MAR10-2009-000991

Abstract for an Invited Paper
for the MAR10 Meeting of
the American Physical Society

Electrical conduction at domain walls in multiferroic BiFeO3[1]

JAN SEIDEL, Lawrence Berkeley National Laboratory

We present recent results on electrical conductivity at ferroelectric domain walls in BiFeO3. The origin and nature of the observed conductivity is probed using a combination of conductive atomic force microscopy, high resolution transmission electron microscopy and first-principles density functional computations. We show that a structurally driven change in both the electrostatic potential and local electronic structure (i.e., a decrease in band gap) at the domain wall is linked to the observed electrical conductivity. Additionally, we observe an anomalous photovoltaic effect arising from structurally driven steps of the electrostatic potential that occur at ferroelectric domain walls. We explore ways of tuning the conductivity by chemical doping.

[1]DOE support through grant DE-AC02-05CH1123 and support from the Alexander von Humboldt Foundation is acknowledged.