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Influence of bending stress on the saturation magnetization of $\mathbf{La_{0.8}Sr_{0.2}MnO_3}$ QIANG WANG, Department of Physics and Astronomy, West Virginia University, Morgantown, West Virginia 26506, USA, AIPING CHEN, Center for Integrated Nanotechnology, Los Alamos National Laboratory, Los Alamos, NM 87545, USA, ERJIA GUO, Quantum Condensed Matter Division, Oak Ridge National Laboratory, Oak Ridge, TN 37831, USA, MANUEL ROLDAN, Imaging and Characterization Core Lab, King Abdullah University of Science and Technology (KAUST), Thuwal 23955-6900, Saudi Arabia, QUANXI JIA, Department of Materials Design and Innovation, University at Buffalo, The State University of New York, Buffalo, NY 14260, USA, MICHAEL FITZSIMMONS, Quantum Condensed Matter Division, Oak Ridge National Laboratory, Oak Ridge, TN 37831, USA — Using polarized neutron reflectometry, we measured the influence of elastic bending stress on the magnetization depth profile of a $La_{0.8}Sr_{0.2}MnO_3$ (LSMO) epitaxial film grown on a $SrTiO_3$ (STO) substrate. Despite the uniform chemical structure throughout the film, we observed strong variations of the saturation magnetization as function of depth. Most important, the elastic bending strain of $\pm$ 0.03% has no obvious effect on the magnetization depth profile at saturation. This result is in stark contrast to that of $(La_{1-x}Pr_x)_{1-y}Ca_yMnO_3$ films for which strain of $\pm$ 0.01% produced dramatic changes in the magnetization profile and Curie temperature. We attribute the difference between the influence of strain on the saturation magnetization in LSMO (weak or none) and LPCMO (strong) to a difference in the ability of LSMO (weak or none) and LPCMO (strong) to phase separate.

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