Supplementary material

High-performance energy-storage ferroelectric multilayer ceramic capacitor via nano-micro engineering

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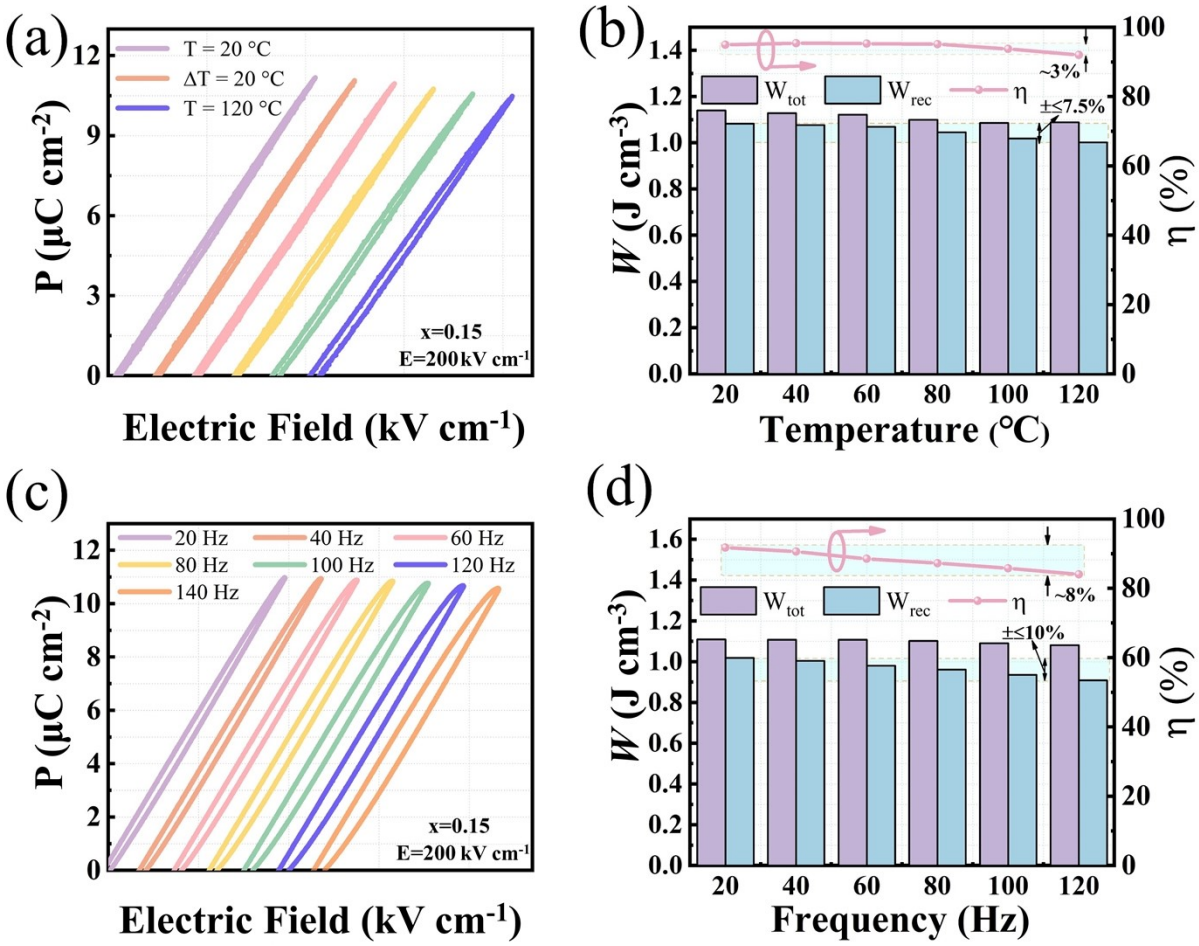

Fig. S1. *P-E* loop of x=0.15 ceramic as a function of (a) temperature, (c) frequency. (b) The temperature dependent, (d) the frequency dependent W_{tot}, W_{rec} and η of x=0.15.

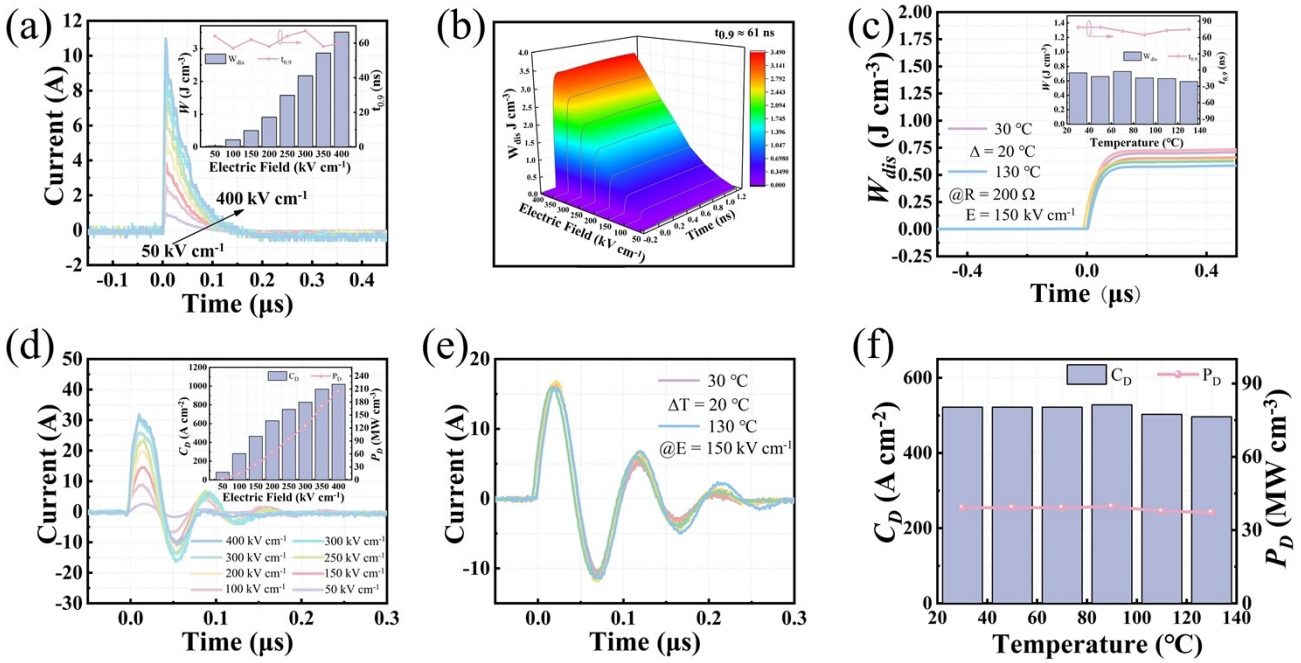

Fig. S2. (a-b) The discharge current waveform, W_{dis} and $t_{0.9}$ of x=0.15 ceramic in the overdamped state at different electric fields and the inset shows the corresponding W_{dis} and $t_{0.9}$. (c) The W_{dis} of x=0.15 ceramic in the overdamped state at different temperatures and the inset shows the corresponding W_{dis} and $t_{0.9}$. (d) The discharge current waveform of x=0.15 ceramic in the underdamped state at different electric fields and the inset shows the corresponding C_D and P_D. (e-f) The discharge current waveform, C_D and P_D of x=0.15 ceramic in the underdamped state at different temperatures.

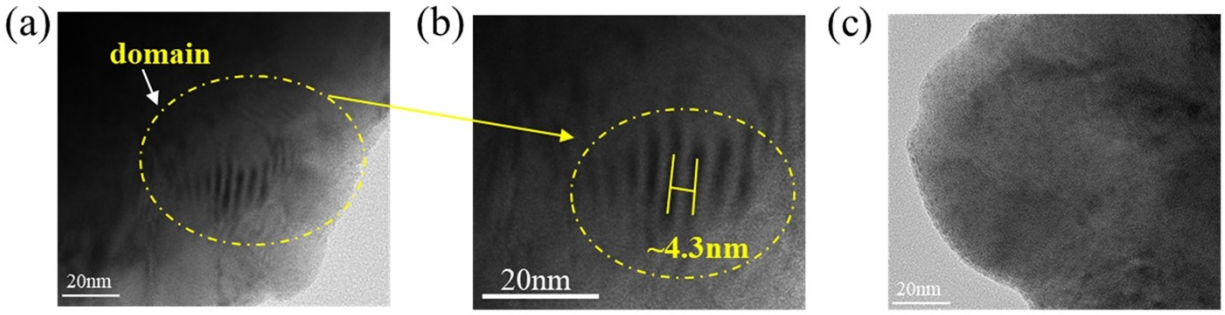

Fig. S3. TEM images of (a-b) x=0.05 and (c) x=0.2.

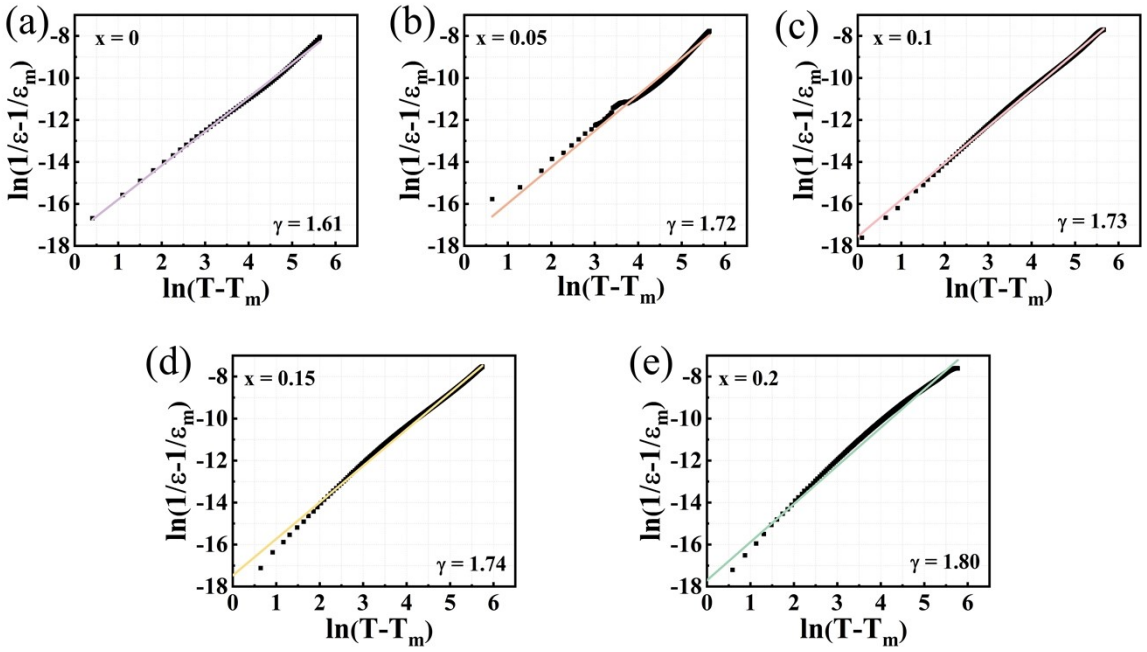

Fig. S4. The $\ln(1/\varepsilon_r - 1/\varepsilon_m)$ varies with $\ln(T - T_m)$ of (1-x)(0.65NBT-0.35ST)-xLMZ ceramics (a) x=0, (b) x=0.05, (c) x=0.1, (d) x=0.15, (e) x=0.2.

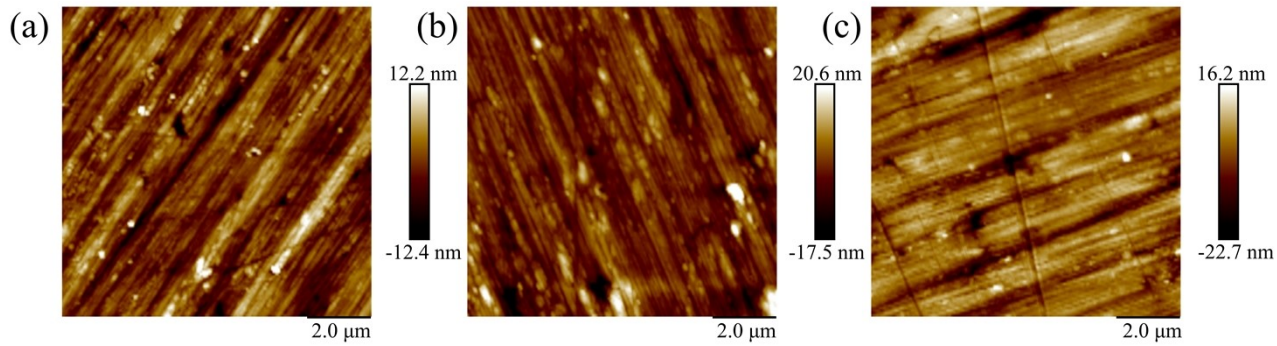

Fig. S5. The topography pictures of: (a) x=0, (b) x=0.10 and (c) 0.15 ceramics.

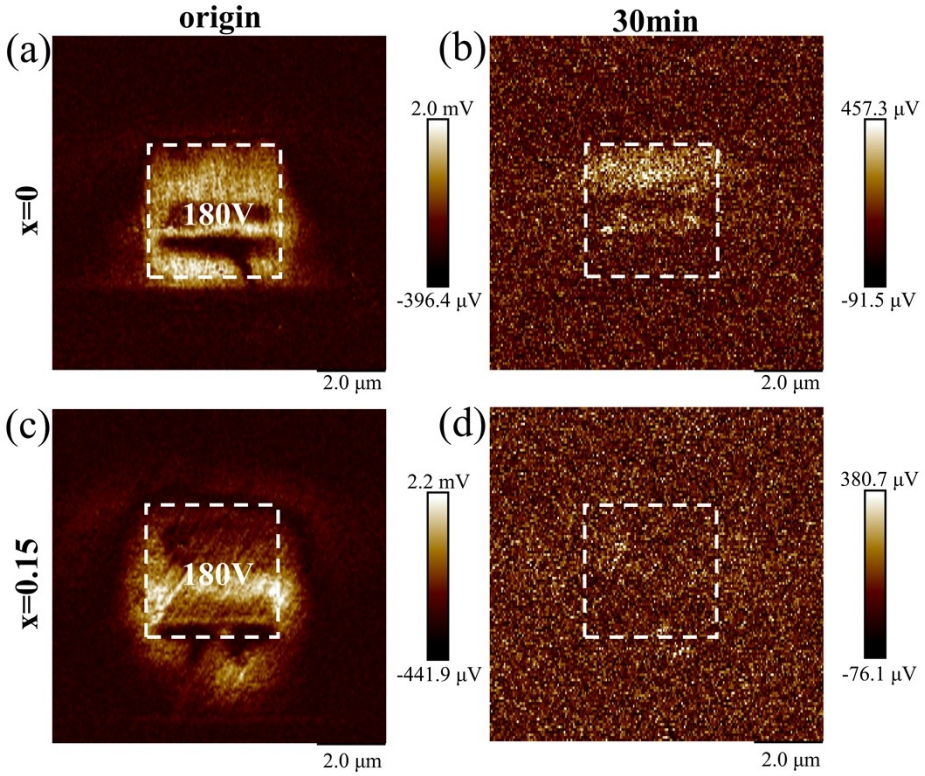

Fig. S6. Out-of-plane PFM amplitude pictures and domains evolution under different times for (a-b) x=0 and (c-d) x=0.15 ceramics.

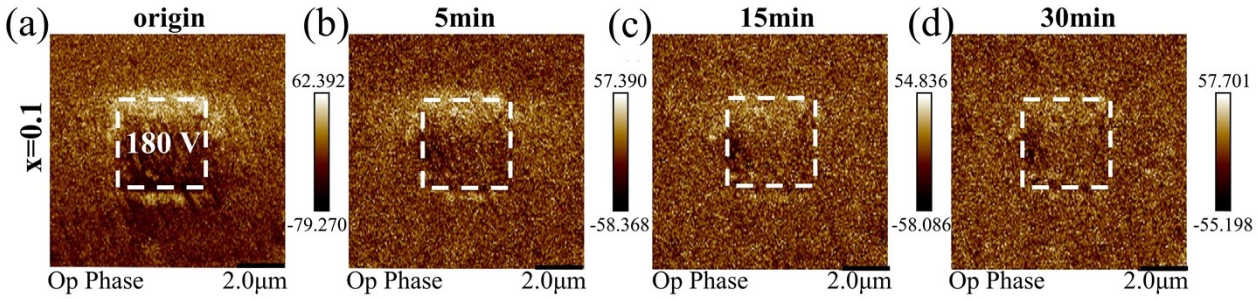

Fig. S7. Out-of-plane PFM phase pictures and domains evolution under different times for x=0.1 ceramics.

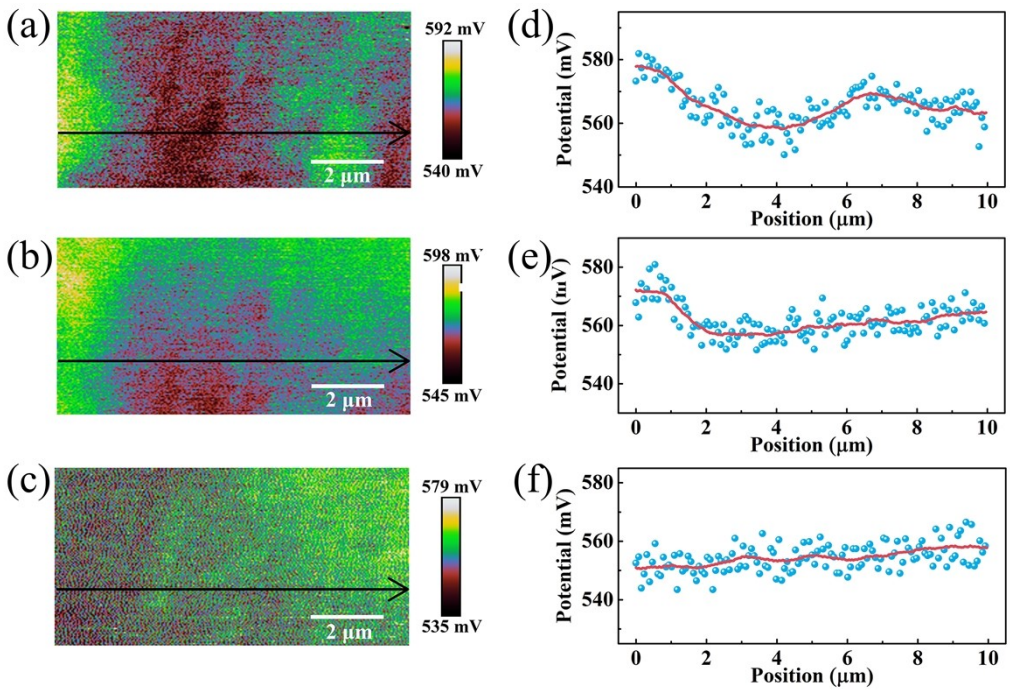

Fig. S8. Potential maps, and potential profile of (a,d) x=0.05, (b,e) x=0.10 and (c,f) x=0.2.