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M. Maria Lumina Sonia, S. Anand, V. Maria Vinosel, M. Asisi Janifer, S. Pauline, A. Manikandan

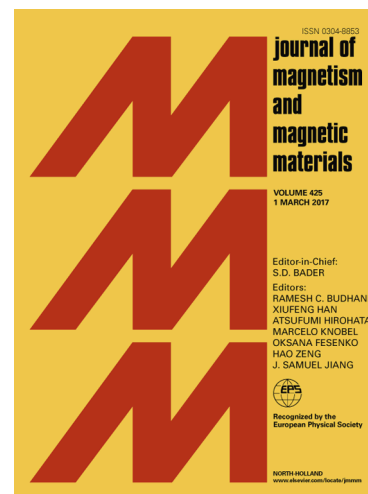
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Effect of lattice strain on structure, morphology and magneto-dielectric properties of spinel NiGd_xFe_{2-x}O₄ ferrite nano-crystallites synthesized by sol-gel route

M. Maria Lumina Sonia^{1, *}, **S. Anand**¹, **V. Maria Vinoseel**¹, **M. Asisi Janifer**¹,
S. Pauline¹, **A. Manikandan**^{2, *}

¹ Department of Physics, Loyola College (Autonomous), Chennai-600034, India

² Department of Chemistry, Bharath Institute of Higher Education and Research (BIHER),
Bharath University, Chennai – 600 073, Tamil Nadu, India

***Corresponding author:** sonyashine77@gmail.com (M. Maria Lumina Sonia)
mkavah15@gmail.com; manikandana.che@bharathuniv.ac.in (A. Manikandan)

Abstract

Nanocrystalline powders of Gadolinium (Gd³⁺) substituted nickel ferrite spinel (NiGd_xFe_{2-x}O₄: x = 0.00, 0.025, 0.050, 0.075 and 0.1) samples were synthesized via sol-gel method. Nickel nitrate hexahydrate and Ferric nitrate hexahydrate were used as the precursors and rare earth Gadolinium nitrate hexahydrate [Gd(NO₃)₃.6H₂O] was used as the dopant. The structural, morphological, magnetic and dielectric properties of the synthesized nanoparticles were examined by XRD, FTIR, HRSEM, EDX, TEM, VSM and dielectric studies. The Scherrer method and Williamson-Hall (W-H) method were used to evaluate the crystallite sizes and lattice strain. The crystallite size of NiGd_xFe_{2-x}O₄ samples were found to decrease from 25 nm to 11 nm with increase in Gd³⁺ content. Lattice parameters decrease and lattice strain increases with the increase in Gd³⁺ content in the sample. HRSEM images showed the spherical morphology and uniform size distribution. The elemental composition

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