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Conducting Ferroelectric Walls, Domain Topology, and Domain Switching Kinetics in a Hybrid Improper Ferroelectric SANG-WOOK CHEONG, Rutgers Univ, RUTGERS CENTER FOR EMERGENT MATERIALS TEAM[1] — **Charged polar interfaces such as charged ferroelectric domain walls or heterostructured interfaces of ZnO/(Zn,Mg)O and $LaAlO_3/SrTiO_3$, across which the normal component of electric polarization changes suddenly, can host large two-dimensional conduction. Charged ferroelectric domain walls can be highly conducting but energetically unfavored; however, they were found to be mysteriously abundant in hybrid improper ferroelectric $(Ca,Sr)_3Ti_2O_7$ single crystals. From the exploration of antiphase domain boundaries, which are hidden in piezoresponse force microscopy, using dark-field electron microscopy, we have explored the macroscopic topology of polarization domains and antiphase domains. We found that the macroscopic domain topology is directly responsible for the presence of charged domain walls, and is closely related with the polarization domain switching mechanism in $(Ca,Sr)_3Ti_2O_7$.**

[1]Rutgers Center for Emergent Materials and Department of Physics and Astronomy, Rutgers University, Piscataway, New Jersey 08854, USA,

Sang-Wook Cheong
Rutgers Univ

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