Abstract Submitted
for the MAR12 Meeting of
The American Physical Society

The magnetoelectirc effect in the $RAl_3(BO_3)_4$ (R=Tb, Ho, Er, and Tm) K.-C. LIANG, R. P. CHAUDHURY, B. LORENZ, TCSUH and Department of Physics, University of Houston, Houston, TX 77204, USA, L.N. BEZMATERNYKH, V.L. TEMEROV, Institute of Physics, Siberian Division, Russian Academy of Sciences, Krasnoyarsk, 660036, Russia, C.W. CHU, TCSUH and Department of Physics, University of Houston, Houston, TX 77204, USA — We study the magnetoelectric (ME) effect of the rare earth aluminum borates, $RAl_3(BO_3)_4$ (R=Tb, Ho, Er, and Tm). The magnetic, magnetoelectric, and magnetostrictive properties were investigated between 2K and 300K with different orientation of fields up to 70kOe. A giant magnetoelectric polarization, 3600 $\mu C/m^2$, is found in $HoAl_3(BO_3)_4$ while a 70kOe transverse magnetic geometry field is applied. This value is significantly larger than that previously reported in all other bulk crystalline linear magnetoelectric or multiferroic materials. Furthermore, the ME polarization decreases with increasing magnetic anisotropy of the rare earth moment. The magnetostrictive measurements show that there is a strong coupling between the 4-f moments and the lattice. Our data further imply that the field-induced ionic displacements in a unit cell give rise to a change of structural symmetry from non-polar to polar symmetry.

Kao-Chen Liang
TCSUH and Department of Physics,
University of Houston, Houston, TX 77204, USA

Date submitted: 27 Nov 2011 Electronic form version 1.4