Supporting information

Achieving multicolor emission readout and tunable photoswitching via multiplexing of dual lanthanides in ferroelectric oxides

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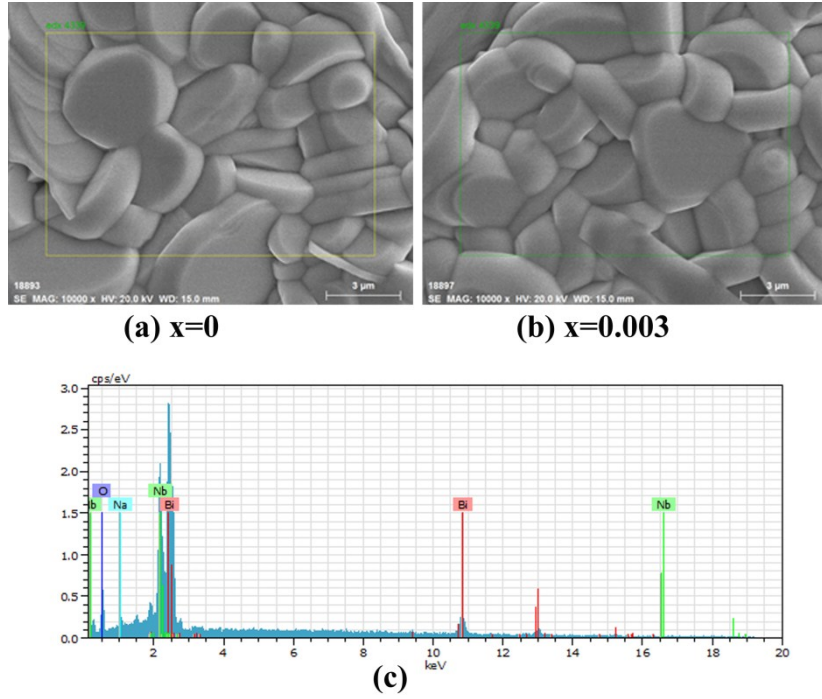E-mail: xhhao@imust.edu.cn (X.H. Hao)

Fig. S1 (a) and (b) SEM images of NBN:yPE ceramics (y=0, 0.003), (c) EDS spectrum of pure NBN.
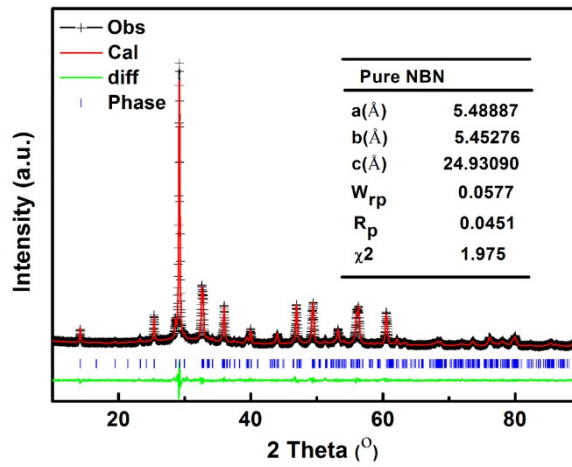

Fig. S2 XRD Rietveld refinement of pure NBN and the fitted paramenters.
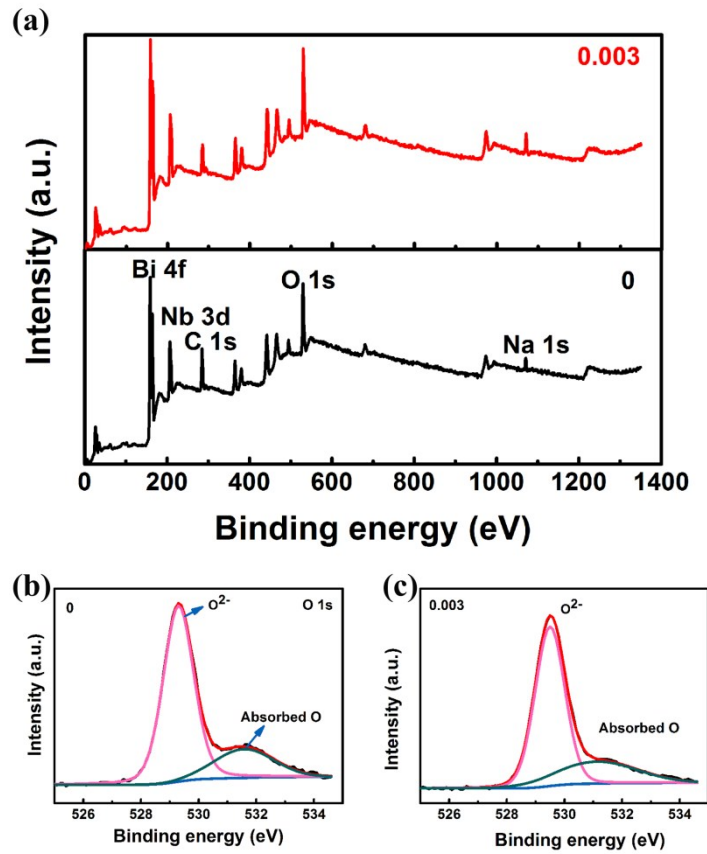
Fig. S3 (a) XPS spectra of O 1s for NBN:yPE ceramics (y=0, 0.003), (b) XPS spectra of O 1s for pure NBN, (c) XPS spectra of O 1s for the NBN:0.003PE ceramic.
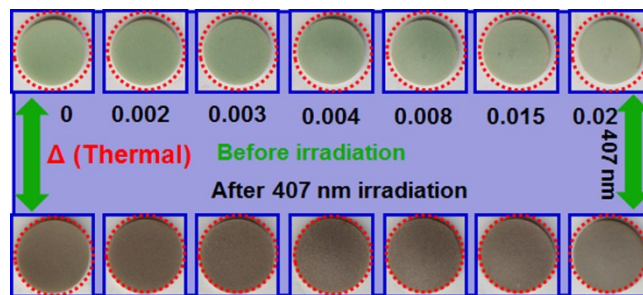

Fig. S4 As-prepared ceramic images before and after 407 nm irradiation with different Er^{3+} concentrations.
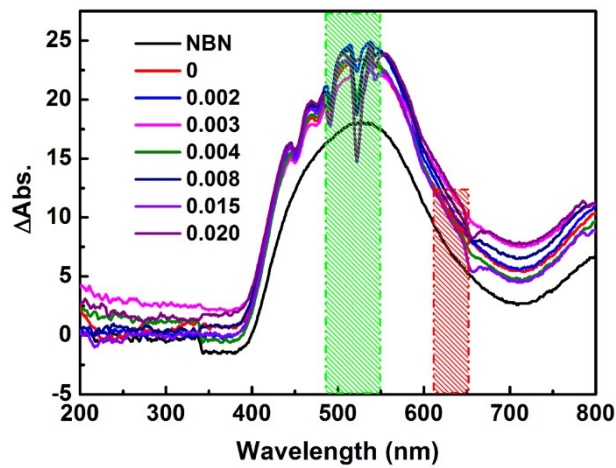
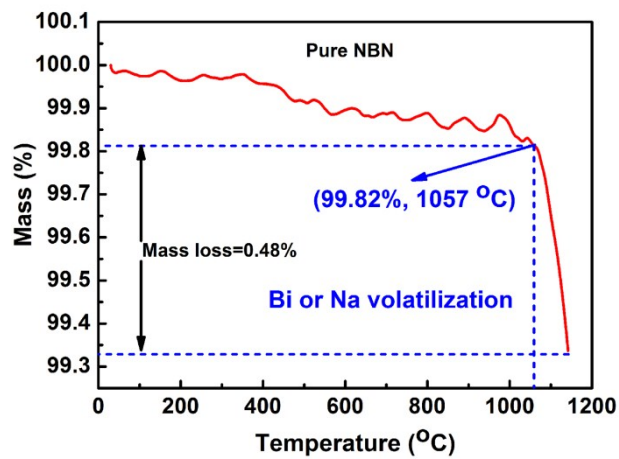**Fig. S5** The ΔAbs. versus wavelength curves for NBN:yPE ceramics.

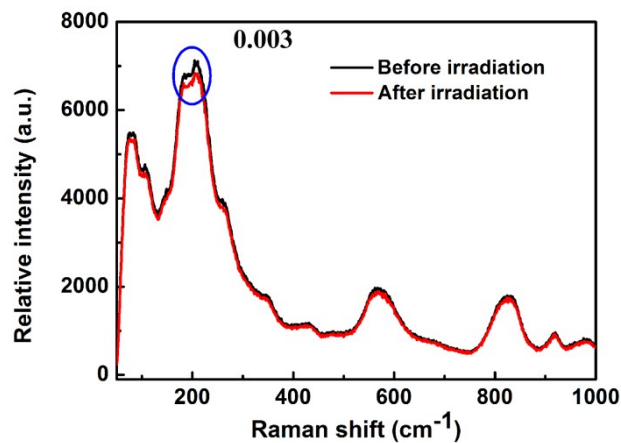**Fig. S6** The TG curve for pure NBN powders calcined at 900 °C for 4h.

Fig. S7 Raman spectra of the NBN:0.003PE sample before and after 407 nm irradiation.
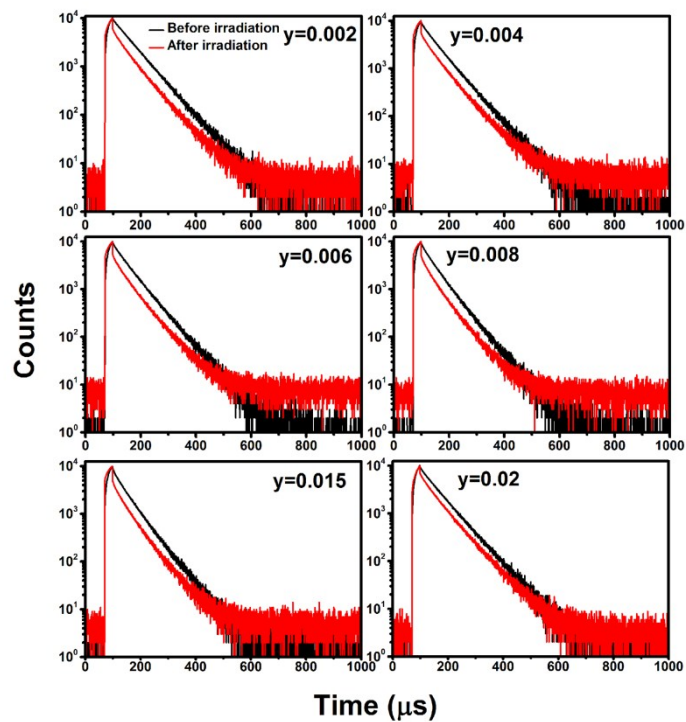
Fig. S8 The change of luminescent lifetimes (monitored at 613 nm) of samples before and after irradiation.

Table S1 Fitting parameters of the O 1s XPS spectra for pure NBN and NBN:0.003PE ceramics.

Samples	Lattice O^{2-} (eV)	Vacancy O (Vo) (eV)	O^{2-}/Vo
NBN	529.304	531.571	3.4520
0.003	529.499	531.127	2.7973

Table S2 The average luminescent lifetimes ($\tau_{ave.}$) of samples before and after irradiation.

Samples	0.002	0.004	0.006	0.008	0.015	0.020
Before (τ_{ave})(μs)	65.6	57.5	54.6	48.8	45.3	64.5
After (τ_{ave})(μs)	54.6	53.4	50.2	45.4	44.2	56.5