IRANIAN SOCIETY of CRYSTALLOGRAPHY and MINERALOGY

Vol. 27, No. 1, Spring 1398/2019

IRANIAN JOURNAL of CRYSTALLOGRAPHY and MINERALOGY

The effect of doping of Mn on structural and magnetic properties of the strontium hexaferritenanoparticels

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(Received: 4/4/2018, in revised form: 11/8/2018)

Abstract: In this research, the $SrMn_xFe_{12-x}O_{19}$ nanoparticles with x = 0.0, 0.5, 1, 1.5 and 2 at 1000 ^oC for 4 h, using sol-gel method, were synthesized. Thermal analysis, crystalline structure and their bonding properties of the samples by TGA / DTA analysis, XRD and FT-IR were investigated. In order to investigate morphology of the samples from field emission, scanning electron microscopy (FESEM) was used. Also, properties of the samples, using vibrating sample magnetometer (VSM), were investigated. In addition to the Curie temperature of $SrMn_xFe_{12-x}O_{19}$ nanoparticles with x = 0.0, 0.5 and 1 was determined. Thermalgravimetric analysis confirms that the formation of the hexagonal phase at temperature of 953.1 ^oC. The results of measurements of the XRD show that the phase percentage of $SrMn_xFe_{12-x}O_{19}$ nanoparticles with x = 0.5 has increased. The results of the hysteresis loops of $SrMn_xFe_{12-x}O_{19}$ nanoparticles reveal that with increasing Mn contents, the saturation magnetization, remanence magnetization and magnetic coercivity reduced. Also, the results of the magnetization of $SrMn_xFe_{12-x}O_{19}$ nanoparticles with temperature reveal that with increasing of Mn contents, the Curie temperature decreased.

Keywords: *$SrMn_xFe_{12-x}O_{19}$ nanoparticles; Sol-Gel; annealing temperature; hexaferrite; structural properties; magnetic properties.*

[DOI: 10.29252/ijcm.27.1.245]

متن فارسی اصل مقاله از صفحه ۲۴۵ تا ۲۵۴ در این شماره به چاپ رسیده است.

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