Abstract Submitted
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Conduction at domain walls in insulating $Pb(Zr_{0.2}Ti_{0.8})O_3$ thin films JILL GUYONNET, IAROSLAV GAPONENKO, STEFANO GARIGLIO, PATRYCJA PARUCH, DPMC, University of Geneva — Ferroic domain walls are intrinsically nanoscale and often present functional properties beyond those of their parent material. One of the most striking examples is the recent discovery of electrical conduction[1] at domain walls in multiferroic $BiFeO_3$. Different scenarios have been proposed to explain the observed conduction, generally relating it to the complex nature of domain walls specific to $BiFeO_3$.[2] Here, we report on scanning probe microscopy studies of domain-wall-specific conduction in thin films of tetragonal ferroelectric (PZT). Our measurements show nonlinear asymmetric current-voltage characteristics with strong thermal activation at $T > 150$ K. Moreover, the average current signals remain stable over the duration of measurement (up to four days). In light of recent transmission electron microscopy measurements at 180° domain walls in PZT,[3] we discuss the possible conduction mechanisms, highlighting the role of electrode asymmetry and microscopic domain wall structure promoting local defect segregation.

[1]Seidel et al., Nat. Mat. **8**, 229 (2009)
[2]Lubk et al., PRB **80**, 104110 (2009); Chiu et al., Adv. Mat. **23**, 1530 (2011); Farokhipoor et al., PRL **107**, 127601 (2011)
[3]Jia et al., Sci. **331**, 1420 (2011)

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