

## Supporting information

### **Bright white light emission from lanthanide oxide LaGdO<sub>3</sub> for LED lighting by the Bi<sup>3+</sup> to Eu<sup>3+</sup> energy transfer**

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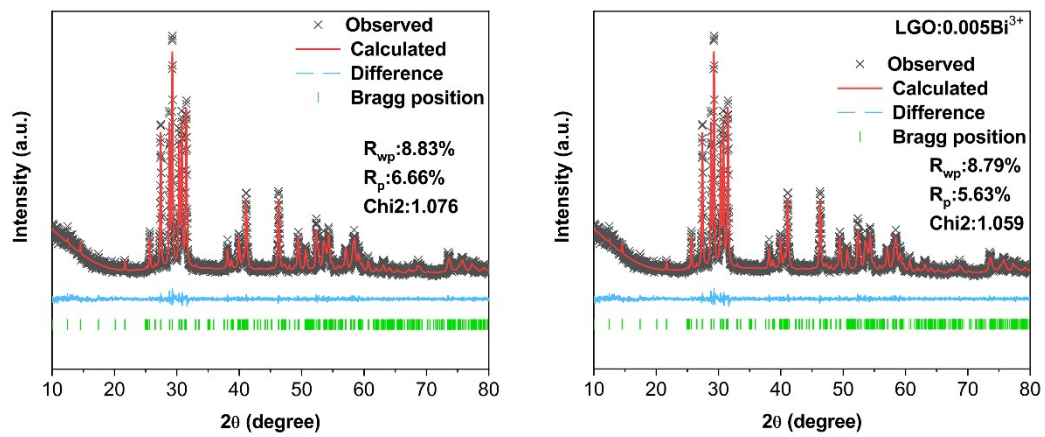


Fig. S1 Rietveld refinements for LGO and LGO: 0.005Bi<sup>3+</sup>.

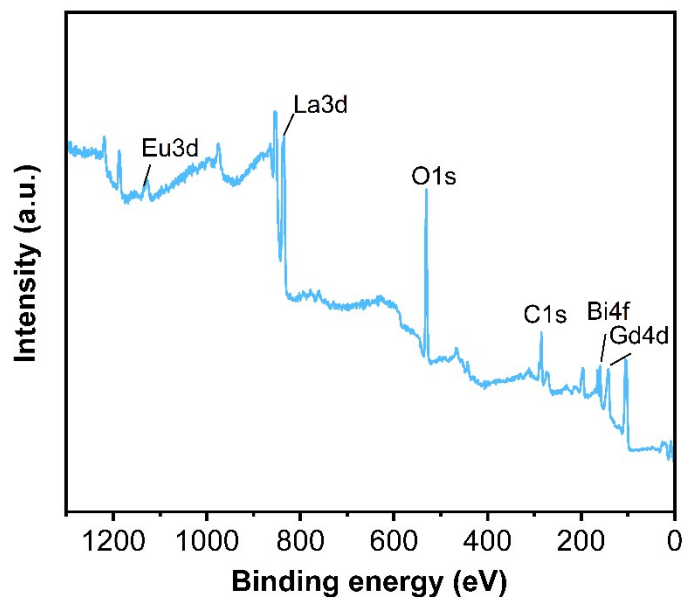


Fig. S2 X-ray photoelectron spectroscopy (XPS) spectra of LGO:Bi<sup>3+</sup>,Eu<sup>3+</sup>.

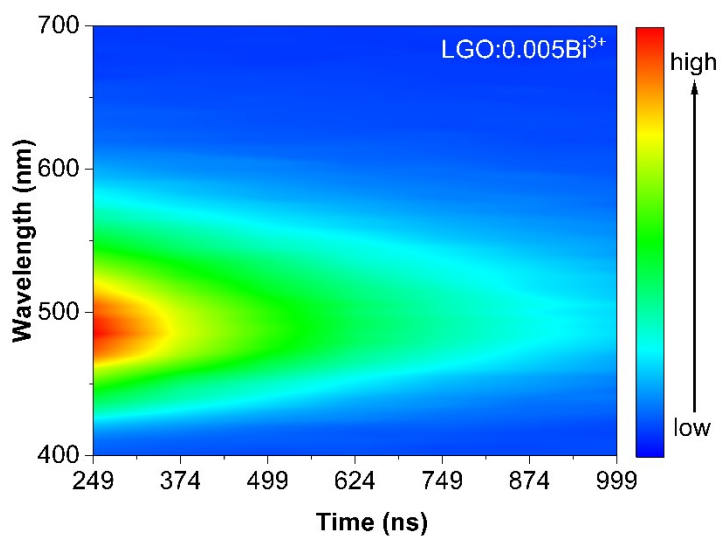


Fig. S3 Time-resolved photoluminescence of LGO:0.005Bi<sup>3+</sup>.

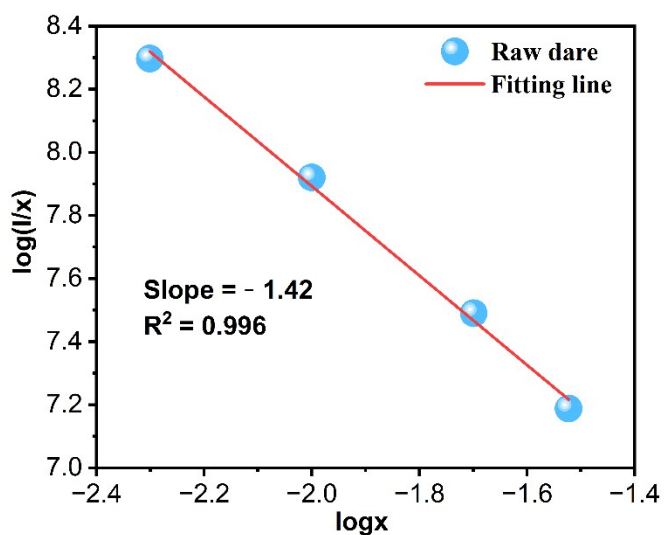


Fig. S4 Linear relationship of  $\log(I/x)$  versus  $\log(x)$  in LGO: $x\text{Bi}^{3+}$ .

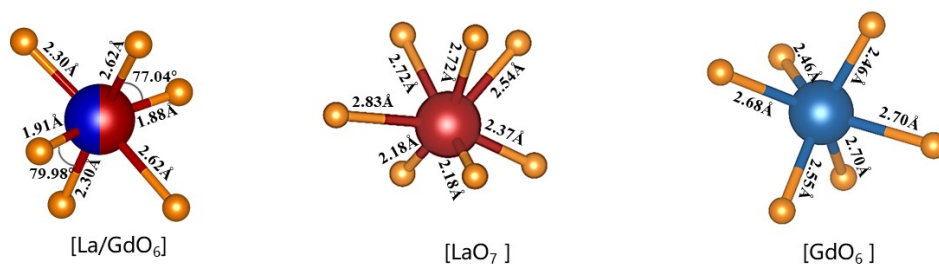
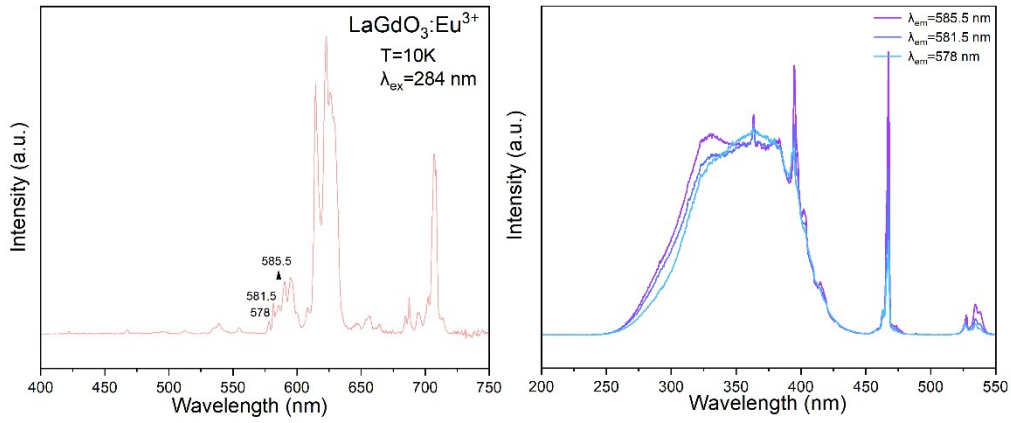
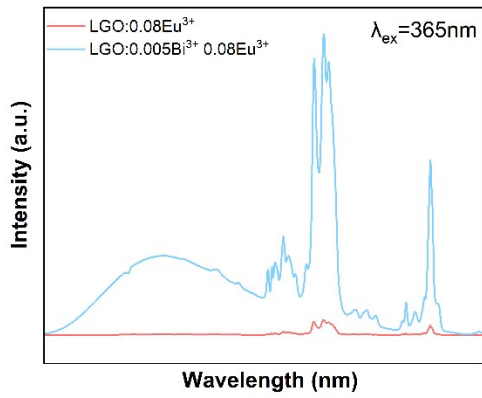


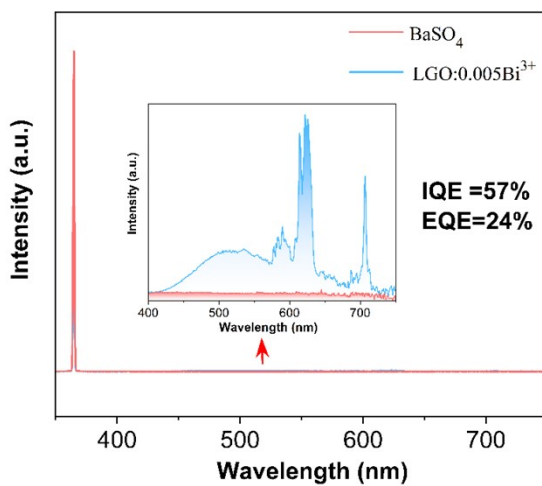
Fig. S5 Bond length and bond angle of the [La/GdO<sub>6</sub>], [LaO<sub>7</sub>] and [GdO<sub>6</sub>].



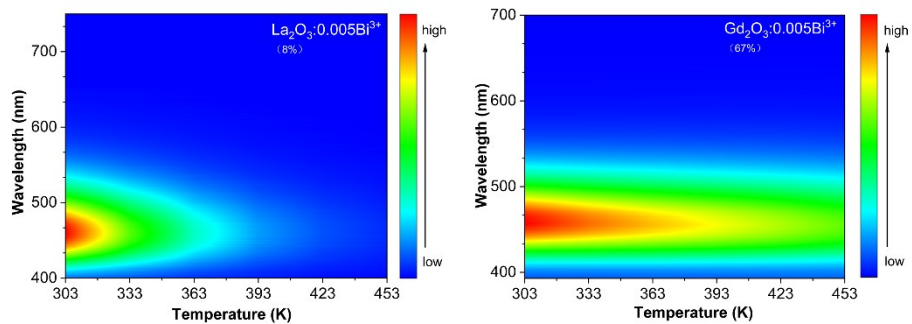
**Fig. S6** PLE ( $\lambda_{em} = 578, 581.5$  and  $585.5$  nm) and PL ( $\lambda_{ex} = 284$  nm) spectra of LGO:0.08Eu<sup>3+</sup> at 10K.



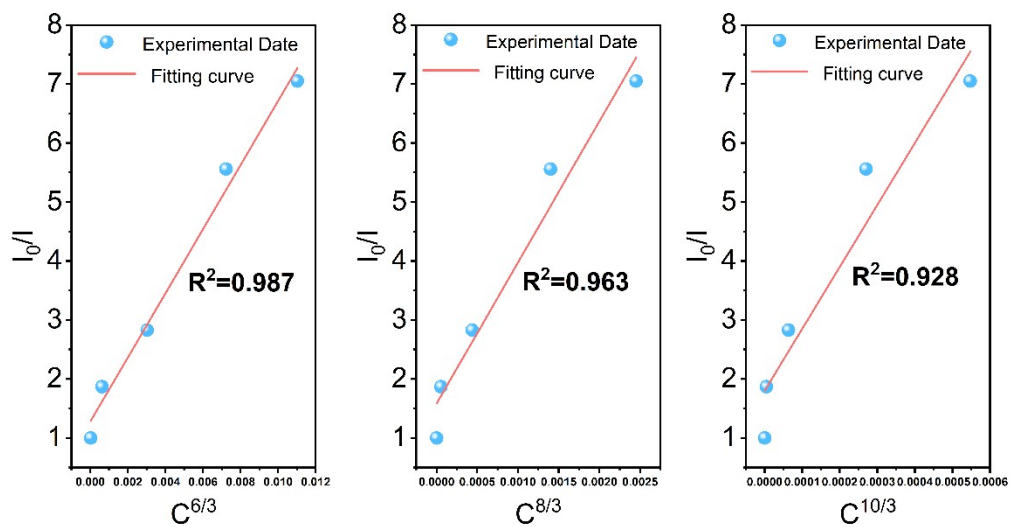
**Fig. S7** PL ( $\lambda_{ex} = 365$  nm) spectra of LGO:0.08Eu<sup>3+</sup> and LGO:0.08Eu<sup>3+</sup>, 0.005Bi<sup>3+</sup>.



**Fig. S8** Excitation line of BaSO<sub>4</sub> and PL spectrum of LGO: 0.005Bi<sup>3+</sup>, 0.05Eu<sup>3+</sup> collected using an integrating sphere.



**Fig. S9** Temperature-dependent PL spectral profiles from 303 to 453 K for  $\text{La}_2\text{O}_3:0.005\text{Bi}^{3+}$  and  $\text{Gd}_2\text{O}_3:0.005\text{Bi}^{3+}$  samples.



**Fig. S10** Dependence of  $I_0/I$  on  $C^{6/3}$ ,  $C^{8/3}$  and  $C^{10/3}$  in  $\text{LGO}:0.005\text{Bi}^{3+}$ ,  $y\text{Eu}^{3+}$  ( $y=0, 0.02, 0.05, 0.08, 0.1$ ) phosphors.