

In Situ Laser Annealing during Growth of $\text{Pb}(\text{Zr}_{0.52}\text{Ti}_{0.48})\text{O}_3$ Thin Films

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Abstract: A pulsed laser deposition system with in situ laser annealing was utilized to grow $\text{Pb}(\text{Zr}_{0.52}\text{Ti}_{0.48})\text{O}_3$ thin films on a laser crystallized $\text{Pb}(\text{Zr}_{0.20}\text{Ti}_{0.80})\text{O}_3$ seed layer, at a temperature of similar to 370 degrees C. Polycrystalline 1.1 μm thick films exhibited columnar grains with small grain sizes (similar to 30 nm). The films showed well-saturated hysteresis loops (with similar to 25 $\mu\text{C}/\text{cm}^2$ remanent polarization, similar to 50 kV/cm coercive field) and exhibited loss tangents <2.5% with a permittivity of similar to 730. Film orientation could be controlled via the substrate choice; {111} $\text{Pb}(\text{Zr}_{0.52}\text{Ti}_{0.48})\text{O}_3$ films were grown on oriented (111) $\text{Pb}(\text{Zr}_{0.30}\text{Ti}_{0.70})\text{O}_3$ sol-gel seed layers, while {001} films were prepared on (100) SrTiO_3 single crystals. (C) 2013 AIP Publishing LLC.