

Supplementary material

Influence of Thermal Treatment on the Cross-Sectional Properties of Aerosol-Deposited $\text{Pb}(\text{Mg}_{1/3}\text{Nb}_{2/3})\text{O}_3\text{-PbTiO}_3$ Thick Films

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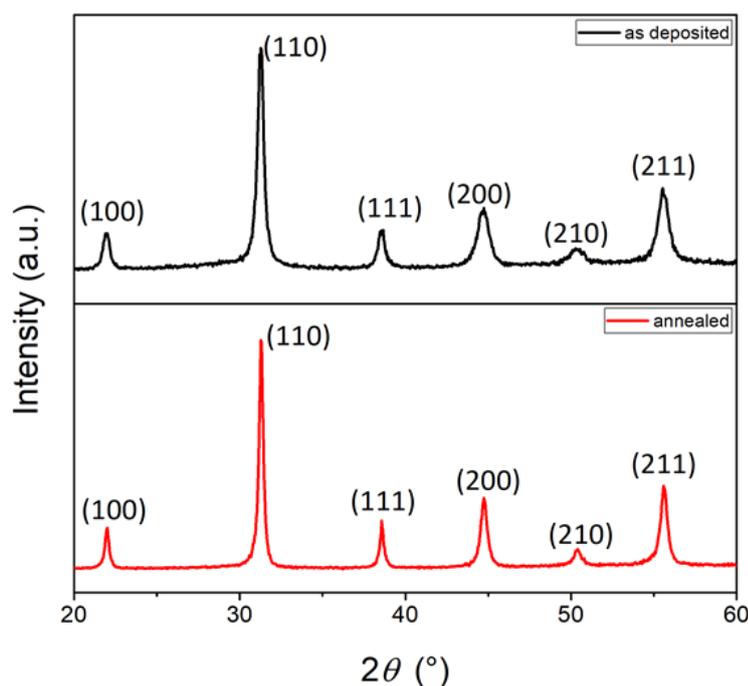


Figure S1: X-ray diffraction patterns of the as deposited and the annealed film. All peaks were indexed with a cubic perovskite structure (space group $Pm\bar{3}m$, JCPDS 81-0861).

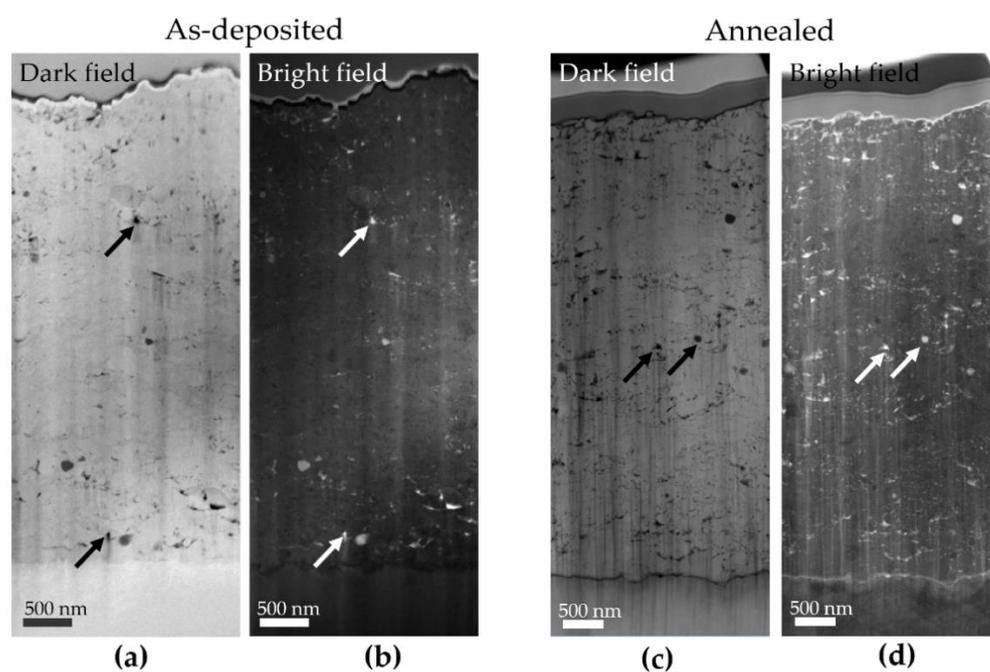


Figure S2. Scanning transmission electron microscopy (STEM) (a) dark-field and (b) bright-field images of the as-deposited film; (c) the dark-field and (d) bright-field images of the annealed film. Note that the black and white arrows point to pores locations, which are black in dark field and white in bright field. The vertical lines observed on the STEM images are a consequence of the focused ion beam curtain effect.

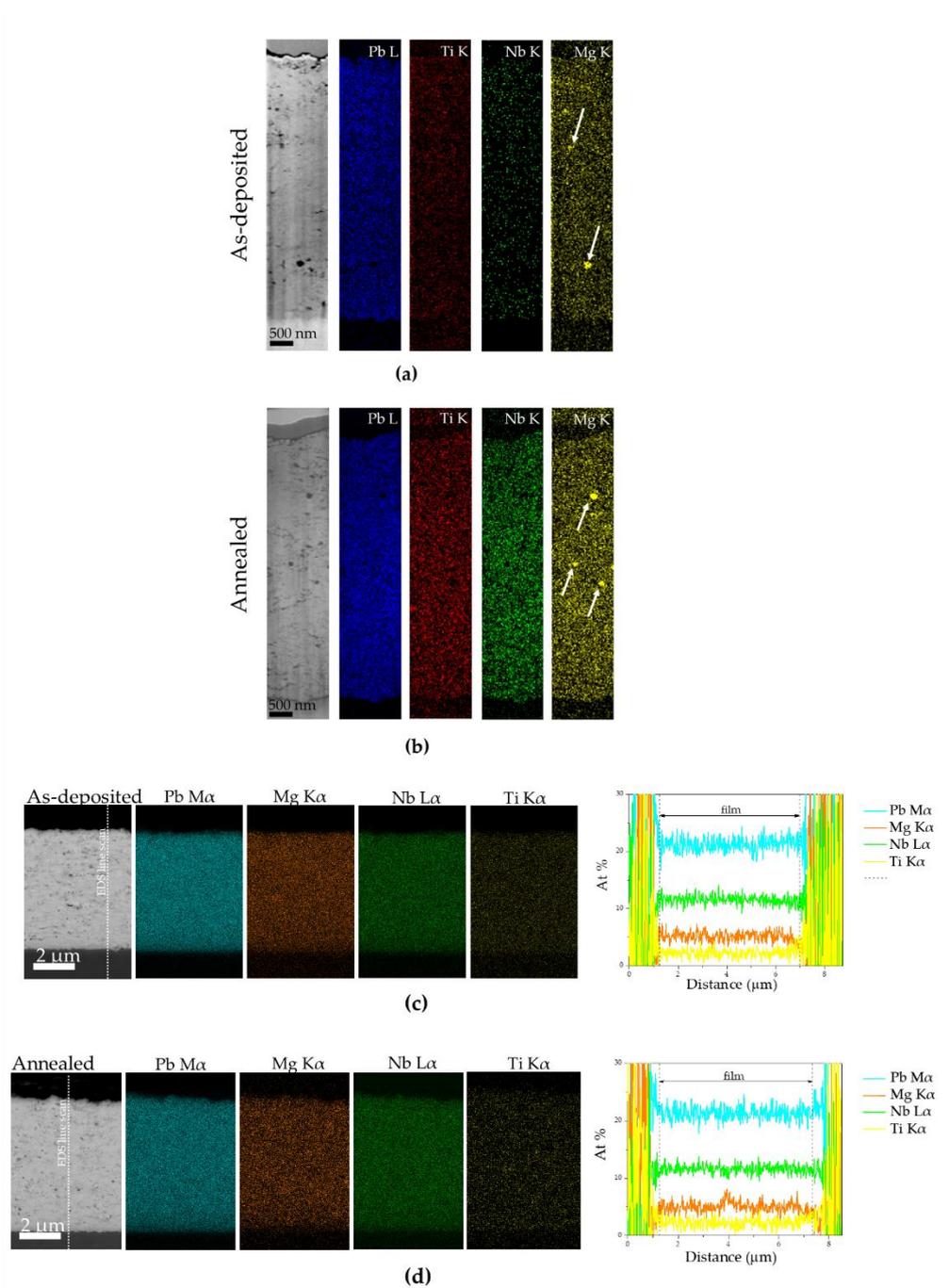


Figure S3. Compositional analysis of the as deposited and the annealed film, respectively, performed using (a,b) EDS-STEM and (c,d) EDS-SEM with the corresponding EDS line analysis. The white arrows in (a,b) indicate the Mg-rich inclusions.

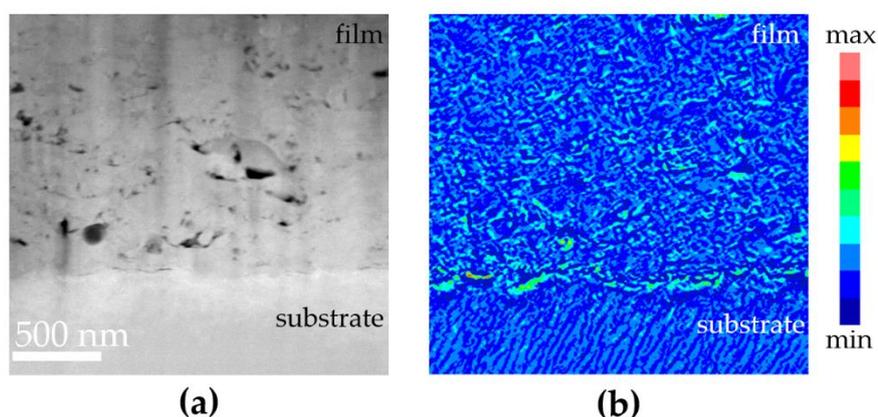


Figure S4. (a) STEM dark-field image of the film-substrate interface in the as-deposited film; (b) the corresponding divergence map obtained from the 4D STEM dataset using differential phase contrast. Areas with higher contrast in the divergence map represent higher local strain.

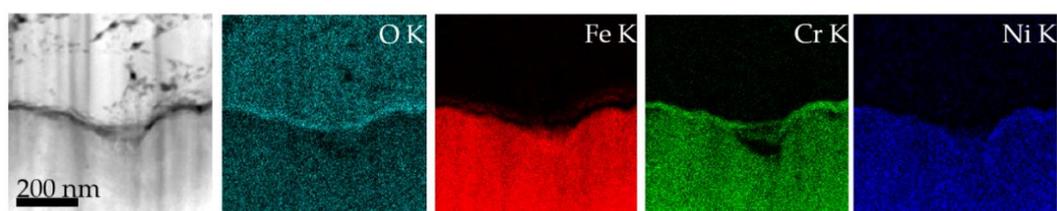


Figure S5. EDS of the film-substrate interface of the annealed PMN-10PT thick film resolving a layered structure formed due to oxidation of the substrate at 500 °C. The layer structure is composed (from substrate to film) of an Fe- and Ni-rich layer, a Cr_xO_y layer and an Fe_mO_n layer.

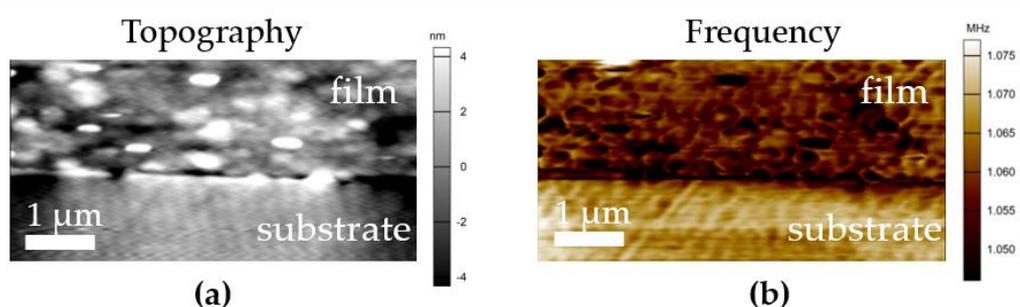


Figure S6. (a) Topography and (b) frequency mapping at the film-substrate interface of the as-deposited film measured in the contact resonance frequency viscoelastic mapping mode. This is an atomic force microscopy technique in which the frequency measured is the resonant frequency of the tip-material system and is related to the Young's modulus of the material. The higher the frequency, the higher the Young's modulus and vice versa. In **b**, a higher frequency is measured in the substrate than in the film, which means that the substrate has a higher Young's modulus than to the film.