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Journal of Magnetism and Magnetic Materials 290–291 (2005) 231–233



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Mössbauer studies of La–Zn substitution effect in strontium ferrite nanoparticles

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Available online 7 December 2004

Abstract

Many studies on cation substitution have been carried out in sintered magnets application, since intrinsic magnetic properties such as saturation magnetization depend on the cation configuration in the M-type hexagonal structure. La–Zn substituted Sr-ferrite nanoparticles were fabricated by a sol–gel method. Their magnetic and structural properties were characterized by using the XRD, VSM, TG/DTA, and Mössbauer spectroscopy. We focused on the Mössbauer effects of non-magnetic ions such as the Zn occupation of $4f_1$ and $2b$ sites in the M-type hexagonal structure. As substitution x increased, the saturation magnetization increased, and took a maximum at $x = 0.2$ before decreasing again. We interpret that it is closely related to Zn occupation of $4f_1$ and $2b$. This was thought to be caused by the preferential location of Zn^{2+} at the down-spin Fe^{3+} site.

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PACS: 61.46.+w; 75.50.Gg; 76.80.+y; 81.20.Fw

Keywords: Sol–gel; Mössbauer; Site occupancy; Nanoparticles
