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Experimental investigation of magnetic and optical properties of strontium hexaferrite nanostructures synthesized by sol-gel method: The effect of annealing and the effect of iron to strontium molar ratio on these properties

E Azarnosh[1], A M Davarpanah[1*], and S Rakhshani Aval[2]

1. Department of Physics Faculty of Science University of Sistan and Baluchestan, Zahedan
2. Department of Chemistry, University of Sistan and Baluchestan, Zahedan

E-mail: a.m.davarpanah@phys.usb.ac.ir

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Abstract

In this research, strontium hexaferrite nanoparticles were synthesized by sol-gel method. Gels were prepared from metal nitrates and citric acid with different Fe/Sr molar ratios and ammonia as pH adjuster. The phase, bond identification, composition, morphology, particle size and magnetic properties of the samples were studied using X-ray diffraction (XRD), Fourier transform infrared spectroscopy (FT-IR), field emission scanning electron microscopy (FESEM) and vibrating sample magnetometer (VSM). The effect of annealing temperature (750, 850, 950 and 1050 °C) as well as the effect of Fe/Sr molar ratio on the crystal structure and magnetic properties of strontium hexaferrite were investigated. XRD shows the formation of M-type strontium hexaferrite phase at temperatures 950 and 1050 °C. Three vibrational modes were observed in the FT-IR spectrum of the annealed samples, indicating the presence of metal-oxygen tensile bonds in hexaferrite. Coercive field (2500-6000 Oe) was obtained under different conditions.

Keywords: Strontium hexaferite; sol gel; ferrite; nanoparticles; magnetic properties

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