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Ferroelectric domain structure in BiFeO3 films F. ZAVALICHE, Materials Research Science and Engineering Center, Univ. of Maryland, College Park MD 20742, Y. H. CHU, Materials Science Center, National Tsing-Hua Univ., Hsinchu, Taiwan 30043, J. WANG, S.Y. YANG, Dept. of Materials Science, Univ. of Maryland, College Park MD 20742, E. REILLY, Dept. of Mechanical Engineering, Univ. of California, Berkeley CA 94720, T. ZHAO, Q. ZHAN, L. MOHADDES-ARDABILI, R. RAMESH, Dept. of Materials Science and Engineering, and Dept. of Physics, Univ. of California, Berkeley CA 94720 — In bulk, $BiFeO_3$ (BFO) possesses a rhombohedrally distorted perovskite structure; in thin films, the structure is sensitive to heteroepitaxial constraints, and a large polarization was measured. To investigate the ferroelectric domain structure, films of various thicknesses were grown by both pulsed laser deposition, and metal-organic chemical vapor deposition on (001), (110) and (111) oriented $SrTiO_3$ (STO) substrates. The ferroelectric domain structure was studied by piezoelectric force microscopy. Contrary to the case of films grown on STO(111), we found that as-grown BFO films on (100) and (110) oriented STO show a strong in-plane polarization component for thicknesses above $\approx$30 nm. This finding is in agreement with the atomistic model of ferroelectricity in distorted rhombohedral BFO. The stability of switched domains is also investigated. This work has been supported in part by the U. of Maryland NSF-MRSEC under grant #DMR 00-80008, and by the ONR under a MURI program.

F. Zavaliche
Materials Research Science and Engineering Center, Univ. of Maryland, College Park MD 20742

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