Title
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Publication Date
2010-04-16

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Over the past few years, much attention has been given to the growth and characterization of artificially created hetero-interfaces in complex oxide systems. Such interfaces have been found to possess novel properties and functionality not found in the bulk materials used to create such interfaces. At the same time, researchers have also reported the formation of intriguing properties at intrinsic interfaces (i.e., grain boundaries, domain walls, etc.) in a wide array of materials. In fact, symmetry analysis of certain functional materials reveals the possibility of creating polarized, magnetized, and even magnetoelectric domain walls in materials. Through a combination of theoretical calculations and experimental studies, a holistic picture of the connection between processing, structure, and properties brings to light the role of magnetism at ferroelectric domain walls in determining the magnetic properties in BiFeO3. By controlling domain structures through epitaxial growth constraints and probing these domain walls with exchange bias studies, x-ray magnetic dichroism based spectromicroscopy, and high resolution transmission electron microscopy we demonstrate that the formation of certain types of ferroelectric domain walls (i.e., 109° walls) can lead to enhanced magnetic moments in BiFeO3.

Supported by the U.S. Department of Energy under Contract No. DE-AC02-05CH11231.