

Electronic Supplementary Information

***In-situ* (K_{0.5}Na_{0.5})NbO₃ doped barium titanate foam framework and its cyanate ester resin composites with temperature-stable dielectric properties and low dielectric loss**

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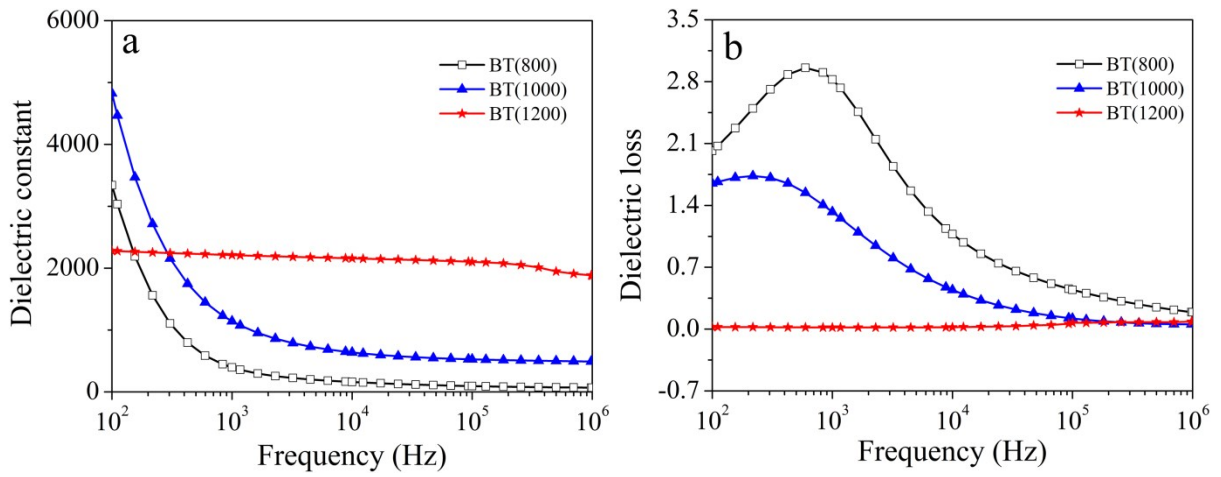


Fig. S1 Frequency dependence of dielectric constant (a) and loss (b) at room temperature for BT at different sintered temperatures.

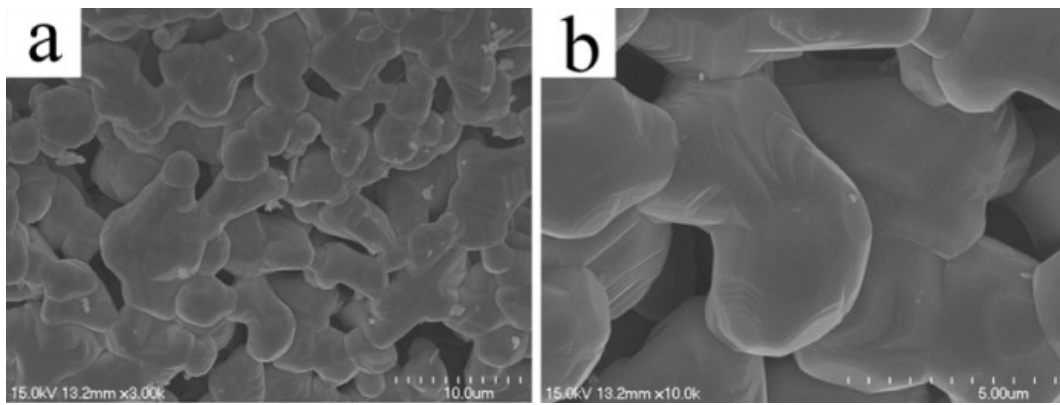


Fig. S2 SEM images of 0dBTF5 prepared from BaCO₃ and TiO₂.

Table S1 Frequency coefficients of ceramic/polymer composites in literature ^{a)}

Filler ^{b)}	Filler loading (vol%)	Polymer matrix ^{c)}	$\alpha_f(k)$ (%)	Ref.
3D-BT	30	EP	~40.4	[S1]
BSCT	33	PVDF	~12.4	[S2]
BST	30	ABS	~7.3	[S3]
BST	30	P(VDF-CTFE)	~24.5	[S4]
BST	30	P(VDF-TrFE)	~20.0	[S5]
BT	30	CR-S	~11.1	[S6]
BT	30	ENR-50	~29.4	[S7]
BT	30	EVM	~11.7	[S8]
BT	30	PVDF	~21.6	[S9]
BT	30	PVDF	~23.5	[S10]
BTF	30.8	CE	~13.7	[S11]
BTF	31.8	CE	14.4	[S12]
BTF	31.8	cPES/CE	3.8	[S12]
BT-OPA	30	P(VDF-HFP)	~14.5	[S13]
BT@TiO ₂	30	P(VDF-HFP)	~18.7	[S14]
c-BT	30	PVDF	~16.7	[S15]
CCTO	30	CE	~22.5	[S16]
CCTO	30	EP	~12.0	[S17]
CCTO	30	PI	~27.8	[S18]
CCTO	30	PVDF	~18.2	[S19]
CCTO	30	PVDF	~18.1	[S20]
CCTO	30	PVDF	~26.9	[S21]
CCTO	30	SR	~1.3	[S22]
CCTO-sg	30	PVDF	~13.0	[S23]
CCTO-ss	30	PVDF	~16.1	[S23]
C _{fg} -CCTO	30	P(VDF-HFP)	~17.1	[S24]
FTN	30	PVDF	~63.0	[S25]
h-BT	30	PVDF	~14.3	[S15]
PLZST	30	P(VDF-CTFE)	~16.7	[S26]
PZT	30	PVDF	~13.0	[S10]
SiC	36	P(VDF-CTFE-DB)	~19.6	[S27]
TDPA-BT	30	PVDF	~38.0	[S28]

a) The data of high- k composites are arranged, while some of them not reported directly in the references are derived from the corresponding curves, the symbol “~” is used to indicate that the datum is an approximate value.

- b) 3D-BT: Three-dimensional BaTiO₃. BCZT: Calcium barium zirconate titanate (Ba_{0.95}Ca_{0.05}Zr_{0.15}Ti_{0.85}O₃). BST: Ba_xSr_yTiO₃. BT: Barium titanate. BTF: BT foam. BT-OPA: BT coated with octylphosphonic acid. BT@TiO₂: TiO₂ shell layer encapsulates BaTiO₃ nanoparticles. c-BT: Crude BaTiO₃. CCTO: CaCu₃Ti₄O₁₂. CCTO-ss: CCTO were prepared by solid-state method. CCTO-sg: CCTO were prepared by sol-gel method. C_{fg}-CCTO: Fine-ground citrate CCTO. FTN: FeTiNbO₆. h-BT: Surface hydroxylated BT. PLZST: Lanthanum doped lead zirconate titanate stannate antiferroelectric ceramic (Pb_{0.97}La_{0.02})(Zr_{0.63}Sn_{0.3}Ti_{0.07})O₃. PZT: Lead zirconate titanate. SiC: Silicon carbide. TDPA-BT: Functionalize the surface of BT with 1-tetradecylphosphonic acid.
- c) EP: Epoxy. PVDF: Poly(vinylidene fluoride). ABS: Acrylonitrile-butadiene-styrene. P(VDF-CTFE): Poly(vinylidene fluoride-chlorotrifluoroethylene). P(VDF-TrFE): Poly(vinylidene fluoride-trifluoroethylene). CR-S: Cyanoethylated cellulose polymer. ENR-50: Epoxidized natural rubber with 50 mol% epoxide. EVM: Ethylene vinyl-acetate copolymer. CE: Cyanate ester. cPES: Phenolphthalein poly(ether sulfone). P(VDF-HFP): Poly(vinylidene fluoride-co-hexafluoropropylene). PI: Polyimide. SR: Silicone resin P(VDF-CTFE-DB): Poly(vinylidene fluoride-co-chlorotrifluoroethylene) with internal double bonds.

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