Octahedral tilt transitions in relaxed epitaxial Pb(Zr(1-x)Ti(x))O(3) films

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Abstract: Relaxed epitaxial {100}(pc) and {111}(pc) oriented films (350 nm) of Pb(Zr(1-x)Ti(x))O(3) (0.2 <= x <= 0.4) on SrRuO(3)/SrTiO(3) substrates were grown by pulsed laser deposition and studied using high resolution synchrotron X-ray diffraction and transmission electron microscopy. The dielectric behavior and ferroelectric phase transition temperatures of the films were consistent with bulk PZT. However, weak 1/2{311}(pc) reflections in x-ray diffraction profiles were recorded above bulk T(Tilt) (as indicated in the Jaffe, Cooke, and Jaffe phase diagram, where pc denotes pseudocubic indices). Moreover, anomalies in the dielectric and ferroelectric response were detected above TTilt which are explained by coupling of short coherence or weakly tilted regions to the ferroelectric polarization.

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