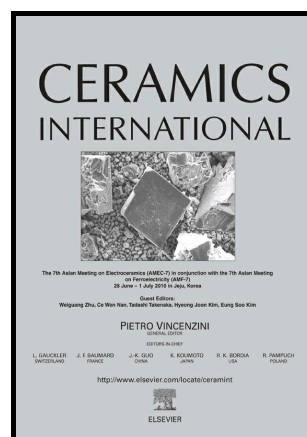


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Investigation of structural, optical and magnetic properties of thermal plasma synthesized Ni-Co spinel ferrite nanoparticles

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Abstract

Magnetic nanoparticles of nickel substituted cobalt ferrites, $\text{Ni}_x\text{Co}_{1-x}\text{Fe}_2\text{O}_4$, $x = 0$ to 1 in the step of 0.2) were successfully synthesized by gas phase nucleation and growth process. For the first time, we report feasibility of synthesizing such mixed ferrite system using thermal plasma route. Further, effect of change in molar ratio of Co: Ni on the structural, optical and magnetic properties has been investigated in detail. The structural and phase formation analysis of the samples under investigation have been carried out using powder X- ray diffraction and Raman spectroscopy. The surface morphology of these particles has been studied using scanning electron microscopy and the micrographs so obtained were used to find out average grain size and size distribution. The optical and magnetic properties of the as synthesized samples were finally correlated with the magnetic moment of substituted species such as Ni for Co and cation distribution, analyzed using Mössbauer spectroscopy. Special modification in Thermo Gravimetric Analyzer was used to determine magnetic transition temperature.

Keywords: Thermal Plasma, Spinel Ferrite, Nanostructure, Magnetic Properties, Mössbauer spectroscopy

1. Introduction

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