

Abstract Submitted
for the MAR10 Meeting of
The American Physical Society

Ferroelectric behavior of ultra-thin BiFeO₃ films¹ DIPANJAN MAZUMDAR, MINT Center, University of Alabama, Tuscaloosa, AL 35487, VILAS SHELKE, ARUNAVA GUPTA, MINT Center, University of Alabama, Tuscaloosa, AL, 35487, SERGEI V. KALININ, STEPHEN JESSE, ART P. BADDORF, Oak Ridge National Laboratory, Oak Ridge, TN 37831 — BiFeO₃ (BFO) is a potential oxide-barrier material for spintronics devices like magnetic tunnel junctions. Also, recent theoretical predictions have opened up the possibility of realizing multi-level devices with ferroelectric (FE) barriers. But understanding the FE properties of ultra-thin BFO films is at its early stages. Control over FE domains with robust polarization switching is a challenge and crucial for achieving any device-related objectives. In this work we have investigated the FE domains of BFO films of thickness between 5 - 100 nm using piezo-force microscopy (PFM) technique, and local properties using switching spectroscopy PFM (SS-PFM). Our films show significant polarization switching loops down to 5nm. We find domains to be irregular-shaped, in sharp contrast to thicker films. Detailed analysis shall be presented.

¹Part of this research was conducted at ORNL's Center for Nanophase Materials Sciences, sponsored by the Division of Scientific User Facilities, U.S. DOE.

Dipanjan Mazumdar
MINT Center, University of Alabama, Tuscaloosa, AL 35487

Date submitted: 04 Jan 2010

Electronic form version 1.4