

Supplementary Material

On the Evolution of Stress and Microstructure in Radio Frequency-Sputtered Lead-Free (Ba,Ca)(Zr,Ti)O₃ Thin Films

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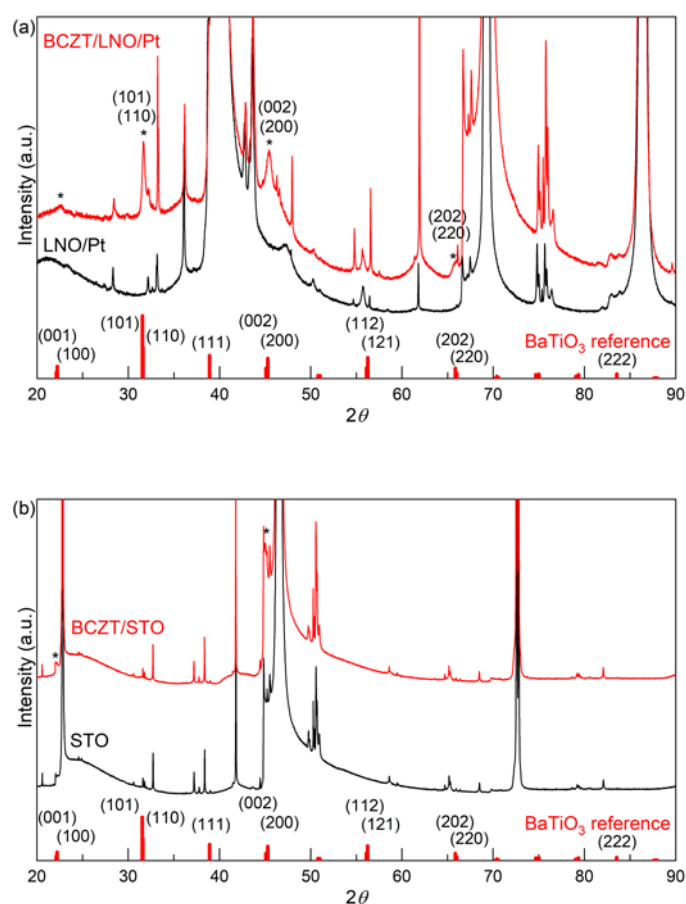


Figure S1. X-ray diffractograms of (a) LNO/Pt substrate and BCZT thin film deposited at 700 °C onto LNO/Pt, and (b) STO substrate and BCZT thin film deposited at 700 °C onto STO. Asterisks indicate BCZT reflections. The sticks at the bottom refer to tetragonal BaTiO₃ (COD 2100858). The extra lines in the X-ray diffractograms of the pure substrates originate from the Cu X-ray source and from W contamination of the Cu source as the available diffractometer was not equipped with a monochromator.

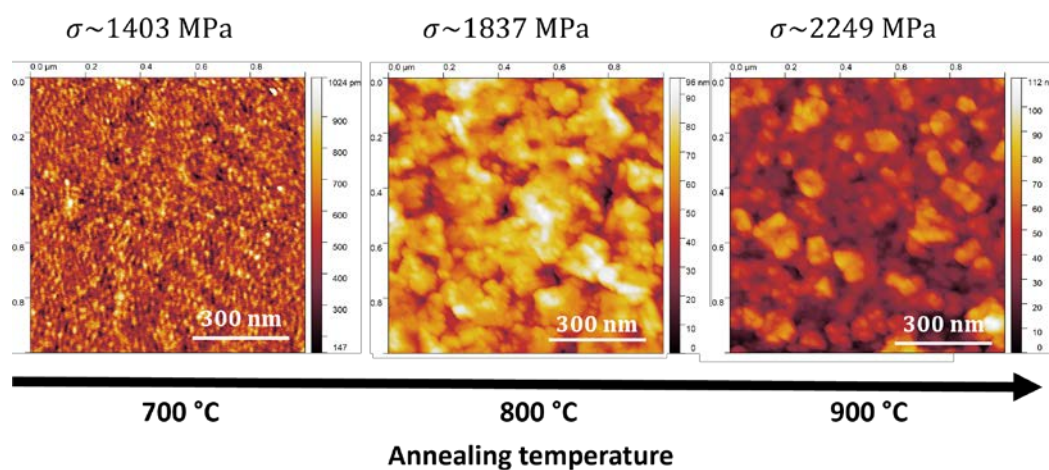


Figure S2. AFM images and measured stress of films deposited at room temperature and subsequently post-annealed.

Table S1. Radius of curvature before and after deposition, and calculated average in-plane stress, for BCZT films deposited at 700 °C at deposition pressure 8×10^{-3} mbar.

Material	r_0 [m]	r [m]	Average stress [MPa]
Si	914 ± 300	86 ± 7	1383 ± 92
Pt/Si	148 ± 29	36 ± 2	1553 ± 97
LNO/Pt	77 ± 17	33 ± 2	1564 ± 68
STO	3.4 ± 0.3	4.0 ± 0.4	-2215 ± 331