3$ layers, was determined to be *4mm*.

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