

## Switching spectroscopy piezoresponse force microscopy of polycrystalline capacitor structures

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Abstract: Polarization switching in polycrystalline  $\text{PbZr}_{0.52}\text{Ti}_{0.48}\text{O}_3$  films on Pt-coated Si substrates was studied by switching spectroscopy piezoresponse force microscopy (SSPFM). Acquisition of multiple hysteresis loops allows polarization switching parameters, including nucleation, coercive biases, and switchable response to be mapped in real space. In contrast to measurements made on the free surface, those on the metal-ferroelectric-metal capacitor structures show the evolution of correlated switching of  $10^2$ - $10^3$  grain clusters with well-defined imprint and nucleation biases. The role of substrate bending on clustering and SSPFM detection mechanisms are discussed. These studies demonstrate real-space imaging of mesoscopic polarization reversal in real-world devices.