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Shaping the Magnetic Easy Axis in CoFe2O4 through Strain Doping T. ZAC WARD, ANDREAS HERKLOTZ, ANTHONY WONG, YOGESH SHARMA, Oak Ridge National Lab — Structural engineering of the lattice through epitaxy and/or isovalent substitutions are widely used for investigating and controlling the fundamental coupling effects inherent in strongly correlated materials. However, these techniques do not allow for continuous and fine control over structural properties post-growth which hampers our ability to systematically study structure-function relationships. We present recent studies on epitaxial CoFe2O4 films which demonstrate how low energy helium ion implantation can be used to bypass these limitations. We show that imposing single axis lattice expansion provides continuous crystal symmetry control which can be used to finely manipulate spin texture through magnetostrictive effects. This allows for full control over the spin reorientation transition. Further, we demonstrate that the flexibility of the strain doping process allows these properties to be written locally into a single crystal and across many length scales, which provides a never before possible means of dictating local susceptibilities. This work was supported by the U. S. Department of Energy, Office of Science, Basic Energy Sciences, Materials Science and Engineering Division.

Thomas Ward
Oak Ridge National Lab

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