

A-site Stoichiometry and Piezoelectric Response in Thin Film $\text{PbZr}_{1-x}\text{Ti}_x\text{O}_3$

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Lead zirconate titanate (PZT) films with Zr/Ti ratios of 52/48 and 30/70 annealed at varying partial pressures of PbO within the perovskite phase field exhibited permittivities of 1150 and 600, respectively with loss tangents of 0.02. Many of the functional properties, including the permittivity, the Rayleigh coefficients, and the aging rates were found to be weakly dependent of the lead content in the single phase field. Minor polarization – electric field hysteresis loops and piezoelectric coefficient $e_{31,f}$ values after hot poling suggest that the $V\text{Pb}''\text{-VO}\cdot\cdot$ defect helps stabilize the poled domain state. Measurements of the local nonlinear response show an increased low response cluster size with decreasing PbO content, indicating that PbO deficiency acts to reduce domain wall motion where it is already low.