

Superior energy density through tailored dopant strategies in multilayer ceramic capacitors

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Supplementary information

Superior energy density through tailored dopant strategies in multilayer ceramic capacitors

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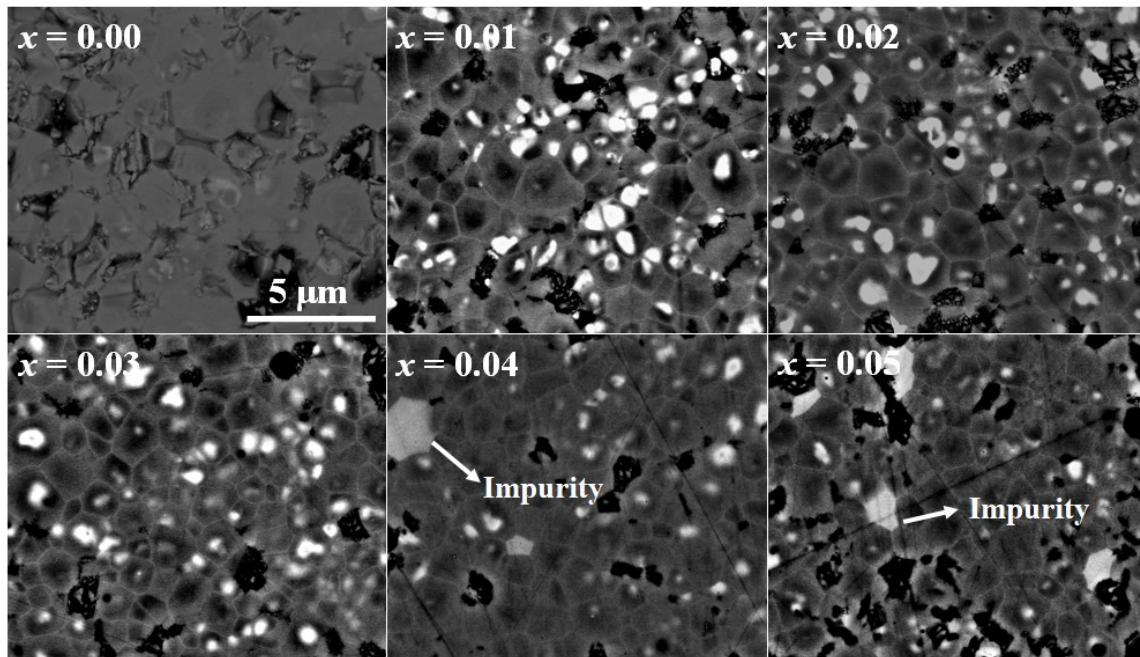


Figure S1 BSE images acquired from polished surfaces of BF-ST-BMN- x Nb ($x = 0, 0.01, 0.02, 0.03, 0.04$ and 0.05) ceramics.

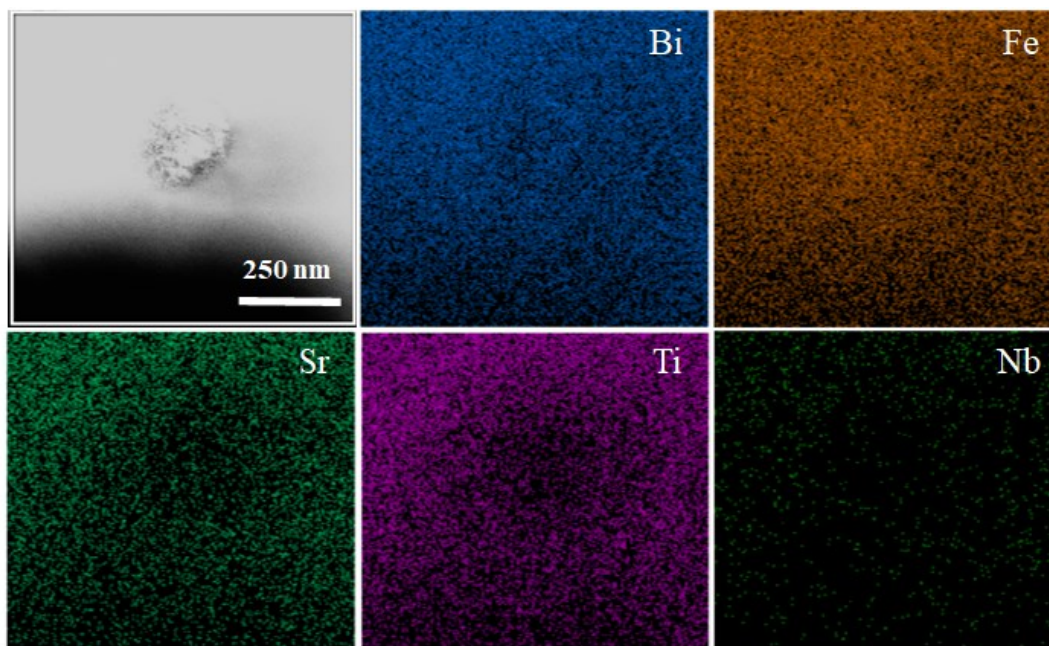


Figure S2 EDS elemental maps obtained from BF-ST-BMN-0.03Nb.

Table 1 Atomic percentage (excl. O) calculated from EDS spectra obtained from different phases presented in BF-ST-BMN-xNb ($x = 0.05$).

Elements	Bright core	Dark core
Bi	37.1	28.9
Fe	32.4	23.8
Sr	12.8	22.4
Ti	13.8	20.6
Mg	2.0	2.2
Nb	2.0	2.0

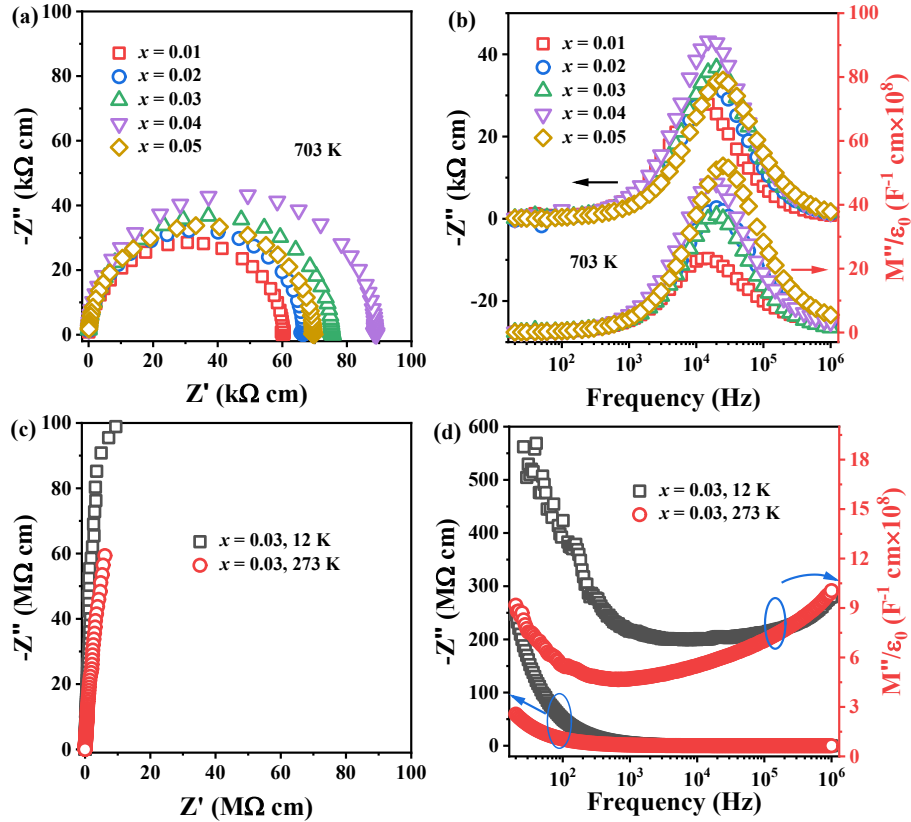


Figure S3 (a) Z^* plots and (b) Z'' and M'' spectroscopic plots at 703 K of BF-ST-BMN-xNb ($x = 0.01, 0.02, 0.03, 0.04$ and 0.05) ceramics; (c) Z^* plots and (d) Z'' and M'' spectroscopic plots of $x = 0.03$ at 12 and 273 K.

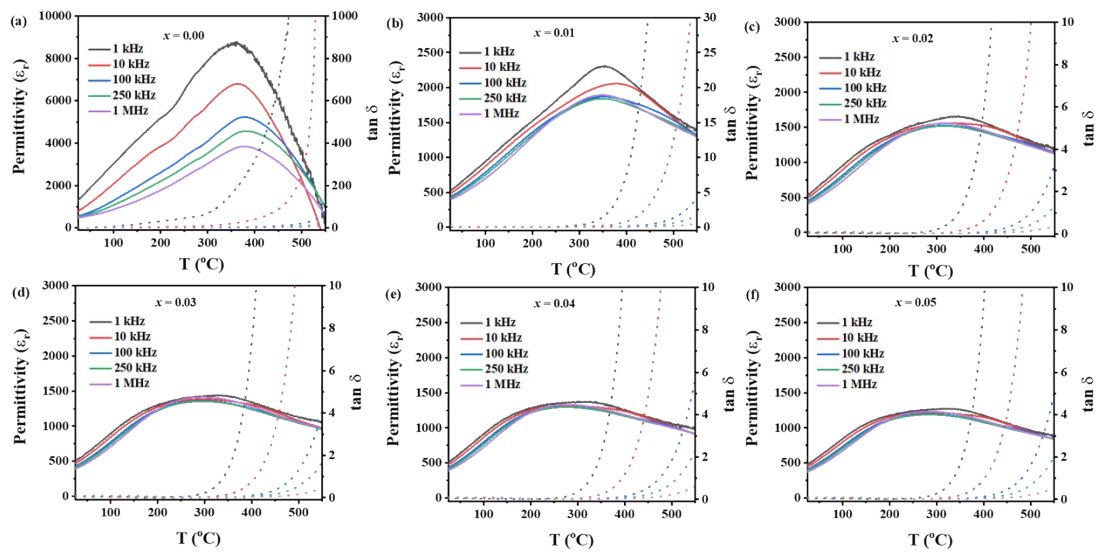


Figure S4 The temperature- and frequency-dependent dielectric permittivity (ϵ_r vs T) and loss ($\tan \delta$ vs T) data for BF-ST-BMN- x Nb, $x =$ (a) 0, (b) 0.01, (c) 0.02, (d) 0.03, (e) 0.04 and (f) 0.05.

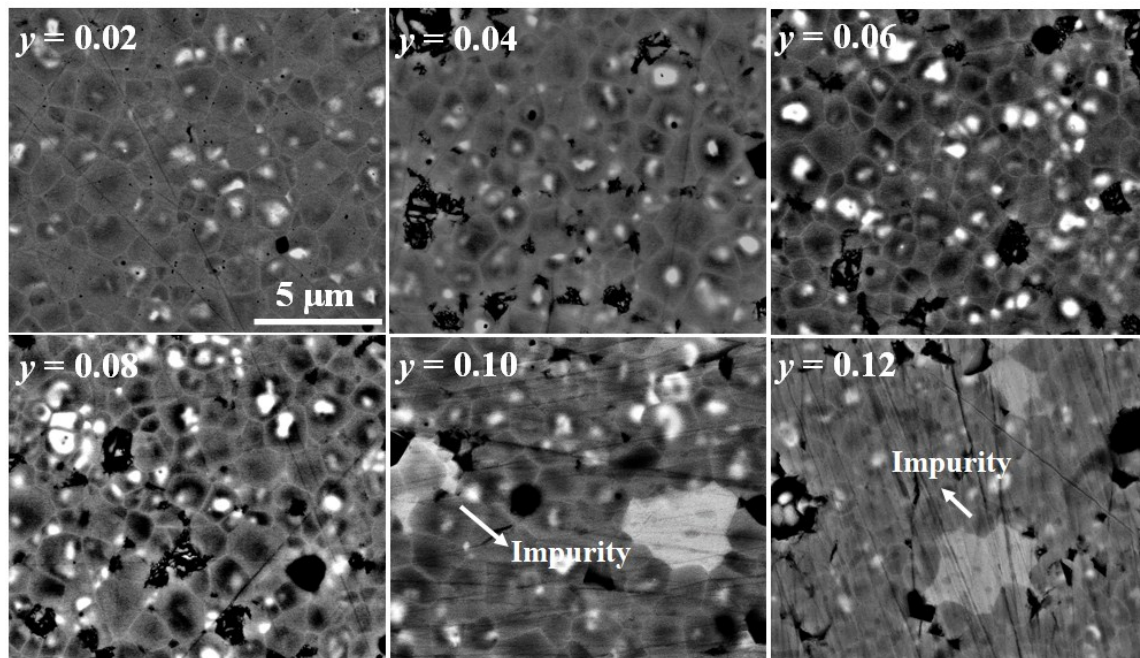


Figure S5 BSE images acquired from polished surfaces of BF-ST-Nb- y BMN ($y = 0.02, 0.04, 0.06, 0.08, 0.10$ and 0.12).

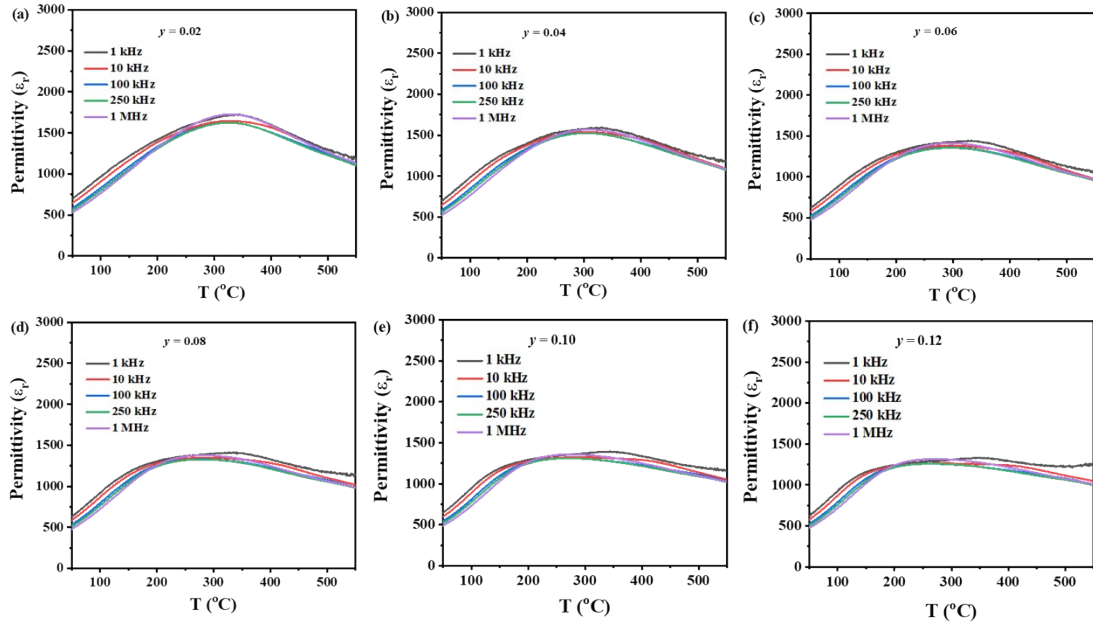


Figure S6 The temperature- and frequency-dependent dielectric permittivity (ϵ_r vs T) of BF-ST-Nb- y BMN ($y = 0.02, 0.04, 0.06, 0.08, 0.10$ and 0.12).

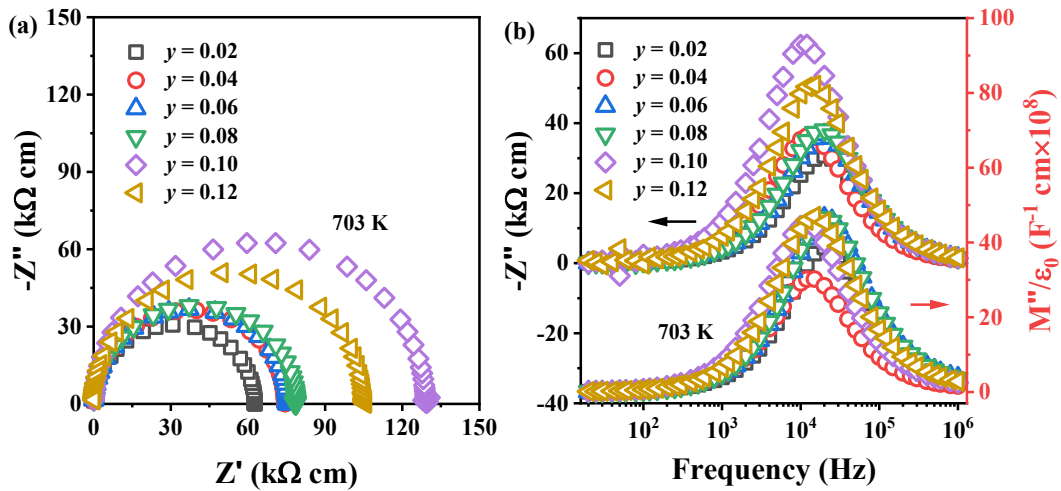


Figure S7 (a) Z^* plots and (b) Z'' and M'' spectroscopic plots at 703 K of BF-ST-Nb- y BMN ($y = 0.02, 0.04, 0.06, 0.08, 0.10$ and 0.12).

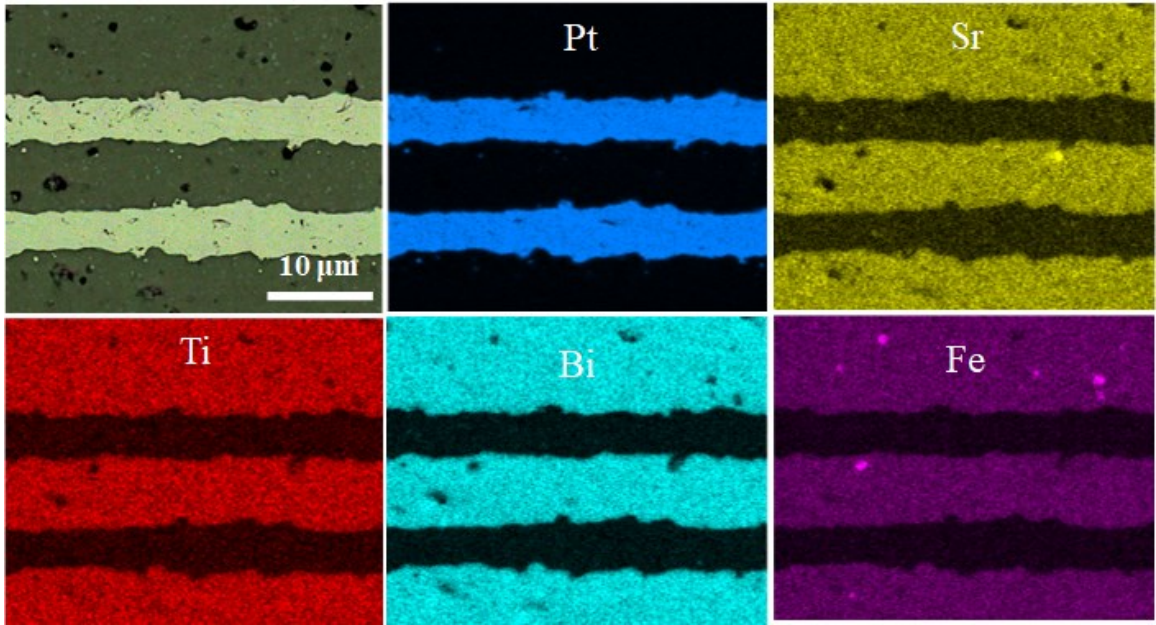


Figure S8 SEM image and corresponding EDS elemental maps obtained from the cross section of BF-ST-Nb-0.1BMN multilayer.