The Annealing Temperature Dependence of Magnetic Properties in Sr-Ferrite Nanoparticles

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***Abstract*—The $SrFe_{12}O_{19}$ powders prepared by a sol-gel method were annealed at temperatures ranging from 400 °C to 900 °C for 3 h and 6 h in air. Magnetic and structural properties of the powders were characterized with a vibrating sample magnetometer (VSM), X-ray diffractometer (XRD), scanning electron spectroscopy (SEM), Mössbauer spectroscopy, thermogravimetry (TG), and differential thermal analysis (DTA).**

M-type hexagonal phase is observed in the samples annealed at temperatures above 600°C by XRD. In the sample annealed at 800 °C, lattice constants are $a_0 = 5.9227$ Å $c_0 = 23.2368$ Å and particle size was about 74 nm. The coercivity of the samples increased from 6.2 Oe for the powder annealed at 500 °C to 7000 Oe for annealed powder at 800 °C. The saturation magnetization increased from 30.7 emu/g to 63.0 emu/g as annealing temperature is increased from 500°C to 800 °C.

***Index Terms*—Mössbauer spectroscopy, nanoparticles, sol-gel, Sr-ferrite.**