

Supplementary Information

Coexistence of ferroelectric and ferrielectric phases in ultrathin antiferroelectric PbZrO₃ thin films

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This PDF includes:

Figure S1 – Figure S5

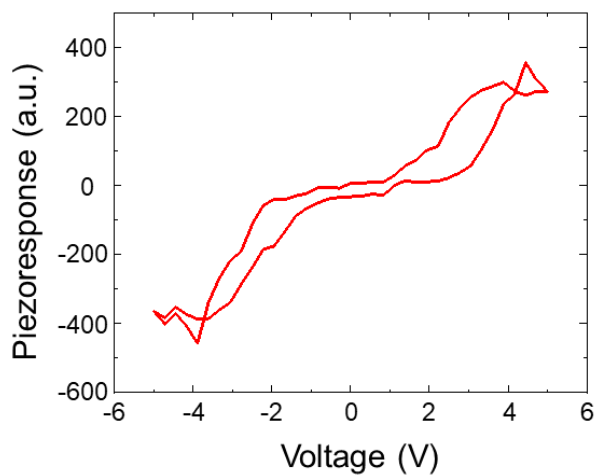


Figure S1. Piezoresponse signal (amplitude multiplied by phase) as a function of tip voltage for PZO thin films of 80 nm. The values for Amplitude and Phase were sourced from Figure 2 in the main text.

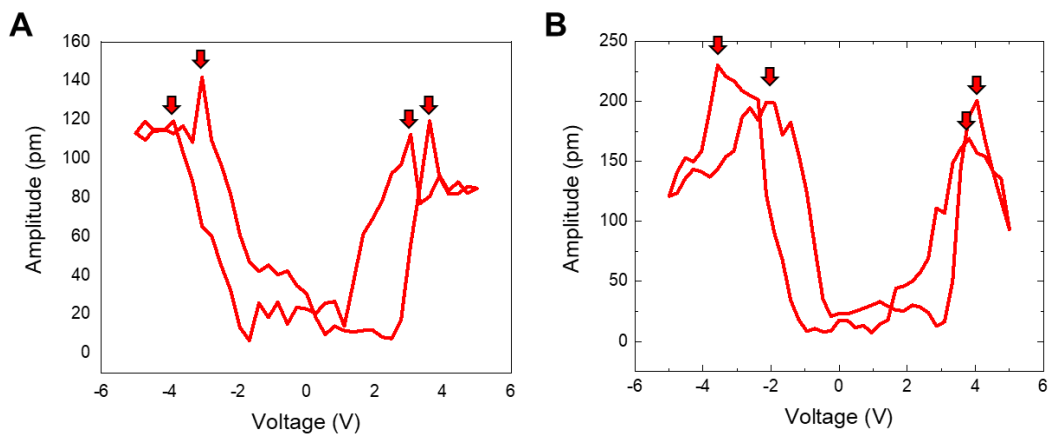


Figure S2. PFM amplitude curves acquired from the 80 nm PZO region showing the antiferroelectric characteristics.

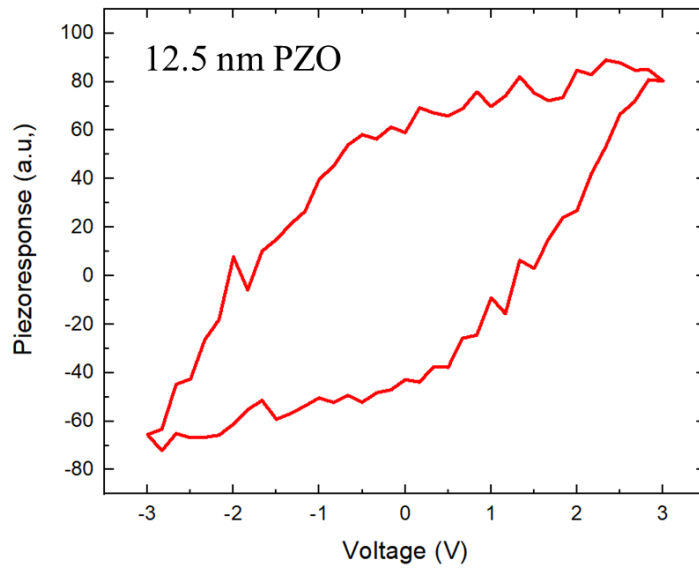


Figure S3. Piezoresponse signal versus voltage for PZO thin films of 12.5 nm thickness, computed as $\text{Amplitude} \times \cos(\text{Phase})$. The values for Amplitude and Phase were sourced from Figure 2 in the main text.

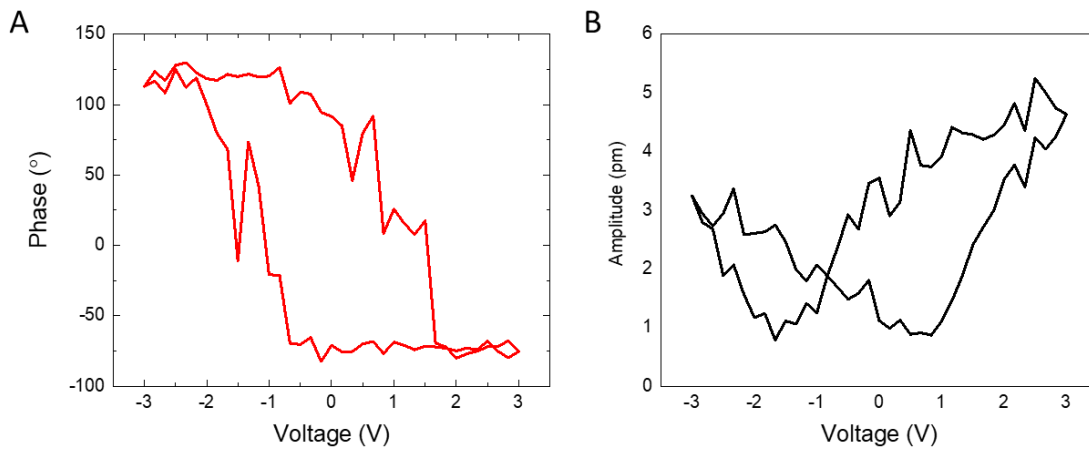


Figure S4. PFM phase (A) and amplitude (B) curves from the 5 nm PZO region showing ferroelectric characteristics.

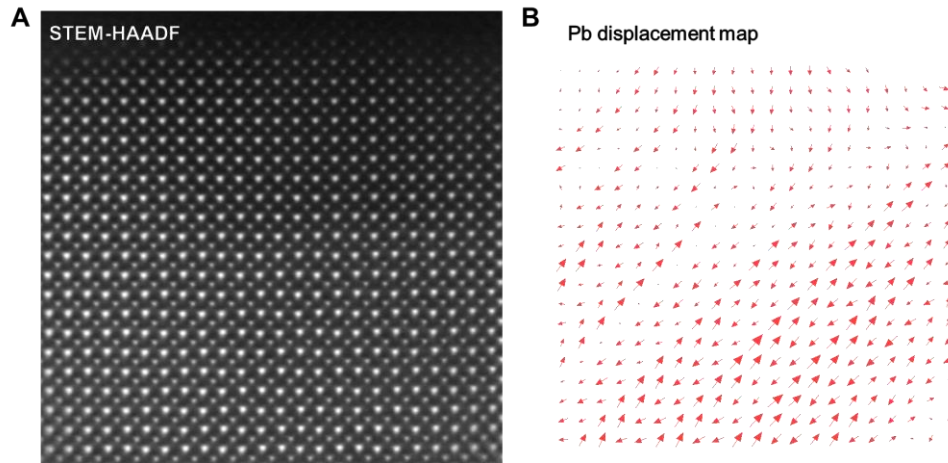


Figure S5. (A) A STEM-HAADF image showing the atomic structure of the PZO single crystal surface. (B) Pb displacement map extracted from (A).