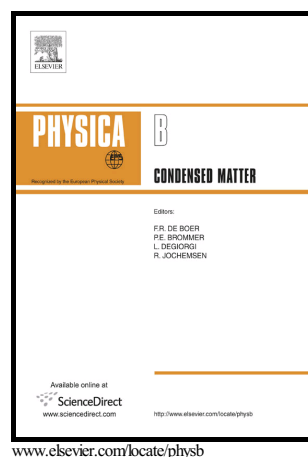


Author's Accepted Manuscript

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PII: S0921-4526(17)30270-3
DOI: <http://dx.doi.org/10.1016/j.physb.2017.05.044>
Reference: PHYSB309968

To appear in: *Physica B: Physics of Condensed Matter*

Received date: 15 April 2017

Accepted date: 24 May 2017

Cite this article as: Muhammad Ajmal, M.U. Islam, Ghulam Abbas Ashraf Muhammad Aamir Nazir and M.I. Ghouri, The influence of Ga doping on structural magnetic and dielectric properties of $\text{NiCr}_{0.2}\text{Fe}_{1.8}\text{O}_4$ spinel ferrite *Physica B: Physics of Condensed Matter* <http://dx.doi.org/10.1016/j.physb.2017.05.044>

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The influence of Ga doping on structural magnetic and dielectric properties of $\text{NiCr}_{0.2}\text{Fe}_{1.8}\text{O}_4$ spinel ferrite

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Abstract

A series of spinel ferrites $\text{NiCr}_{0.2}\text{Ga}_x\text{Fe}_{1.8-x}\text{O}_4$ ($x = 0.00, 0.002, 0.04, 0.06, 0.08$) was prepared by co precipitation technique. The influence of rare earth element Ga ions the structural dielectric and magnetic properties of $\text{NiCr}_{0.2}\text{Fe}_{1.8}\text{O}_4$ ferrites was investigated. The X-ray diffraction confirmed the phase precipitated out was pure spinel phase with few traces of secondary phases. The crystallite size decreases and density increases with the increases of Ga contents. The magnetic moment, saturation magnetization and remanent magnetization increased with addition of Ga ions in spinel ferrite. The dielectric constant is described that it decreases more suddenly at low frequencies as compare at higher frequencies. The decrease in dielectric loss with frequency follows Deby's relaxation phenomena. Both the variation in tan loss and dielectric loss with frequency shows a similar. AC conductivity increases with the increases of frequency which inversely proportional to concentration of Ga^{3+} ions follows Jonscher law. These Gallium Chromium doped nickel ferrites are very helpful for high frequency switching devices.

Key words: Rare earth spinel Ferrite; Magnetization; dielectric constant; ac conductivity

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