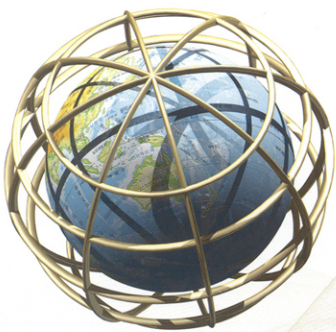
ISAMMA2007

The 1st International Symposium on Advanced Magnetic Materials
May 28-June 1, 2007, Jeju, Korea



Organized by

Research Center for Advanced Magnetic Materials
The Korean Magnetics Society

Sponsored by

Korea Science and Engineering Foundation
Korean Federation of Science and Technology Societies
Research Center for Spin Dynamics and Spin-Wave Devices

PE08

Mössbauer Studies of Fe-Zn Sulphur Spinels

Sung Hwan Bae, Sam Jin Kim, and Chul Sung Kim*

Department of Physics, Kookmin University, Soeul 136-702, Korea

*Corresponding author: cskim@phys.kookmin.ac.kr, Phone: +82 2 910 4752, Fax: +82 2 910 4728

The fascinating ground state for Cr-based chalcogenide spinels are interested for strong-correlation between the charge, spin, and orbital degree of freedom [1]. Very recently, spin-driven phonon splitting in bond-frustrated $ZnCr_2S_4$ has been reported [2]. Now, whether frustration mechanism on Cr-based spinels isoriginated from the geometrical structure or quenching of magnetic exchange interaction is not resolved, yet. In this report, we present a detailed investigation of Fe-Zn-Cr spinels.

The polycrystalline sample of Zn doped $Fe_{1-x}Zn_xCr_2S_4$(x=0.1, 0.3) were prepared by solid state reaction. The crystallographic and magnetic properties of $Fe_{1-x}Zn_xCr_2S_4$(x=0.1, 0.3) have been studied by x-ray diffractometer(XRD), vibrating sample magnetometer(VSM) and Mössbauer spectroscopy measurement. The crystal structure was determined by the normal cubic spinel of space group *Fd3m* and the lattice constants(x=0.1, 0.3) were a_0 = 9.9967 Å and a_0 = 9.9931 Å, respectively. The specific cusp like patterns were observed in magnetization curves (ZFC:zero field cooling) under 100 Oe applied field. With increasing Zn concentration from x=0.1 to x=0.3, the cusp like point shifted from 77 to 86 K. The Néel temperature of FeCr2S4 was reported to be 170 K [3]. It was diminished to 153 K(x=0.1), 135 K(x=0.3) withZn substitution concentration. This result is interpreted that the A-B superexchange interaction of the spinel with the fomula AB2S4 was decreased by decrease of Fe ions of A site.

REFERENCES

[1] K. Ohgushi, T. Ogasawara, Y. Okimoto, S. Miyasaka, and Y. Tokura, Phys. Rev. B 72, 155114 (2005).

[2] J. Hemberger, T. Rudolf, H. -A. Krug von Nidda, F. Mayr, A. Pimenov, V. Tsurkan, and A. Loidl, Phys. Rev. Lett. 97, 087204 (2006).

[3] A. P. Ramirez, R. J. Cava, and J. Krajewski, Nature 386, 156 (1997).