

DR06

Effects of NiO Addition on the Structure and Electric Properties $Dy_{3-x}Ni_xFe_5O_{12}$ Garnet Ferrite

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Polycrystalline garnet ferrites $Dy_{3-x}Ni_xFe_5O_{12}$ with varying Ni substitution ($x=0.0, 0.1, 0.2, 0.3, 0.4, \text{ and } 0.5$) have been prepared by the standard ceramic technique and their crystalline structure were investigated by using X-ray diffraction and IR spectroscopy. The X-ray diffraction analysis showed that all samples have a single cubic garnet phase. The materials prepared are identified by infrared rays which indicate the presence of three absorption bands ν_2, ν_3 and ν_4 which represent the tetrahedral, octahedral and dodecahedral sites respectively which characterize the garnet ferrite.

The dielectric constant (ϵ'), and dielectric loss ($\tan\delta$) of the prepared samples were measured at 1 KHz in the temperature range 300 to 700 K. The dielectric constant (ϵ'), and dielectric loss ($\tan\delta$) are a function of temperature.

The initial magnetic permeability has been studied at different temperatures. The initial magnetic permeability (μ_i) increases gradually with increasing temperature and then drops suddenly at certain temperature T_c .

Keywords : garnet ferrite, structural, Magnetic properties

DR07

A Study of Co Substituted Mn-ferrite, $Mn_{1-x}Co_xFe_2O_4$ ($x=0.0, 0.5, 1.0$)

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The unique magnetic phenomena of magnetic nanoparticles have been studied, because these properties have the potentiality for utilization in a variety of applications from biomedical science such as hyperthermia, drug delivery, MRI contrast etc [1-3]. Nano ferrite has been fabricated by various synthetic methods [4]. The $Mn_{1-x}Co_xFe_2O_4$ ($x=0.0, 0.5, 1.0$) materials prepared by HTTD (High Temperature Thermal Decomposition) method using the starting materials with divalent manganese chloride ($MnCl_2$) and iron nitrate in the presence of dodecanoic acid and 1-dodecylamine as surfactants. $Mn_{1-x}Co_xFe_2O_4$ ($x=0.0, 0.5, 1.0$) has been studied by XRD, VSM and Mössbauer spectroscopy. The crystal structure is found to be an inverse cubic spinel with space group of $Fd\bar{3}m$ and the lattice constants (a_0) of 8.432, 8.486 and 8.407, respectively. We investigated $Mn_{1-x}Co_xFe_2O_4$ ($x=0.0, 0.5, 1.0$), which samples show magnetization (M_s) of 54.2, 29.4 and 46.9 emu/g, respectively. Also, the coercivity (H_c) of all samples is 32.4, 86.9 and 90.7 Oe, respectively. Mössbauer spectra of all samples were obtained at room temperature. Mössbauer spectra show ferrimagnetic state of six-line have the hyperfine field (H_f) values of 456, 472, and 474 kOe for the tetrahedral sites and 400, 422, and 430 kOe for the octahedral sites, respectively, which increases with doping Co concentration.

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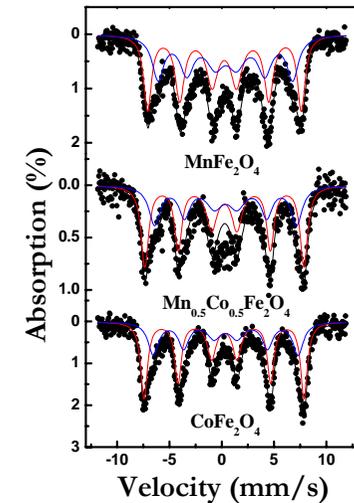


Fig. 1. Mössbauer spectra of $Mn_{1-x}Co_xFe_2O_4$ ($x=0.0, 0.5, 1.0$) at room temperature.