

Abstract Submitted  
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**Piezoelectricity and structure of epitaxial ferroic thin films at high electric fields** ALEXEI GRIGORIEV, RIBECCA SICHEL, University of Wisconsin-Madison, HO NUYNG LEE, Oak Ridge National Lab, CHANG-BEOM EOM, University of Wisconsin-Madison, ZHONGHOU CAI, ERIC C. LANDAHL, BERNHARD ADAMS, ERIC M. DUFRESNE, Argonne National Lab, PAUL G. EVANS, University of Wisconsin-Madison — With mastering the techniques to grow nearly perfect epitaxial thin oxide films, there are emerging opportunities to control the structure and properties of oxide materials using extremely high electric fields. To unveil the piezoelectric and structural properties of  $\text{Pb}(\text{Zr,Ti})\text{O}_3$  and  $\text{BiFeO}_3$  epitaxial thin films at electric fields which are a few times stronger than the low-frequency dielectric breakdown field, we employed time-resolved structural measurements synchronized with electric field pulses of a nanosecond duration. At these extreme fields we measured record-high piezoelectric strains and explored nonlinearities in piezoelectric responses predicted to occur due to the changes in interatomic interactions.

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