

## Electronic Supplementary Information (ESI)

### **A Ferroelectric Tunnel Junction Based on Piezoelectric Effect for Non-Volatile Nanoferroelectric Devices**

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#### **Experimental Section**

The  $\text{Bi}_{3.15}\text{Nd}_{0.85}\text{Ti}_3\text{O}_{12}$  (BNT) target was synthesized by a standard solid-state reaction using high purity  $\text{Bi}_2\text{O}_3$ ,  $\text{Nd}_2\text{O}_5$ , and  $\text{TiO}_2$ . The BNT thin films were fabricated on Pt-coated silicon substrates using PLD at a substrate temperature of 700 °C in 200 mTorr of oxygen. The laser ablation was carried out at a laser fluence of 2.5 J/cm<sup>2</sup> with a repetition rate of 10 Hz using a KrF excimer laser with a wavelength of 248 nm.

The film thicknesses were measured on a Filmetrics model F20-UV and F50-UV. The domain structures, local phase hysteresis loops and amplitude butterfly loops of the BNT films were studied with a Veeco MultiMode-V AFM for the nanoscale polarization detection by PFM (using Pt-coated cantilever at an ac voltage of 1 V with an excitation frequency of 120 kHz), The current-voltage characteristics were measured in the CAFM mode (using Au-coated cantilever) with a scanning rate of 1 Hz.