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ABSTRACTS

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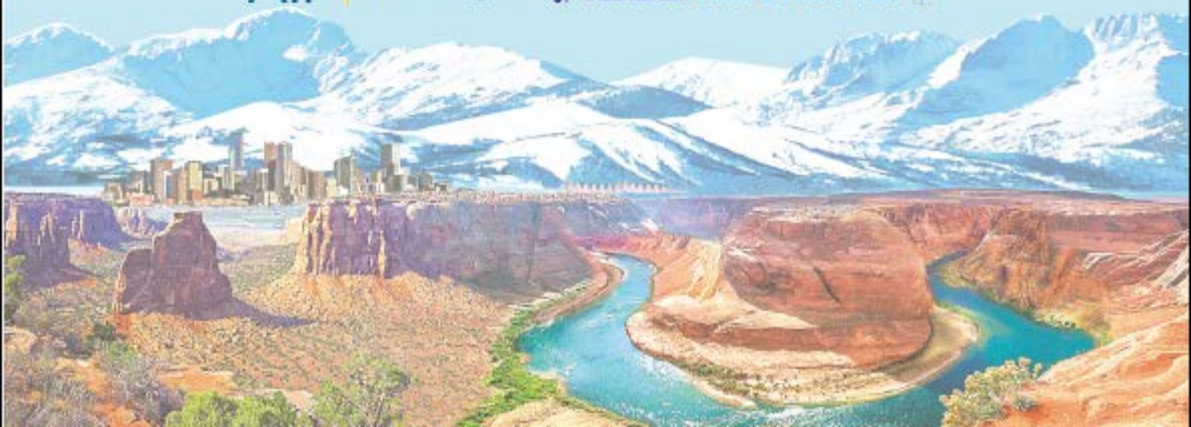

EQ-01. Investigation of site preference of Zn doped $Ba_3Co_{2-x}Zn_xFe_{24}O_{41}$ by Mössbauer spectroscopy. *J. Lim*[1], C. Rhee[1], H. Noh[1] and C. Kim[1] *1. Physics, Kookmin University, Seoul, Republic of Korea*

The polycrystalline $Ba_3Co_{2-x}Zn_xFe_{24}O_{41}$ (x = 0.0, 0.5, 1.0) samples were prepared by using solid-state-reaction method. The crystal structures and magnetic properties of samples were investigated with x-ray diffractometer (XRD), vibrating sample magnetometer (VSM), and Mössbauer spectroscopy. The results of XRD patterns analyzed by Rietveld refinement showed that samples were single-phased with the Bragg factor (R_B) and structure factor (R_F) less than 5 %. The crystal structure of $Ba_3Co_{2-x}Zn_xFe_{24}O_{41}$ (x = 0.0, 0.5, 1.0) samples was determined to be a hexagonal structure with $P6_3/mmc$ space group, and the unit cell volume (V_u) of the samples increased with increasing Zn ion concentration. From the magnetic hysteresis curves at 295 K, the saturation magnetization (M_s) and coercivity (H_c) of $Ba_3Co_{2-x}Zn_xFe_{24}O_{41}$ (x = 0.0, 0.5, 1.0) samples were found to be M_s = 50.9, 53.1, 55.0 emu/g and H_c = 37.1, 27.3, 25.9 Oe, respectively. M_s decreases due to preferential occupation of non-magnetic Zn ions in the tetrahedral sublattices of down-spin site. Base on the temperature dependence of magnetization curves under 100 Oe between 4.2 and 740 K, all samples showed spin transition (T_s). The T_s and Curie temperature (T_C) of samples decreased with increasing Zn ion concentration. The decrease of the T_C means that the non-magnetic Zn ions doping weakens super-exchange interaction. Zero-field Mössbauer spectra of all samples were obtained and analyzed at various temperatures ranging from 4.2 to 740 K. With ten-sextets for Fe sites corresponding to the Z-type hexagonal crystallographic sites, all spectra below T_C were fitted by least-square method. Isomer shift values of all samples show that the charge states are Fe^{3+} high spin. In addition, from the site occupation numbers of Fe calculated from the relative areas fitted of the Mössbauer spectra, Zn ions preferentially occupy the tetrahedral sublattices of down sites.

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