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Ferroelastic domain formation in epitaxial $La_{0.7}Sr_{0.3}MnO_3$ thin films TIM FISTER, DILLON FONG, JEFFREY EASTMAN, PAUL FUOSS, Materials Science Division, Argonne National Laboratory, KAVAIPATTI BALASUBRAMANIAM, PAUL SALVADOR, Department of Materials Science & Engineering, Carnegie Mellon University — Epitaxial $La_{1-x}Sr_xMnO_3$ (LSMO) thin films are known to form domains to reduce substrate-induced strain. For instance, on cubic $SrTiO_3$ (100), LSMO thin films can have up to four rhombohedrally-strained variants. These individual strain states can distort the MnO_6 octahedra and lead to unique electrical and magnetic properties. We have used synchrotron x-ray diffuse scattering to probe the in- and out-of-plane domain structure of a 5 nm LSMO film grown on $SrTiO_3$ (100). Satellites are present near integer order and half-order peaks that result from octahedral tilting in the coherent LSMO film. By analyzing the amplitude, position, and anisotropy of the satellite peaks for multiple half-order peaks, we obtain a robust measure of the dimensions of the domains, the ordering of the variants, and the strain state of each variant. Implications of the domain structure on magnetic properties will be discussed.

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