Supporting Information

All sites systematic non-stoichiometry regulation of ordering related structure and microstructure for enabling ultralow dielectric loss and temperature stability in $Ba(Mg_{1/3}Nb_{2/3})O_3$ perovskite ceramics

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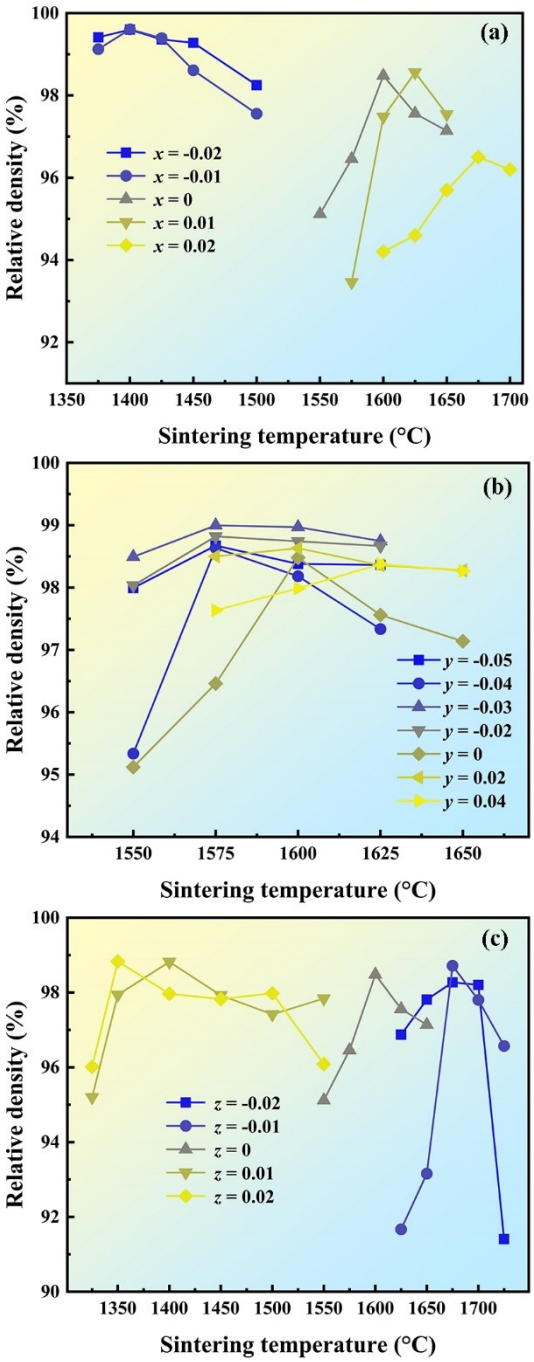

Fig. S1 The relative density of the non-stoichiometric $Ba(Mg_{1/3}Nb_{2/3})O_3$ ceramics as a function of sintering temperature: (a) $Ba_{1+x}(Mg_{1/3}Nb_{2/3})O_{3+x}$ ceramics, (b) $Ba(Mg_{1/3+y}Nb_{2/3})O_{3+y}$ ceramics, (c) $Ba(Mg_{1/3}Nb_{2/3+z})O_{3+5z/2}$ ceramics.

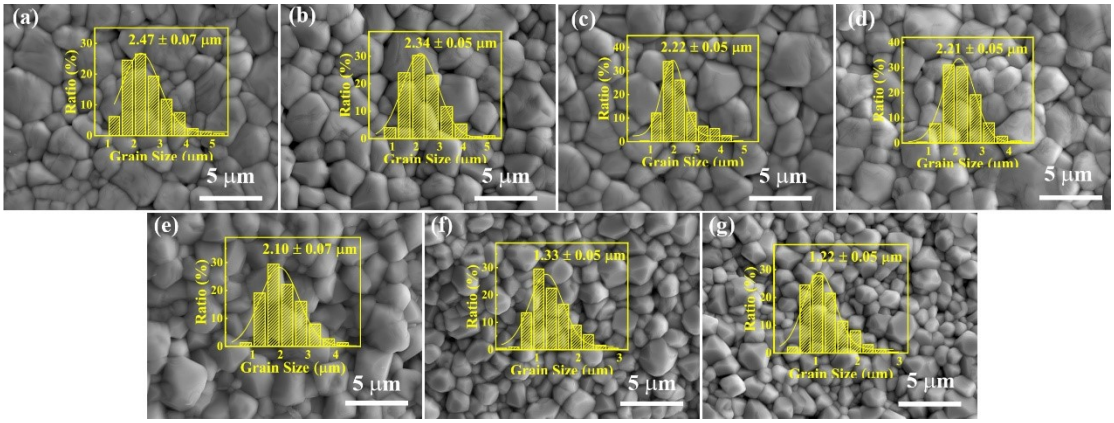

Fig. S2 SEM images of surface and corresponding grain size distributions for $Ba(Mg_{1/3+y}Nb_{2/3})O_{3+y}$ ceramics:(a) -0.05, (b) -0.04, (c) -0.03, (d) -0.02, (e) 0, (f) 0.02, (g), 0.04.

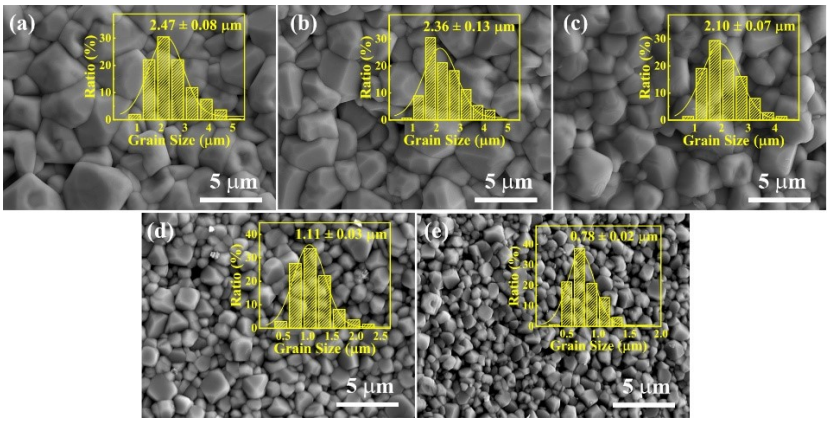

Fig. S3 SEM images of surface and corresponding grain size distributions for $Ba(Mg_{1/3}Nb_{2/3+z})O_{3+5z/2}$ ceramics:(a) -0.02, (b) -0.01, (c) 0, (d) 0.01, (e) 0.02.

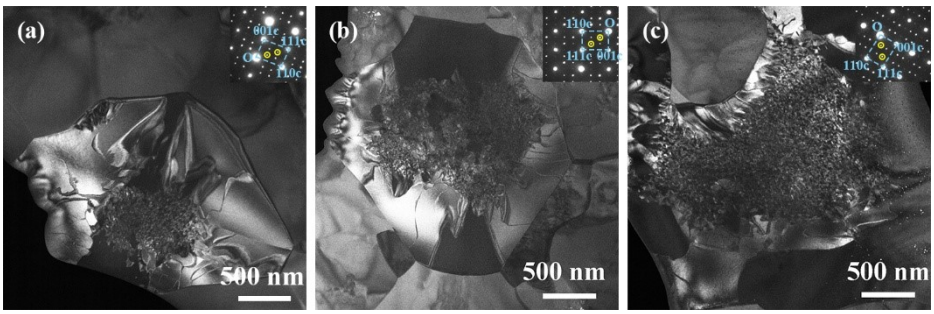

Fig. S4 Dark-field images and SAED patterns of $Ba(Mg_{1/3+y}Nb_{2/3})O_{3+y}$ ceramics: (a) y = -0.02, (b) y = 0, (c) y = 0.02

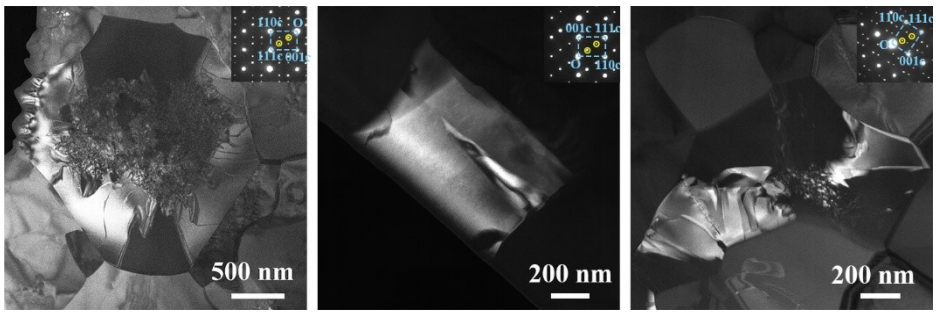

Fig. S5 Dark-field images and SAED patterns of $Ba(Mg_{1/3}Nb_{2/3+z})O_{3+5z/2}$ ceramics: (a) $z = 0$, (b) $z = 0.01$, (c) $z = 0.02$.