

Abstract Submitted  
for the MAR09 Meeting of  
The American Physical Society

**Reentrant ferroelectricity and the multiferroic phase diagram of  $\text{Mn}_{1-x}\text{Fe}_x\text{WO}_4$**  RAJIT CHAUDHURY, BERND LORENZ, YAQI WANG, YANYI SUN, CHING CHU, TCSUH and Department of Physics, University of Houston, Houston, Texas 77204-5002, USA — Recently  $\text{MnWO}_4$  has attracted attention because of its multiferroic properties. In  $\text{MnWO}_4$  the  $\text{Mn}^{2+}$  ions can be substituted by  $\text{Fe}^{2+}$  since  $\text{MnWO}_4$  and  $\text{FeWO}_4$  are isomorphic. This opens the possibility to tune the magnetic orders by Fe-substitution for a better understanding of the microscopic interactions resulting in the multiferroic properties. We report the discovery of reentrant ferroelectricity in the phase diagram of multiferroic  $\text{Mn}_{1-x}\text{Fe}_x\text{WO}_4$  single crystals. At zero magnetic field (H) the spin-spiral ferroelectric (FE) state is completely suppressed at Fe substitutions (x) exceeding 0.04. For  $x > 0.04$  a ferroelectric phase exists in a narrow temperature (T) range at zero magnetic field. This FE phase shows a reentrant behavior at lower T above a critical magnetic field  $H_c(x)$ . The reentrant FE transition is explored by polarization, dielectric constant, and magnetization measurements. The complete multiferroic x-T-H phase diagram of  $\text{Mn}_{1-x}\text{Fe}_x\text{WO}_4$  is derived.

Rajit Chaudhury  
TCSUH and Department of Physics, University of Houston,  
Houston, Texas 77204-5002, USA

Date submitted: 01 Dec 2008

Electronic form version 1.4