

On the decay time of upconversion luminescence

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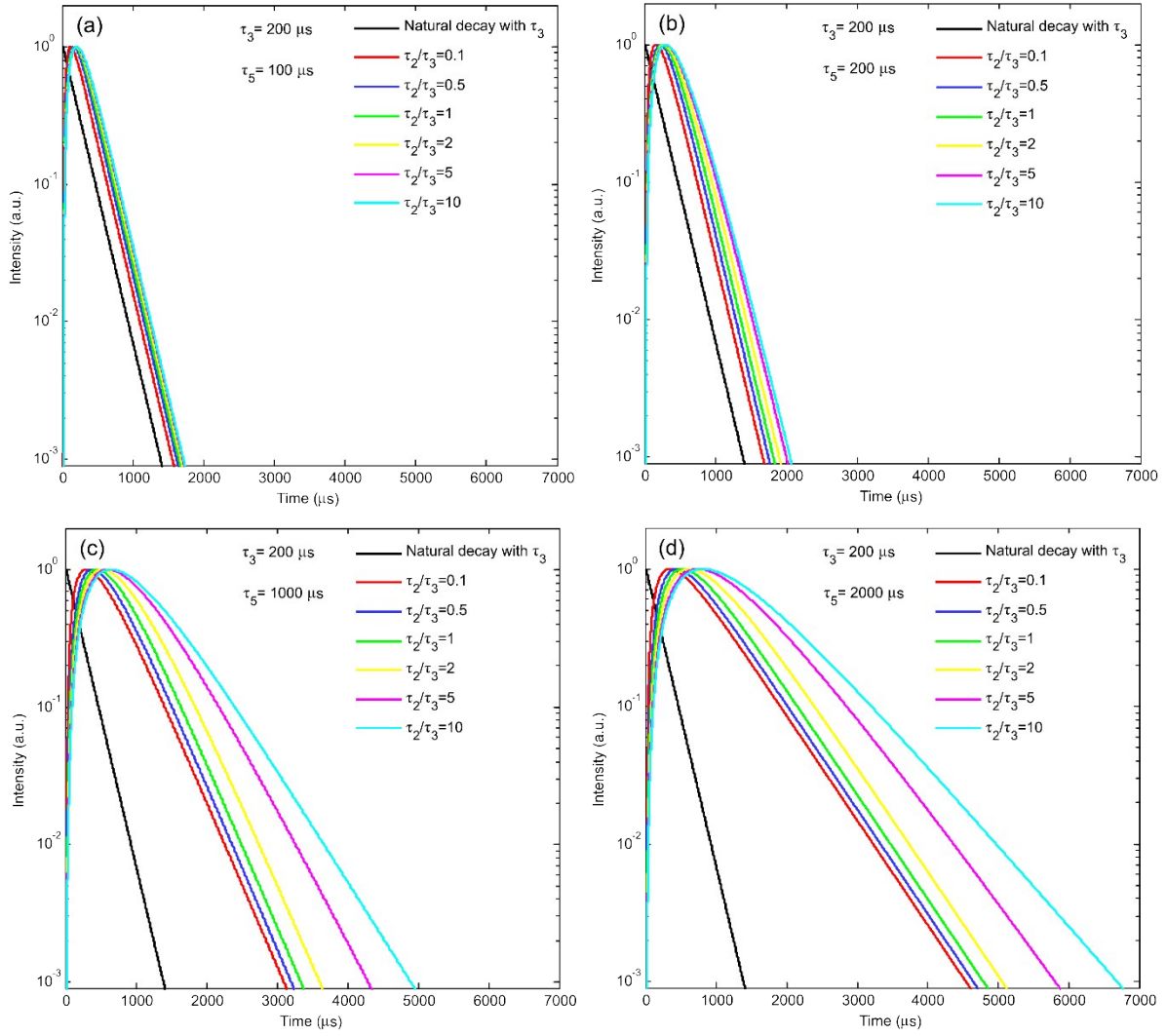


Figure S1 UCL decay profiles under short-pulse upconversion excitation with different τ_2/τ_3 , given that (a) $\tau_5 = 100 \mu\text{s}$, (b) $\tau_5 = 200 \mu\text{s}$, (c) $\tau_5 = 1000 \mu\text{s}$, and (d) $\tau_5 = 2000 \mu\text{s}$

Table S1 Summary of constant parameters used in the simulations studying the effect of the doping levels of activator ions

σ (cm ²)	n_S (cm ⁻³)	τ_2 (ms)	τ_3 (ms)	τ_5 (ms)	W_1 (cm ³ s ⁻¹)	W_2 (cm ³ s ⁻¹)
1.5×10^{-20}	1.5×10^{21}	1.32	0.2	1.32	2.5×10^{-18}	5×10^{-17}

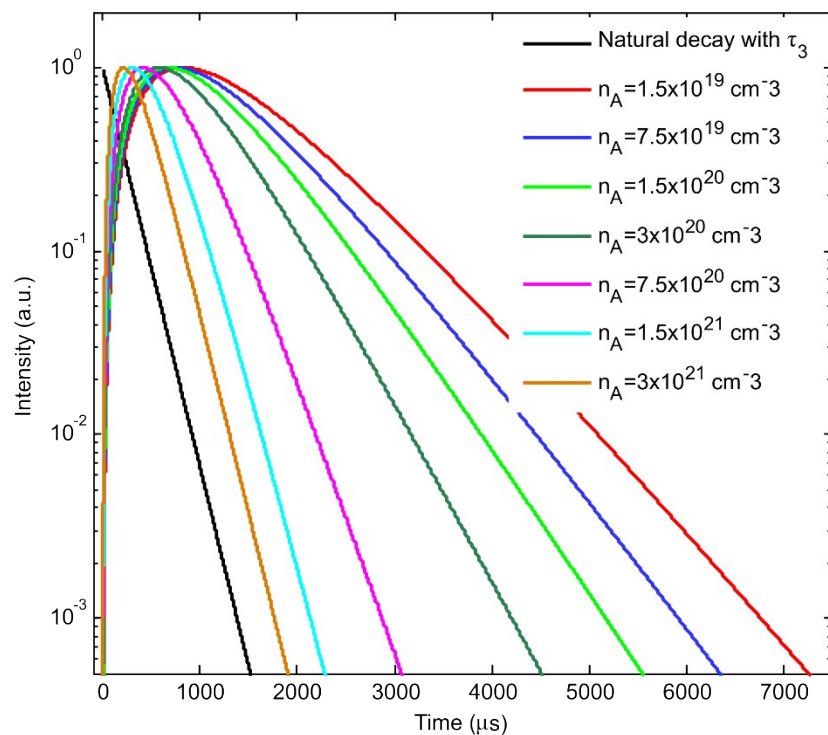


Figure S2 Upconversion luminescence decay profiles under short pulse excitation with different doping levels of activator ions

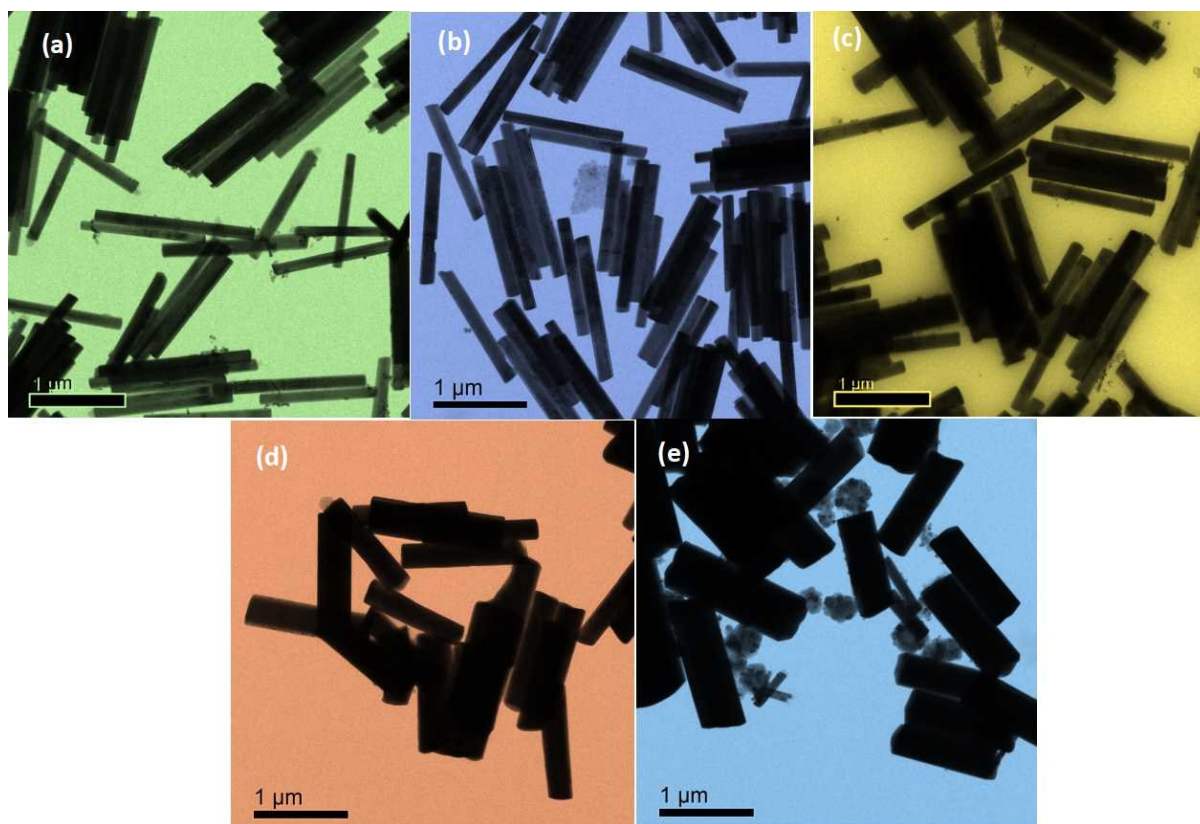


Figure S3 Transmission electron microscopic images of (a) NaYF₄:2% Yb³⁺, 5% Er³⁺, (b) NaYF₄:6% Yb³⁺, 5% Er³⁺, (c) NaYF₄:20% Yb³⁺, 5% Er³⁺, (d) NaYF₄:50% Yb³⁺, 5% Er³⁺, and (e) NaYF₄:80% Yb³⁺, 5% Er³⁺ nanorods