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A comparative study of magnetic properties of MnFe_2O_4 nanoparticles prepared by thermal decomposition and solvothermal methods

B Aslibeiki¹ and P Kameli²

1. Department of Physics, University of Tabriz, Tabriz, Iran

2. Department of Physics, Isfahan University of Technology, Isfahan, Iran

E-mail: b.aslibeiki@tabrizu.ac.ir

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Abstract

A comparative study of magnetic properties of MnFe_2O_4 ferrite nanoparticles prepared by two different methods has been reported. The first sample (S1) was synthesized by thermal decomposition of metal nitrates. And the second sample (S2) was prepared by solvothermal method using Tri-ethylene glycol (TEG). Magnetic hysteresis loops at 300 and 5 K; magnetization and AC susceptibility measurements versus temperature confirmed the effective role of TEG on the magnetic properties of nanoparticles. The results showed that, at 300 K the saturation magnetization (M_S) of S2 sample is 46% greater than that of S1 sample. At 5 K, the difference in M_S of the samples raised to 60%. AC susceptibility measurements at different frequencies and also magnetization versus temperature under field cooling and zero field cooling processes revealed that, the TEG molecules influence the surface spins order of S2 sample. The sample S1 showed strongly interacting superspin glass state, while the sample S2 consists of weakly interacting superparamagnetic nanoparticles.

Keywords: ferrite nanoparticles, MnFe_2O_4 , polymer coating, superparamagnetic, superspin glass

For full article, refer to the Persian section