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Depth-resolved magnetic and structural analysis of relaxing epitaxial Sr_2CrReO_6[1] JEREMY LUCY, FENGYUAN YANG, The Ohio State University, ADAM HAUSER, University of California, Santa Barbara, YAOHUA LIU, HUA ZHOU, YONGSEONG CHOI, SUZANNE G.E. TE VELTHUIS, DANIEL HASKEL, Argonne National Laboratory — Structural relaxation in a Sr_2CrReO_6 epitaxial film, with strong spin-orbit coupling, leads to depth-dependent magnetism. We combine a couple of depth-resolved synchrotron x-ray techniques, including two-dimensional reciprocal space mapping and x-ray magnetic circular dichroism experiments, to demonstrate this effect. An 800 nm film of Sr_2CrReO_6, grown with tensile epitaxial strain on $SrCr_{0.5}Nb_{0.5}O_3$(200 nm)/LSAT, relaxes away from the $Sr_2CrReO_6/SrCr_{0.5}Nb_{0.5}O_3$ interface. Grazing incidence x-ray diffraction measurements of the film elucidate the in-plane strain relaxation while depth-resolved x-ray magnetic circular dichroism at the Re L edge reveals the magnetic contributions of the Re site. The smooth relaxation of the film correlates with a systematic change in the magnetism.This provides an interesting and powerful way to probe the depth-varying structural and magnetic properties of a complex oxide with synchrotron-source x-ray techniques.

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