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**Uniaxial Magnetic Anisotropy Induced By Steps in La<sub>0.67</sub>Sr<sub>0.33</sub>MnO<sub>3</sub> Thin Films** M. MATHEWS, F.M. POSTMA, G.J.H.M. RIJNDERS, D.H.A. BLANK, J.C. LODDER, R. JANSEN, MESA+ Institute for Nanotechnology, University of Twente, The Netherlands — Epitaxial thin films of La<sub>0.67</sub>Sr<sub>0.33</sub>MnO<sub>3</sub> (LSMO) were grown by pulsed laser deposition on TiO<sub>2</sub> terminated SrTiO<sub>3</sub> (STO) vicinal substrates having regular arrays of monatomic steps. The LSMO films grow epitaxial, thereby replicating the step-terrace structure of the substrate up to the film surface, as confirmed by atomic force microscopy. Magnetic studies using a Vibrating Sample Magnetometer show that the films have an in-plane uniaxial magnetic anisotropy at room temperature. Interestingly, we observe that the easy axis depends on the direction of steps on the film surface and is always oriented along the direction of the steps. We attribute the uniaxial anisotropy to magneto-crystalline anisotropy due to defect planes induced by the step-terrace structure of the substrate and film. At low temperatures, biaxial anisotropy dominates with [110] as easy and [100] direction as hard axes and with no significant dependence on step orientation. The biaxial anisotropy at low temperatures is thought to arise from the four-fold tensile strain in the LSMO film caused by its lattice mismatch with the STO substrate.

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