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Supporting Information for

Highly resolved and refreshable X-ray imaging from Tb^{3+} doped aluminosilicate oxyfluoride glass scintillators

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Fig. S1(a) depicts the comparison of PL spectra of host glass and Tb^{3+} doped glass specimens. Under 274 nm UV light excitation, G-host sample merely presents the distinguished emission at 313 nm ($^6P_{7/2}$ to $^8S_{7/2}$ transition of Gd^{3+}). As the content of Tb^{3+} raises, the emission at 313 nm declines. The emission peaks at 485, 542, 586 and 621 nm ($^5D_4$ to $^7F_{6,5,4,3}$ transitions of Tb^{3+}) enhance first and descend afterward with increasing Tb^{3+} content. Above phenomena prove the energy transfer from Gd^{3+} to Tb^{3+}.[1-10] The emission peaks at 379, 415 and 436 nm ($^5D_3$ to $^7F_{6,5,4}$ transitions of Tb^{3+}) diminish gradually with boosting Tb^{3+} content, which is owing to the cross relaxation ($^5D_3 + {}^7F_6 \rightarrow {}^5D_4 + {}^7F_0$) between Tb^{3+} ions.

As shown in Fig. S1(b) and listed in Table 2, the lifetime of $^6P_{7/2}$ of Gd^{3+} (calculated from equation S1) is shortened gradually. Energy transfer efficiency η can be calculated by equation S2,[11]

$$\overline{\tau}_{\mathrm{Gd}} = \int tI(t)dt \Big/ \int I(t)dt \tag{S1}$$

$$\eta = 1 - \overline{\tau}_{\mathrm{Gd}} / \tau_{host} \tag{S2}$$

where $\overline{\tau}_{\mathrm{Gd}}$ is the average lifetime of $^6P_{7/2}$ level of Gd^{3+}, τ_{host} is the average lifetime of $^6P_{7/2}$ level of Gd^{3+} in pure host (G-host specimen) without Tb^{3+} doping. As displayed in Table 2, the energy transfer efficiency is enhanced with increasing Tb^{3+} content, and the maximal energy transfer efficiency is 94.2%.

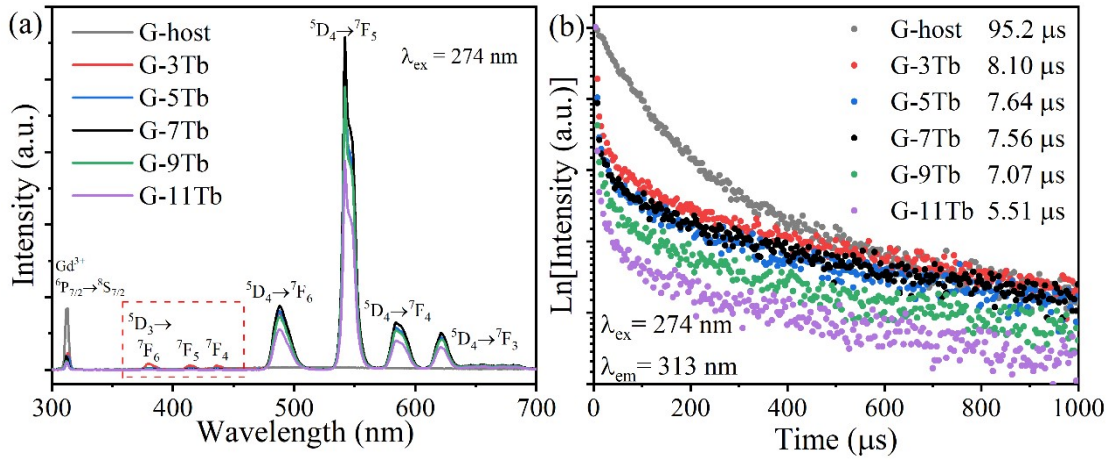

Fig. S1(a) Emission spectra of G-host and G-*x*Tb specimens excited by 274 nm; (b) decay curves of emission at 313 nm of Gd^{3+} in G-host and G-*x*Tb specimens (λ_{ex} = 274 nm).

Table S1 The density of all glass specimens.

Specimen	G-host	G-3Tb	G-5Tb	G-7Tb	G-9Tb	G-11Tb
Density (g/cm^3)	3.90	3.86	3.88	3.88	3.90	3.91

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