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Magnetization reversal and negative volume thermal expansion in Fe doped Ca_2RuO_4[1] T. F. QI, S. J. YUAN, Center for Advanced Materials, Department of Physics and Astronomy, University of Kentucky, Lexington, KY 40506, USA, F. YE, S. CHI, Quantum Conensed Matter Division, Oak Ridge National Laboratory, Oak Ridge, TN 37831, USA, J. TERZIC, H. ZHANG, Center for Advanced Materials, Department of Physics and Astronomy, University of Kentucky, Lexington, KY 40506, USA, Z. ZHAO, Department of Geological and Environmental Sciences, Stanford University, Stanford, CA 94305, USA, X. LIU, Institure of Physics, Chinese Academy of Sciences, Beijing, 100190, China, S. PARKIN, Department of Chemistry, University of Kentucky, Lexington, KY 40506, USA, W. L. MAO, Department of Geological and Environmental Sciences, Stanford University, Stanford, CA 94305, USA, G. CAO, Center for Advanced Materials, Department of Physics and Astronomy, University of Kentucky, Lexington, KY 40506, USA —
We report structural, magnetic, transport and thermal properties of single-crystal $Ca_2Ru_{1-x}Fe_xO_4$ ($0 \leq x \leq 0.2$) as functions of pressure, magnetic field and temperature. The central findings of this work are a pronounced magnetization reversal and a negative thermal expansion that are induced by Fe doping. Our results including neutron diffraction data suggest that the magnetization reversal is primarily a result of different temperature dependences of two antiparallel, competing Ru and Fe sublattices and that the negative thermal expansion is achieved via magnetic and metal-insulator transitions. We will present and discuss our results with comparison drawn with relevant systems.

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