MÖSSBAUER STUDY OF NiCr$_{1.5}$Fe$_{0.5}$O$_4$

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The ultimate single phase NiCr$_{1.5}$Fe$_{0.5}$O$_4$ sample was obtained for annealed 12 hr in atmosphere at 1000 °C after the sol-gel processing. The Crystalline structure of NiCr$_{1.5}$Fe$_{0.5}$O$_4$ was spinel cubic structure with a lattice constant $a_0 = 8.312$ Å at room temperature. Mössbauer spectra were measured at various temperatures ranging from 4.2 to 400 K. The spectrum at room temperature was fitted to two magnetic components of the magnetic hyperfine fields $H_{hf} = 357$ and 316 kOe. The magnetic Néel temperature ($T_N$) of the Fe doped nickel chromite sample is determined to be 375 K by the temperature dependence of magnetic curve. The electric quadrupole splittings ($AE_Q$) were found to be nearly zero values below the $T_N$. The values of the isomer shifts show that of all temperature ranges the states are ferric. As a below the $T_N$, the shape of the Mössbauer spectra show that the line broadening and the line-width difference between 1, 6 and 3, 4 with the accompanying relaxation effects.

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