Abstract Submitted
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Ferroelastic switching in a layered-perovskite thin film.[1] CHUANSHOU WANG, Department of Physics, Beijing Normal University, RAMAMOORTHY RAMESH, Department of Materials Science and Engineering, University of California, JINXING ZHANG, Department of Physics, Beijing Normal University — A controllable ferroelastic switching in ferroelectric/multiferroic oxides is highly desirable due to the non-volatile strain and possible coupling between lattice and other order parameter in heterostructures. However, a substrate clamping usually inhibits their elastic deformation in thin films without micro/nano-patterned structure so that the integration of the non-volatile strain with thin film devices is challenging. Here, we report that reversible in-plane elastic switching with a non-volatile strain of approximately 0.4% can be achieved in layered-perovskite Bi2WO6 thin films, where the ferroelectric polarization rotates by 90 within four in-plane preferred orientations. Phase-field simulation indicates that the energy barrier of ferroelastic switching in orthorhombic Bi2WO6 film is ten times lower than the one in PbTiO3 films, revealing the origin of the switching with negligible substrate constraint. The reversible control of the in-plane strain in this layered-perovskite thin film demonstrates a new pathway to integrate mechanical deformation with nanoscale electronic and/or magnetoelectronic applications.

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