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ABSTRACTS

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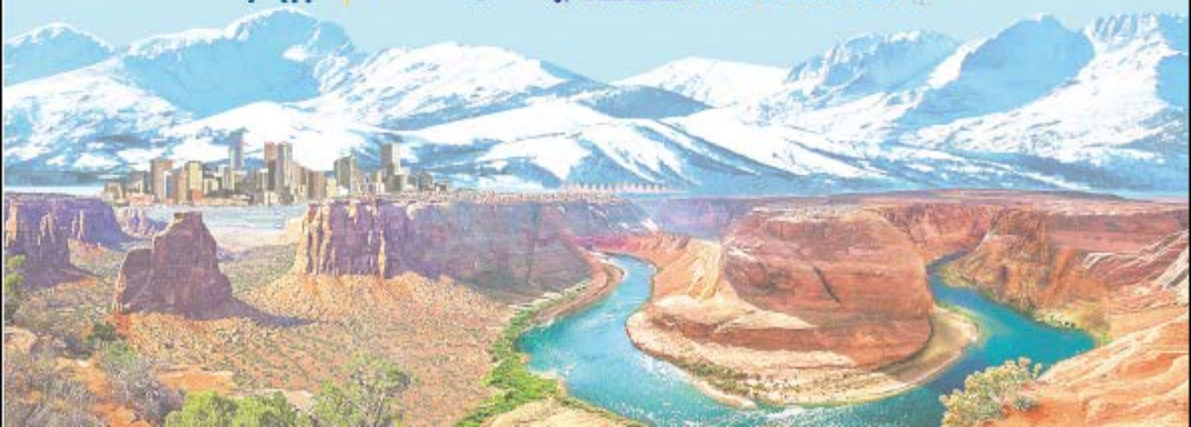

CX-03. The crystal structure and magnetic properties of $Ba_{2-x}Sr_xCo_2Fe_{12}O_{22}$. *K. Cho*[1], C. Rhee[1] and C. Kim[1] *1. Department of Physics, Kookmin University, Seoul, Republic of Korea*

The Y-type hexaferrite has been extensively studied for the magnetoelectric effect and possible microwave device applications. We have synthesized the $Ba_{2-x}Sr_xCo_2Fe_{12}O_{22}$ samples (x=0, 0.1, 0.2, 0.3, 0.4, 0.5) by the solid-state reaction method and investigated their crystalline and magnetic properties by XRD, Mössbauer spectrometer, VSM, and network analyzer. From the XRD patterns, all the samples were confirmed to be rhombohedral with space group R-3m with decreasing lattice constants a_0 and c_0 due to the smaller ion radius of Sr^{2+} (1.27 Å) than that of Ba^{2+} (1.43 Å). The Mössbauer spectroscopy measurements indicate that the relative area ratios of Fe ion remain constant regardless of the Sr concentration with Sr^{2+} completely substituting for Ba^{2+} in Y-type hexaferrite. Also, magnetic hyperfine field of $18h_{VI}$ has the highest area value among the sextets, slightly increasing with the Sr concentration. This agree with the saturation magnetization(M_s) measurement, where M_s linearly increase with increasing super-exchange interaction due to difference in ionic radius between Ba^{2+} and Sr^{2+}. To characterize the high frequency properties, all samples were sintered at various temperatures, and complex permeability and permittivity were measured by network analyzer between 100 MHz to 4 GHz. Even though for x below 0.3 the initial permeability at 100MHz increased, its value decreased at higher values of x. The permeability, which is closely related to Ohta's model, can be described by $\mu_i \propto M_s^2/(K_1+\lambda_s\sigma)$, where K_1 is the magneto-crystalline anisotropy, λs is magnetostriction factor, and σ is internal stress. Due to increasing coercivity(H_c), which is closely related with K_1, the permeability can reach maximum value with an appropriate amount of Sr substitution. Our study shows and all samples sintered below 1100 °C have low magnetic loss less than 0.1 in 1 GHz band, which is the indication of the potential application of $Ba_{2-x}Sr_xCo_2Fe_{12}O_{22}$ samples in RF and antenna devices in UHF band.

[1] R. C. Pullar, Prog. Mater. Sci. 57, 1191 (2012). [2] V. Tsakaloudi, D. Holz, V. Zaspalis, J. Mater. Sci. 48, 3825 (2013).