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Structural and magnetic properties of nanocrystalline stannic substituted cobalt ferrite

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Abstract

The structural and magnetic properties of the spinel ferrite system $\text{Co}_{1+x}\text{Fe}_{2-2x}\text{Sn}_x\text{O}_4$ ($x=0.0-1.0$) have been studied. Samples in the series were prepared by the ceramic technique. The structural and microstructural evolutions of the nanophase have been studied using X-ray powder diffraction and the Rietveld method. The refinement result showed that the type of the cationic distribution over the tetrahedral and octahedral sites in the nanocrystalline lattice is partially an inverse spinel. Far infrared absorption spectra show two significant absorption bands, around 600 cm^{-1} and 425 cm^{-1} , which are respectively attributed to tetrahedral (A) and octahedral [B] vibrations of the spinel. Scanning Electron Microscopy (SEM) was used to study surface morphology. SEM images reveal particles in the nanosize range. The transmission electronic microscope (TEM) reveals that the grains are spherical in shape. TEM analysis confirmed the X-ray results. The magnetic properties of the prepared samples were characterized by using a vibrating sample magnetometer. (C) 2012 Elsevier B.V. All rights reserved.

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