

**Electronic Supplementary Information for**  
**The slush-like polar structure for the high energy storage performance in**  
 **$\text{Sr}_{0.7}\text{Bi}_{0.2}\text{TiO}_3$  lead-free relaxor ferroelectric thin film**

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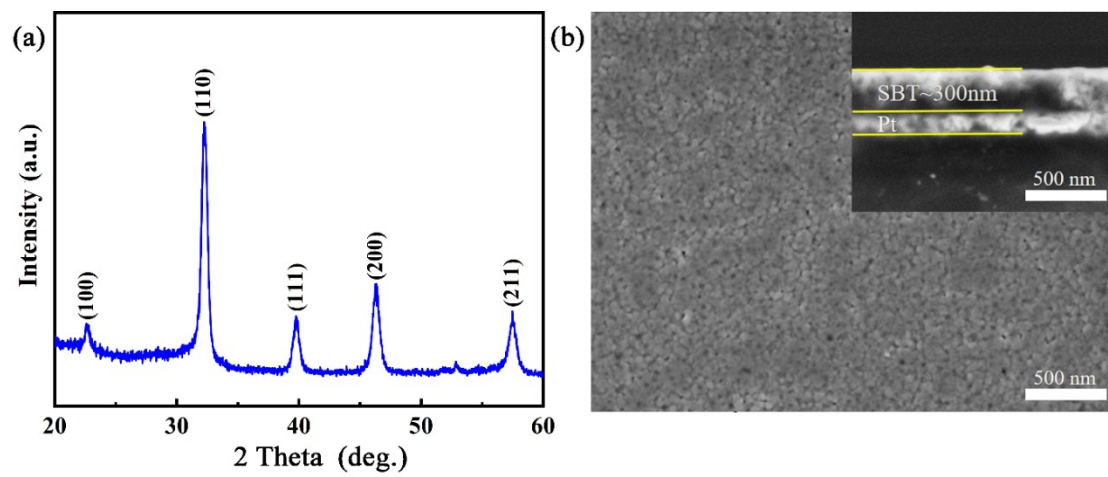
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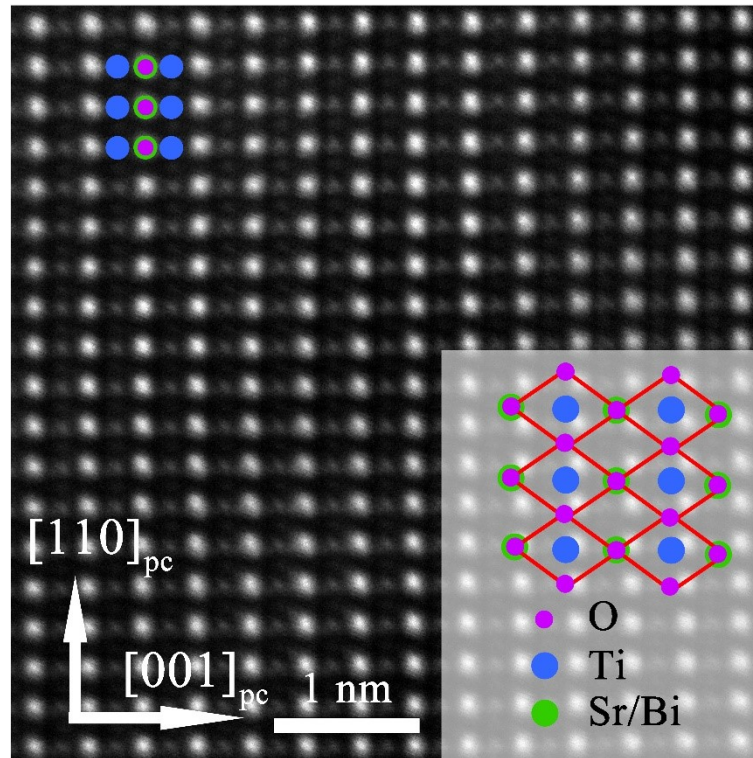
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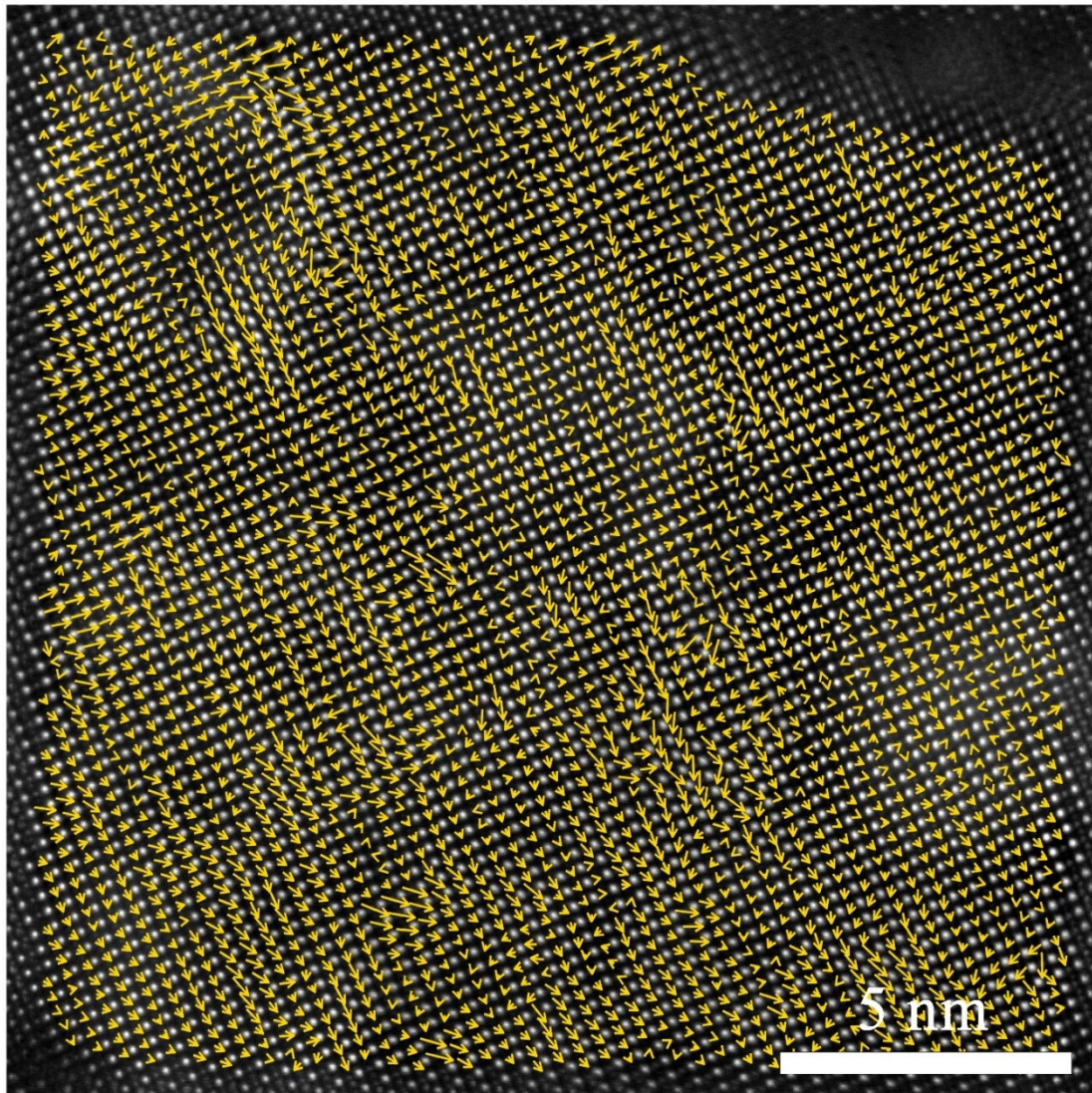
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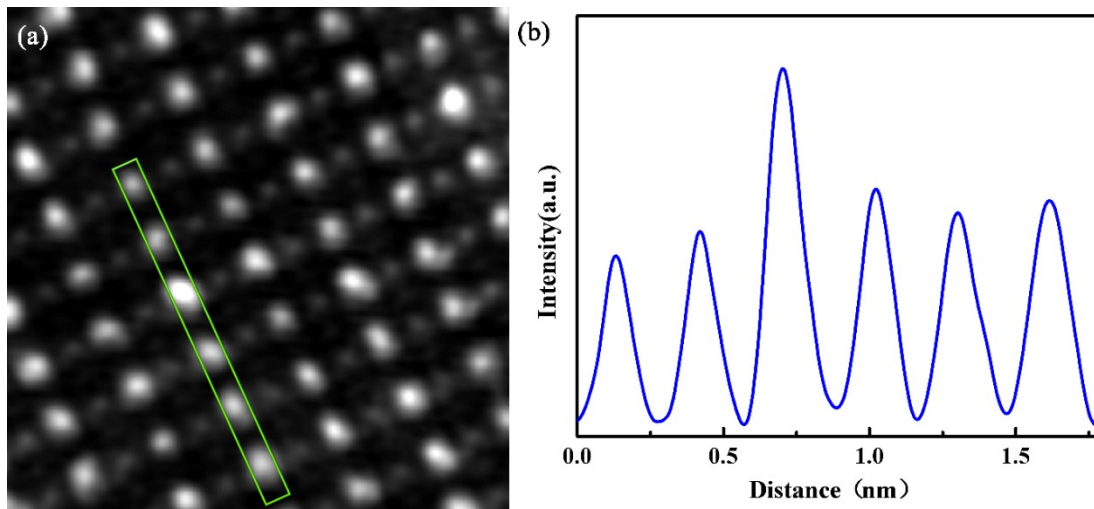
**Figure S1.** a) Grazing incidence X-ray diffraction (GIXRD) pattern of the SBT thin film. b) Surface morphology and cross-section microstructure of the SBT thin film. GIXRD result shows a perovskite structure of the SBT thin film without obvious impurities. Surface and cross-section morphologies exhibit that the SBT thin film has dense microstructures with thickness at around 300 nm.



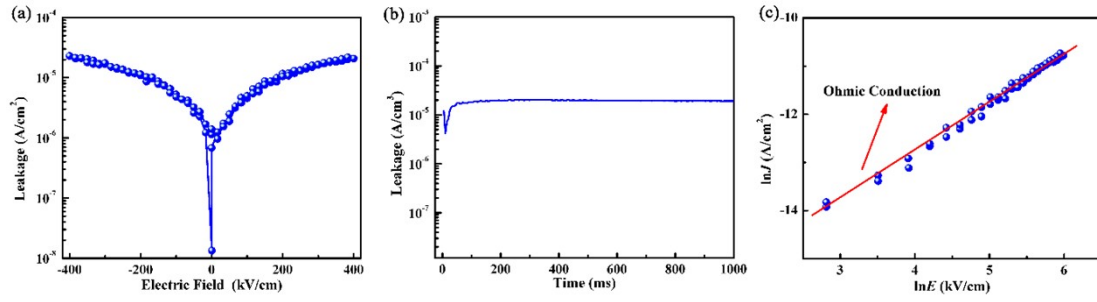
**Figure S2.** The HAADF image inside a single grain viewed along the [10] zone axis. The pale spots correspond to the B-site Ti columns, the brighter spots to the A-site Sr/Bi columns. The inset shows the projected atomic columns along the [10] zone axis.



**Figure S3.** The HAADF image of the area marked with a white square in Figure 1b. The superimposed arrows in the B-site atoms represent displacement of the Ti atoms with respects to the ideal mass center of the two A-site neighbor atoms. The position center of the A and B-site atoms are determined by 2D Gaussian fitting. The length and orientation of the arrows show the magnitude and direction of the B-site displacement from the corresponding experimental A-site mass center.



**Figure S4.** a) HAADF Z-contrast image. b) Integrated line profiles of the A-site Sr/Bi atom columns marked with green rectangle in (a).



**Figure S5.** a) Leakage current of the SBT thin film as a function of the electric field. b) Leakage current of SBT at 400 kv cm<sup>-1</sup>. c) ln $J$  is plotted as a function of ln $E$ . The red straight line is plotted according to the Ohmic conduction mechanism, which dominates the leakage current. The Ohmic conduction mechanism can be described by  $J = nq\mu E$ , where  $J$ ,  $n$ ,  $q$ ,  $\mu$  and  $E$  are the leakage current, densities of the carriers, electron charge, carrier mobility and electron field, respectively.