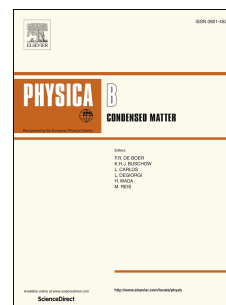


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Composition dependence of structural, magnetic and electrical properties of Co substituted Magnesium ferrite

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Abstract

In this work cobalt substituted magnesium spinel ferrite having general formula $\text{Mg}_{1-x}\text{Co}_x\text{Fe}_2\text{O}_4$ (where $x = 0.0, 0.1, 0.15, 0.2, 0.25$ and 0.3) was synthesized by solid state reaction method. All the sample are characterized by X-ray diffraction (XRD), Fourier transform infrared spectroscopy (FTIR), Vibrating sample magnetometer (VSM) and dc resistivity measurements. XRD analysis confirms the formation of single phase spinel and the calculated lattice constant ' a_{exp} ' from XRD decreases as substitution of Co (x) is increased. The FTIR spectra revealed two prominent frequency bands in the wave number range $400\text{--}600\text{ cm}^{-1}$, which confirm the cubic spinel structure. Magnetic studies revealed that the saturation magnetization attains a maximum value when $x=0.2$, and then decreases for higher concentration of (x). This non-linear trend in magnetization has been explained on the basis of redistribution of magnetic and non-magnetic cations among A and B sites of the spinel lattice. A significant influence of cation distribution observed on DC electrical resistivity and activation energy.

Keywords: Mg-Co ferrite; Solid state reaction; XRD; VSM; FE-SEM;

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