

Materials Science and Technology Division  
Materials Theory Group

**“Magnetic Structure and Electric Field Effects  
in Multiferroic BiFeO<sub>3</sub>”**

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Wednesday, May 22, 2013  
11:00 a.m.  
4100, J-302

**Abstract**

BiFeO<sub>3</sub> (BFO) is a room-temperature multiferroic combining large electric polarization with a "tilted" anharmonic magnetic cycloid. In this talk, we discuss various ways of controlling magnetism in BFO single crystals using coupling between the ferroelectric and magnetic order parameters.

Elastic and inelastic neutron scattering, as well as SANS, are used, and electric and magnetic fields are applied in-situ. Electric field can rotate the electric polarization and Fe spins simultaneously, and a chiral magnetic monodomain state can be obtained. Populations of the 3 equivalent cycloidal magnetic domains can be controlled by an electric field through piezoelectric coupling. Alternatively, the domains can be controlled via the inverse effect by applying uniaxial pressure. Magnetic excitation spectra are presented, and effects of an electric field on the magnetic excitations are discussed. The ability to control the magnetic domains and excitations by an electric field or tiny deformation accentuates the potential of BFO for room-temperature applications involving magnetoelectric effects.

Host: Randy Fishman (574-5786, fishmanrs@ornl.gov)