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Coherent X-ray Diffraction from Striped Nanodomain in a PbTiO₃/SrTiO₃ Superlattice QINGTENG ZHANG, PICE CHEN, University of Wisconsin, Madison, ZHONGHOU CAI, Argonne National Laboratory, MATTHEW DAWBER, SARA CALLORI, Stony Brook University, PAUL EVANS, University of Wisconsin, Madison — Polarization striped domains in ferroelectric/dielectric superlattices reflect the coupling between the polarization and a lattice distortion in each component layer. We have used coherent x-ray diffraction to study the variation of the striped domain pattern in a PbTiO₃/SrTiO₃ ferroelectric/dielectric superlattice over lateral length scales of hundreds of nanometers to microns. A coherent beam of synchrotron x-rays with a photon energy of 10 keV was focused to a spot with a diameter of approximately 200 nm. The arrangement of domains produces a speckle pattern of intensity in reciprocal space that varies according to the detailed arrangement of domains within the focal spot. When the focal spot is moved across the sample, it is found that the intensity of the total diffuse scattering remains constant while the positions of speckles vary in reciprocal space. This provides additional spatial information about the speckles which leads to better understandings of the configurations of the striped domains in ferroelectric/dielectric superlattices. This work is supported by US DOE under Grant No. DE-FG02-10ER46147.

Qingteng Zhang
University of Wisconsin, Madison

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