

Deep trap engineering in $\text{Gd}_3\text{GaO}_6:\text{Bi}^{3+}$ persistent phosphors through co-doping lanthanide ions

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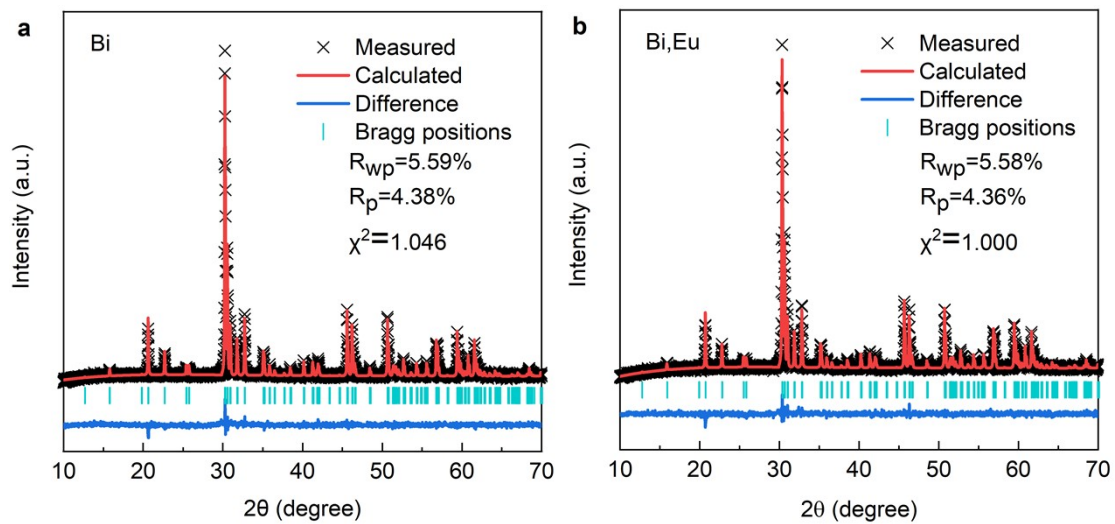


Fig. S1. The Rietveld refinement of pure GGO:Bi and GGO:Bi,Eu.

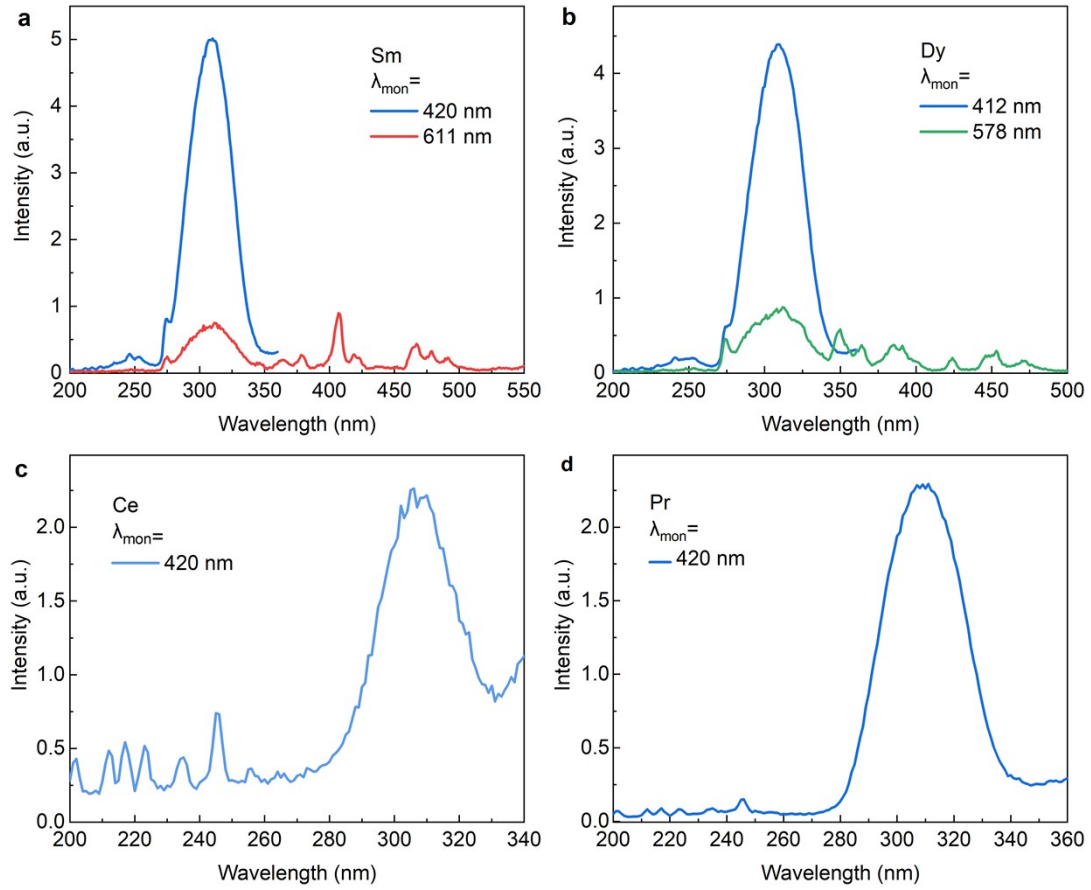


Fig. S2. PLE spectra of GGO:Bi,Ln³⁺ (Ln=Sm, Dy, Ce and Pr). (a) GGO:Bi,Sm³⁺; (b) GGO:Bi,Dy³⁺; (c) GGO:Bi,Ce³⁺ and (d) GGO:Bi,Pr³⁺.

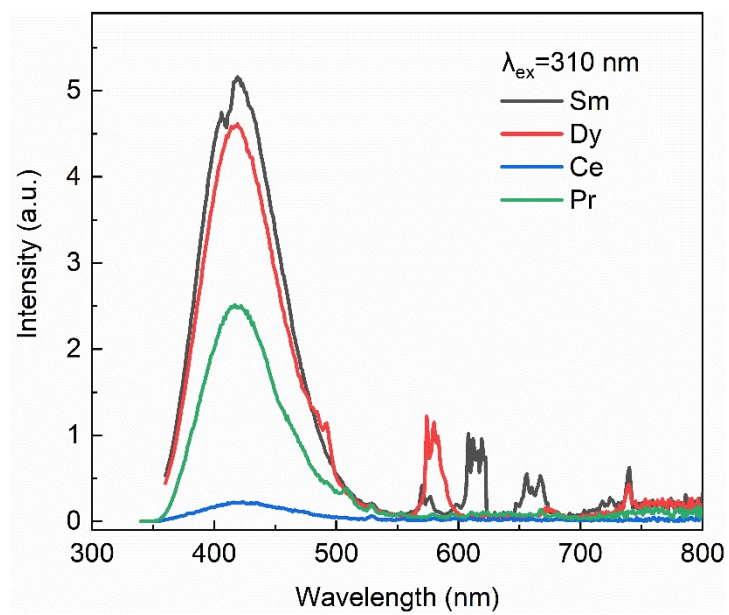


Fig. S3. PL spectra of GGO:Bi,Ln³⁺ (Ln=Sm, Dy, Ce and Pr).

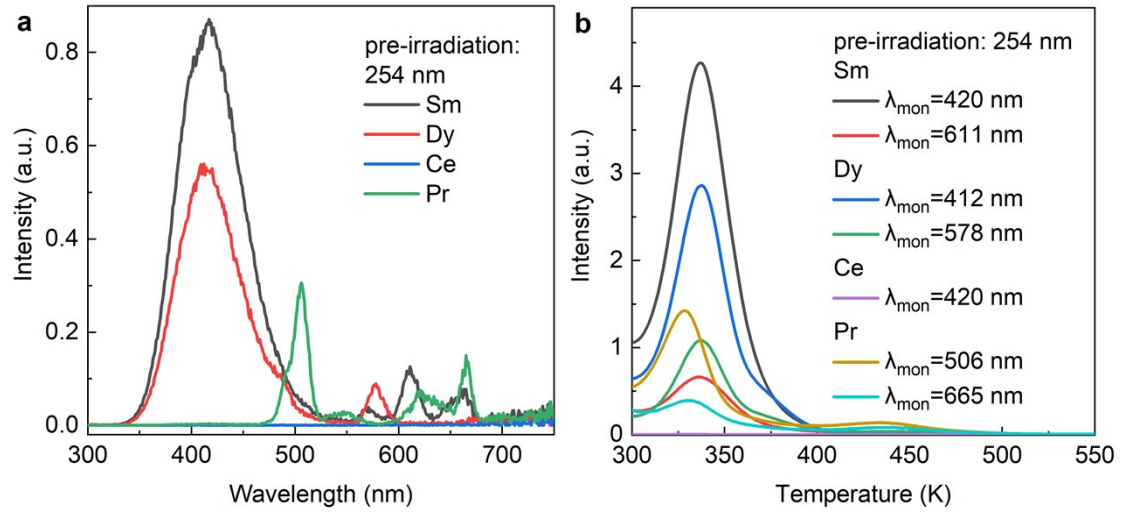


Fig. S4. PersL and TL spectra of GGO:Bi, Ln³⁺ (Ln=Sm, Dy, Ce and Pr). (a,b) PersL spectra and TL curves. Before the measurement of PersL and PSL, the samples have been pre-irradiated for 3 min.

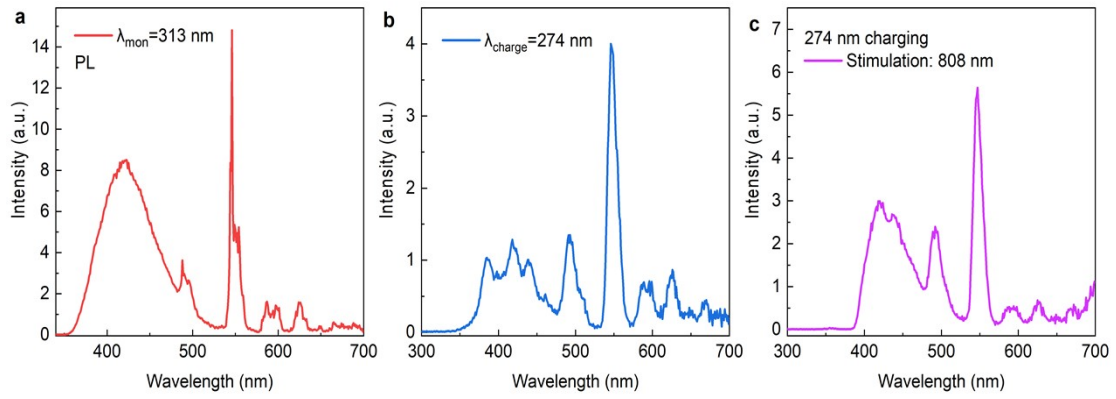


Fig. S5. Comparison of PL, PersL and PSL emission spectra in GGO:Bi,Tb³⁺. (a) PL spectrum; (b) PersL spectrum and (c) PSL spectra. Before the measurement of PersL and PSL, the sample has been pre-irradiated for 3 min.