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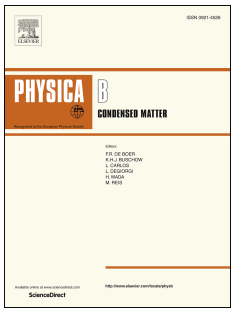

Composition dependence of structural, magnetic and electrical properties of Co substituted magnesium ferrite

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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 $Mg_{1-x}Co_xFe_2O_4$ (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 reveled two prominent frequency bands in the wave number range 400-600 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;