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Strain induced ferromagnetism in LaCoO3 and interface coupling in magnetic multilayers FRANCISCO RIVADULLA, BEATRIZ RIVAS-MURIAS, Centro de Investigación en Química Biológica y Materiales Moleculares, CIQUS, Univ. Santiago de Compostela, Spain, IRENE LUCAS, PILAR CAVERO, Instituto de Nanociencia de Aragón, Universidad de Zaragoza, 50018 Zaragoza, Spain, ANDREY CHUVILIN, LUIS HUESO, CIC nanoGUNE, Avenida de Tolosa 76, 20018 San Sebastian, and IKERBASQUE, Basque Foundation for Science, Bilbao, LUIS MORELLÓN, Instituto de Nanociencia de Aragón, Universidad de Zaragoza, 50018 Zaragoza, Spain — Bulk $LaCoO_3$ (LCO) is rhombohedral with the Co^{3+} atoms in a low spin (LS) diamagnetic configuration. Intraatomic exchange splitting is of similar energy to the crystal field of Co^{3+} in an octahedral oxygen environment, and a transition from LS to high-spin (HS) can be induced by epitaxial tensile stress. We have grown ultrathin films of LCO ($\approx$2 nm) on top of $SrTiO_3$ (STO, $\approx$1.5 nm) and $La_{2/3}Sr_{1/3}MnO_3$ (LSMO, $\approx$22 nm). Magnetization and conductive AFM (C-AFM) experiments in the trilayer demonstrate that the ferromagnetic insulating behavior is kept in ultrathin LCO, with a T_C $\approx$90 K, and M$\approx$0.8 μ_B/Co. The magnetization of LCO and LSMO is decoupled by the STO barrier, and so can be independently switched. C-AFM experiments show I-V curves characteristic of tunnel conduction between the ferromagnetic electrodes across the STO barrier. Moreover, the magnetization of both layers can be conveniently coupled/decoupled by changing the order of deposition of the films (either LCO/LSMO or LSMO/LCO). These results show that new approaches for the design of insulating ferromagnets are possible.

Francisco Rivadulla
Centro de Investigación en Química Biológica y Materiales Moleculares,
CIQUS, Univ. Santiago de Compostela, Spain

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