Electronic Supplementary Information (ESI)

Phase Transition and Domain Configuration of Poled Rhombohedral PIN-PZ-PMN-PT Single Crystal

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The chemical composition presented in the main text was the average value of three areas, as schematically illustrated in **Fig. S1** below. Each area for surface sweep was 5×4 μm^2. The general distribution of elemetns in the three areas on the (001) surface is shown in **Table S1.**

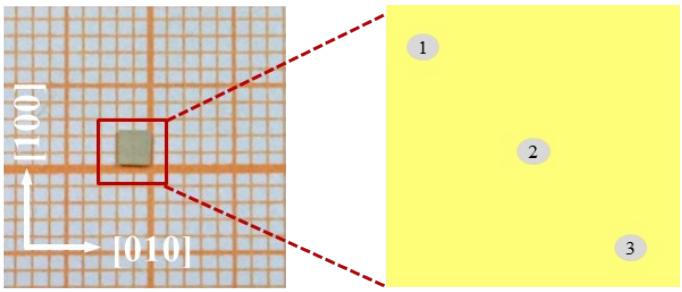

Fig. S1 EDS spectra corresponding to the general regions on the (001) surface of PIN-PZ-PMN-PT single crystal.

Table S1 Chemical composition of the as-grown PIN-PZ-PMN-PT single crystal.

Elements	Pb	Mg	Nb	In	Zr	Ti	O
Mass percentage calculated from the designed compositions (*w*t %)	63.00	0.76	10.07	5.24	1.39	4.95	14.59
Mass percentage obtained by EDS analysis (*w*t %)	61.77	0.70	10.61	4.78	1.98	3.96	16.32
	61.67	0.58	10.45	4.76	2.56	3.83	16.14
	61.79	0.58	10.45	4.65	2.67	3.72	16.14
Average values (*w*t %)	61.74 ±0.07	0.62 ±0.08	10.50 ±0.11	4.73 ±0.08	2.40 ±0.42	3.84 ±0.12	16.20 ±0.12

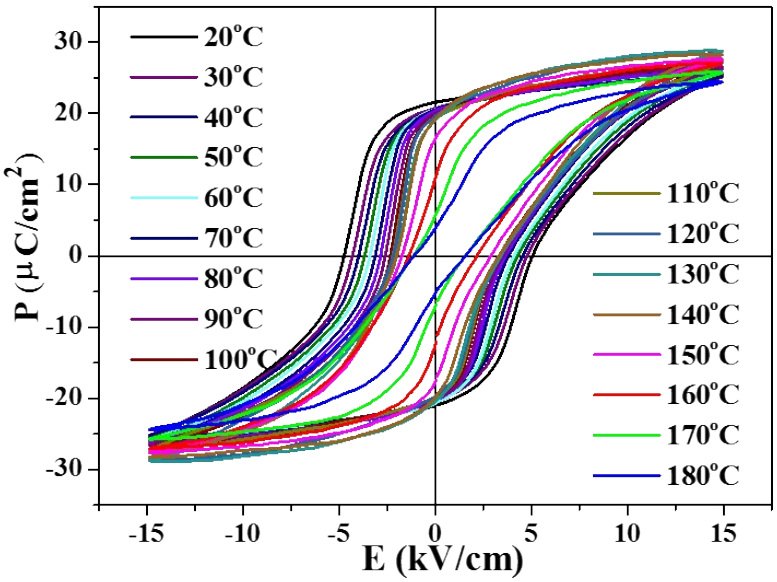

Fig. S2. Bipolar polarization hysteresis loop patterns of the $[001]_C$ PIN-PZ-PMN-PT single crystal at different temperature.

Coercive field E_C provided was calculated by the following equation:

$$Ec = \frac{|E_{c+}|}{2} + \frac{|E_{c-}|}{2}$$

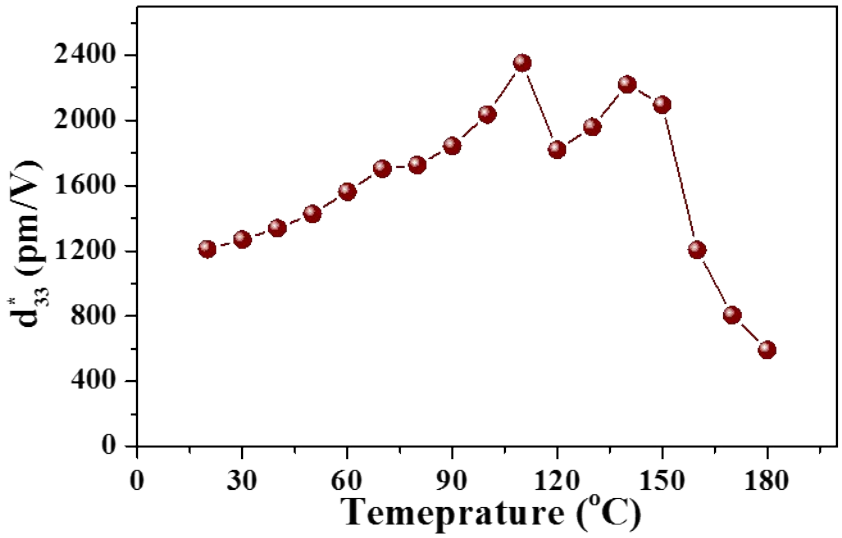

Fig. S3. d_{33}^* values derived from the unipolar strains as a function of temperature for the $[001]_C$ PIN-PZ-PMN-PT single crystal.