

## Magnetic Properties and Crystalline Transition for the $\text{NiCr}_{1.7}\text{Fe}_{0.3}\text{O}_4$

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We have studied the temperature dependent magnetic properties and crystalline phase transition in small amount Fe doped nickel chromite. The Crystalline structure of  $\text{NiCr}_{1.7}\text{Fe}_{0.3}\text{O}_4$  is spinel cubic ( $Fd-3m$ ) structure with a lattice constant  $a_0 = 8.317 \text{ \AA}$  at room temperature. The magnetic Néel temperature ( $T_N$ ) of the Fe doped nickel chromite sample is determined to be 250 K. The Mössbauer spectra exhibit that there are two magnetic phases with the two different sites for the  $\text{Cr}^{3+}$  ions. The spectrum at 4.2 K is fitted to two magnetic components of the magnetic hyperfine fields  $H_{\text{hf}} = 496$  and 485 kOe. From the spectrum at 295 K, the electric quadrupole splittings are observed with large values of 0.49 and 0.50 mm/s, respectively. The values of the isomer shifts at all temperature ranges show that the Fe ions are ferric states. We are suggested that the dynamic Jahn-Teller distortion and anisotropic magnetic relaxation effects due to the crystalline phase transition.

**Keywords :** Mössbauer spectroscopy, nickel chromite, crystalline transition