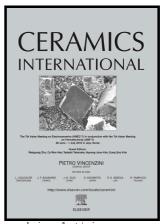
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Tailoring of structural and magnetic properties by substitution of copper in

cobalt chromium ferrites

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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}Fe₂O₄ (x=0, 0.2, 0.4, 0.6, 0.8, 1.0).

The calcination of the samples has been carried out at 1100°C 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

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