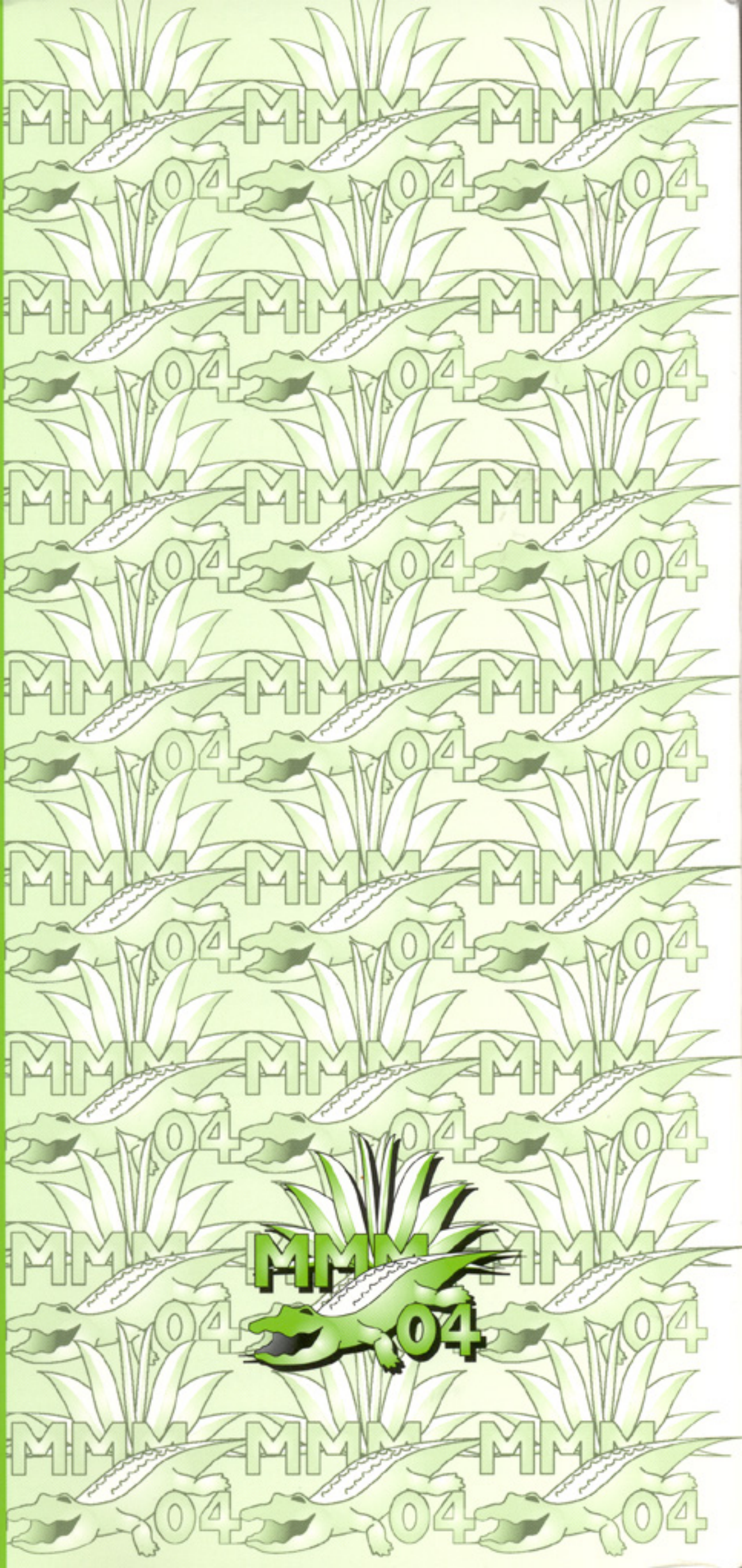


# ABSTRACTS

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**BP-10. Compensation effects and magnetic properties of  $Tb_3Fe_{5-x}Al_xO_{12}$  ( $x=0.00, 0.75$ ).** *Y. Hong<sup>1</sup>, I. Shim<sup>1</sup>, S. Kim<sup>1</sup> and C. Kim<sup>1</sup>*. *Department of Physics, Kookmin University, SungBuk-Gu, Seoul, South Korea*

The crystallographic and magnetic properties of  $Tb_3Fe_{5-x}Al_xO_{12}$  ( $x=0.00$  and  $0.75$ ) powders were studied using x-ray diffraction, vibrating sample magnetometer (VSM) and Mössbauer spectroscopy. The crystal structure was found to have a single phase of garnet cubic structure, and the lattice constants of  $Tb_3Fe_{5-x}Al_xO_{12}$  ( $x=0.00$  and  $0.75$ ) were found to be  $a_0=12.436$  Å and  $12.248$  Å, respectively. The Rietveld refinement of x-ray patterns convinced that Tb ions were totally occupied into the dodecahedral (24c) site. Fe ions are situated on octahedral (16a) and tetrahedral (24d) sites. Mössbauer spectra of  $Tb_3Fe_{5-x}Al_xO_{12}$  were measured at various temperatures below the Néel temperature. The temperature dependence of the magnetic hyperfine field in  $^{57}Fe$  nuclei at the octahedral (16a) and tetrahedral (24d) sites were analyzed. The temperature dependence of magnetization have shown that the Néel temperature decreased from  $T_N=560$  K to  $500$  K with Al doping  $x=0.00$  and  $0.75$ , while the compensation temperature increased from  $T_{comp}=260$  K to  $450$  K. Specially, in the case of  $x=0.75$ , it showed an unusual phenomenon in the magnetization curve near the compensation temperature that the positive value of magnetization persist up to the Néel temperature. The reduction of the Néel temperature with non magnetic material of Iron Garnets is interpreted by a-d sublattice exchange interaction. Therefore nonmagnetic material substituted for iron ions reduced the Néel temperature. We suggest that the unusual phenomenon at the compensation temperature is explained that the magnetic moments are coupled antiparallel between Tb ions and net sum of a-d sublattice ions for the  $x=0.00$ . On the other hand they are coupled parallel for the Al doped TbIG.