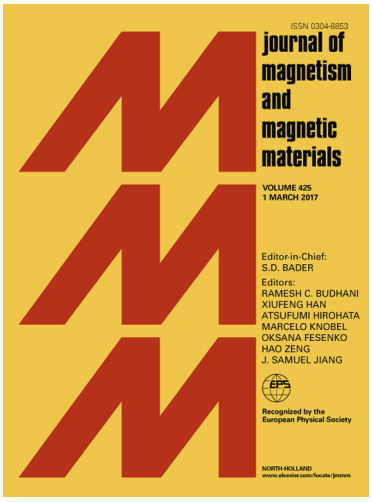

Experimental and Theoretical Investigations of Unusual Enhancement of Room Temperature Ferromagnetism in Nickel-Cobalt Codoped CeO_2 Nanostructures

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PII: S0304-8853(17)32447-2
DOI: https://doi.org/10.1016/j.jmmm.2018.05.024
Reference: MAGMA 63936

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

Received Date: 4 August 2017
Accepted Date: 9 May 2018

Please cite this article as: S. Kumar, B. Ahmed, A. Singh, A. Singh, A.K. Ojha, Experimental and Theoretical Investigations of Unusual Enhancement of Room Temperature Ferromagnetism in Nickel-Cobalt Codoped CeO_2 Nanostructures, *Journal of Magnetism and Magnetic Materials* (2018), doi: https://doi.org/10.1016/j.jmmm.2018.05.024

Experimental and Theoretical Investigations of Unusual Enhancement of Room Temperature Ferromagnetism in Nickel-Cobalt Codoped CeO_2 Nanostructures

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Abstract

Room temperature ferromagnetism (RTFM) in Ni/Co codoped CeO_2 nanostructures has been studied. The samples are synthesized by hydrothermal method and further characterized by X-ray diffraction (XRD), transmission electron microscopy (TEM), energy dispersive X-ray spectroscopy (EDX), Raman spectroscopy (RS), photoluminescence (PL) spectroscopy and vibrating sample magnetometer (VSM) measurements. The undoped CeO_2 sample shows RTFM and a consistent enhancement in RTFM is observed after doping. The Ni (5%)-Co (5%) codoped CeO_2 nanostructures revealed interestingly, highest RTFM. The origin of RTFM in all CeO_2 samples is explained by electronic density of states and magnetic moments calculated using density functional theory (DFT).

Keywords: RTFM, CeO_2 nanostructures, Density of states, DFT, Hydrothermal

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1. Introduction

Recently, diluted magnetic oxides (DMOs), which show ferromagnetic properties and high Curie temperature (T_C), have been studied extensively by the material scientists due to their potential applications in the field of second generation spin electronic devices [1-4]. However, the origin of observed room temperature ferromagnetism (RTFM) in DMOs materials remains