

# Realizing Outstanding Energy Storage Performance in BNST- based lead-free ceramics via introducing pyrochlore phase $\text{La}_2\text{Zr}_2\text{O}_7$

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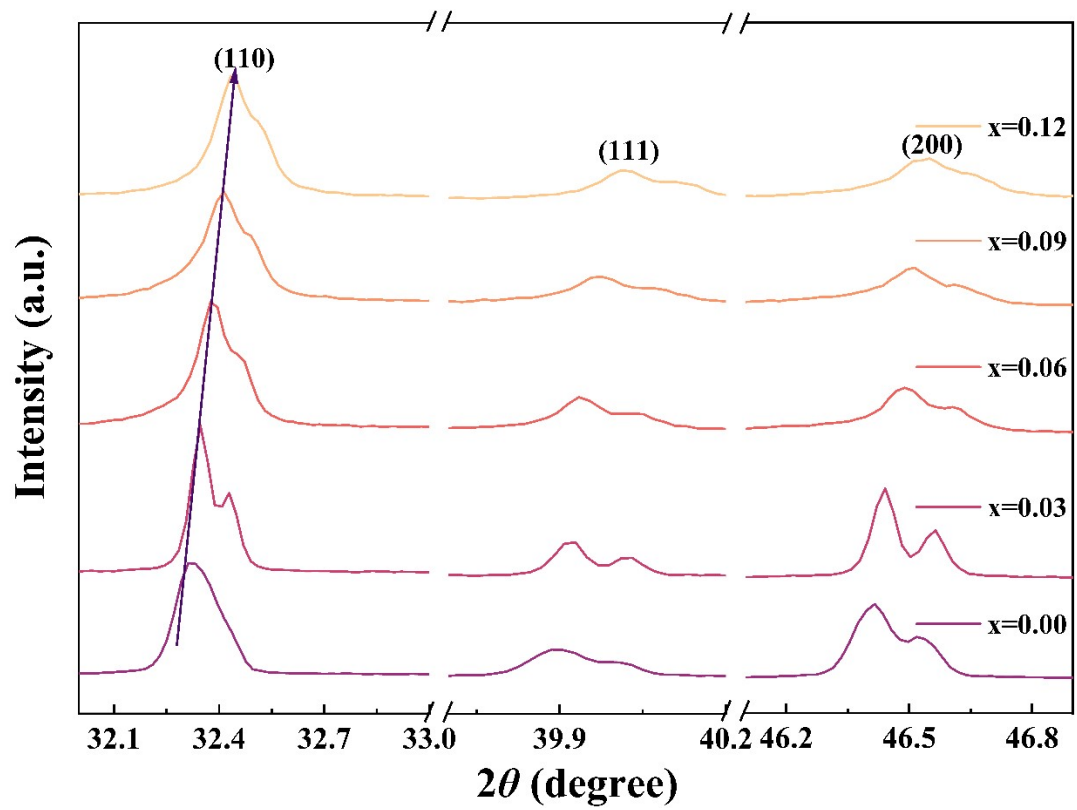
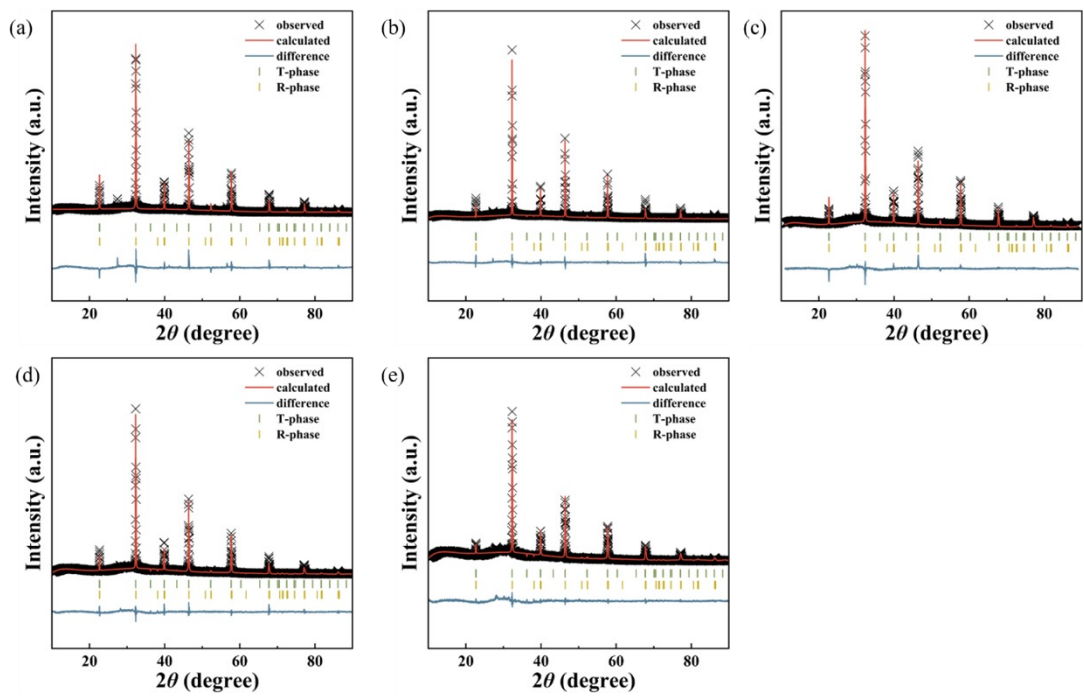


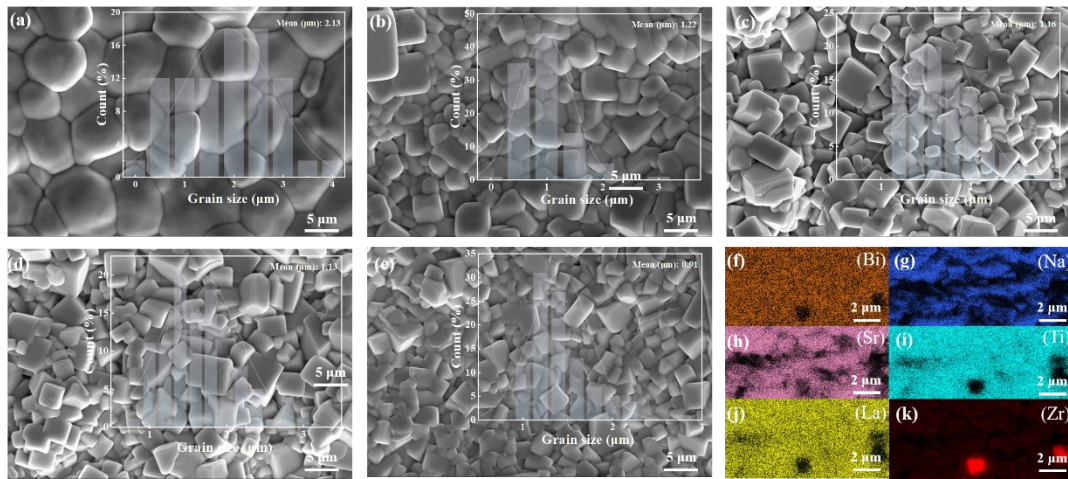
Fig.S1 XRD patterns of the enlarged patterns of 32-47°.



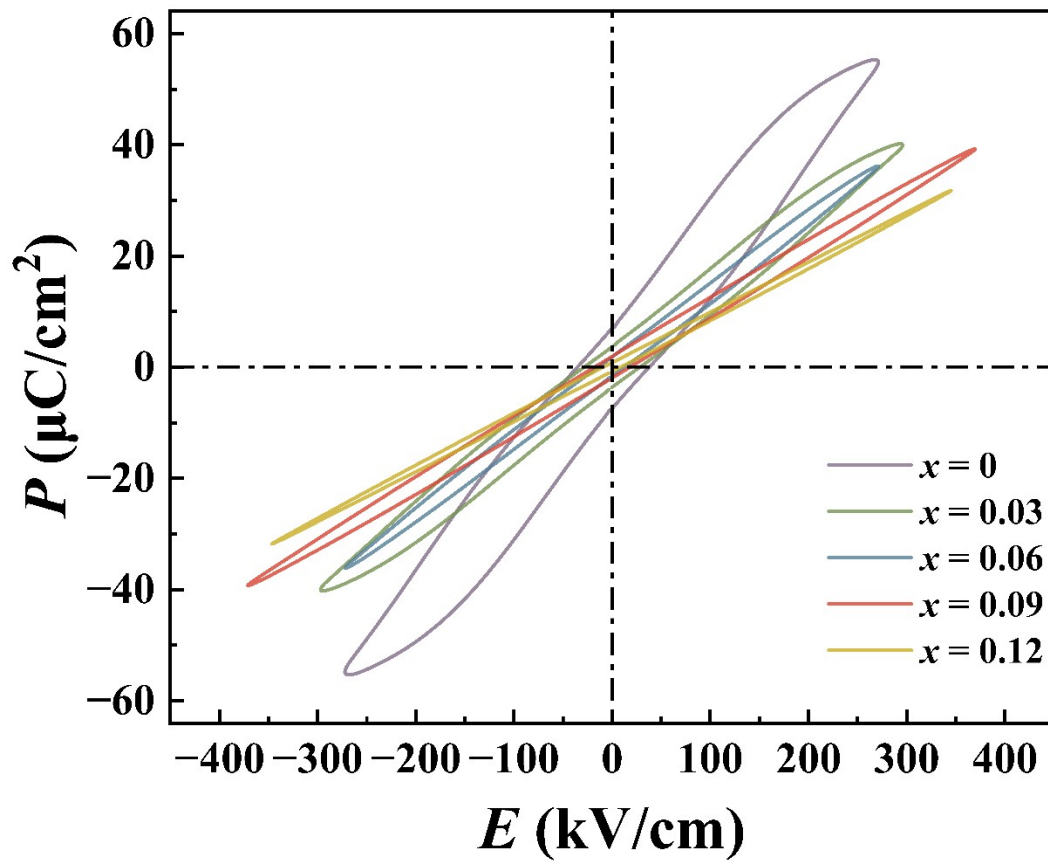
**Fig.S2** Rietveld refinement analysis of BNST-xLZO ceramics.

**Table.S1** The information of all ceramics of Rietveld refinement

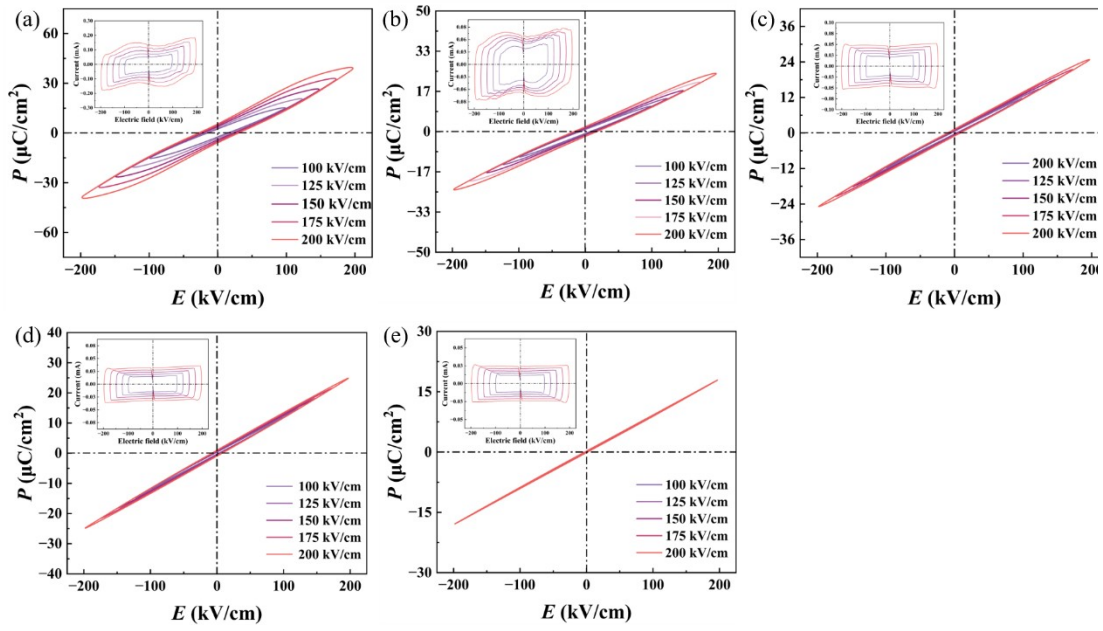
		$x = 0$	$x = 0.03$	$x = 0.06$	$x = 0.09$	$x = 0.12$
Crystal system		$R+T$	$R+T$	$R+T$	$R+T$	$R+T$
Space group		$R3c+P4b$ $m$	$R3c+P4bm$	$R3c+P4bm$	$R3c+P4bm$	$R3c+P4bm$
$R$	$a/b$ (Å)	5.513	5.512	5.516	5.514	5.515
	$c$ (Å)	13.518	13.498	13.588	13.520	13.510
$T$	$a/b$ (Å)	5.507	5.511	5.522	5.516	5.516
	$c$ (Å)	3.897	3.888	3.909	3.903	3.901
$R$ - factor	$R_{wp}$	9.329	9.165	9.966	9.26	9.824
	$R_p$	7.41	4.60	3.83	5.32	4.32



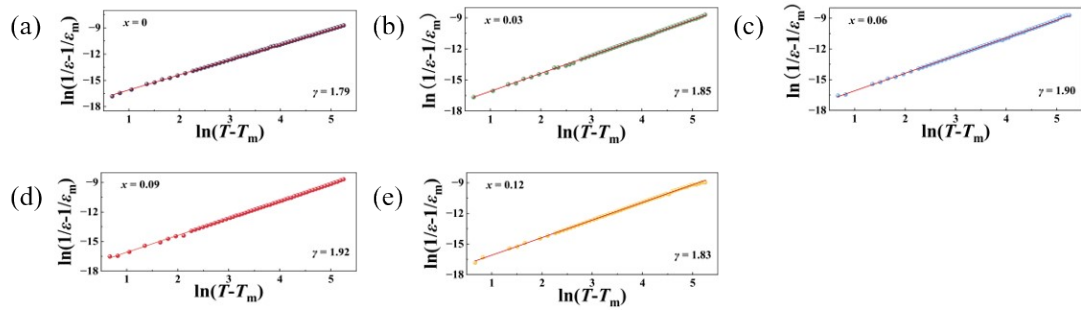
**Fig.S3** SEM images of BNST- $x$ LZO ceramics: (a)  $x = 0$ ; (b)  $x = 0.03$ ; (c)  $x = 0.06$ ; (d)  $x = 0.09$ ; (e)  $x = 0.12$ ; (f)-(k) EDS images of BNST- $x$ LZO ceramics.



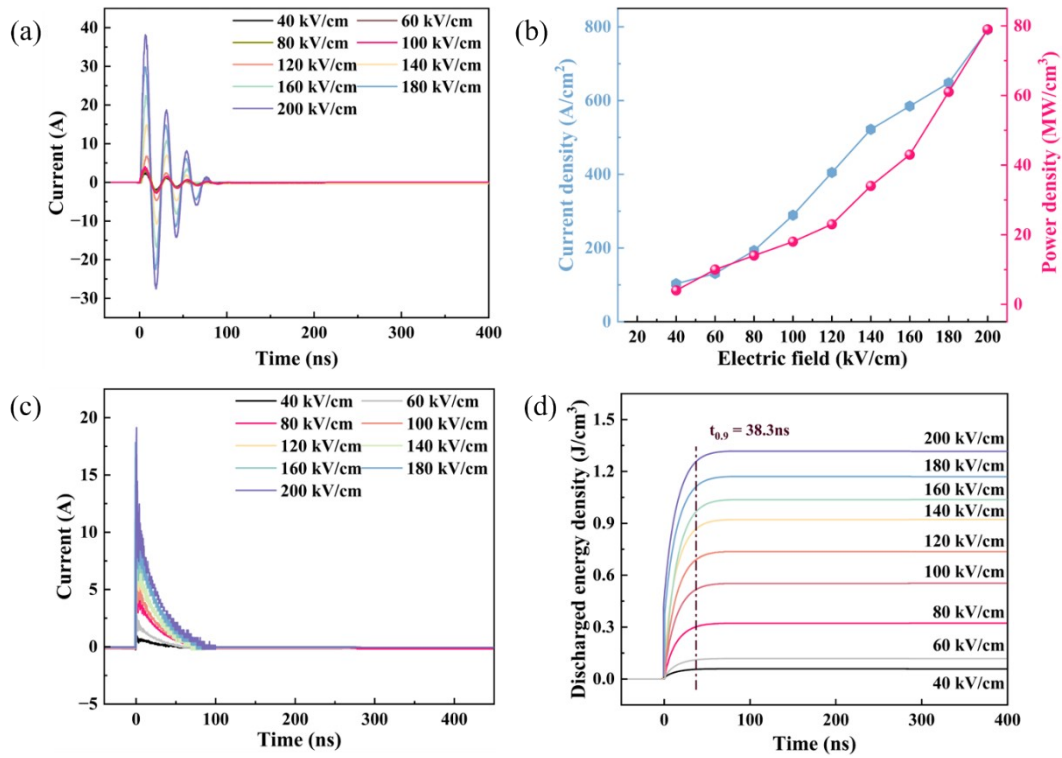
**Fig.S4** The  $P$ - $E$  hysteresis loops of BNST- $x$ LZO ceramics under different electric field.



**Fig.S5** The  $P$ - $E$  loops and corresponding  $I$ - $E$  loops of BNST- $x$ LZO ceramics: (a)  $x = 0$ ; (b)  $x = 0.03$ ; (c)  $x = 0.06$ ; (d)  $x = 0.09$ ; (e)  $x = 0.12$ .



**Fig.S6** Temperature dependence of diffuseness parameter  $\gamma$  for BNST-xLZO ceramics: (a)  $x = 0$ ; (b)  $x = 0.03$ ; (c)  $x = 0.06$ ; (d)  $x = 0.09$ ; (e)  $x = 0.12$ .



**Fig.S7** (a) The underdamped discharge performance and (b)  $C_D$  and  $P_D$  for BNST-0.09LZO ceramic under different electric fields; (c) The overdamped discharge curves and (d) Time-dependent discharge energy density for BNST-0.09LZO ceramic under various electric fields with a fixed load resistance.