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Thermal Variation of MgZn Nanoferrites for Magnetic Hyperthermia

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$Mg_{1-x}Zn_xFe_2O_4$ (x = 0.2, 0.4, 0.5, 0.6, 0.8) nanoparticles were prepared for the characterization of the crystallographic and magnetic properties. The Rietveld refinement for x-ray diffraction was used to confirm that the Zn ion occupied on B-site for dopings over 0.5 doping. The lattice constant (a_0) was increased from 8.3969 to 8.4100 ± 0.0001 Å with increasing Zn concentration. Mössbauer spectra of all samples were taken at room temperature and showed Fe^{3+} and Fe^{2+} valence states. The thermal properties of all samples were measured at 50 kHz and 25 mT. The heating temperature was increased up to 124 °C until 0.5 doping of Zn ions, however it was decreased down to 69 °C over 0.5 doping of Zn ions. These results can be explained by the fact that the saturation magnetization was increased by Fe^{2+} ion, but, the heating temperature was decreased due to occupation of Zn ions on B-site for dopings above 0.5.

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