

55TH ANNUAL
CONFERENCE
ON MAGNETISM
AND MAGNETIC
MATERIALS
NOVEMBER 14–18, 2010
ATLANTA, GA



ABSTRACTS
www.magnetism.org

DW-10. Mössbauer spectra of the Co substituted Y-type Ba-ferrite $\text{Ba}_2\text{Co}_2\text{Fe}_{12}\text{O}_{22}$. I. Lee¹, H. Cho¹ and C. Kim¹. *Department of Physics, Kookmin University, Seoul, Korea, Republic of*

The cobalt substituted Y-type barium ferrite $\text{Ba}_2\text{Co}_2\text{Fe}_{12}\text{O}_{22}$ (Co_2Y) was prepared by solid state reaction method. From the refined X-ray diffraction patterns, there are six interstitial sites for Fe and Co ions such as $3b_{\text{VI}}$, $6c_{\text{IV}}^*$, $6c_{\text{VI}}$, $18h_{\text{VI}}$, $6c_{\text{IV}}$ and $3a_{\text{VI}}$. Also, the crystal structure was found to be a single-phase rhombohedral structure with the lattice constants $a_0=5.8638 \text{ \AA}$ and $c_0=43.5259 \text{ \AA}$ (space group: R-3mH). The Bragg factor R_B and R_F were 5.83% and 3.81%, respectively. The Mössbauer spectra of Co_2Y were taken in the temperatures range $4.2 \text{ K} \leq T \leq 715 \text{ K}$. The spectra below Curie temperature ($T_c=715 \text{ K}$) were fitted by a least-squares technique with six interstitial Fe sites corresponding to the $3b_{\text{VI}}$, $6c_{\text{IV}}^*$, $6c_{\text{VI}}$, $18h_{\text{VI}}$, $6c_{\text{IV}}$ and $3a_{\text{VI}}$ subspectrum. From the analyzed Mössbauer spectrum, the site occupancy in six interstitial sites of the Co and Fe ions were calculated by the relative subspectrum absorption areas.[1] The occupation number of Co ions in the system determined to be 0.55 and 0.35 for $18h_{\text{VI}}$ and $6c_{\text{VI}}$ sites, respectively. This result is an experimental evidence of the site occupancy distribution in the six interstitial Fe^{3+} sites for $\text{Ba}_2\text{Co}_2\text{Fe}_{12}\text{O}_{22}$.

[1] Z. W. Li, L. Guoqing, N.-L. Di, Z.-H. Cheng, and C. K. Ong, *Phys. Rev. B* **72**, 104420 (2005)