

Effect of Lead Content on the Performance of Niobium-doped {100} Textured Lead Zirconate Titanate Films

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Niobium-doped, {100} textured, gradient-free, lead zirconate titanate (PZT) films were fabricated from solutions with different lead contents. Film lead content was controlled through changes in the average solution lead excess from 14.7% to 17 at.%. The low field dielectric response as well as the polarization-electric field hysteresis loops were not a strong function of lead content. However, films with lower lead contents in the precursor tended to withstand higher poling fields than films prepared from more lead-rich precursors. Although no residual PbO was observed at the grain boundaries, films prepared from more lead-rich solutions had higher levels of grain-boundary porosity, lower breakdown strengths, and lower threshold electric fields at which cracking was observed.