

Accepted Manuscript

Effect of Yttrium substitution on the structural and magnetic properties of GdCrO_3

Bibhuti.B. Dash, S. Ravi

PII: S0304-8853(17)30251-2

DOI: <http://dx.doi.org/10.1016/j.jmmm.2017.06.068>

Reference: MAGMA 62864

To appear in: *Journal of Magnetism and Magnetic Materials*

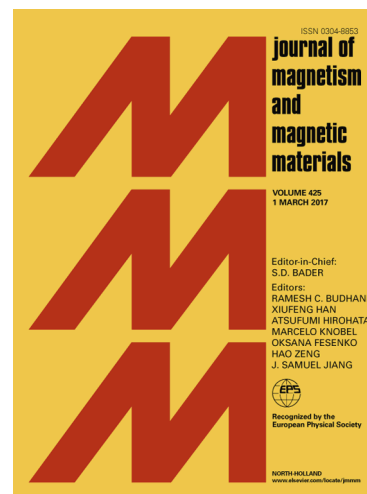
Received Date: 27 January 2017

Revised Date: 23 May 2017

Accepted Date: 11 June 2017

Please cite this article as: Bibhuti.B. Dash, S. Ravi, Effect of Yttrium substitution on the structural and magnetic properties of GdCrO_3 , *Journal of Magnetism and Magnetic Materials* (2017), doi: <http://dx.doi.org/10.1016/j.jmmm.2017.06.068>

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.



Effect of Yttrium substitution on the structural and magnetic properties of GdCrO₃

Bibhuti. B. Dash and S. Ravi*

*Department of Physics, Indian Institute of Technology Guwahati, Guwahati-781039, India.***Abstract**

We report the preparation of single phase samples of Gd_{1-x}Y_xCrO₃ ($x = 0 - 0.30$) compounds using the sol-gel method. Analysis of X-ray diffraction patterns shows a systematic decrease in lattice parameters a , c and volume of the unit cell with increase in Y concentration. Raman spectra recorded at room temperature shows a systematic shift of various modes towards higher wave number suggesting the presence of lattice distortion. The temperature variation of magnetization measurements show the presence of magnetization reversal and the magnetic compensation temperature is found to decrease upon Y doping. The origin of magnetization reversal is explained by considering competition between the paramagnetic moment of Gd³⁺ ions under the influence of negative internal field and the weak ferromagnetic component of Cr³⁺ ions due to canted antiferromagnetic ordering.

Keywords: Gadolinium chromites; Yttrium substitution; Magnetization reversal.

I. Introduction

Rare earth orthochromites with general formula RCrO₃ (R = rare earth or Y) are an important class of multifunctional materials due to their rich physical properties like magnetization reversal (MR), exchange bias, magnetocaloric effect and multiferroicity which find potential applications in magnetic recording, data storage, thermomagnetic switches and magnetic refrigeration[1-8]. RCrO₃ with an orthorhombic distorted perovskite structure exhibits canted antiferromagnetism below their Neel temperature (T_N) and the canting arises due to the antisymmetric Dzyloshinskii-Moriya interaction (DM) [9, 10] which also accounts for the origin of weak ferromagnetism in these materials [11]. In these orthorhombically distorted perovskite materials, the magnetic exchange interaction between Cr³⁺ ions and the rare earth ions (R^{3+}) leads to spin reorientation transition at low temperature [12].

* Corresponding author. Tel.:+91-361-258 2707.
E-mail address: sravi@iitg.ernet.in (S. Ravi)

Download English Version:

<https://daneshyari.com/en/article/8154171>

Download Persian Version:

<https://daneshyari.com/article/8154171>

[Daneshyari.com](https://daneshyari.com)