

A study of structural, electrical and magnetic properties of zinc ferrite nanoparticles doped with chromium

M. Soltani*, M. Zargar Shoushtari, S. E. Mousavi Ghahfarokhi

Department of Physics, Faculty of Sciences, Shahid Chamran University of Ahvaz

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Abstract: In this paper, the chromium doped spinel zinc ferrite nanoparticles were synthesized by using of glycine as a fuel with microwave combustion method. After preparing the samples $ZnCr_xFe_{2-x}O_4$ with $x = 0.0, 0.5, 1.0, 1.5, 2.0$, the electromagnetic and electrical properties such as dielectric constant, ac conductivity, dielectric loss factor ($\tan \delta$) and Curie temperature were investigated. According to the results, increasing of the amount of chromium in samples causes to increase the real and imaginary part of dielectric constant. Although the chromium ions do not participate in transporting electrons between Fe^{+2} and Fe^{+3} , they cause reduction in transporting electrons. For a typical sample, the imaginary and real parts of dielectric constant and dielectric losses decrease and ac conductivity increases with increasing frequency, which is natural feature of ferrites. These results are described by Maxwell-Wagner model and Koops's theory. Also, the results show that the Curie temperature of samples increased a chromium added.

Keywords: Nanoparticles; zinc ferrite; microwave combustion; electrical and magnetic properties; Curie temperature.

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*Corresponding author, Tel: 09387174913, E-mail: Mitra.soltani64@yahoo.com