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Swiching Spectroscopy Piezoresponse Force Microscopy study of Domain Wall hysteresis at the nanoscale: Mapping lattice and defect pinning effects VASUDEVA RAO ARAVIND, Pennsylvania State University, SAMRAT CHOUDHURY, YULAN LI, KATYAYINI SEAL, STEPHEN JESSE, ANNA MOROZOVSKA, EUGENE ELISEEV, LONG-QING CHEN, SERGEI KALININ, VENKATRAMAN GOPALAN — In this work, Using scanning probe microscopy with ∼10 nanometer resolution along with theoretical modeling, we demonstrate the role of 180^o ferroelectric domain wall as an intrinsic defect that lowers coercive fields in its vicinity by an order of magnitude. The interaction of ferroelectric 180^o domain wall with a strongly inhomogeneous electric field of biased scanning probe microscope tip is analyzed within decoupling approximation allowing for the spatial redistribution of polarization caused by the biased probe using continuous Landau-Ginzburg-Devonshire theory. Theoretical calculations predict that equilibrium shape of the initially flat domain wall boundary bends, attracts or repels from the probe apex. The bending of the wall and its depolarization electric field facilitates tip induced domain nucleation. The experiments and theory are compared quantitatively, to show that lattice friction as well as lattice pinning play important role in the domain wall softening behavior. Acknowledgements: [1] National Science Foundation, [2] Center for Nanophase Materials Sciences, Oak Ridge National Laboratory.

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