

**10TH JOINT
MMM/INTERMAG
CONFERENCE
JANUARY 7-11, 2007
BALTIMORE, MARYLAND**



ABSTRACTS

EE-07. Electric quadrupole interaction in $\text{HoMn}_{0.99}^{57}\text{Fe}_{0.01}\text{O}_3$. S. Kim¹, S. Cheong² and C. Kim¹. *Physics, Kookmin University, Seoul, South Korea; 2. Physics and Astronomy, Rutgers University, Piscataway, NJ, USA*

Single- and polycrystalline HoMnO_3 system were synthesized in an optical floating zone furnace and with solid-state reaction methods, respectively. The dielectric constant $\epsilon(T)$ was measured using an LCR meter under the various external magnetic fields and heat capacity $C(T)$ was measured using a relaxational method from 2 to 300 K. The sharp features along the c-axis of HoMnO_3 in $\epsilon(T)$ and $C(T)$ at 5 and 40 K correspond to Ho antiferromagnetic ordering and Mn spin reorientation, and the magnetic Néel temperature (T_N) shows at 72 K. As increasing external applied magnetic field, the dielectric anomaly peak at 40 K was shifted to low temperature and finally the value is about 27 K under 4 Tesla. Mössbauer spectra of the Fe-doped polycrystalline HoMnO_3 have been taken at various temperatures ranging from 4.2 K to room temperature. We notice that the electric quadrupole splitting (ΔE_Q) values are large for all temperature ranges. The value is 0.42 ± 0.01 and 1.86 ± 0.01 mm/s at 4.2 K and above T_N , respectively. Also, the temperature dependence of quadrupole splitting show two peaks at the same point obtained from $\epsilon(T)$ and $C(T)$ curve. We present that the change of electric quadrupole splitting occurs simultaneously with the anomaly of dielectric constant. The isomer shift value at room temperature is found to be 0.16 ± 0.01 mm/s relative to the Fe metal that are consistent with the Fe^{3+} valence state.