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Magnetic structure of epitaxial self-assembled $La_{0.7}Sr_{0.3}MnO_3$ nanoislands JONE ZABALETA[1], ICMAB-CSIC, SERGIO VALENCIA, FLORIAN KRONAST, Helhmoltz-Zentrum Berlin, MIRIAM JAAFAR, ICMM-CSIC, PATRICIA ABELLAN, CESAR MORENO, JAUME GAZQUEZ, ICMAB-CSIC, OSCAR IGLESIAS-FREIRE, ICMM-CSIC, FELIP SANDIUMENGE, TERESA PUIG, ICMAB-CSIC, AGUSTINA ASENJO, ICMM-CSIC, NARCIS MESTRES, XAVIER OBRADORS, ICMAB-CSIC, ICMAB-CSIC TEAM, HELMHOLTZ-ZENTRUM BERLIN COLLABORATION, ICMM-CSIC COLLABORATION —
The mixed-valence manganite $La_{0.7}Sr_{0.3}MnO_3$ (LSMO), in nanoscale configuration, is a strong candidate for magnetic logic and sensor applications because of its Curie temperature (360 K) and high degree of spin polarization. In this work we unravel the magnetic structure of self-assembled ferromagnetic LSMO epitaxial nanoislands smaller than 200 nm in lateral size and less than 40 nm in height, grown using a bottom-up solution-based methodology. Magnetic force microscopy shows that LSMO islands stabilize either single domain, multidomain, or vortex state configurations, depending on their lateral size and aspect ratio. The vortex state of islands with different morphology and two distinct crystallographic orientations is further explored using spatially-resolved x-ray magnetic circular dichroism in photoemission electron microscopy measurements. The vortex evolution of individual islands is tracked in-situ by applying in-plane magnetic field. The magnetic structure study is complemented with crystal structure, strain state, and chemical composition studies.

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