

**Subject:** MSD Colloquium, Fennie, Thurs, 10/25, 11am, 200, Auditorium  
**From:** Suzanne Kokosz <kokosz@anl.gov>  
**Date:** Mon, 01 Oct 2007 15:18:02 -0500  
**To:** Materials Science Division <msd@anl.gov>

MATERIALS SCIENCE COLLOQUIUM

\*\*\*Note Building Change\*\*\*

**SPEAKER:** CRAIG FENNIE  
Center for Nanoscale Materials, ANL

**TITLE:**  ${}^3\text{In}$  pursuit of strongly coupled multiferroics<sup>2</sup>

**DATE:** Thursday, October 25, 2007

**TIME:** 11:00 a.m.

**PLACE:** Building 200, Auditorium

**HOST:** Serge Nakhmanson

Refreshments will be available at 10:45 a.m.

**Abstract:**

To realize novel electrically controlled magnetic devices based on single-phase multiferroic oxides materials that are simultaneously ferroelectric and magnetic a strong coupling between an external electric-field and the magnetization is required. Recent advances in the vapor phase epitaxial growth of complex oxide thin films have provided a new route to achieve this coupling allowing properties to be tailored and enhanced at the nanoscale. In this talk I will discuss our recently proposed strategies to identify new strongly coupled multiferroic thin films. In one case the interplay of spins, optical phonons, and epitaxial strain leads to a competition between different ordered states producing a colossal magnetoelectric effect. In a second case, a ferroelectric distortion induces weak-ferromagnetism facilitating the electric-field control of a switchable magnetization. We also present first-principles density-functional calculations for several realizations.

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