

Synthesis and characterization from $Zn_{1-x}Co_xFe_2O_4$ nanostructures prepared by hydrothermal method

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In this work, we report the synthesis of $Zn_xCo_{1-x}Fe_2O_4$ nanoparticles ($x = 0.0, 0.2, 0.4, 0.6, 0.8, \text{ and } 1.0$) prepared by hydrothermal method. The results of XRD, SEM and TEM showed that were cubic spinel structure with the particle size in the range of 7-17 nm. The IR spectra of $Zn_{1-x}Co_xFe_2O_4$ nanoparticles exposed the intrinsic stretching vibrational modes of the metals at the tetrahedral and octahedral sites. The magnetic properties as measured by VSM indicated that all sample behaved ferromagnetic with saturation magnetization (Ms) and coercivity of 15-52 emu/g and 72-257 Oe, respectively. The XANES spectra were used to identify the oxidation state of Zn, Co and Fe ions using K-edge profiles by shifts of separate edge. The oxidation state of Zn and Co cations are found to be +2 and +2,+3 respectively. The Fe^{2+} and Fe^{3+} cations are preferable to be at preference for the tetrahedral and octahedral sites, respectively.

Summary

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