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Research note

The study of the physical properties of Ni-Cu-Zn ferrite nanoparticles by the auto-combustion method

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Abstract

In this paper, 5 different samples of Ni-Cu-Zn nanoparticles ($\text{Ni}_{0.8-x}\text{Cu}_x\text{Zn}_{0.2}\text{Fe}_2\text{O}_4$) with different compositions of $x=0.2, 0.4, 0.6, 0.8$ were synthesized through the auto-combustion method, using glycine as the fuel; then, the structural, magnetic and optical properties of these samples were investigated. Characterization of these samples was done using XRD, FTIR, UV-Visible, SEM and TEM. XRD data proved the existence of a spinel structure for all samples. FTIR spectra showed the existence of an oxygen-metal M-O bond at tetrahedral and octahedral bonds. SEM images also revealed the semispherical shape of particles. Using the UV-Visible spectrum, we found that by increasing the amount of the Cu dopant, the gap energy of Ni-Cu-Zn nano particles was decreased; also, the results of VSM showed that saturation magnetization was decreased by increasing the amount of the Cu dopant.

Keywords: Ni-Cu-Zn nanoparticles, auto-combustion method, spinel structure, magnetic properties

For full article, refer to the Persian section