Abstract Submitted
for the MAR10 Meeting of
The American Physical Society

Magnetic and ferroelectric properties of bulk and thin film $FeVO_4$[1] GAVIN LAWES, AMBESH DIXIT, Wayne State University — The development of ferroelectric order at a magnetic phase transition is a particularly striking example of the strong coupling that can arise between charge and spin degrees of freedom. We present results on the magnetic, electrical, dielectric, optical, and thermodyamic characterization of $FeVO_4$ ceramic and thin film samples. This system has two low temperature phase transitions at T=22 K and T=15 K, with ferroelectric order developing at the lower temperature transition. The polarization at this transition is only 6 $\mu C/m^2$ in the bulk polycrystalline sample, although we believe the intrinsic polarization could be as large as 40 $\mu C/m^2$ without powder averaging. There are distinct shifts in certain Raman peaks in the narrow temperature range between the two magnetic phase transitions, which may be related to the development of ferroelectric order. The T=15 K phase transition shifts to lower temperatures with the application of an external magnetic field but, in the thin film sample, shifts to higher temperatures with the application of an external electric field. This electric field control of a magnetic transition confirms the strong coupling between ferroelectricity and magnetism in this system.

[1]Supported by NSF DMR-0644823

Gavin Lawes
Wayne State University

Date submitted: 20 Nov 2009 Electronic form version 1.4