

## Supplementary Information

### **Giant energy-storage density and high efficiency achieved in (Bi<sub>0.5</sub>Na<sub>0.5</sub>)TiO<sub>3</sub>-Bi(Ni<sub>0.5</sub>Zr<sub>0.5</sub>)O<sub>3</sub> thick films with polar nanoregions**

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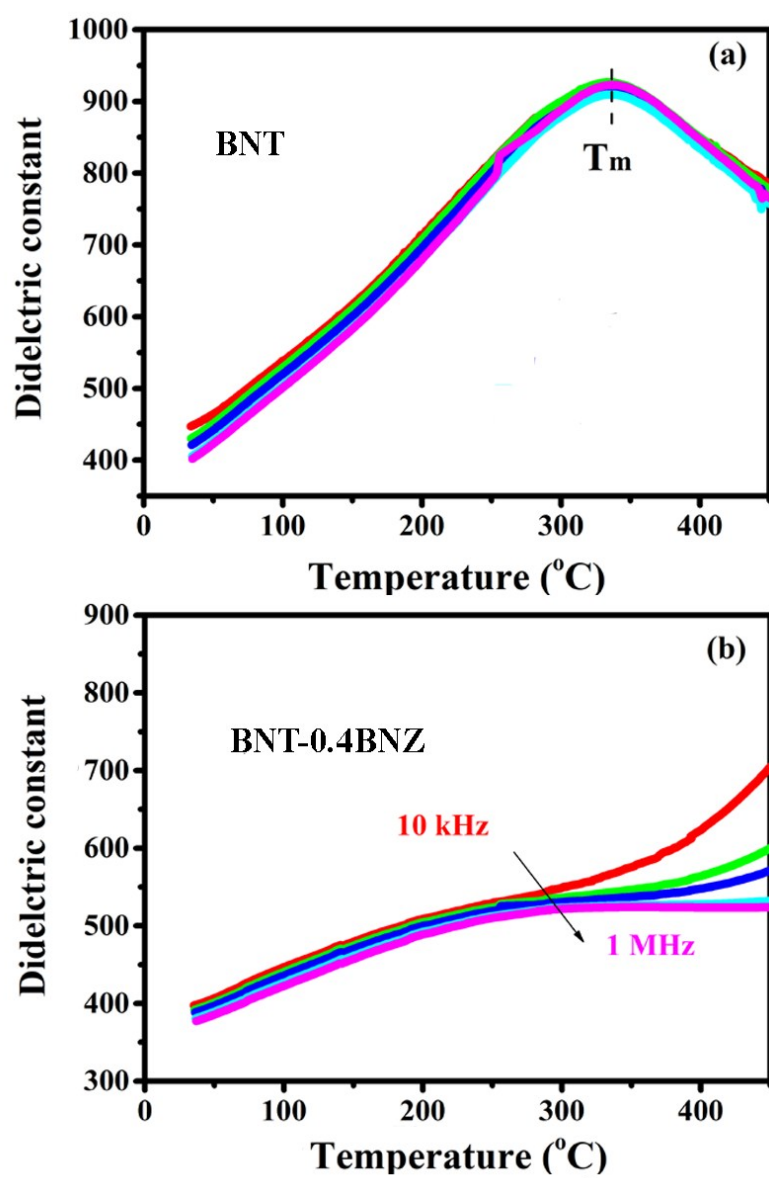


Fig. S1. Temperature dependence of the dielectric constant of the BNT (a) and BNT-0.4BNZ (b) thick films measured from 10 k to 1M Hz.

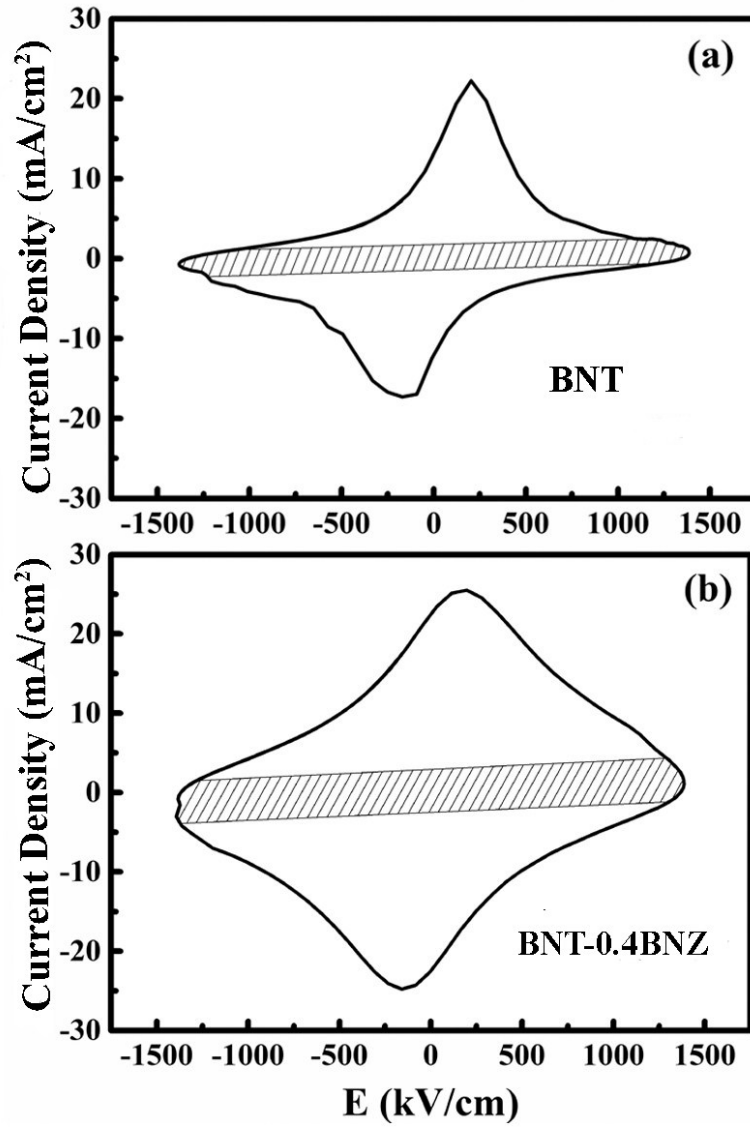


Fig. S2.  $I$ - $V$  curves of the BNT(a) and BNT-0.4BNZ(b) films at a constant cycling rate of 2800 V/s, depicting the contributions to the total dielectric displacement by electric conductivity  $D1$ , dielectric capacitance  $D2$ , and ferroelectric domain switching polarization  $P$ . The shade area represents the total contribution of  $D1$  and  $D2$ , and the remaining area is the contribution of  $P$ .