Table S1 Energy storage parameters of BF-, BF-BT-, BNT- and NN-based ceramic systems.

Ceramics	W_{rec} (J/cm^3)	η (%)	E_b (kV/cm)	ρ (J/kV·cm^2)	reference
$Bi_{0.83}Sm_{0.17}Fe_{0.95}Sc_{0.05}O_3$	2.21	76	230	9.6 × 10^{-3}	[41]
$0.67Bi_{0.9}Sm_{0.1}FeO_3$-$0.33BaTiO_3$	2.8	55.8	200	14.0 × 10^{-3}	[41]
$0.56BiFeO_3$-$0.3BaTiO_3$-$0.14AgNbO_3$	2.11	84	195	10.8 × 10^{-3}	[15]
$0.75BiFeO_3$-$0.25Ba(Zn_{1/2}Ta_{2/3})O_3$	2.56	75	160	16.0 × 10^{-3}	[41]
$0.75BiNdFeO_3$-$0.12SrBaTiO_3$	1.74	74	150	16.6 × 10^{-3}	[41]
$0.62BiFeO_3$–$0.3BaTiO_3$ –$0.08Nd(Zn_{0.5}Zr_{0.5})O_3$	2.45	72	240	10.2 × 10^{-3}	[45]
$0.61BiFeO_3$-$0.33(Ba_{0.8}Sr_{0.2})TiO_3$-$0.06La(Mg_{2/3}Nb_{1/3})O_3$	3.38	59	230	14.6 × 10^{-3}	[42]
$0.65BiFeO_3$-$0.3BaTiO_3$-$0.05Bi(Zn_{2/3}Nb_{1/3})O_3$	2.1	55.7	180	11.6 × 10^{-3}	[42]
$0.56BiFeO_3$-$0.3BaTiO_3$-$0.14Ba(Zn_{1/3}Nb_{2/3})O_3$	1.61	~65	180	8.9 × 10^{-3}	[42]
$0.61BiFeO_3$-$0.33BaTiO_3$-$0.06Ba(Mg_{1/3}Nb_{2/3})O_3$	1.56	75	125	12.4 × 10^{-3}	[42]
$0.7(0.67BiFeO_3$-$0.33BaTiO_3)$-$0.3(Sr_{0.7}Bi_{0.2})TiO_3$	2.4	90.4	180	13.3 × 10^{-3}	[42]
$0.75(Bi_{0.85}Nd_{0.15})FeO_3$-$0.25BaTiO_3$	1.8	41.3	170	10.5 × 10^{-3}	[42]
$0.52Bi_{0.98}La_{0.02}FeO_3$-$0.48BaTiO_3$	1.22	58	140	8.71 × 10^{-3}	[42]
$0.65Bi_{0.5}Na_{0.5}TiO_3$-$0.35BaTiO_3$-$SrZr_{0.5}Ti_{0.5}O_3$	4.32	93.5	302	14.3 × 10^{-3}	[43]
$0.8BNT$-$0.2SrNb_{0.5}Al_{0.5}O_3$	6.5	89	480	13.5 × 10^{-3}	[44]
$0.16BNT$-$0.8NaNbO_3$-$0.04CaZrO_3$	3.7	82.1	400	9.2 × 10^{-3}	[44]
$(Na_{0.73}Bi_{0.08}Sm_{0.01})(Nb_{0.91}Ta_{0.09})O_3$	1.66	83.6	214	7.7 × 10^{-3}	[45]
$0.85(0.92NaNbO_3$-$0.08Bi(Mg_{0.5}Ti_{0.5})O_3)$-$0.15SrTiO_3$	6	81	300	20.0 × 10^{-3}	[46]
$0.2NaNbO_3$-$0.8Sm(Mg_{0.5}Zr_{0.5})O_3$	4.3	85.6	560	7.6 × 10^{-3}	[47]
$0.85(0.7BiFeO_3$-$0.3BaTiO_3)$-$0.15NaNbO_3$	8.2	70	325	25.2 × 10^{-3}	[14]
$Bi_{0.595}Ba_{0.255}Na_{0.15}Fe_{0.595}Ti_{0.255}Ta_{0.15}O_3$	8.7	65	350 (1Hz)	24.9 × 10^{-3}	This work
$Bi_{0.595}Ba_{0.255}Na_{0.15}Fe_{0.595}Ti_{0.255}Ta_{0.15}O_3$	9.6	77	350 (10 Hz)	27.4 × 10^{-3}	This work
$Bi_{0.56}Ba_{0.24}Na_{0.2}Fe_{0.56}Ti_{0.24}Ta_{0.2}O_3$	8.7	66	550 (1 Hz)	15.8 × 10^{-3}	This work
$Bi_{0.56}Ba_{0.24}Na_{0.2}Fe_{0.56}Ti_{0.24}Ta_{0.2}O_3$	10.3	68	550 (10 Hz)	18.7 × 10^{-3}	This work

Table S2 □Recoverable energy storage intensity (ρ). The calculated ρ values were obtained using the relation $\rho = W_{rec} / \Delta E$, based on Fig. 5(b,c,e,f).

x - NT	W_{rec} (J/cm^3)	ΔE (kV/cm)	ρ (J/kV·cm^2)	Measuring frequency
0	2	175	11.4×10^{-3}	1 Hz
0.05	5.5	275	20.0×10^{-3}	1 Hz
0.10	7.4	350	21.1×10^{-3}	1 Hz
□0.15	8.7	350	24.9×10^{-3}	1 Hz
0.15	9.6	350	27.4×10^{-3}	10 Hz
0.20	8.7	550	15.8×10^{-3}	1 Hz
0.20	10.3	550	18.7×10^{-3}	10 Hz
0.30	4.6	425	10.8×10^{-3}	1 Hz

$$(1-x)(0.7BiFeO_3-0.3BaTiO_3)-xNaTaO_3$$

$$S_{config}=-R\left[\sum_{(A-site\ cations)} x_i ln(x_i)+\sum_{(B-site\ cations)} x_j ln(x_j)+\sum_{(anions)} x_k ln(x_k)\right]$$

$$at\ x=0$$

$$(Bi_{1.0}Fe_{1.0})_{0.7}(Ba_{1.0}Ti_{1.0})_{0.3}O_3$$

$$S_{config}=-R[2*0.7\ln(0.7)+2*0.3\ln(0.3)+1.0\ln(1.0)]$$

$$S_{config}=-R[2*0.7(-0.356)+2*0.3(-1.203)+0]$$

$$S_{config}=R[0.498+0.721]=1.21R$$

$$at\ x=0.30$$

$$(Bi_{0.70}Fe_{0.70})_{0.7}(Ba_{0.70}Ti_{0.70})_{0.3}Na_{0.30}Ta_{0.30}O_3$$

$$S_{config}=-R[2*0.49\ln(0.49)+2*0.21\ln(0.21)+2*0.30\ln(0.30)+1.0\ln(1.0)]$$

$$S_{config}=-R[2*0.49(-0.713)+2*0.21(-1.560)+2*0.30(1.203)+0]$$

$$S_{config}=R[0.698+0.655+0.721]=2.07R$$

Figure S1 The calculation process of configuration entropy.

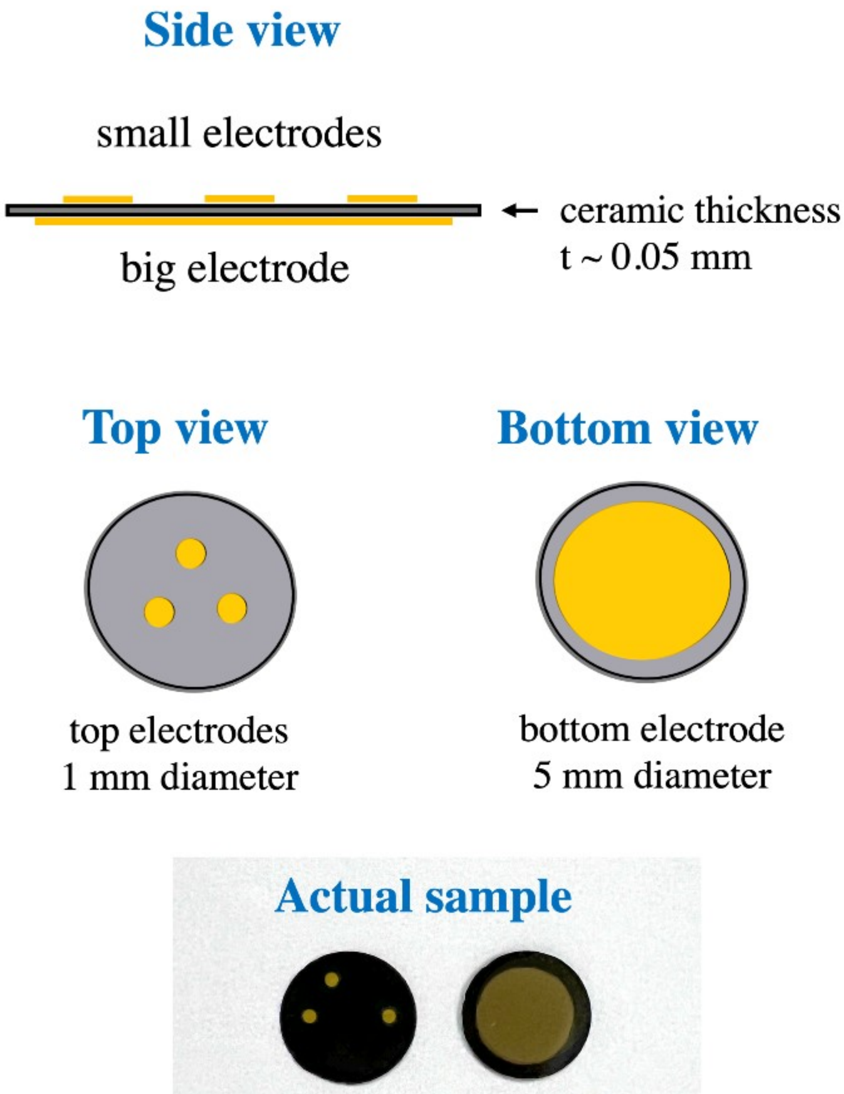


Figure S2 Electrode's configuration for the P-E loop experiment.

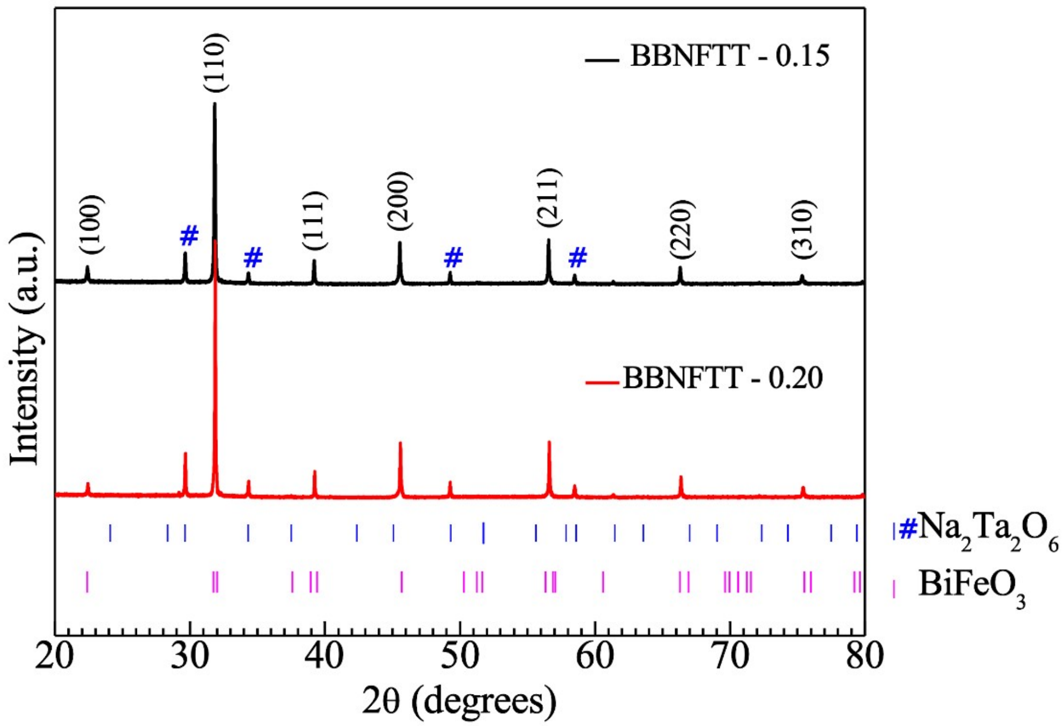


Figure S3 Identification of the cubic *Fd*-3*m* $Na_2Ta_2O_6$ phase in the $NaTaO_3$-contained specimens.

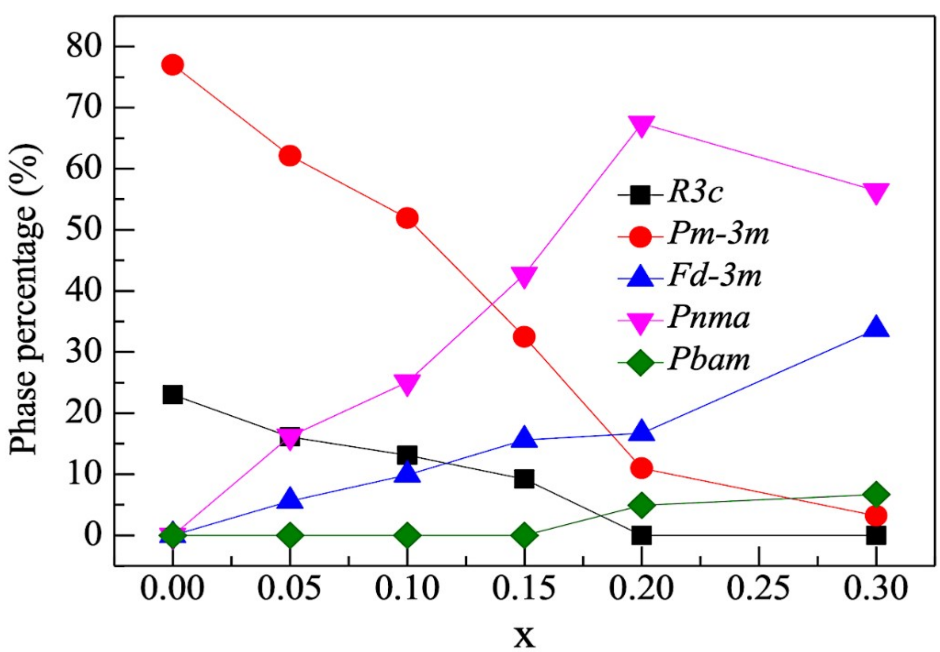


Figure S4 Variations of different phase percentages (wt.%) of BBNFTT-*x* ceramics.

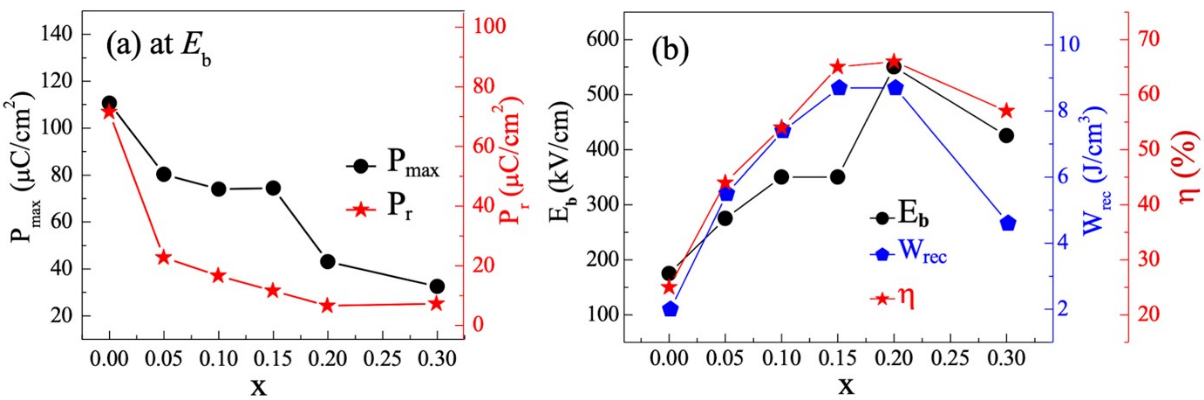


Figure S5 (a) P_{max} and P_r measured at E_b and (b) E_b, W_{rec}, and η vs. x of BBNFTT-x ceramics.

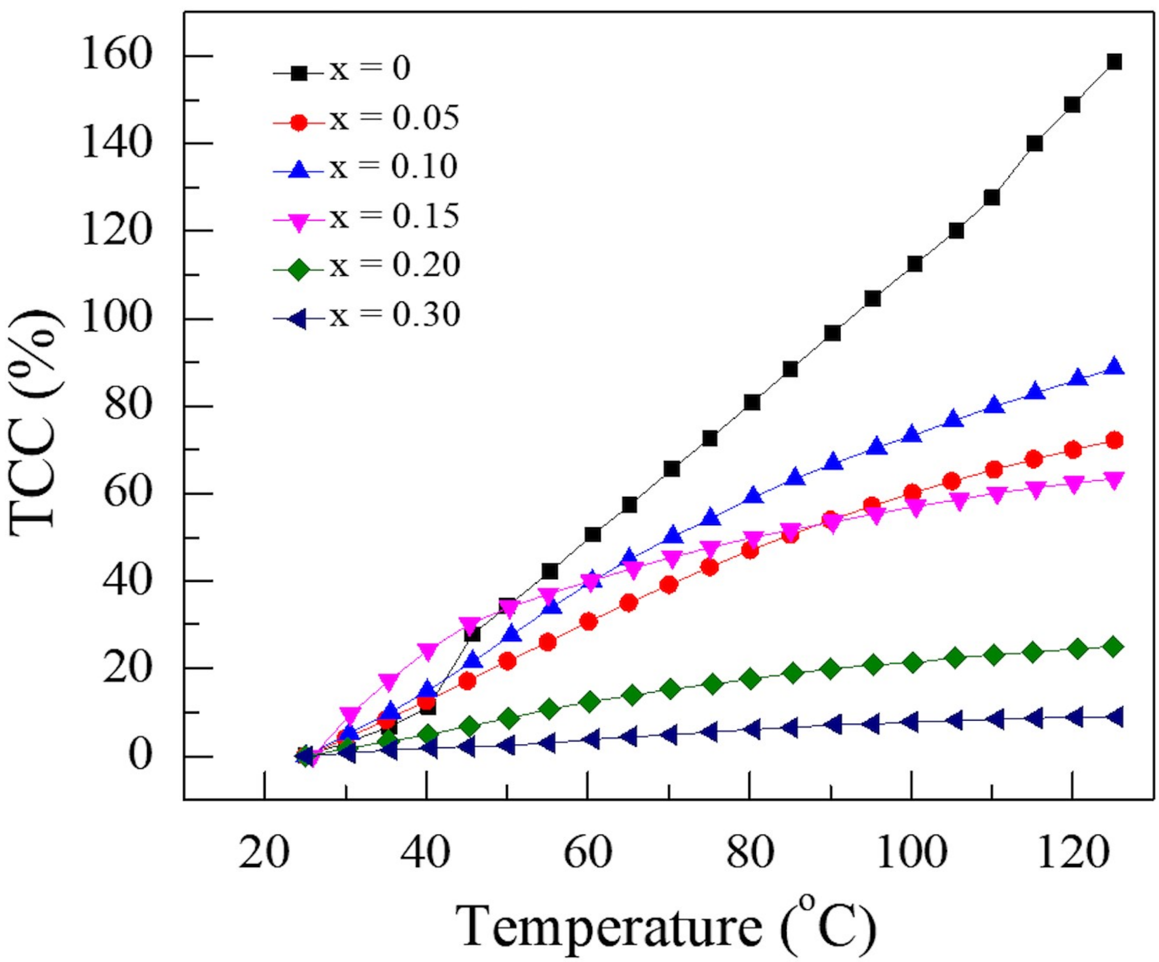
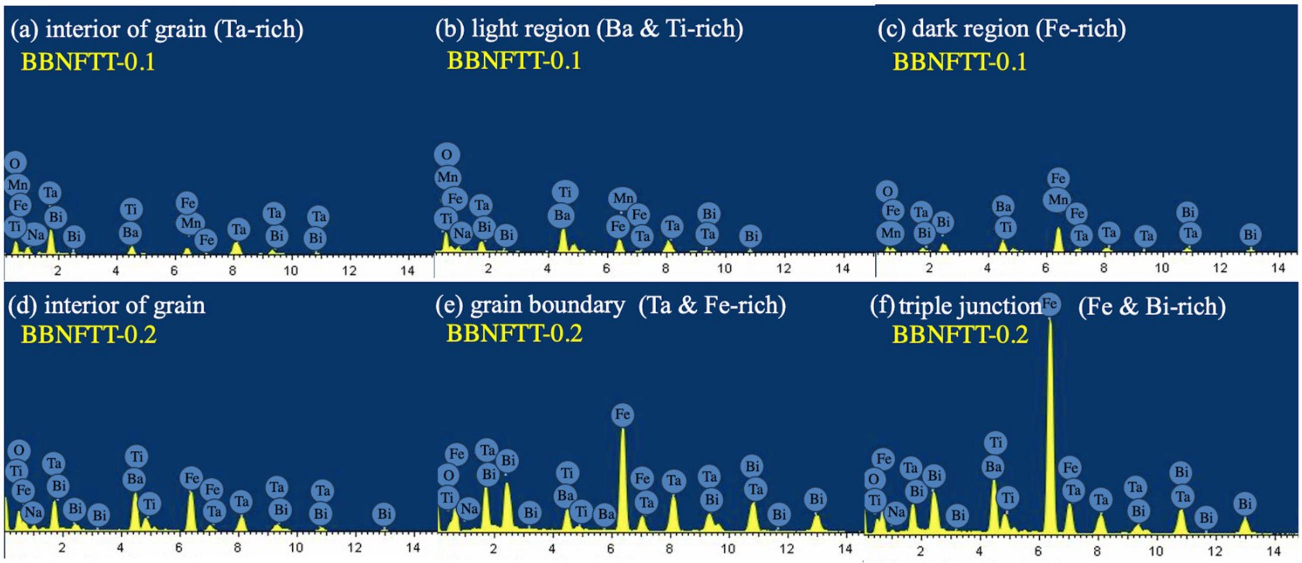


Figure S6 Temperature coefficients of capacitance (TCC) for BBNFTT-x from x = 0 to x = 0.30 for measuring frequency of 1 kHz.



Element	(a)	(b)	(c)	(d)	(e)	(f)	Unit
O	58.16	57.37	20.18	34.29	10.84	11.70	
Na	0.68	0.31	0.10	3.74	0.38	0.95	
Ti	9.47	11.14	7.10	10.62	5.87	5.46	atomic %
Fe	10.01	10.35	56.78	23.79	44.72	56.84	
Ba	3.21	14.80	10.63	14.33	3.27	9.50	
Ta	17.32	4.81	3.80	10.03	17. 64	5.41	
Bi	1.15	1.22	1.42	3.20	17.28	10.14	

Figure S7 EDX spectra of (a-c) BBNFTT-0.1 and (d-f) BBNFTT-0.2.