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Metallic oxides as dielectrics in artificially layered ferroelectric superlattices SARA CALLORI, Dept. of Physics and Astronomy, Stony Brook University, DONG SU, Center for Functional Nanomaterials, Brookhaven National Laboratory, JOHN SINSHEIMER, MATTHEW DAWBER, Dept. of Physics and Astronomy, Stony Brook University — Artificially structured oxides provide many opportunities to develop systems with novel and tunable properties. $SrRuO_3$ has a metal-insulator transition as a function of thickness, which suggested to us the idea that we could use extremely thin layers (less than 3 unit cells) of $SrRuO_3$ as a novel dielectric component within an artificially layered superlattice system. We have created high quality $PbTiO_3/SrRuO_3$ superlattices by using an off-axis RF magnetron sputtering technique. The samples were characterized by x-ray diffraction, atomic force microscopy, transmission electron microscopy, and electrical measurements. When the $PbTiO_3$ layers are above a certain critical thickness, significant out-of-plane ferroelectricity develops in the system and the overall material has a semiconducting character. In this talk we will present a detailed experimental investigation of the behavior of ferroelectric polarization and domain size as the relative thicknesses of the superlattice layers are varied. Our work serves as a demonstration that a new set of materials, metallic oxides, can be considered for inclusion as novel dielectric layers in ferroelectric superlattices.

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