

Abstract Submitted  
for the MAR06 Meeting of  
The American Physical Society

**Mossbauer Spectroscopy Investigation of Substituted Cobalt Ferrites ( $\text{CoM}_x\text{Fe}_{2-x}\text{O}_4$ , where  $\text{M} = \text{Mn}$  or  $\text{Cr}$ , and  $x = 0.0-0.8$ )**<sup>1</sup> JOHN SNYDER, CHESTER LO, YEVGEN MELIKHOV, PAUL MATLAGE, MSE Dept and CNDE, Iowa State Univ, Ames IA, KELLY KRIEBLE, Physics Dept, Moravian College, Bethlehem PA — In order to enable applications of substituted cobalt ferrites for strain sensing, magnetostrictive actuating, and “multiferroic” composites, more basic knowledge is needed concerning how cation substitution affects the atomic level environments, distributions, and interactions of the cations. In this study, the local environments of the Fe atoms in two series of substituted cobalt ferrites ( $\text{CoM}_x\text{Fe}_{2-x}\text{O}_4$ , where  $\text{M} = \text{Mn}$  or  $\text{Cr}$ , and  $x = 0.0-0.8$ ) have been investigated using Mossbauer spectroscopy. Results of both series show two distinct six-line hyperfine patterns, indicating Fe in A (tetrahedral) and B (octahedral) sites. They can be identified by isomer shift and hyperfine distribution width. Both series show some similar behavior: with increasing substitution, magnetic hyperfine field decreases and hyperfine field distribution width increases for both A and B sites. B-site hyperfine fields and distribution widths are more affected than A. All of these effects are more pronounced for Cr-substitution than for Mn. Results are consistent with a model of Mn or Cr ions substituting into B-sites and displacing Co ions onto A sites. It would appear that Cr has an even stronger B-site preference than Mn, and displaces more of the Co to the A sites.

<sup>1</sup>Supported by NSF Grant No.DMR-0402716.

John Snyder  
MSE Dept., Iowa State University

Date submitted: 30 Nov 2005

Electronic form version 1.4