

Abstract Submitted
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Direct measurement of oxygen octahedral rotations in improper ferroelectric superlattices by STEM¹ JASON LAPANO, RYAN HAISLMAIER, GREGORY STONE, VENKAT GOPALAN, ROMAN ENGELHERBERT, Penn State University — Complex ABO₃ perovskites are an intensely studied class of materials due to their numerous magnetic and electronic functionalities. Using strain and A-site cation, can induce new high temperature functionality known as improper ferroelectricity¹. Visualizing the interplay between strain, cation ordering and octahedral rotations in improper ferroelectrics is crucial to understand how this property manifests itself in thin films². A series of CaTiO_{3n}/SrTiO_{3n} with periodicities n=2-10 were grown on (La,Sr)(Al,Ta)O₃ by hybrid molecular beam epitaxy. I will discuss how strain and layering affects the cation and oxygen sublattices, and how these distortions propagate through the layers, with direct imaging of the oxygen cations by annular bright field (ABF) STEM. I will then relate these back to understanding how improper ferroelectricity evolves in these films. 1. Rondinelli, J. M. & Fennie, C. J. Octahedral Rotation-Induced Ferroelectricity in Cation Ordered Perovskites. *Adv. Mater.* 24, 1961–1968 (2012). 2. Biegalski, M. D. et al. Impact of symmetry on the ferroelectric properties of CaTiO₃ thin films. *Appl. Phys. Lett.* 106, 162904 (2015).

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