

Abstract Submitted
for the MAR11 Meeting of
The American Physical Society

Ferroelectricity in CaTiO_3 Single Crystal Surfaces and Thin Films and Probed by Nonlinear Optics and Raman Spectroscopy EFTIHIA VLAHOS, TOM LUMMEN, RYAN HAISLMAIER, SAVA DENEV, CHARLES BROOKS, The Pennsylvania State University, MICHAEL BIEGALSKI, Oak Ridge National Lab, DARRELL SCHLOM, Cornell University, CARL-JOHAN EKLUND, KARIN RABE, Rutgers University, CRAIG FENNIE, Cornell University, VENKATRAMAN GOPALAN, The Pennsylvania State University — Bulk CaTiO_3 has a centrosymmetric point group and is *not* polar or ferroelectric. However, we present surprising results that show highly regular polar domains in single crystals of CaTiO_3 . Confocal Second Harmonic Generation (SHG) and Raman imaging studies were carried out on perovskite CaTiO_3 crystal surfaces. They reveal large, crystallographic polar domains at room temperature, with in-plane polarization components delineated by twin walls. SHG analysis indicates that the highest symmetry of the polar surface is m (space group Pc) with polarization in the m plane. In addition, we present results of the polar domain structure imaged before and after the application of an external electric field. Finally, we present the SHG studies of CaTiO_3 thin films grown using reactive Molecular Beam Epitaxy (MBE); these films are predicted by theory to be ferroelectric and are shown experimentally, both with SHG and in-plane dielectric measurements, to be ferroelectric for temperatures less than ~ 150 K with group symmetry $mm2$.

Eftihia Vlahos
The Pennsylvania State University

Date submitted: 26 Nov 2010

Electronic form version 1.4