Supporting Information for

Optimization of indirect method for electrocaloric effect in BT-based ceramics validated through the Rayleigh relationship and direct method

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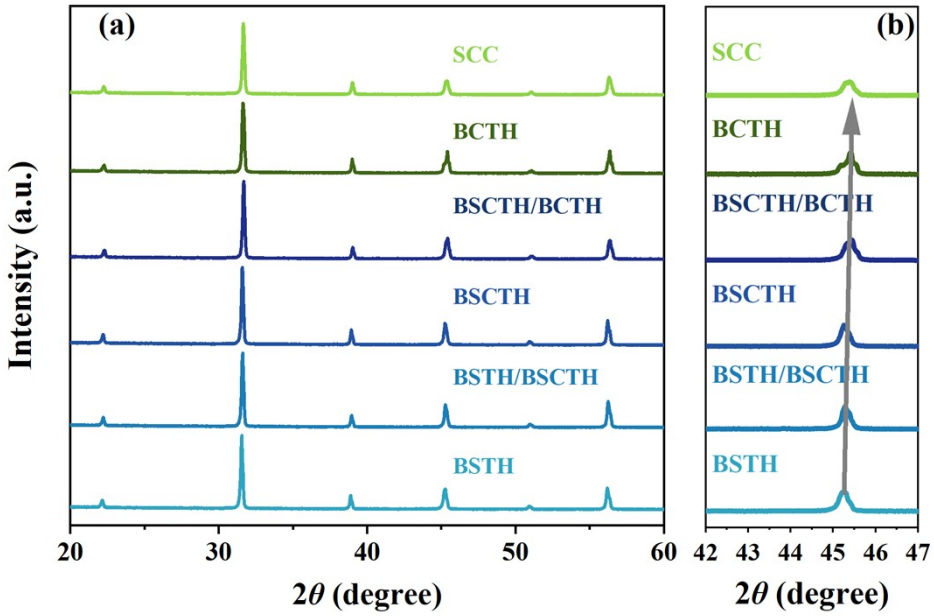

Fig. S1 (a) The room temperature XRD patterns corresponding to BSTH, BSCTH, BCTH, SCC, and interfaces. (b) The room temperature XRD patterns correspond to enlarged patterns with $2\theta = 42 - 47$ ° for BSTH, BSCTH, BCTH, SCC, and interfaces**.**

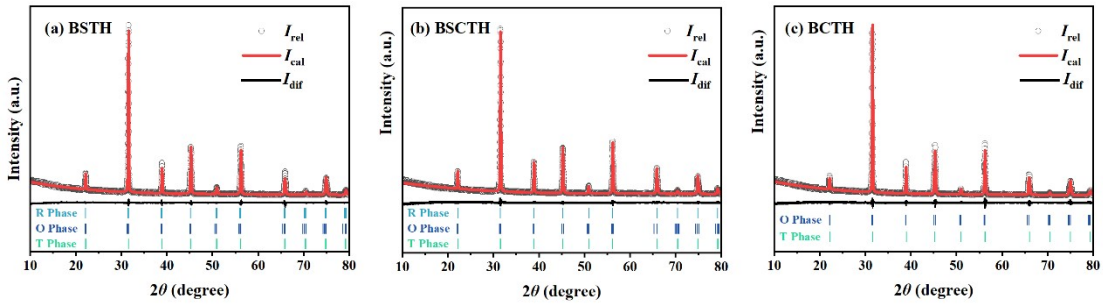

Fig. S2 The room temperature Rietveld fitted XRD patterns corresponding amplified views for (a) BSTH, (b)BSCTH and (c)BCTH.

Table S1: Lattice parameters and refined structure parameters of BSTH, BSCTH and BCTH ceramics.

Sample	Space group	a (Å)	b (Å)	c (Å)	Alpha(°)	Sig	Rwp (%)
BSTH	R3m(39.9%)	4.0100	4.0100	4.0100	89.8079	1.65	7.645
	Amm2(40.1)	4.0036	5.6640	5.7130	90		
	P4mm(20.0%)	4.0053	4.0053	4.0111	90		
BSCTH	R3m(49.8%)	4.0083	4.0083	4.0083	89.9944	1.78	8.056
	Amm2(39.7%)	3.9912	5.6622	5.7127	90		
	P4mm(10.5%)	4.0052	4.0052	4.0100	90		
BCTH	Amm2(83.5%)	4.0014	4.0014	4.0020	90	1.788	8.359
	P4mm(16.5%)	3.9997	5.6733	5.6903	90		

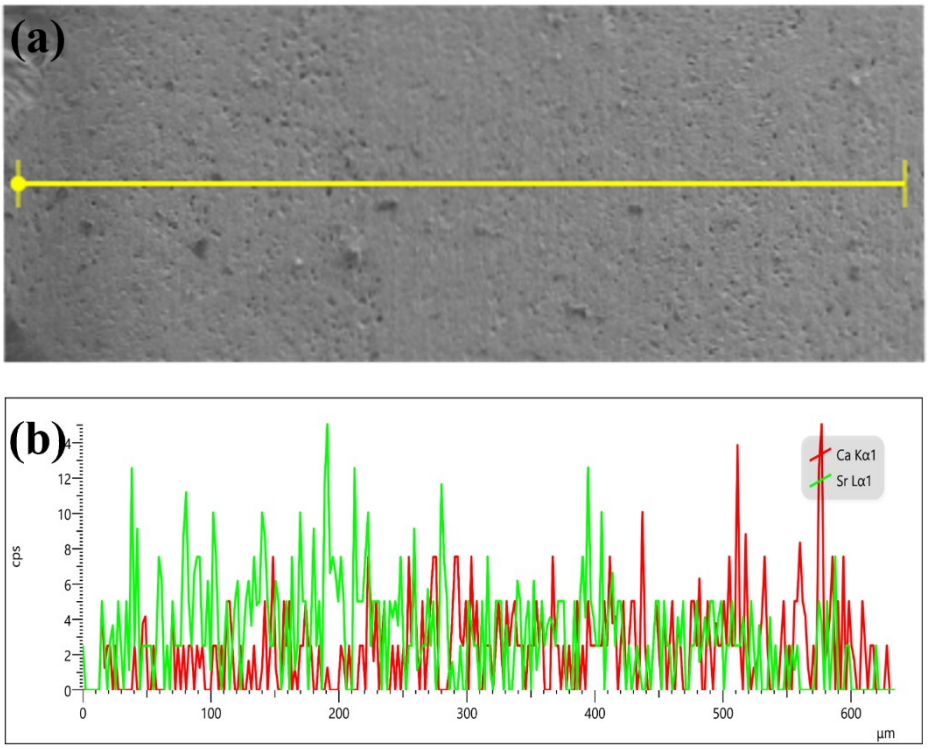

Fig. S3 (a) FE-SEM profiles and (b) corresponding EDS line scan for SCC sample.

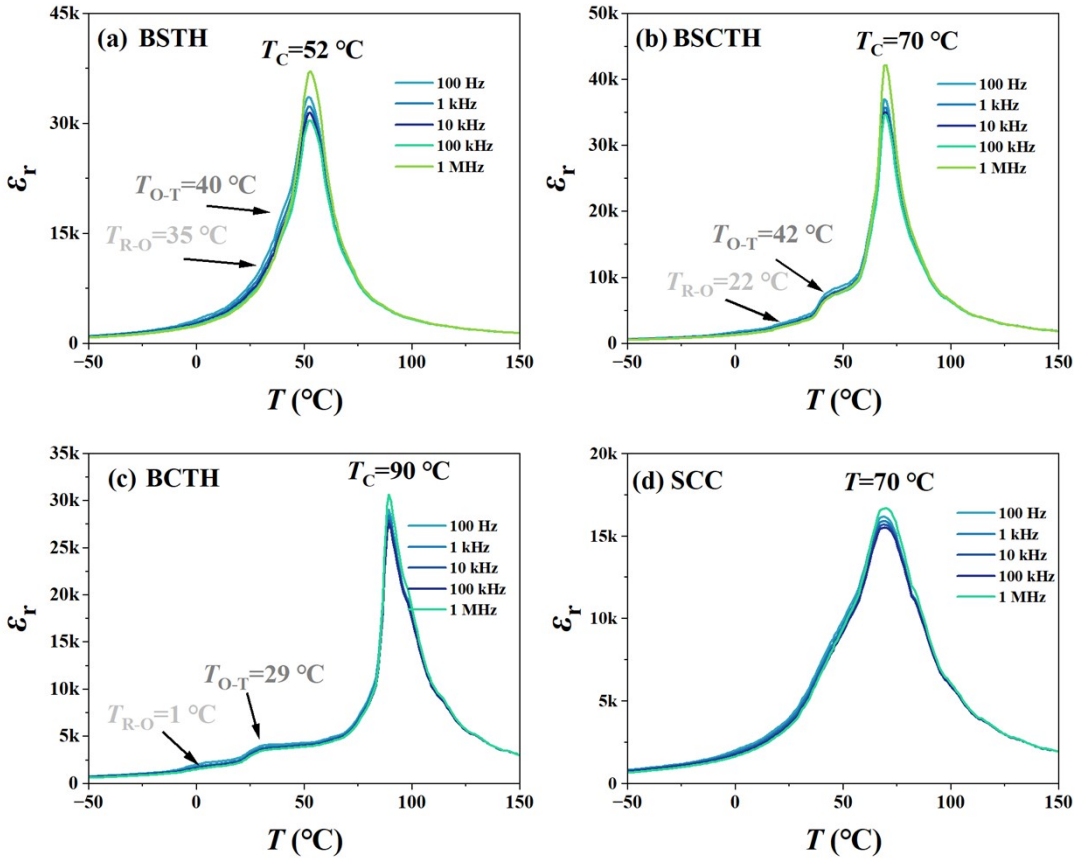

Fig. S4 Temperature dependence of ε_r at different frequency of (a) BSTH, (b) BSCTH, (c) BCTH, and (d) SCC.

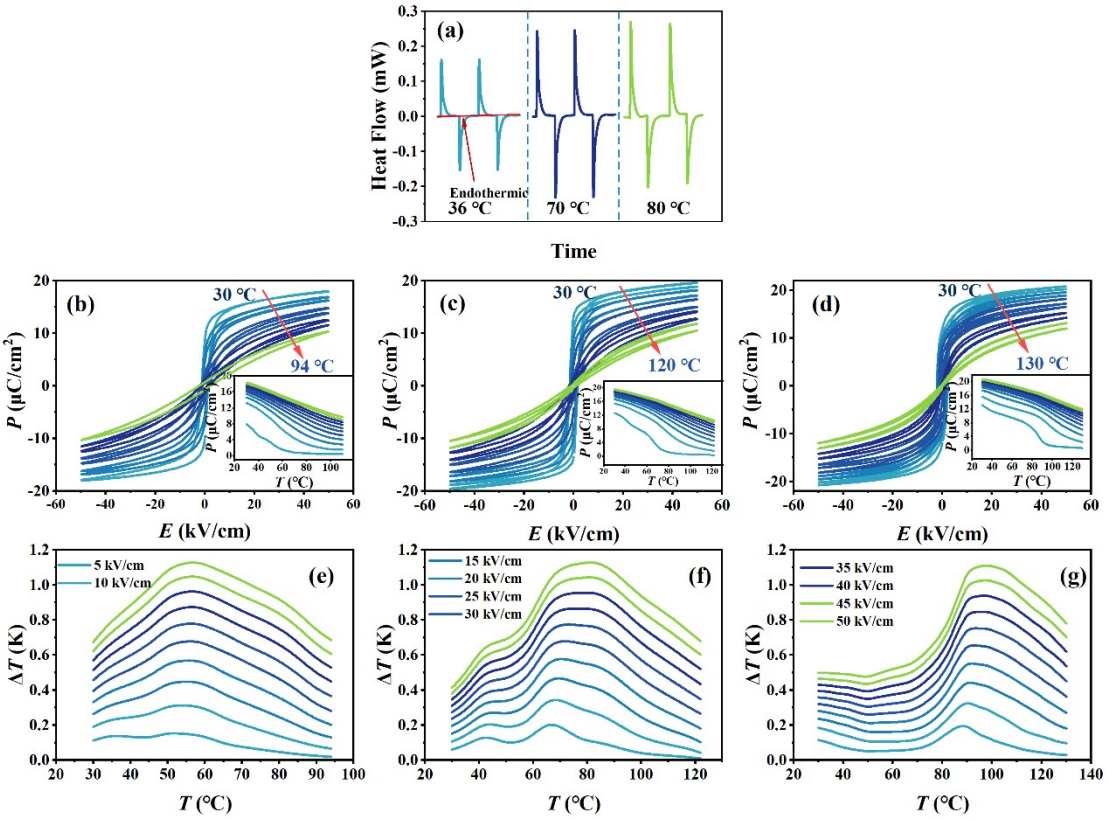

Fig. S5 (a) DSC heat flow results at various temperatures under E = 20 kV/cm for SCC. Temperature dependence of P-E loops for (b) BSTH, (c) BSCTH, and (d) BCTH. The insetes in (b)-(d) are the temperature dependence of polarization (P). Temperature dependence of ΔT for (e) BSTH, (f) BSCTH, and (g) BCTH.

Table S2: Comparison of EC properties of SCC samples and thin film materials.

Material	T(K)	E (kV/cm)	ΔT (K)	Ref.
$Pb_{0.99}Nb_{0.02}(Zr_{0.85}Sn_{0.13}Ti_{0.02})O_3$	323	139	5.5	1
$Pb_{0.97}La_{0.02}(Zr_{0.75}Sn_{0.16}Ti_{0.09})O_3$	305	80	3.8	1
$PbZrO_3$	508	400	11.4	2
$PbZr_{0.95}Ti_{0.05}O_3$	499	480	12	3
0.93PMN–0.07PT	298	723	13.4	4
0.9PMN–0.1PT	348	895	5	5
0.68PMN–0.32PT	419	600	9	6
SCC	353.15	50	1.198	This work

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