

Supporting information

Multicolor tunable luminescence based on Tb³⁺/Eu³⁺ doping through a facile hydrothermal route

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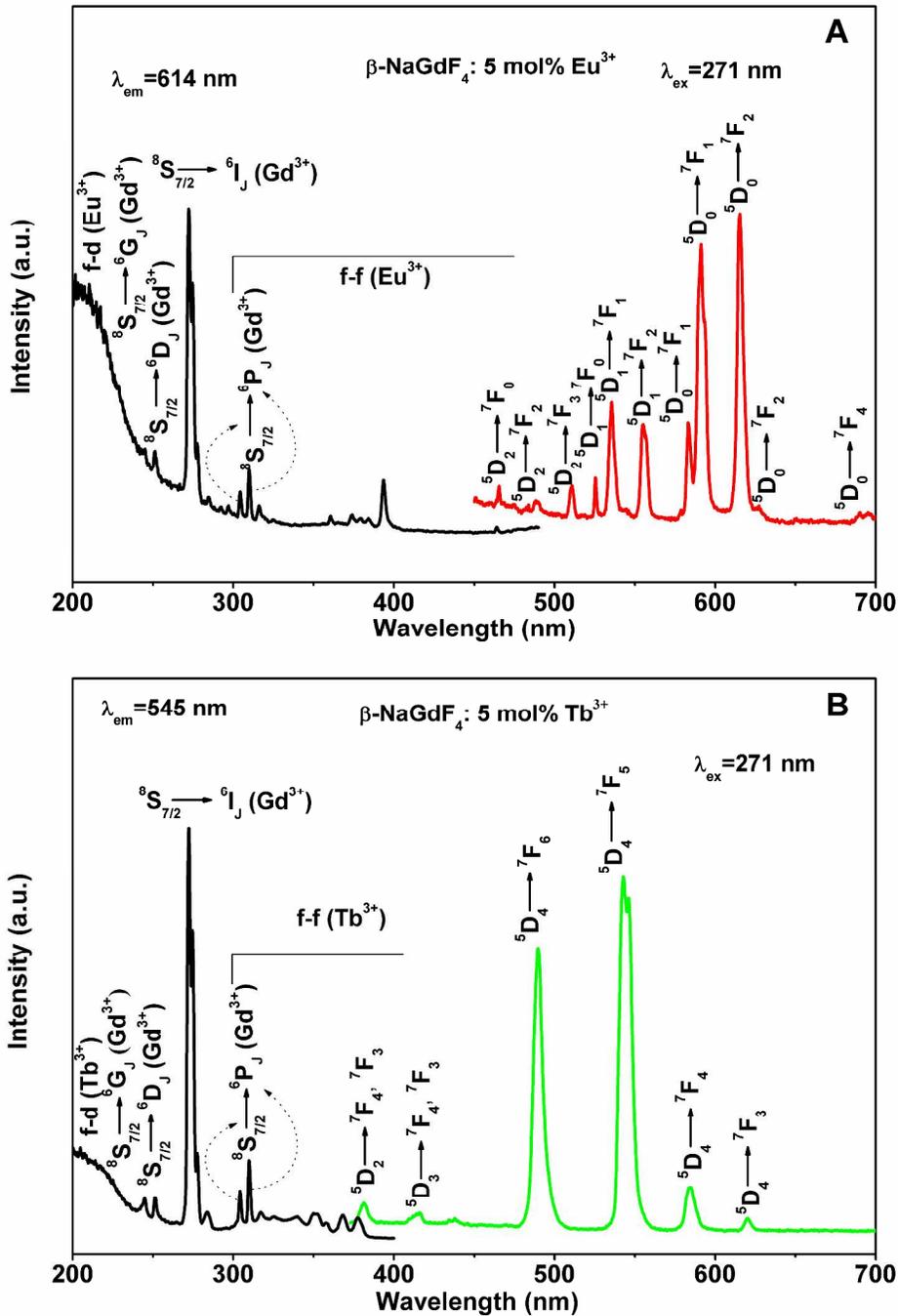


Figure S1. PL excitation (left) and emission (right) spectra of $\beta\text{-NaGdF}_4: 5 \text{ mol\% Eu}^{3+}$ (A) and $\beta\text{-NaGdF}_4: 5 \text{ mol\% Tb}^{3+}$ (B) samples. The excitation spectra (Figure S1, left) are obtained by monitoring the emissions at 614 nm ($5D_0 \rightarrow 7F_2$ transition of Eu^{3+}) and 545 nm ($5D_4 \rightarrow 7F_5$ transition

of Tb^{3+}). Hereinto, the broad bands at 200–230 nm (centered at ~ 215 nm) are ascribed to the overlapping of low-spin (LS) inter-configurational $4f^8 \rightarrow 4f^7 5d^1$ transitions of Eu^{3+} , Tb^{3+} and ${}^8\text{S}_{7/2} \rightarrow {}^6\text{G}_J$ of Gd^{3+} ions. The weak peaks in the range of 240–260 nm are due to ${}^8\text{S}_{7/2} \rightarrow {}^6\text{D}_J$ transitions of Gd^{3+} ions, whereas the sharp excitation peaks with a maxima at 271 nm is attributed to the typical ${}^8\text{S}_{7/2} \rightarrow {}^6\text{I}_J$ transition of Gd^{3+} ions. The emission spectra show the typical emissions of Eu^{3+} ions at 614 nm and 590 nm (Figure S1 (A), right) and characteristic emissions of Tb^{3+} ions at 488 nm, 545 nm, 585 nm and 620 nm (Figure S1 (B), right).

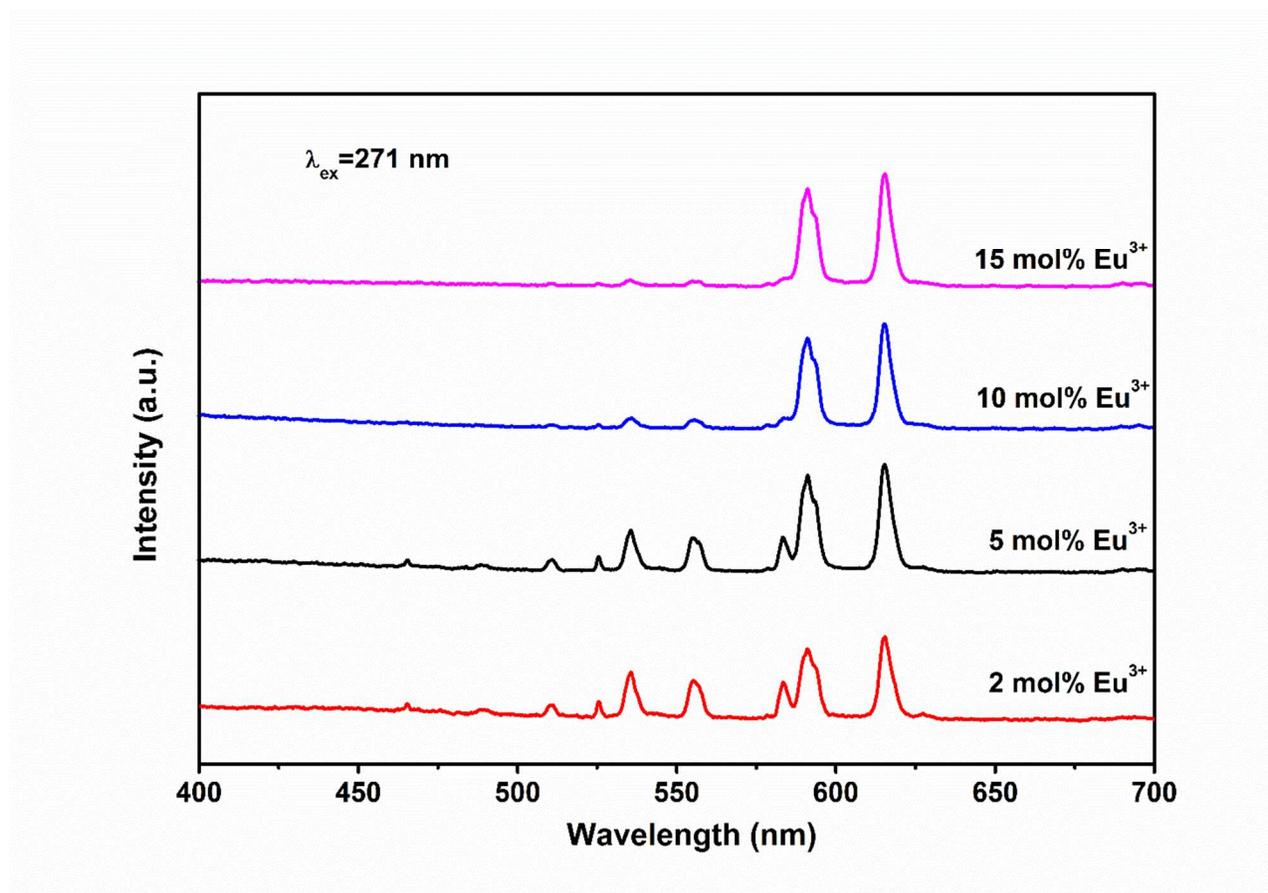


Figure S2. PL emission spectra of β -NaGdF₄: x mol% Eu³⁺ ($x=2, 5, 10$ and 15) samples. With increasing dopant concentration of Eu³⁺ from 2 mol% to 5 mol%, enhanced red emission is obtained. While further increase the Eu³⁺ doping concentration from 5 mol% to 15 mol%, the red emission nearly stay the same.

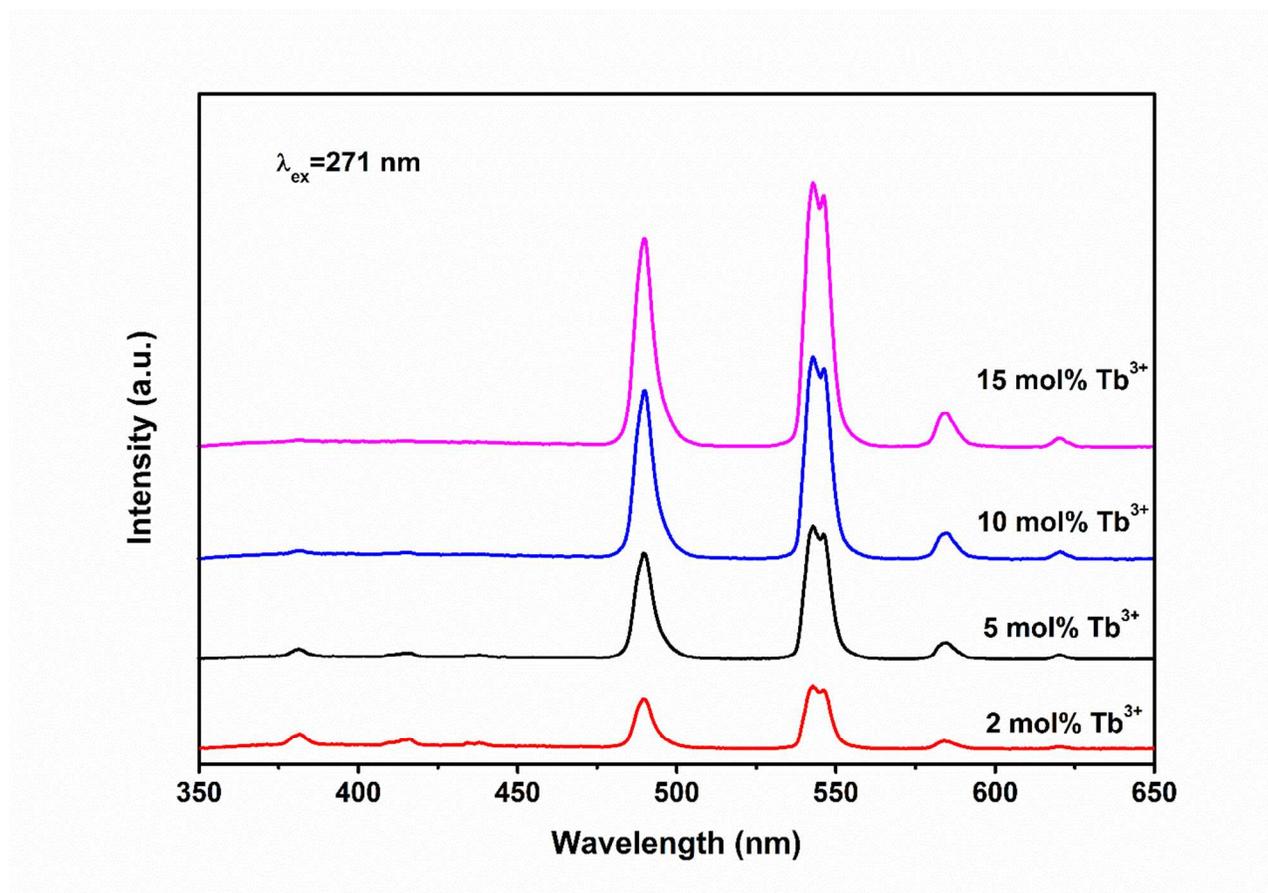


Figure S3. PL emission spectra of β -NaGdF₄: y mol% Tb³⁺ ($y=2, 5, 10$ and 15) samples. With increasing dopant concentration of Tb³⁺ from 2 mol% to 15 mol%, enhanced green and blue emissions are obtained.