Abstract Submitted
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Polarization of strained $SrTiO_3$ films grown on Si (001) F. J. WALKER, YARON SEGAL, Yale University, J. W. REINER, C. H. AHN, Yale University, ZHAN ZHANG, Argonne National Laboratory — Perovskite oxides grown on silicon provide powerful new functionalities for device components built upon the ubiquitous silicon platform. A rich set of applications results from the combination of the perovskite's diverse electrical and physical structures and the semiconducting properties of silicon. Understanding how to develop new functionalities, however, requires detailed knowledge of the real space positions of atoms with sub-angstrom resolution. In this work, we have carried out synchrotron x-ray diffraction studies of crystal truncation rods on 4-5 unit-cell-thick $SrTiO_3$ films grown epitaxially on silicon, which have been terminated with different gate metals. We determine the precise atomic structure of these materials, in particular the displacements of the TiO_2 planes relative to the SrO planes that make up the perovskite structure. We show that the polarization and structure of commensurately strained films depend critically upon the electrical and chemical properties of the terminating metal.

Fred Walker
Yale University

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