

Piezoelectric and Dielectric Properties of $\text{Pb}(\text{Zr},\text{Ti})\text{O}_3$ Ferroelectric Bilayers

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The dielectric and piezoelectric properties of an epitaxial $\text{PbZr}_{0.8}\text{Ti}_{0.2}\text{O}_3/\text{PbZr}_{0.6}\text{Ti}_{0.4}\text{O}_3$ ferroelectric bilayer film were studied. Time-resolved synchrotron x-ray microdiffraction provided access to layer specific structural information during electric-field-induced changes. The observed dielectric and electromechanical responses are consistent with a weak electrostatic polarization coupling and can be described using a thermodynamic model of epitaxial ferroelectric bilayers. The weak electrostatic coupling between ferroelectric layers can enable unusual tail-to-tail and head-to-head polarization configurations. X ray measurements of the piezoelectric response of the ferroelectric bilayer at a microsecond time scale confirmed a possible tail-to-tail polarization domain configuration.