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Low Temperature Magnetic Force Microscopy of $La_{2-2x}Sr_{1+2x}Mn_2O_7$[1] NELIZA LEON BRITO, J.-S. ZHOU, J.B. GOODENOUGH, ALEX DE LOZANNE, University of Texas at Austin, JEEHOON KIM, ROMAN MOVSHOVICH, Los Alamos National Laboratory — We present micromagnetic studies of $La_{2-2x}Sr_{1+2x}Mn_2O_7$ (x = 0.32, 0.36, 0.40) taken with a magnetic force microscope at 4 K in magnetic fields up to 5 T. The x = 0.32 sample shows branching domains with magnetization in/out of the surface that evolve into stripes and bubbles as a function of increasing field until saturation is reached at $\sim$ 0.29 T. The rms average of the magnetic images show an unexpected non-monotonic dependence on field that is not observed in SQUID data of a sister sample. We speculate that this difference is caused by the micro vs. macro nature of the two measurements. The magnetic microstructure for the doping level of x = 0.36 agrees with the expected in-plane magnetization. The sample reaches saturation by magnetic domain reorientation at |H|>0.18 T. The x = 0.40 sample also shows in-plane magnetization, but the increasing magnetic field does not appear to change noticeably the magnetic domain structure and only seems to change the magnitude of the contrast. From the drastic change in contrast, it would appear the sample reaches saturation around 0.4 T. Since this is the only sample that required polishing, it may be that this caused strong pinning of the domains at the surface.

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