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Conduction at different ferroelectric domain walls in $BiFeO_3$
SAEEDEH FAROKHIPOOR, CHRISTOPHE DAUMONT[1], BEATRIZ NOHEDA, Zernike Institute for Advanced Materials, University of Groningen — $BiFeO_3$ (BFO) is, at room temperature, a rhombohedrally distorted, ferroelectric perovskite. There are eight possible polarization directions (or domains) and three different types of domain walls, namely, 180 $^\circ$ (ferroelectric) and 109 $^\circ$ and 71 $^\circ$ (ferroelectric and ferroelastic) domain walls. Recent works have shown that the domain walls of BFO can display functionalities different from those of the domains, generating photocurrents [1], inducing exchange bias [2] and displaying conductivity at room temperature [3]. Conduction has been reported at 180 $^\circ$ and 109 $^\circ$ domain walls[3] and it was proposed that the reduction of the band gap, associated with the suppression of ferroelectric distortions, at domain walls was responsible for the observed conduction[3]. It is, however, not yet clear if and how other (extrinsic) mechanisms affect the conductivity at the walls. In order to help clarifying the origin of domain wall conductivity, we have performed temperature, thickness and orientation dependent local conductivity measurements in BFO thin films. The results will be discussed in this presentation.

[1] S.Y. Yang, Nature Nanotech. 5, 143 (2010); [2] L.W. Martin et al. Nano Letters 8, 2050 (2008);[3] J. Seidel et al., Nature Mat. 8, 229 (2009).

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