MAR14-2013-020271

Abstract for an Invited Paper
for the MAR14 Meeting of
the American Physical Society

**Charged domain walls in ferroelectrics**

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Solid interfaces including compositionally homogeneous ferroic domain walls (DWs) display uniquely distorted electronic structures and ionic displacements. Their intrinsic properties may therefore be fundamentally different from those of their parent matrices. Indeed, phenomena like semiconductor-metal transition, the quantum Hall effect, magnetoresistance and superconductivity were discovered at hetero-interfaces between transition metal oxides and elevated photoactivity and conductivity were reported at (multi-) ferroic DWs. Unlike hetero-interfaces, the DWs provide "perfect" structure by nature and can be written, displaced, and erased inside a material monolith of functioning devices. Theory predicts the existence of charged DWs which seemingly violate electrostatic compatibility due to head-to-head and tail-to-tail polarization discontinuity, but are stable because bound polarization charge is compensated by mobile charge carriers including quasi-two-dimensional electron gas. This talk will introduce current theory, engineering, control and characteristics of charged DWs, which are mobile, extremely wide and exhibit steady metallic-like conductivity up to $10^9$ times that of the insulating bulk.