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Magnetic Behavior of Rare-Earth Substituted Orthochromites
AUSTIN MCDANNALD, Department of Materials Science and Engineering, University of Connecticut , LUKASZ KUNA, MENKA JAIN, Department of Physics, University of Connecticut — Rare-earth orthochromites ($RCrO_3$) with ABO_3 perovskite structure have recently attracted attention due their potential as magnetoelectric multiferroics (ME MFs). Materials with both magnetic and ferroelectric ordering are considered magnetoelectric mulitferroics. As compared to the rare earth manganite based ME MFs, such as $TbMnO_3$ (with Neel temperature 40 K), the rare-earth orthochromites have Neel temperatures close to 150 K that could result in higher temperature ferroelectric transition than that of $TbMnO_3$. While the mechanism of ferroelectricity and ferroelectric transition in the orthochromites is still unclear, these materials are known to show canted antiferromagnetic ordering. However, there is little understanding of the R-Cr interaction that may result in interesting magnetic behavior. In this work, several rare-earth (such as Er, Nd, etc.) substituted at the A-site of $DyCrO_3$ have been studied. The bulk powder samples were prepared by a citrate route and the phase purity was examined by the X-ray diffraction measurements. In the Nd substituted samples trends in the coercive field and the emergence of exchange bias were observed. A better understanding of the magnetic properties of these orthochromites may lead to development of high temperature ME MFs.

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