

Magnetic properties of Zn doped Co_2Y hexaferrite by using high-field Mössbauer spectroscopy

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The polycrystalline samples of $\text{Ba}_2\text{Co}_{2-x}\text{Zn}_x\text{Fe}_{12}\text{O}_{22}$ ($x = 0.5, 1.0, 1.5$) were synthesized by using solid-state-reaction method. From the XRD patterns, analyzed by Rietveld refinement, the prepared samples are found to be single-phased with rhombohedral structure ($R-3m$). The magnetic properties of samples were investigated with vibrating sample magnetometer, and high-field Mössbauer spectrometer. From the zero-field-cooled curves under 100 Oe between 4.2 and 740 K, we observe that the samples show spin transition from helicalmagnetic to ferrimagnetic order. With increasing Zn ion concentration, the spin transition temperature (T_s) and Curie temperature (T_C) decrease linearly. We have obtained Zero-field Mössbauer spectra of all samples at various temperatures ranging from 4.2 to 650 K, and analyzed the spectra below T_C as six-sextets for Fe sites. From the temperature dependence of hyperfine field (H_{hf}), we have noticed an abrupt change in H_{hf} at T_s . In addition, Mössbauer spectra of all samples at 4.2 K were taken with applied field ranging from 0 to 50 kOe, indicating the canting angle between applied field and H_{hf} decreased with increasing Zn concentration. © 2014 AIP Publishing LLC. [<http://dx.doi.org/10.1063/1.4865879>]