

Investigation of spin reorientation in $\text{YMn}_{1-x}\text{Fe}_x\text{O}_3$ ($x = 0.55, 0.6, 0.7, 0.8, 0.9,$ and 1.0) by Mössbauer spectroscopy

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(Presented 7 November 2014; received 22 September 2014; accepted 23 November 2014; published online 22 April 2015)

$\text{YMn}_{1-x}\text{Fe}_x\text{O}_3$ ($x = 0.55, 0.6, 0.7, 0.8, 0.9,$ and 1.0) polycrystalline samples were prepared by the solid-state-reaction method. The crystal structure and magnetic properties of samples were investigated with x-ray diffractometer (XRD), vibrating sample magnetometer, and Mössbauer spectroscopy. The XRD patterns at 295 K, analyzed by Rietveld refinement method, showed that all samples were single-phased orthorhombic of $Pnma$ with both Bragg (R_B) and structure (R_F) factors less than 5%. Mössbauer spectra of all samples were obtained at various temperatures ranging from 4.2 to 500 K, and the spectra below T_C were fitted by least-square method as a function of the Fe and Mn distribution. Isomer shift (δ) values of all samples indicated that the charge states were Fe^{3+} . In addition, temperature-dependent hyperfine field (H_{hf}), averaged electric quadrupole shift ($\langle E_Q \rangle$), and averaged isomer shift ($\langle \delta \rangle$) have shown abrupt changes around T_{SR} due to the change in the charge state of Mn ions. © 2015 AIP Publishing LLC. [<http://dx.doi.org/10.1063/1.4918564>]