Supporting Information

Regulating luminescence thermal quenching based on the synergistic effect of energy transfer and energy gap modulation

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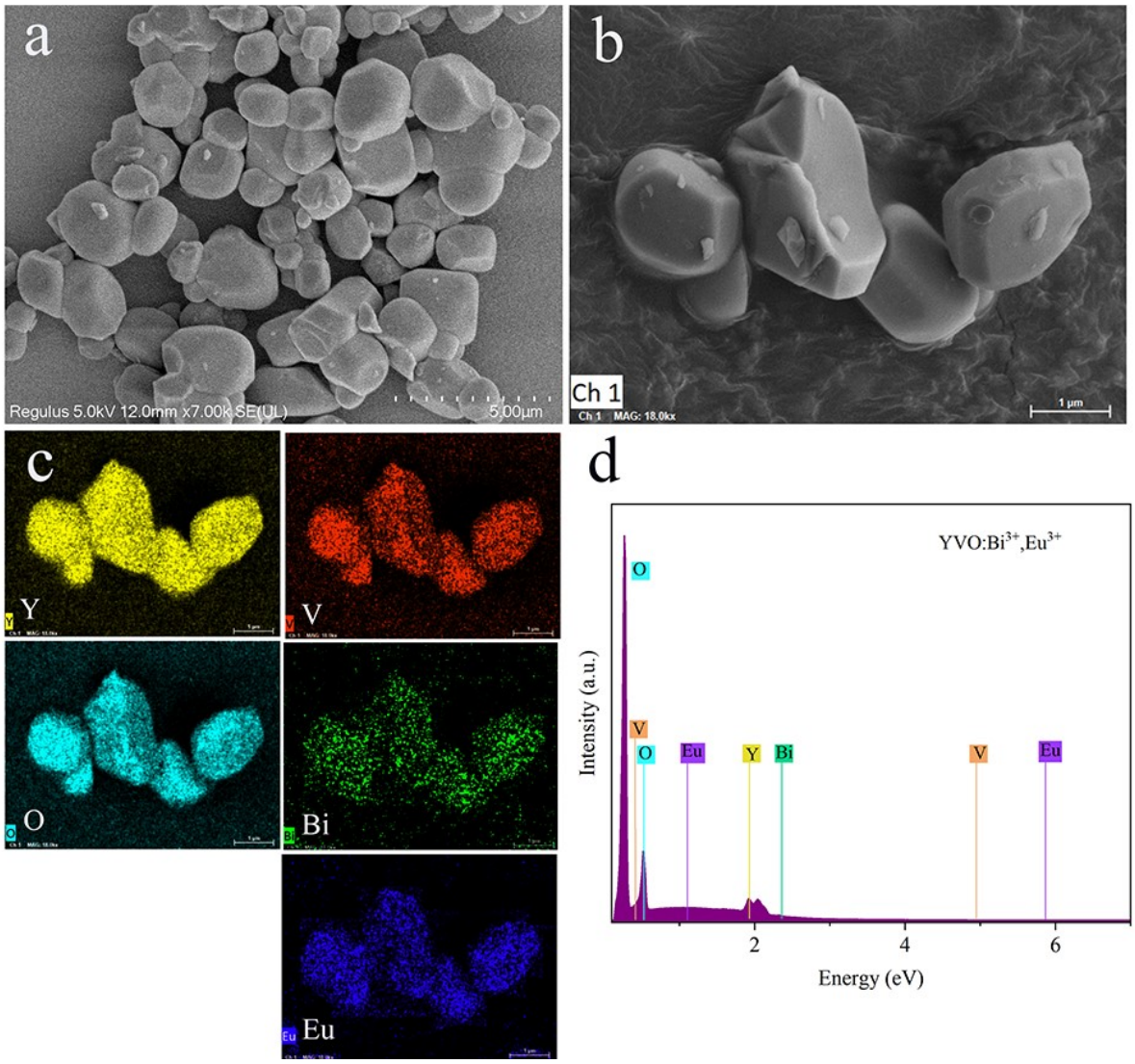

Fig. S1 (a) Typical SEM image of YVO_4:Bi^{3+}, Eu^{3+}solid solution. (b) Mapping diagram of YVO_4:Bi^{3+}, Eu^{3+}solid solution. (c) The corresponding elemental mapping analysis for the Y, V, O, Bi and Eu elements. (d) EDS spectra of YVO_4:Bi^{3+}, Eu^{3+}.

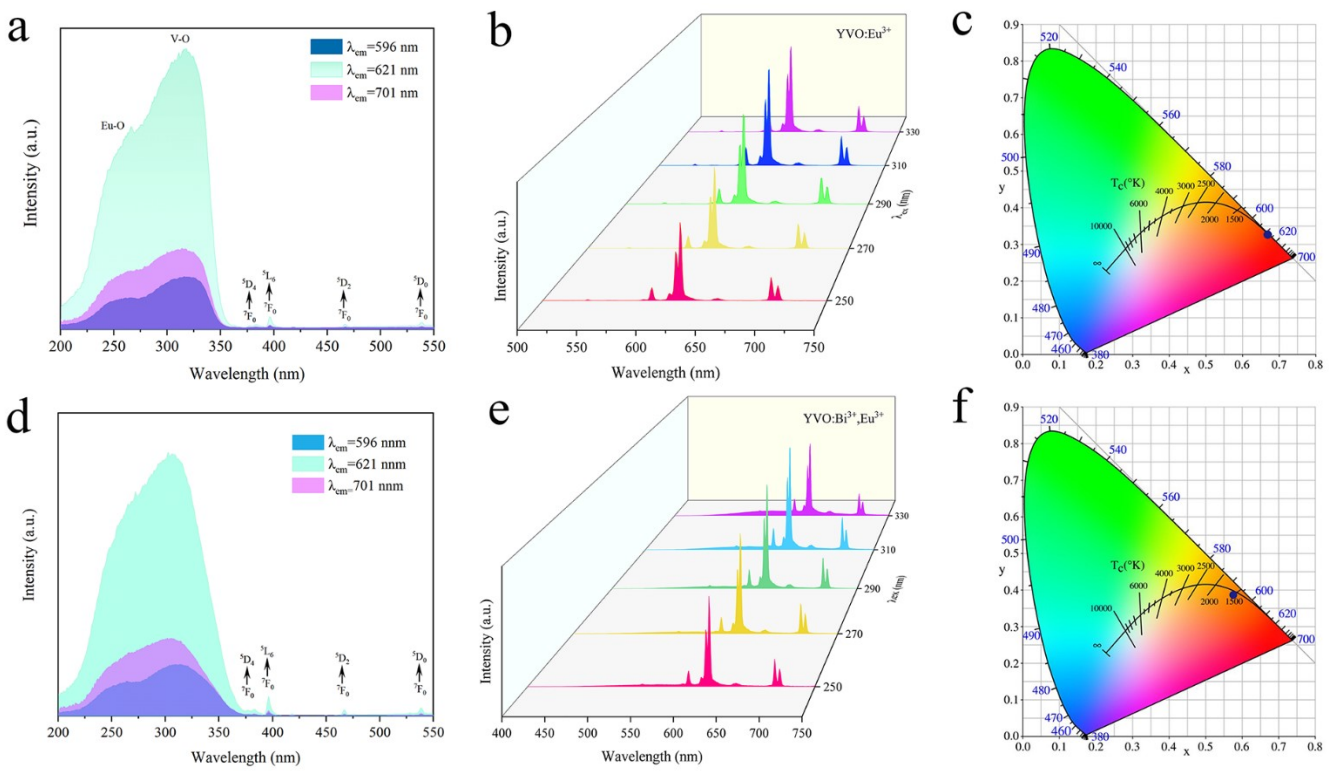

Fig. S2 (a) PLE spectra of YVO_4: Eu^{3+} (λ_{em} =596 nm, 621 nm, 621 nm). (b) PL spectra of YVO_4: Eu^{3+} (λ_{ex} =250 nm, 270 nm, 290 nm, 310 nm, 330 nm). (c) CIE chromaticity diagram (λ_{ex}=310 nm). (d) PLE spectra of YVO_4:Bi^{3+}, Eu^{3+} (λ_{em} =596 nm, 621 nm, 621 nm). (e) PL spectra of YVO_4:Bi^{3+}, Eu^{3+} (λ_{ex} =250 nm, 270 nm, 290 nm, 310 nm, 330 nm). (f) CIE chromaticity diagram (λ_{ex}=310 nm).

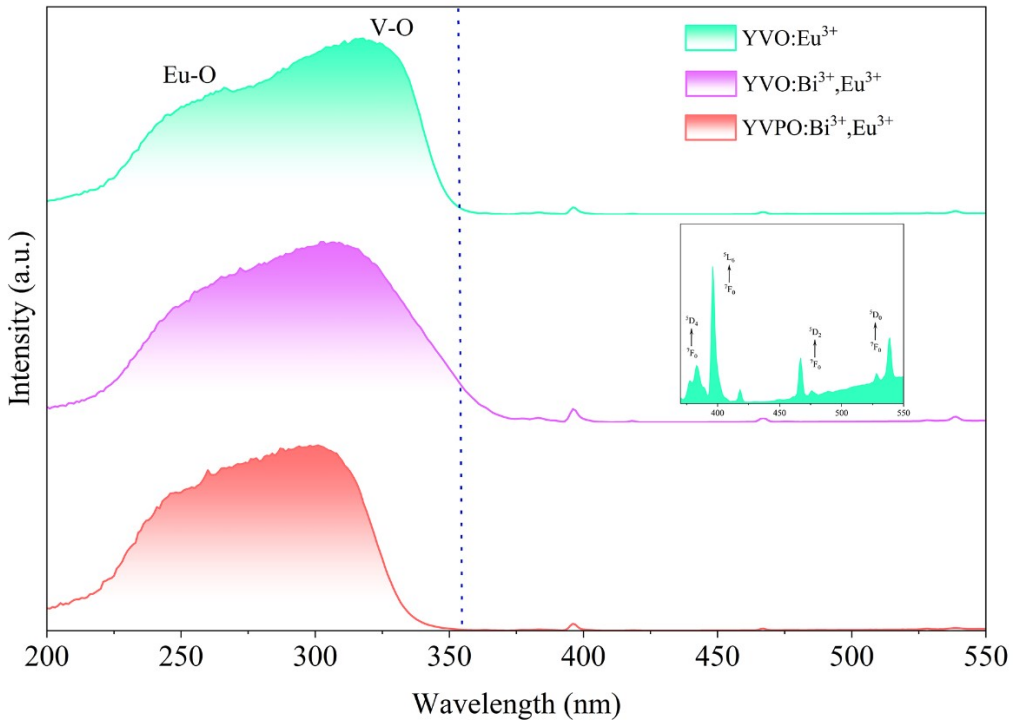

Fig. S3 PLE spectra of YVO_4: Eu^{3+}, YVO_4:Bi^{3+}, Eu^{3+} and $YV_{0.25}P_{0.75}O_4$:Bi^{3+}, Eu^{3+} at λ_{em}=621nm.

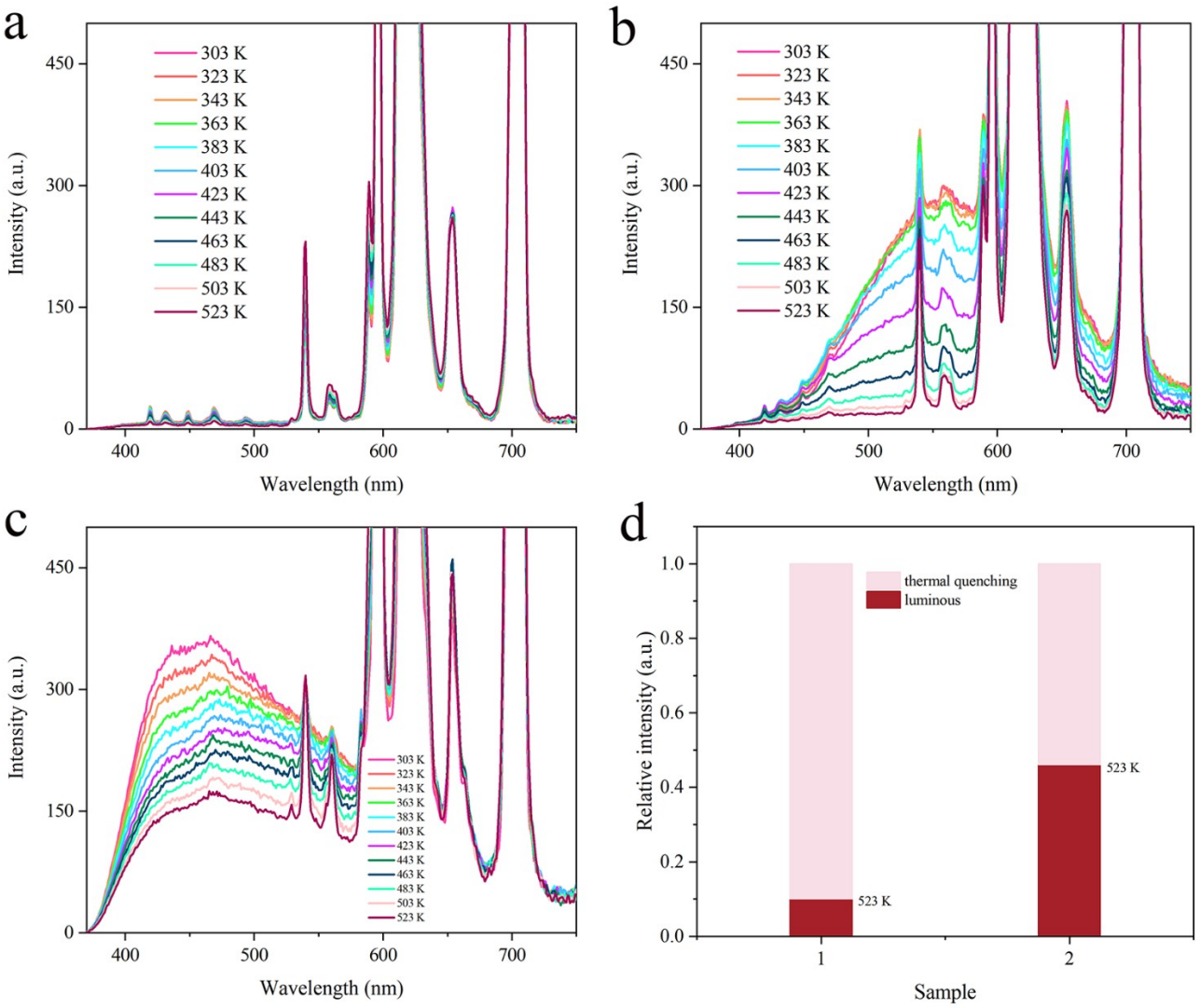

Fig. S4 PL spectra of (a) YVO_4: Eu^{3+} (λ_{ex}=320 nm), (b) PL spectra of YVO_4:Bi^{3+}, Eu^{3+} (λ_{ex}=310 nm), (c) PL spectra of $YV_{0.25}P_{0.75}O_4$:Bi^{3+}, Eu^{3+} (λ_{ex}=305 nm) at various temperatures. (d) Relative emission intensity of Bi^{3+} at various temperature.

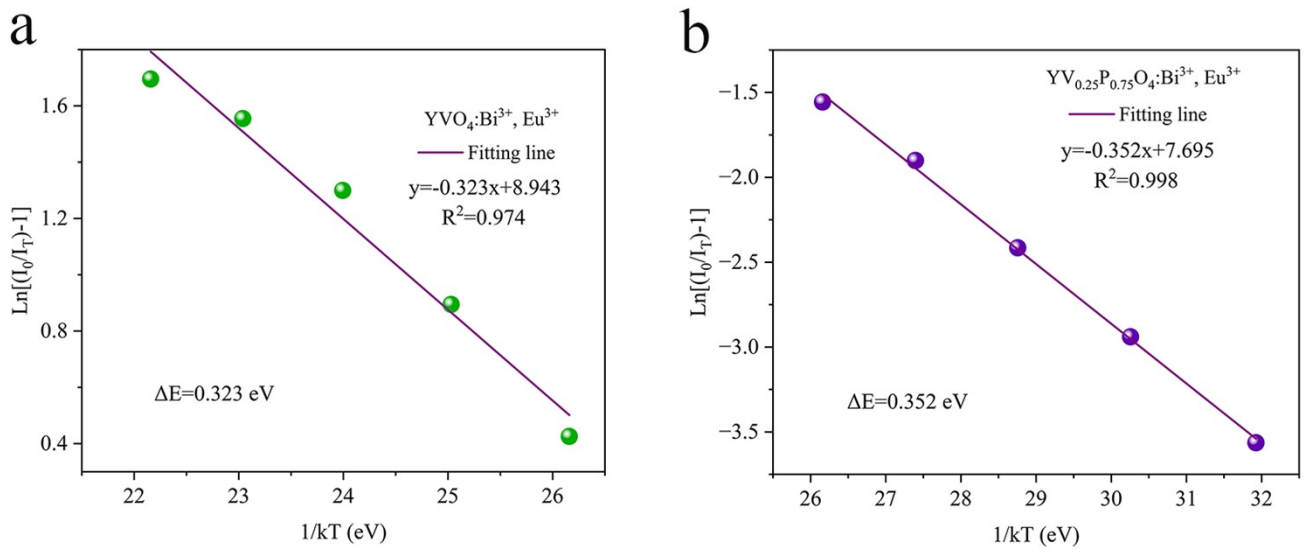

Fig. S5 Thermal quenching activation energy (ΔE) of (a) $YVO_4:Bi^{3+}$, Eu^{3+} and (b) $YV_{0.25}P_{0.75}O_4:Bi^{3+}$, Eu^{3+}.