

Synthesis and Characterization of Co-Zn Ferrite Nanoparticles for Application to Magnetic Hyperthermia

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(Received 30 November 2016)

Co-Zn ferrite nanoparticles have been investigated, aiming at a further improvement of the magnetic hyperthermia properties for bio-medical applications. We precisely tune the magnetic and the thermal properties of $\text{Co}_x\text{Zn}_{1-x}\text{Fe}_2\text{O}_4$ nanoparticles, prepared by using a high-temperature thermal-decomposition method, by chemically controlling the cation. The structure and the magnetic properties as well as the AC-heating characteristics of the synthesized $\text{Co}_x\text{Zn}_{1-x}\text{Fe}_2\text{O}_4$ were measured by using X-ray diffraction (XRD), vibrating sample magnetometer, magneTherm device and Mössbauer spectroscopy. The analysis of the XRD patterns confirmed the spinel phase, the crystalline size, and the lattice parameter. The magnetic behavior of Co-Zn ferrite was studied with M-H hysteresis curve measurements at room temperature. Also, the thermal properties were measured under an external applied field of 250 Oe at 112 kHz. In addition, we plasma-treated the samples with magnetic and thermal excellent characteristics for 30 min at room temperature. The cation distribution was investigated with Mössbauer spectroscopy and further analyzed with one sextet for the tetrahedral A site and four six-lines for the octahedral B_1 , B_2 , B_3 , and B_4 sites.

PACS numbers: 61.46.Df, 82.80.Ej, 87.54.Br

Keywords: Co-Zn ferrite, Hyperthermia, Nanoparticles, Mössbauer spectroscopy

DOI: 10.3938/jkps.70.89