Electronic Supplementary Information

Lead-free $BaTiO_3$-$Bi(Zn_{2/3}Nb_{1/3})O_3$ weakly coupled relaxor ferroelectric materials for energy storage

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Table S1 Summary of values obtained for the electric parameters corresponding to the equivalent circuit model used in the fitting processes of the measured data at various temperatures for the BZN samples.

Sample	Parameter		Temperature [℃]				
			500	525	550	575	600
0.05BZN	R_g	[Ω]	1.24E+4	7.88E+3	5.28E+3	3.51E+3	2.51E+3
	CPE_g-T		2.02E-9	2.11E-9	2.39E-9	2.45E-9	3.29E-9
	CPE_g-P		0.939	0.935	0.925	0.928	0.895
	C_g	[F]	1.02E-9	9.84E-10	9.59E-10	9.94E-10	8.36E-10
	R_{gb}	[Ω]	6.02E+4	3.31E+4	2.07E+4	1.46E+4	8.33E+3
	CPE_{gb}-T		1.15E-08	1.26E-08	1.13E-08	1.20E-08	9.25E-09
	CPE_g-P		0.826	0.819	0.828	0.815	0.854
	C_{gb}	[F]	2.50E-9	2.27E-09	1.98E-09	1.68E-09	1.83E-09
0.10BZN	R_g	[Ω]	1.04E+4	5.95E+3	3.66E+3	2.35E+3	1.45E+3
	CPE_g-T		3.02E-10	3.22E-10	3.57E-10	3.20E-10	3.09E-10
	CPE_g-P		0.990	0.982	0.970	0.976	0.975
	C_g	[F]	2.66E-10	2.52E-10	2.37E-10	2.25E-10	2.12E-10
	R_{gb}	[Ω]	7.37E+4	3.22E+4	1.57E+4	7.99E+4	3.99E+4
	CPE_{gb}-T		4.99E-10	5.35E-10	5.45E-10	5.94E-10	6.11E-10
	CPE_g-P		0.985	0.980	0.977	0.976	0.974
	C_{gb}	[F]	4.29E-10	4.29E-10	4.16E-10	4.38E-10	4.32E-10
0.15BZN	R_g	[Ω]	1.62E+4	8.84E+3	5.12E+3	2.94E+3	1.66E+3
	CPE_g-T		3.24E-10	3.09E-10	2.73E-10	2.49E-10	2.30E-10
	CPE_g-P		0.990	0.990	0.990	0.991	0.991
	C_g	[F]	2.87E-10	2.72E-10	2.39E-10	2.17E-10	2.00E-10
	R_{gb}	[Ω]	3.74E+5	1.62E+5	7.36E+4	3.51E+4	1.74E+4
	CPE_{gb}-T		2.74E-08	2.57E-08	2.31E-08	2.52E-08	2.99E-08
	CPE_g-P		0.790	0.786	0.779	0.762	0.738
	C_{gb}	[F]	8.10E-9	5.75E-9	3.78E-9	2.80E-9	2.05E-9
0.20BZN	R_g	[Ω]	3.84E+4	1.99E+4	1.03E+4	5.45E+3	3.16E+3
	CPE_g-T		6.39E-10	6.12E-10	5.66E-10	5.10E-10	5.09E-10
	CPE_g-P		0.964	0.964	0.968	0.973	0.971
	C_g	[F]	4.29E-10	4.02E-10	3.82E-10	3.60E-10	3.41E-10
	R_{gb}	[Ω]	4.53E+5	1.86E+5	8.04E+4	3.66E+4	1.74E+4
	CPE_{gb}-T		6.61E-10	7.30E-10	7.80E-10	1.04E-09	8.84E-10
	CPE_g-P		0.880	0.866	0.856	0.843	0.861
	C_{gb}	[F]	2.19E-10	1.83E-10	1.53E-10	1.58E-10	1.47E-10

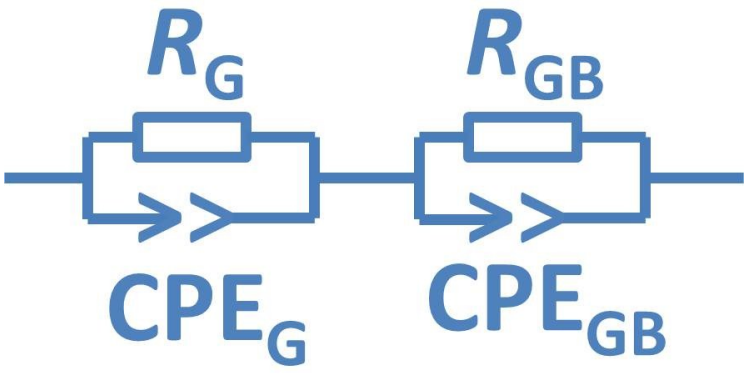

Figure S1. A sketch of the effective electrical equivalent circuit model for the grain (G) and grain boundary (GB) with a resistor (R) in parallel with a constant phase element (CPE).

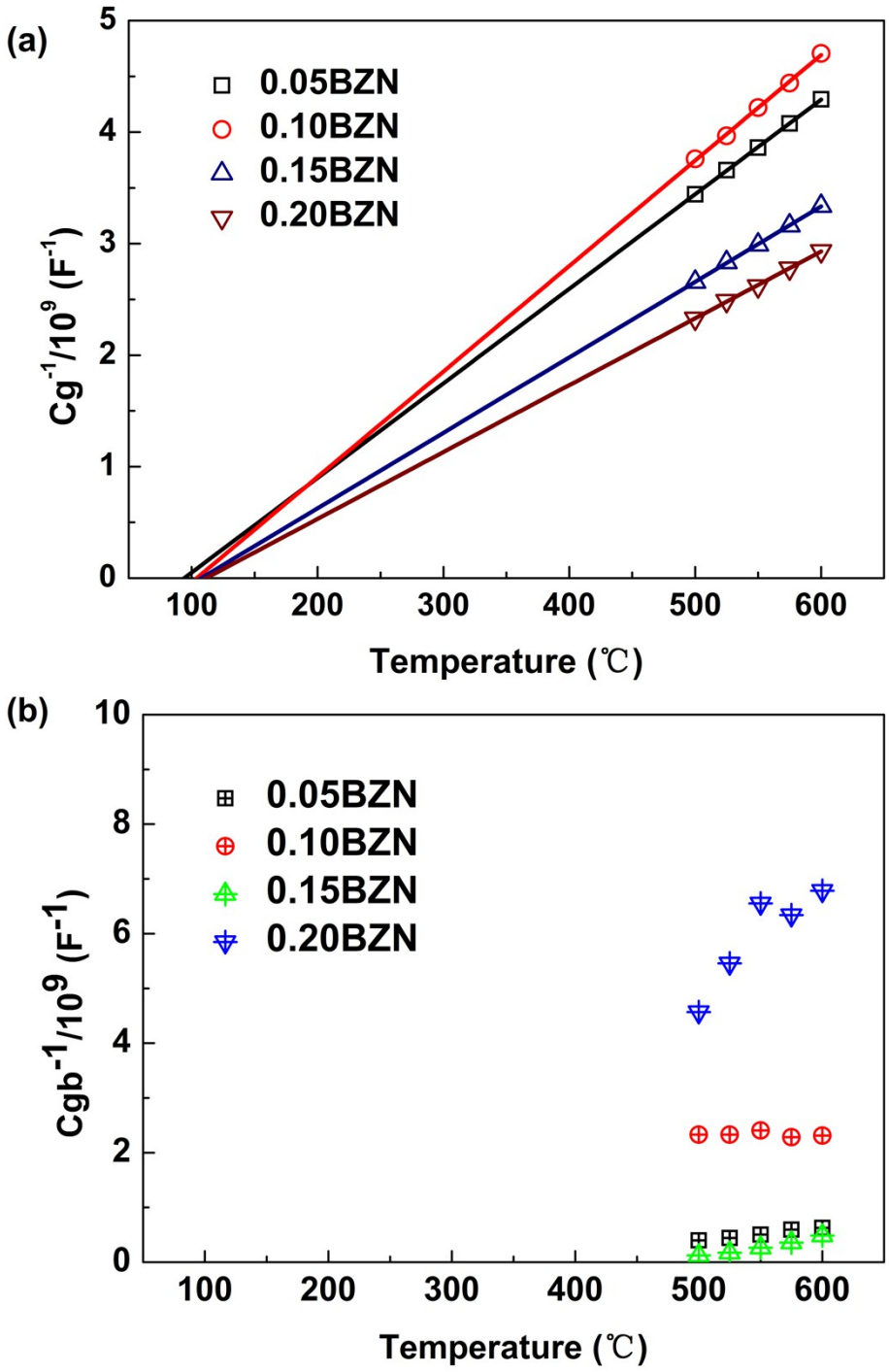

Figure S2. (a) Curie-Weiss fit for the values of the reciprocal of C_g obtained from the fitting of the equivalent circuit model. (b) Reciprocal of C_{gb} for different BZN samples.