

ARTICLE

Supplementary Information

The band gap of the host is crucial to the luminescent properties of the phosphor. Fig. S1a displays the reflectance spectra of $Y_{0.95}LuGdAl_{5-z}Ga_2O_{12}:0.05Ce^{3+}$, ($z=1-4$, sintered at 1600 °C for 6 h) ranging from 300 to 700 nm. The band gap energy (E_g) of $Y_{0.95}LuGdAl_{5-z}Ga_2O_{12}:0.05Ce^{3+}$ was determined by extrapolating the Kubelka-Munk absorption function:

$$F(R) = (1 - R)^2 / 2R \quad (1)$$

$$[F(R)h\nu]^2 = C (h\nu - E_g) \quad (2)$$

where R represents the diffuse reflection coefficient; $h\nu$ denotes the photon energy, and C is the proportionality constant. As depicted in the inset of Fig. S1b, the extrapolating of the linear portion of the $[F(R)h\nu]^2 - h\nu$ curve yields an E_g value of 4.63 eV for the $Y_{0.95}LuGdAl_4GaO_{12}:0.05Ce^{3+}$ ($z=1$), 4.25 eV for $Y_{0.95}LuGdAlGa_4O_{12}:0.05Ce^{3+}$ ($z = 4$).

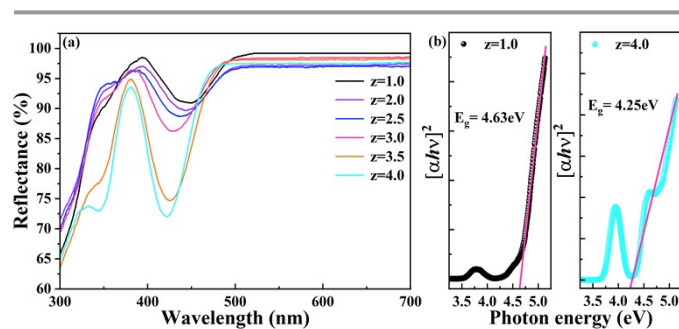


Fig. S1 (a) Diffuse reflection spectra of $Y_{0.95}LuGdAl_{5-z}Ga_2O_{12}:0.05Ce^{3+}$ ($z=1-4$). (b) The experimental E_g of $Y_{0.95}LuGdAl_4GaO_{12}:0.05Ce^{3+}$ ($z=1$) and $Y_{0.95}LuGdAlGa_4O_{12}:0.05Ce^{3+}$ ($z = 4$).