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Ferroelectric Striped Nanodomains in $\text{PbTiO}_3/\text{SrTiO}_3$ Superlattice Islands QINGTENG ZHANG, JOONKYU PARK, Univ of Wisconsin, Madison, ROSS HARDER, JORG M. MASER, Argonne National Laboratory, MOHAMMED YUSUF, MATTHEW DAWBER, Stony Brook University, PAUL G. EVANS, Univ of Wisconsin, Madison — The ferroelectric remnant polarization of isolated unscreened ferroelectric layers in ultrathin films or ferroelectric/dielectric superlattices spontaneously forms striped domains to minimize the total electrostatic energy. The X-ray scattering patterns of domains in a $\text{PbTiO}_3/\text{SrTiO}_3$ ferroelectric/dielectric superlattice indicate that the striped domains have a highly disordered arrangement with an average period of approximately 8 nm. Isolated superlattice islands have been fabricated with lengths of 2 μm and widths ranging from 150 nm to 800 nm using focused ion beam (FIB) patterning. Coherent x-ray scattering patterns show that the striped domain pattern is preserved in the nanopatterned islands. Neither the width nor the in-plane coherence length of the domains have shown any meaningful dependence on the width of the island. In addition, the correlation of the coherent scattering patterns indicates that the temporal fluctuation of the domain patterns is different from what have been previously observed in the unpatterned areas. We expect that such difference be due to the mechanical boundary introduced by the FIB etching.

Qingteng Zhang
Univ of Wisconsin, Madison

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