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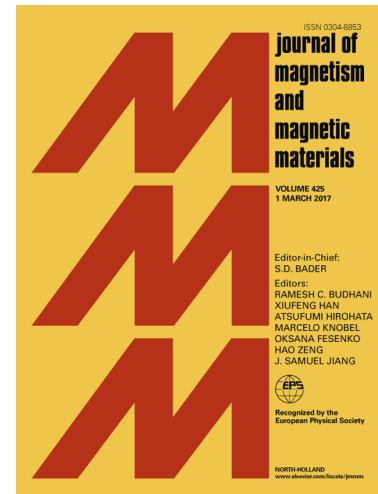
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# Experimental and Theoretical Investigations of Unusual Enhancement of Room Temperature Ferromagnetism in Nickel-Cobalt Codoped CeO<sub>2</sub> Nanostructures

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## Abstract

Room temperature ferromagnetism (RTFM) in Ni/Co codoped CeO<sub>2</sub> 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<sub>2</sub> sample shows RTFM and a consistent enhancement in RTFM is observed after doping. The Ni (5%)-Co (5%) codoped CeO<sub>2</sub> nanostructures revealed interestingly, highest RTFM. The origin of RTFM in all CeO<sub>2</sub> samples is explained by electronic density of states and magnetic moments calculated using density functional theory (DFT).

**Keywords:** RTFM, CeO<sub>2</sub> 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

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