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Complete Suppression of Magnetism in Gd/(La,Sr)CoO_3 Films via Redox Design of Oxygen Distributions[1] PEYTON MURRAY, KAI LIU, ALEKSEY IONIN, RAJESH CHOPDEKAR, YAYOI TAKAMURA, UC Davis, DUSTIN GILBERT, ALEX GRUTTER, BRIAN KIRBY, BRIAN MARANVILLE, JULIE BORCHERS, National Institute of Standards and Technology - NCNR, ALPHA N'DIAYE, ELKE ARENHOLZ, Lawrence Berkeley National Lab - ALS — We demonstrate full control of the magnetism of La0.7Sr0.3CoO3 (LSCO, nominally 40 nm) by interfacial redox reactions realized via a strongly reducing Gd capping layer (0-5nm). Polarized neutron reflectometry reveals full control of the oxygen depth-profile, and the corresponding magnetic profile, by tuning the Gd capping layer thickness. For large Gd thicknesses (5nm), oxygen is removed from deep within the film, fully suppressing the magnetism throughout the entire 40 nm LSCO. X-ray absorption and magnetic circular dichroism also show the suppression of the Co magnetization and an accompanying reduction in the Co oxidation state. X-ray diffraction and reciprocal space mapping show that leaching of oxygen by the Gd capping layer increases the c-axis lattice parameter in the LSCO. These results demonstrate a new level of control of magnetism through redox reactions, using interface reactions to tune and eventually fully suppress bulk magnetization.

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Peyton Murray
UC Davis

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