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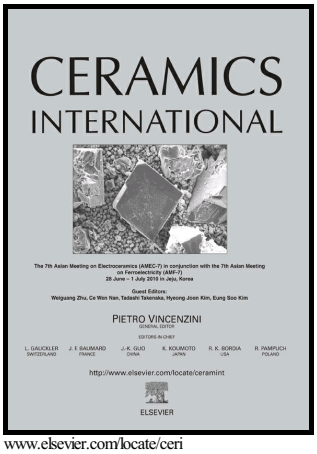
Talat Zeeshan, Safia Anjum, Salma Waseem, Lubna Mustufa



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Tailoring of structural and magnetic properties by substitution of copper in cobalt chromium ferrites

Talat Zeeshan, Safia Anjum, Salma Waseem, Lubna Mustufa

Department of Physics, Lahore College for Women University, Lahore

Abstract

The simple and cost-effective powder metallurgy method has been employed to prepare a series of copper substituted cobalt chromium ferrites $Cu_xCo_{1-x}Cr_{0.5}Fe_2O_4$ (x=0, 0.2, 0.4, 0.6, 0.8, 1.0). The calcination of the samples has been carried out at 1100^oC for 24 hours. X-Ray Diffractometer (XRD) and Fourier transform infrared spectroscopy (FTIR) measurement proves the formation of cubic spinel ferrites. Vibrating Sample Magnetometer (VSM)) analysis revealed that the substitution of copper in the Co-Cr ferrites leads to reduce the magnetic moment that in turns decrease the saturation magnetization and coercivity. The Ultra violet visible spectroscopy (UV-VIS) showed that the band gap energy increases with copper substitution which is due to reduction in crystallite size. The results indicate that the replacement of copper with the cobalt-chromium ferries strongly influences the crystal structure, microstructure, magnetic parameters and band gap energy.

Keywords: Electromagnetic; X-Ray diffraction and scattering; Scanning electron microscopy

Introduction

Among magnetic materials used in the modern electronic engineering, the spinel ferrites are fascinating from applied and scientific points of view [1]. The functional properties of ferro-spinels depend on their magnetic features and composition.

The novel fabrication techniques to synthesize new materials with improved properties have become challenge for the material scientists to attain the current technological demands. Recently spinel ferrites have attracted considerable attention due to their interesting magnetic