

Fabrication and investigation of the magnetic and dielectric properties of M-type strontium hexaferrite nanoparticles

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Abstract: In this research, M- type strontium hexaferrite nanoparticles ($\text{SrFe}_{12}\text{O}_{19}$) were synthesized via combustion sol–gel technique. To determine the optimum annealing temperature, thermogravimetry-differential thermal analysis (DTA/TG) was used. Based on the results obtained from this analysis, the powders strontium hexaferrite were annealed between temperatures 750 and 1050°C. The structural and morphology properties of the samples were investigated by X- ray diffraction (XRD), Fourier transform infrared spectroscopy (FT- IR) and scanning electron microscopy (SEM). The XRD results showed that the sample with annealing temperature and annealing time of 950°C and 4h is single-phase. Also, magnetic and dielectric properties of the samples were studied by VSM and LCR meter at room temperature. The results of magnetic measurements show that there is only one peak in the magnetic susceptibility of all samples. This and the results obtained by XRD patterns are correspond to that of the single phase. Also, the dielectric measurements show that the samples with increasing frequency dielectric constant and dielectric loss of the samples decrease. These decline procedure dielectrics indicative of normal behavior of ferrites. The FT-IR results revealed that the frequency bands in the range of 560–580 cm^{-1} and 430– 470 cm^{-1} correspond to the formation of tetrahedral and octahedral clusters of the metal oxides in ferrites, respectively.

Keywords: *strontium hexaferrite; nanoparticles; sol– gel technique; magnetic; dielectric.*

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