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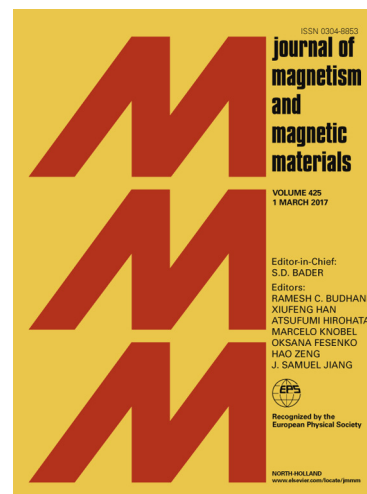
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# Evidence of exchange-coupled behavior in chromium-cobalt ferrite nanoparticles

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## Abstract

Cr doped cobalt ferrite nanoparticles were synthesized with the generic formula  $\text{Co}_{1-x}\text{Cr}_x\text{Fe}_2\text{O}_4$  ( $x = 0, 0.05, 0.15, 0.25$ ) through standard chemical co-precipitation method. XRD studies confirmed the pure spinel cubic structure belonging to  $Fd\bar{3}m$  space group. From the Williamson-Hall plots, crystallite sizes were found to lie within the range  $(42 \pm 1)$  nm for the different doped samples. The lattice parameter was found to decrease linearly with increase in the concentration of  $\text{Cr}^{3+}$  ion. The magnetic behavior of the samples was determined by M-H studies at 300K, field cooled (5 T) at 5K and temperature dependent studies. The M-H at 300K show soft magnetic behavior whereas the M-H plots at 5K predict the existence of in-homogeneity of the exchange interactions due to strong exchange coupling between the spins at the core and the surface of the nanoparticles.

Keywords: Ferrites; Williamson Hall plot; core-shell; Exchange-coupling

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