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Atomic Migration in $Co_{0.9}Mn_{0.1}Fe_2O_4$ Prepared by a Sol-Gel Method

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Abstract

$Co_{0.9}Mn_{0.1}Fe_2O_4$ prepared by a sol-gel method has been studied by Mössbauer spectroscopy and x-ray diffraction. The crystal structure is found to have a cubic spinel structure with the lattice constant of a_0 = 8.384 ± 0.005 Å. The iron ions at both *A* (tetrahedral) and *B* (octahedral) sites are found to be in ferric high-spin states. Its Néel temperature T_N is found to be 850 ± 2 K. Debye temperatures for *A* and *B* sites found to be Θ_A = 757 ± 5 K and Θ_B = 282 ± 5 K, respectively. Atomic migration from the *A* to the *B* sites starts near 400 K and increases rapidly with increasesing temperature to such a degree that 52 % of the ferric ions at the *A* sites have moved over to the *B* sites by 700 K.