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Local Piezoresponse of Strained $BaTiO_3$/Si Heterostructures
AJAY K. KOCHHAR, JEREMY LEVY, Dept. of Physics and Astronomy, University of Pittsburgh, VENU VAITHYANATHAN, DARRELL G. SCHLOM, Dept. of Materials Science and Engineering, Pennsylvania State University — Ferroelectric-silicon heterostructures can provide new functionality with applications for classical and quantum computing architectures. For quantum computing, it is important to have reversible polarization oriented parallel to the growth direction. Strained $BaTiO_3$/relaxed (Ba,Sr) TiO_3/Si heterostructures were grown by oxide-MBE. X-ray diffraction measurements indicate an out-of-plane orientation for the $BaTiO_3$ films. Thin (1.5 nm) Au electrodes are deposited on top of the films, and piezoresponse measurements are performed using an atomic-force microscope in contact mode. Local hysteresis curves are imaged by an interleave method that ensures proper registry of successive scans taken at various applied bias voltages. The results suggest that such thin film structures exhibit local hysteresis with varying coercive fields over sub-micrometer regions. This work was supported by DARPA QuIST DAAD-19-01-1-0650.

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