Supporting Information

Self-surfactant room-temperature synthesis of morphology-controlled $K_{0.3}Bi_{0.7}F_{2.4}$ nanoscintillators

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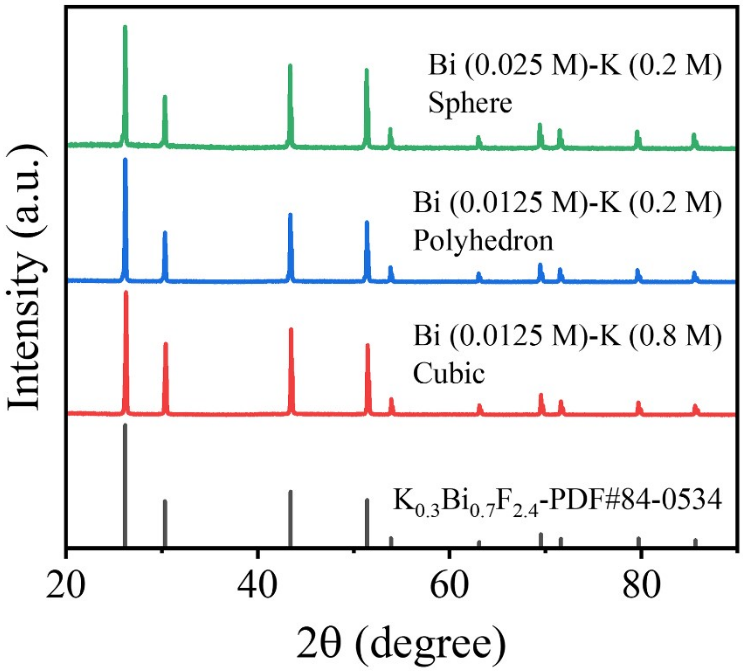

Fig. S1 XRD patterns of the KBF samples at different concentrations of Bi and F sources.

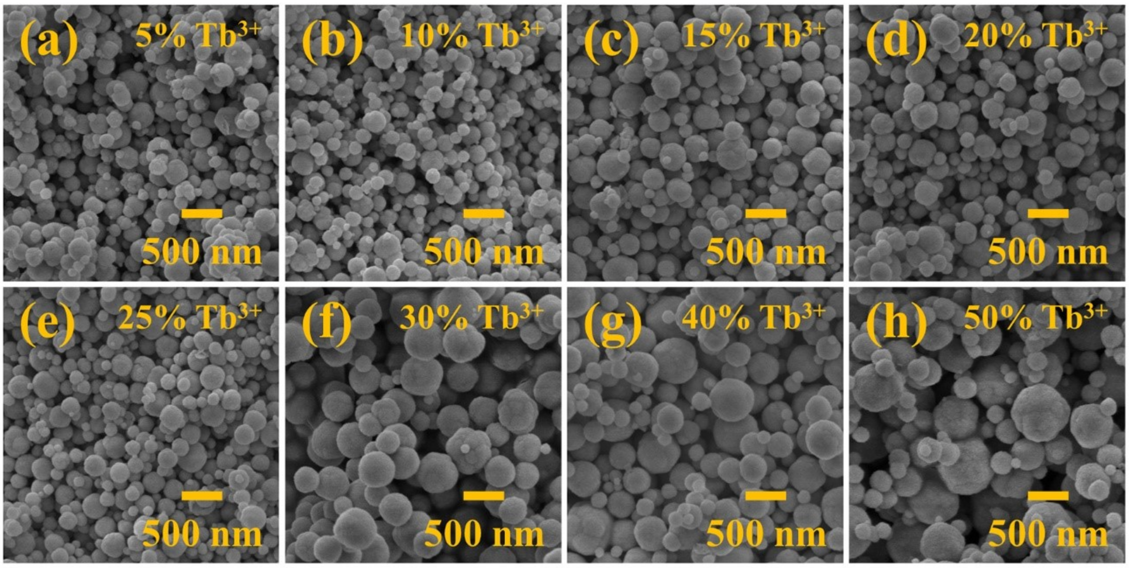

Fig. S2 SEM images of the KBF:x%Tb samples with different doping concentrations of Tb^{3+} ions (x = 5, 10, 15, 20, 25, 30, 40, 50).

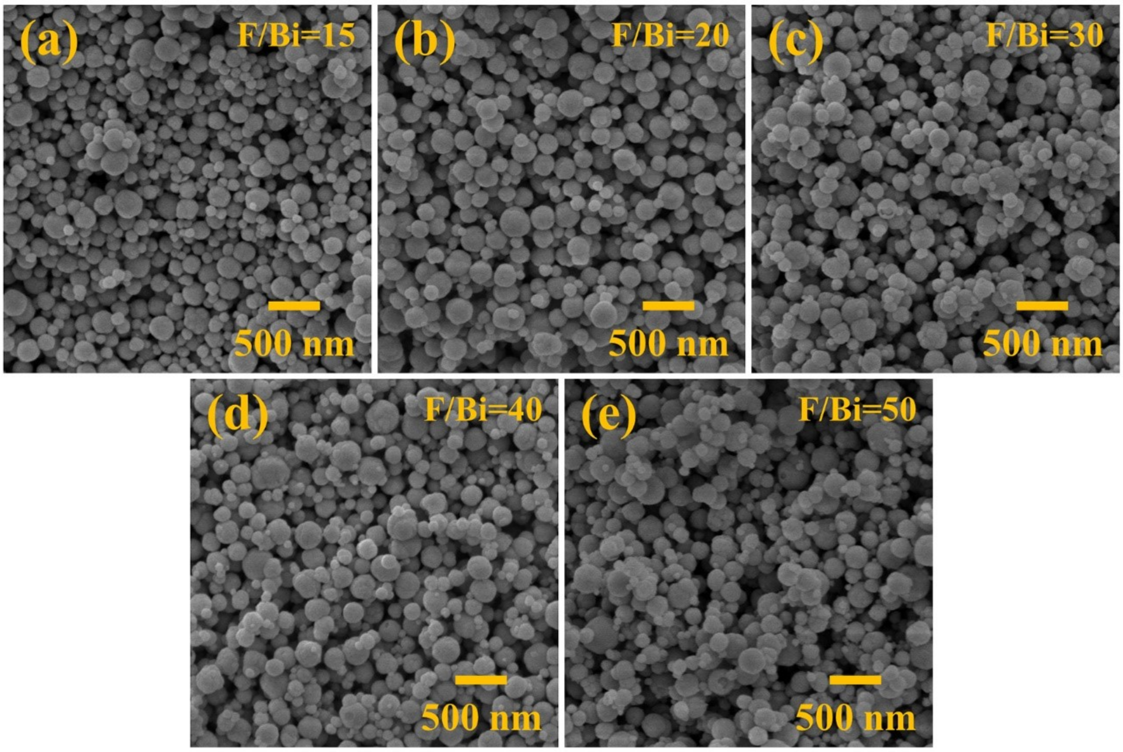

Fig. S3 SEM images of the KBF:10%Tb samples at different mole ratios of Bi and F source (F/Bi = 15, 20, 30, 40, 50).

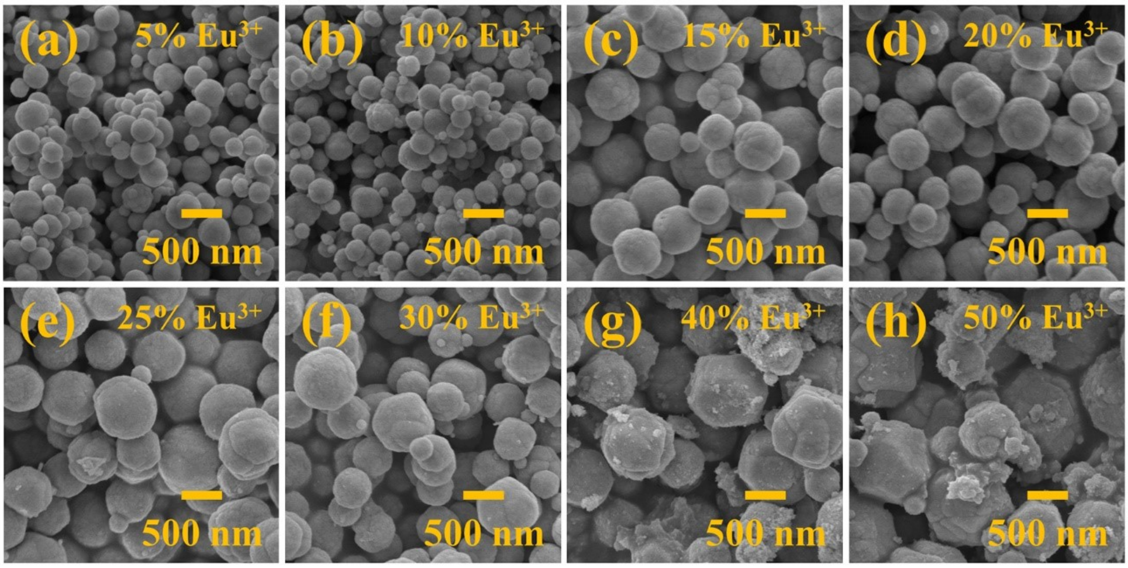

Fig. S4 SEM images of the KBF:x%Eu samples with different doping concentrations of Eu^{3+} ions (x = 5, 10, 15, 20, 25, 30, 40, 50).

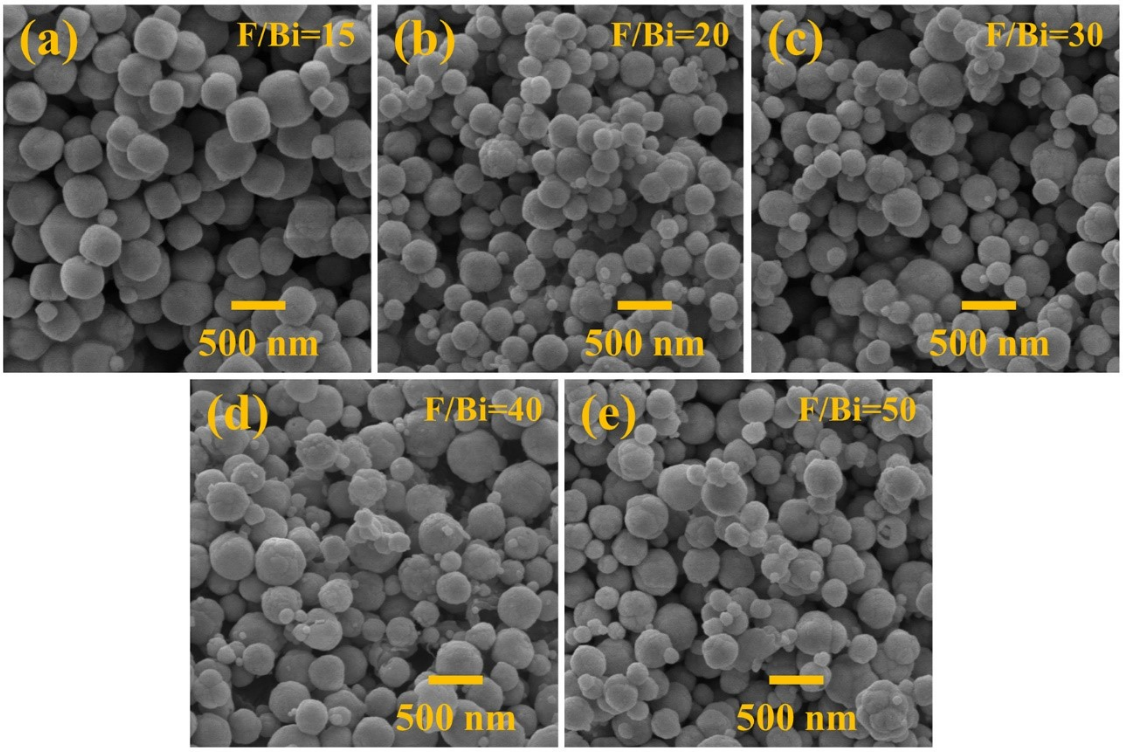

Fig. S5 SEM images of the KBF:10%Eu samples at different mole ratios of Bi and F source (F/Bi = 15, 20, 30, 40, 50).

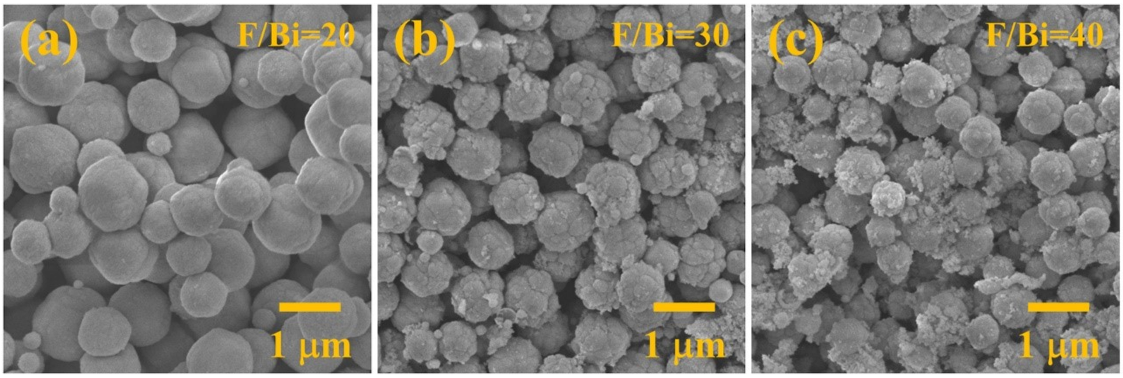

Fig. S6 SEM images of the KBF:30%Eu samples at different mole ratios of Bi and F source (F/Bi = 20, 30, 40).

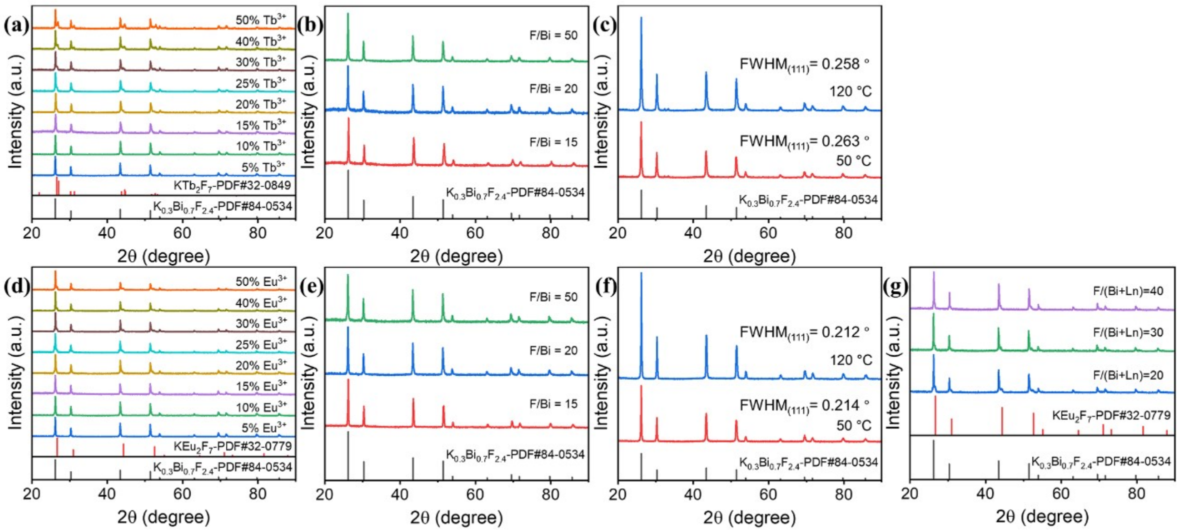

Fig. S7 XRD patterns of a) KBF:x%Tb and d) KBF:x%Eu samples with different doping concentrations of Tb^{3+} and Eu^{3+} ions, respectively. XRD patterns of the b) KBF:10%Tb, e) KBF:10%Eu and g) KBF:30%Eu samples synthesized with different mole ratios of Bi and F source. XRD patterns of c) KBF:10%Tb and f) KBF:10%Eu samples treated at different drying temperatures (50 and 120 ºC).

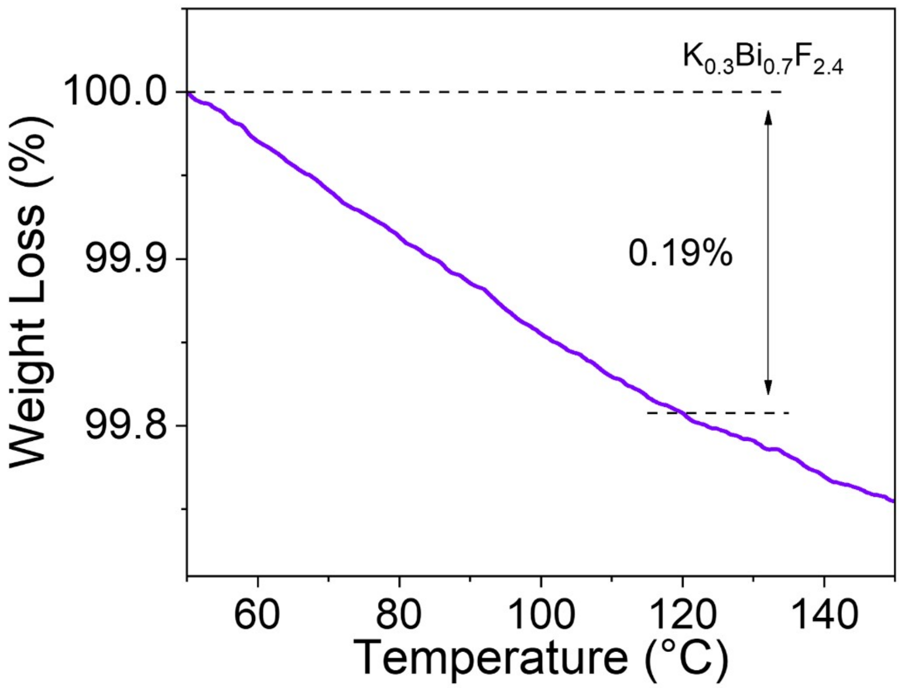

Fig. S8 TGA curve of the KBF sample from 50 to 150 °C with a heating rate of 10 °C min^{-1}.

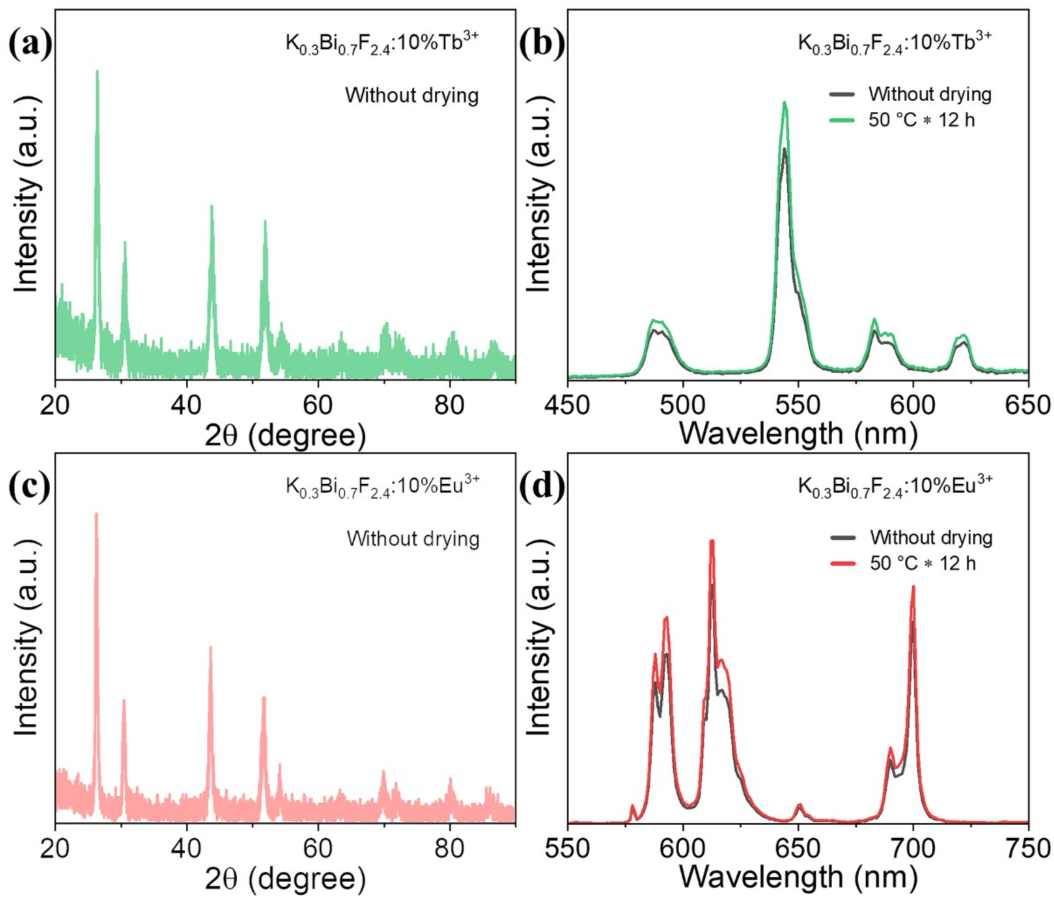

Fig. S9 (a,c) XRD patterns of the KBF:10%Tb and KBF:10%Eu samples without drying. (b,d) The photoluminescence emission spectra of the KBF:10%Tb and KBF:10%Eu samples before and after drying at 50 ºC.

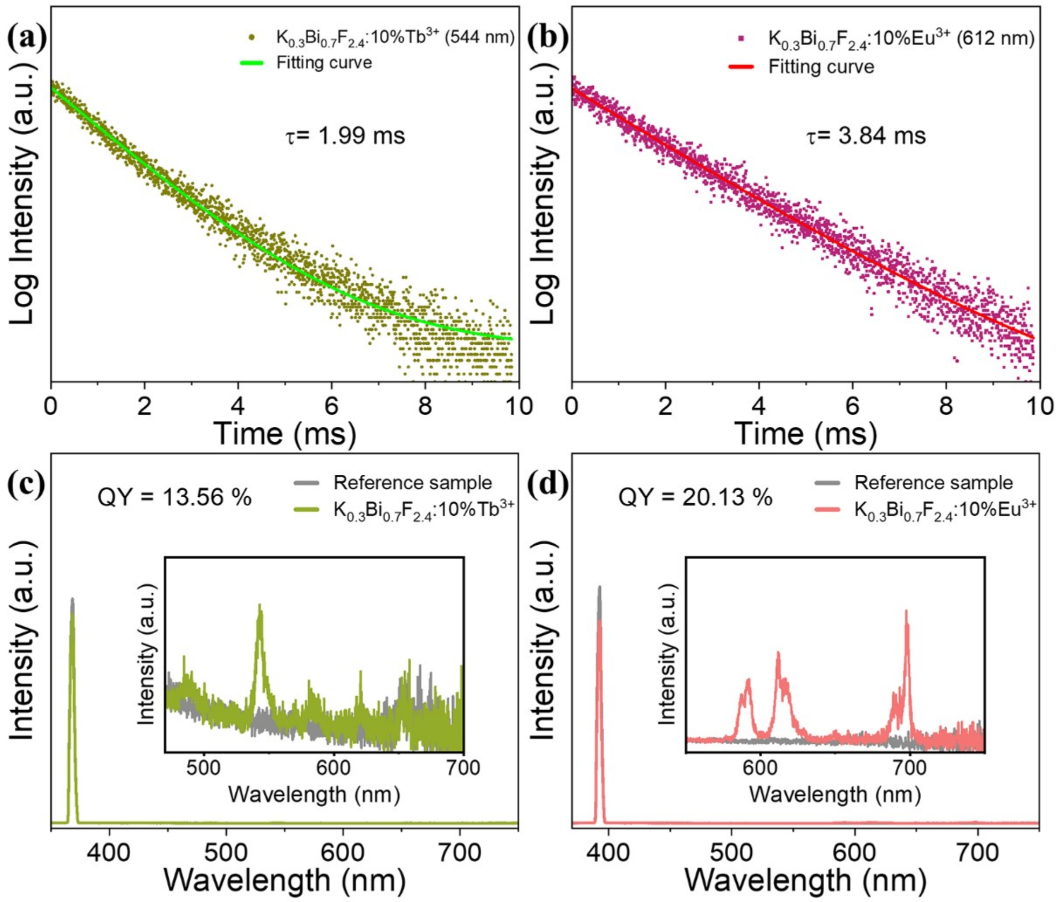

Fig. S10 (a,b) Luminescence decay curves of the KBF:10%Tb and KBF:10%Eu samples. Excitation line of $BaSO_4$ and emission spectrum of KBF:10%Tb (c) and KBF:10%Eu (d) samples. Insets show the magnification of the emission spectra.

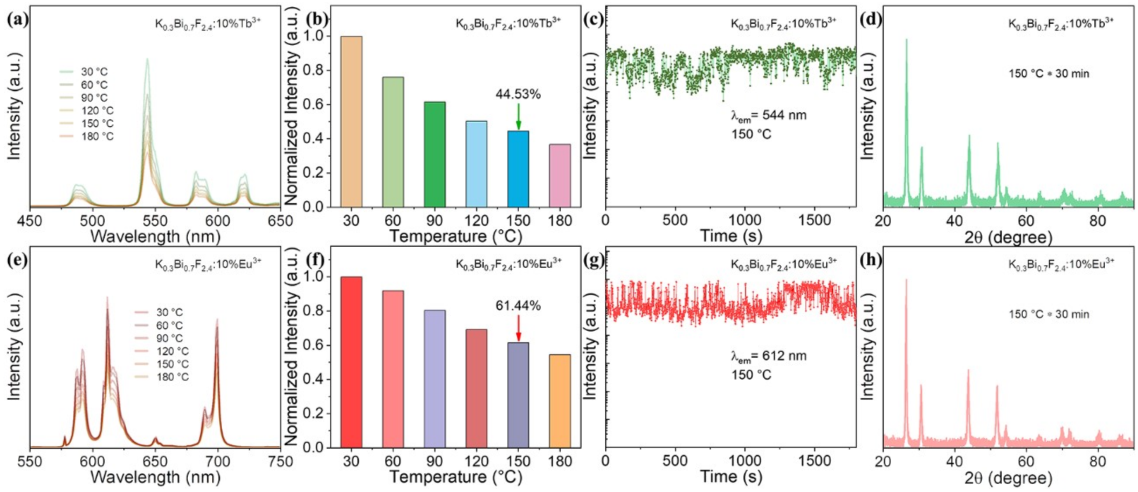

Fig. S11 Temperature-dependent emission spectra of the KBF:10%Tb (a) and KBF:10%Eu (e) samples. Dependence of emission intensity on the temperature of the KBF:10%Tb (b) and KBF:10%Eu (f) samples. The variation of emission intensities of the KBF:10%Tb (c) and KBF:10%Eu (g) samples under continuous heating at 150 °C for 30 min. XRD patterns of KBF:10%Tb (d) and KBF:10%Eu (h) samples after continuous heating at 150 °C for 30 min.

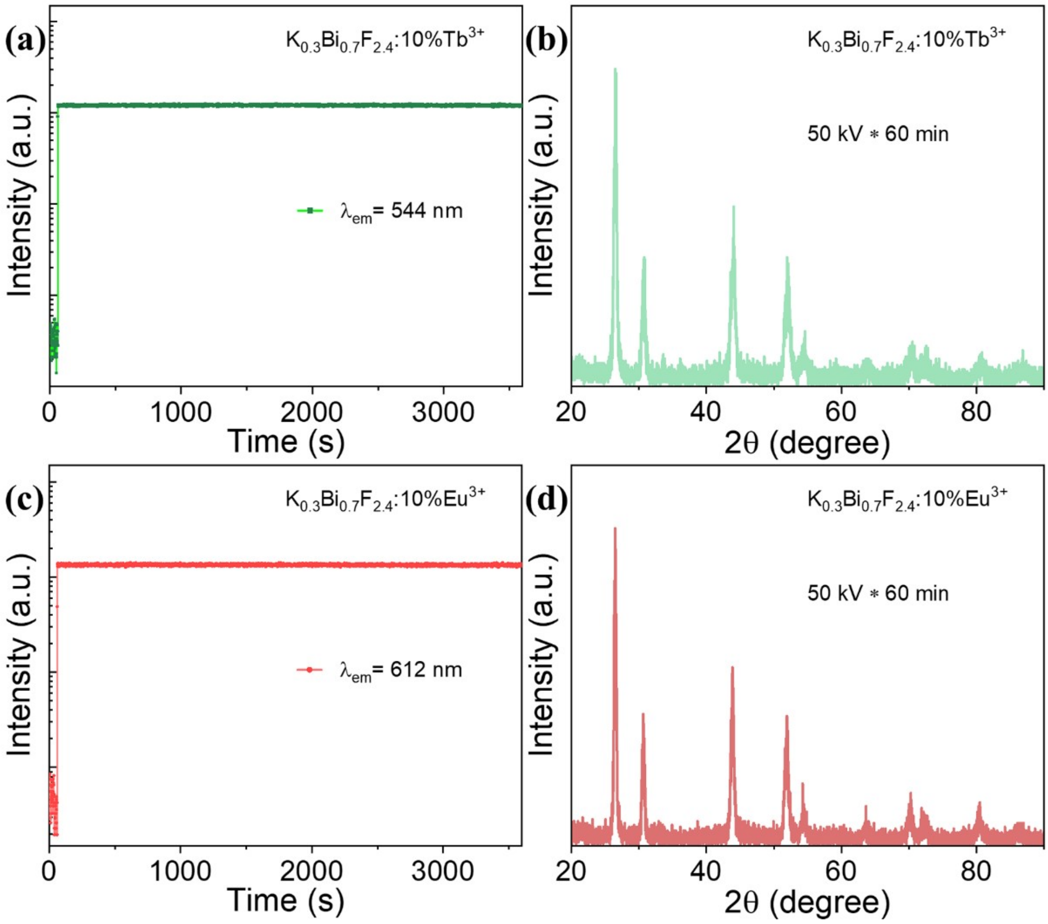

Fig. S12 (a,c) Radioluminescence stability of a) KBF:10%Tb and c) KBF:10%Eu powder samples under continuous X-ray irradiation with a voltage of 50 kV for 60 min. (b,d) XRD patterns of the KBF:10%Tb and KBF:10%Eu samples after continuous X-ray irradiation with a voltage of 50 kV for 60 min.

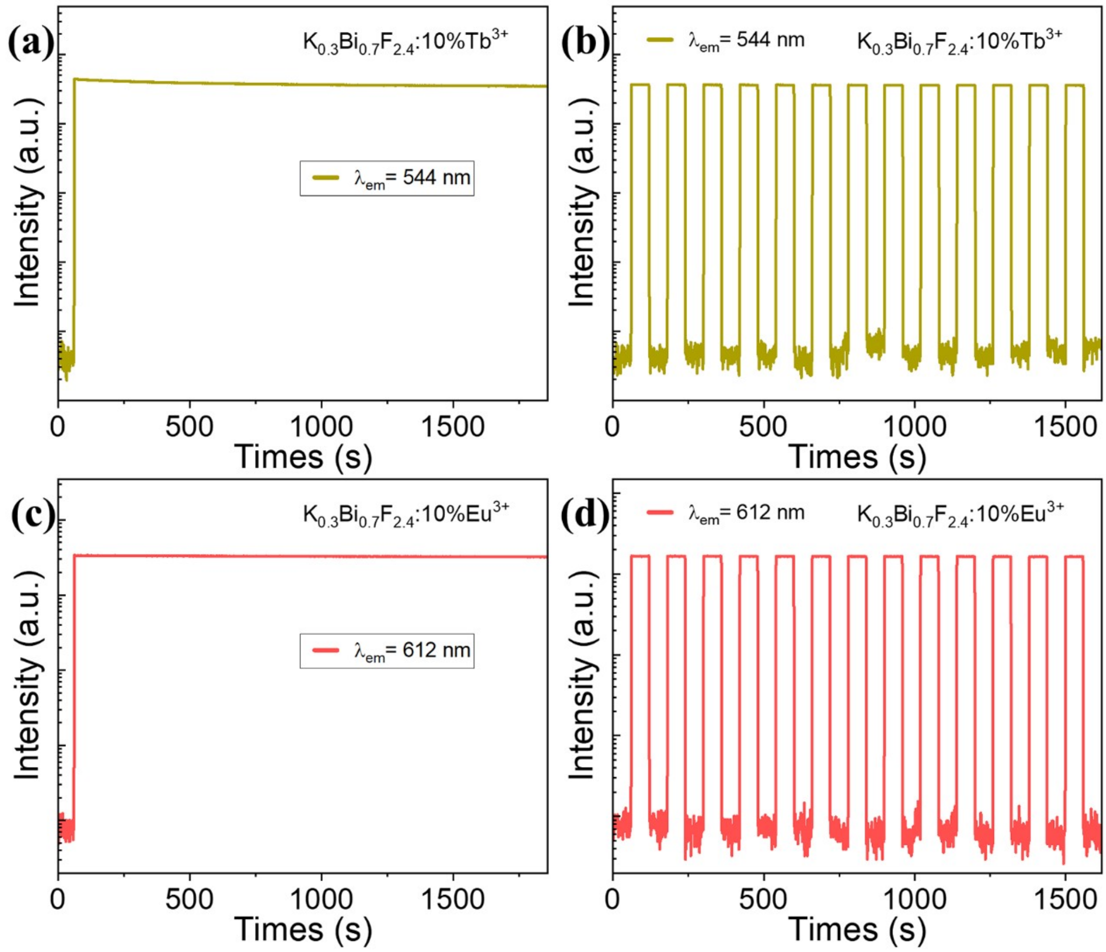

Fig. S13. Radioluminescence stability of a) KBF:10%Tb and c) KBF:10%Eu scintillator films under continuous X-ray irradiation with a voltage of 50 kV for 30 min. Radioluminescence stability of b) KBF:10%Tb and d) KBF:10%Eu scintillator films under repeated cycles of X-ray excitation with a time interval of 60 s.

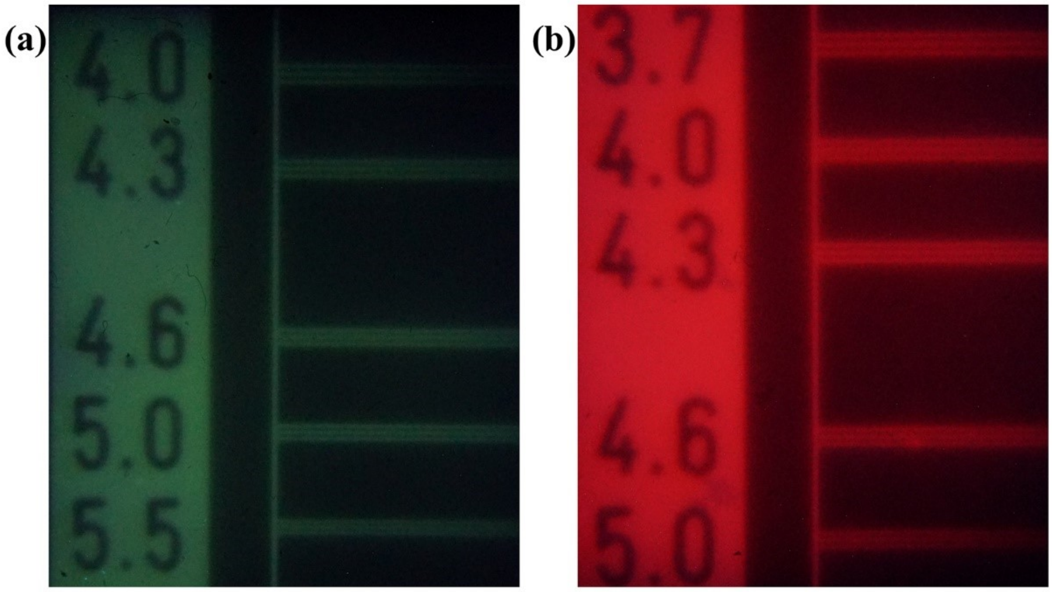

Fig. S14 Spatial resolution measurements of the KBF:10%Tb (a) and KBF:10%Eu (b) scintillator films.

Tab. S1 Calculated lattice parameters for the standard KBF host lattice, KBF:Eu and KBF:Tb nanocrystalline particles.

Parameters	Compounds		
	$K_{0.3}Bi_{0.7}F_{2.4}$ (JCPDS No. 84-0534)	$K_{0.3}Bi_{0.7}F_{2.4}$: 10%Tb^{3+}	$K_{0.3}Bi_{0.7}F_{2.4}$: 10%Eu^{3+}
$a=b=c$	5.8895 Å	5.88985 Å	5.88947 Å
V	204.28 Å^3	204.32 Å^3	204.28 Å^3
$\alpha = \beta = \gamma$	90º	90º	90º
Z	4	4	4
R_P	—	6.87%	4.91%
R_{WP}	—	9.15%	6.51%
χ^2	—	6.30	2.99