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ABSTRACTS

CS-07. Effects of bismuth substitution on $Tb_{3-x}Bi_xFe_5O_{12}$. *J. Park*[1] and C. Kim[1] *1. Physics, Kookmin University, Seoul, South Korea*

Compunds of composition $Tb_{3-x}Bi_xFe_5O_{12}$ (x = 0.5, 0.75, 1.0, 1.25) were prepared using the sol-gel method. The crystallographic and magnetic properties of $Tb_{3-x}Bi_xFe_5O_{12}$ (x = 0.5, 0.75, 1.0, 1.25) powders were studied by using x-ray diffraction, vibrating sample magnetometer and Mössbauer spectroscopy. Crystal structure of the samples is determined to be normal cubic structure *Ia3d* by Rietveld refinement. The lattice constants increase linearly with increasing bismuth concentration. These results accord with Vegard's law. The temperature dependence of magnetization with increasing bismuth concentration from x = 0.5 to x = 1.25 showed the decrease of compensation temperature from 177 to 107 K. Moreover, the field cooled magnetization of all samples show negative magnetization below the compensation temperature. We suggest that the negative magnetization is related to the local anisotropy by the strong covalent interaction between bismuth and iron. Mössbauer absorption spectra of $Tb_{3-x}Bi_xFe_5O_{12}$ (x = 0.5, 0.75, 1.0, 1.25) were taken at various tempertures from 4.2 to 700 K. The isomer shifts at room temperature of (16a) and (24d) site are around 0.26 mm/s and 0.04 mm/s, respectively, for all samples. The smaller isomer shifts of (24d) site than that of (16a) site means that the irons at (24d) site have a strong covalent interaction with bismuth. Although the nonmagnetic ion of bismuth substituted in TbIG, Néel temperature increased from 616 to 655 K with increase of bismuth concentration from x = 0.5 to x = 1.25. Also, the saturation magnetization at room temperature is increase linearly with increase of bismuth concentration. These behaviors can be explained by strong exchange interaction between a-d sublattices with increase of bismuth concentration.