

Abstract Submitted  
for the MAR09 Meeting of  
The American Physical Society

**Multiple magnetic transitions and glass dynamics in LuFe<sub>2</sub>O<sub>4</sub>**<sup>1</sup>  
HARI SRIKANTH, MANH-HUONG PHAN, NATALIE FREY, University of South Florida, MANUEL ANGST, BRIAN SALES, DAVID MANDRUS, Oak Ridge National Laboratory — LuFe<sub>2</sub>O<sub>4</sub> is a complex oxide of topical interest as ferroelectricity in this material arises from charge ordering and it also exhibits multiferroic behavior. A good understanding of the magnetic phase diagram has remained elusive primarily due to the complexity of the system as well as the sensitivity to sample quality. In this study, we report on the magnetic properties of high quality LuFe<sub>2</sub>O<sub>4</sub> single crystals grown by the floating zone method. Temperature dependent DC, AC susceptibility and isothermal magnetization reveal a rich and complex phase diagram. Magnetic transitions at 240K and 175K are accompanied by strong frequency dependence of the real ( $\chi'$ ) and imaginary ( $\chi''$ ) parts of the AC susceptibility indicative of glassy behavior. Quantitative fits to the glass model confirm cluster glass dynamics and this is consistent with the presence of ferrimagnetic domains within the Fe-O planes. Magnetocaloric effect (MCE) in these materials will also be presented. We will place our results in the context of work by other groups on this system and clarify the nature of the magnetic phase diagram that emerges from our studies.

<sup>1</sup>Work supported by DOE.

Hariharan Srikanth  
University of South Florida

Date submitted: 22 Nov 2008

Electronic form version 1.4