

Domain Wall Mobility in Ferroelectric Films

Susan Trolier-McKinstry

¹Department of Materials Science and Engineering and Materials Research Institute, Penn State
N-227 Millennium Science Complex, University Park, PA, 16802

*Susan Trolier-McKinstry: STMckinstry@psu.edu

An understanding of domains and domain walls was pivotal to the career of Dr. Jan Fousek. This paper honors the memory of Prof. Fousek through a review of the factors that control the domain state, as well as the mobility of domain walls in perovskite ferroelectric films. The strong coupling between polarization in strain in $\text{PbZr}_{1-x}\text{Ti}_x\text{O}_3$ films implies that the residual stresses in films profoundly influences both the static domain state and the mobility of domain walls. In general, domain wall contributions to the properties are considerably smaller in thin films than in bulk materials of the same composition. Some of the mobility of domains can be restored by removing the film from the substrate, or by growing the films on flexible substrates. It is found that the method by which a film is released from a substrate has a surprisingly large influence on domain reorientation post-release. When domain walls move, they tend to move in clusters, where the characteristic length scale for correlated motion or pinning of walls is often on the length scale of hundreds of nm. Additional factors that influence domains in ferroelectric thin films will also be discussed.