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Magnetic domain configuration of $La_{0.7}Sr_{0.3}MnO_3$ patterned elements CARLOS A.F. VAZ, JAN RHENSIUS, ANDRE BISIG, MATHIAS KLÄUI, LAURA HEYDERMAN, Paul Scherrer Institut, Switzerland, MIGUEL NIÑO, ANDREA LOCATELLI, Sincrotrone Trieste, Italy, F. GAUCHER, ALICE GALDI, LAURENCE MÉCHIN, Universite de Caen Basse-Normandie, France — The magnetization configuration in small $La_{0.7}Sr_{0.3}MnO_3$ elements is investigated as a function of geometry, film thickness, magnetic field, and temperature using x-ray magnetic circular dichroism photoemission electron microscopy (XMCD-PEEM). The patterned elements were defined by focused ion beam (FIB) lithography, and consist of elements varying in shape (from circular, triangular and quadrangular) and size, from 200 nm up to 10 μm. A strong magnetic contrast is observed for all thicknesses (10-50 nm). The magnetic state in the larger elements tends to be multidomain, with complex configurations that are determined by the presence of local pinning sites. These pinning sites are overcome with increasing temperature, and the magnetic configuration evolves into lower energy states. In contrast, the magnetic configuration of the smaller elements are largely determined by the magnetostatic energy contribution, which gives rise to highly symmetric states as found in 3d ferromagnetic structures. Our results show that the magnetism of small LSMO elements is robust nearly up to the critical temperature, with magnetic configurations that can be controlled by suitable geometrical design.

Carlos A.F. Vaz
Paul Scherrer Institut, Switzerland

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