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High energy storage responses in all-oxide epitaxial relaxor ferroelectric thin films with the coexistence of relaxor and antiferroelectric-like behaviors

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Abstract: Relaxor ferroelectric $\text{Pb}_{0.9}\text{La}_{0.1}(\text{Zr}_{0.52}\text{Ti}_{0.48})\text{O}_3$ (PLZT) thin films have been epitaxially grown via pulsed laser deposition on $\text{SrRuO}_3/\text{SrTiO}_3$ single crystal with different orientations. The high recoverable energy-storage density and energy-storage efficiency in the epitaxial PLZT thin films are mainly caused by the coexistence of relaxor and antiferroelectric-like behaviors. The recoverable energy-storage density of 12.03, 12.51 and 12.74 J/cm^3 and energy-storage efficiency of 86.50, 88.14 and 88.44%, respectively, for the PLZT(001), PLZT(011) and PLZT(111) thin films measured at 1000 kV/cm. The high energy density and high efficiency indicate that the relaxor epitaxial PLZT(111) thin film is a promising candidate for high pulsed power capacitors.

Keywords: *Relaxor ferroelectrics, epitaxial growth, orientation, energy storage.*

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