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Supporting Information

Li⁺ ions doping: An Approach for Improving the Crystallinity and Upconversion Emissions of NaYF₄: Yb³⁺, Tm³⁺ Nanoparticles

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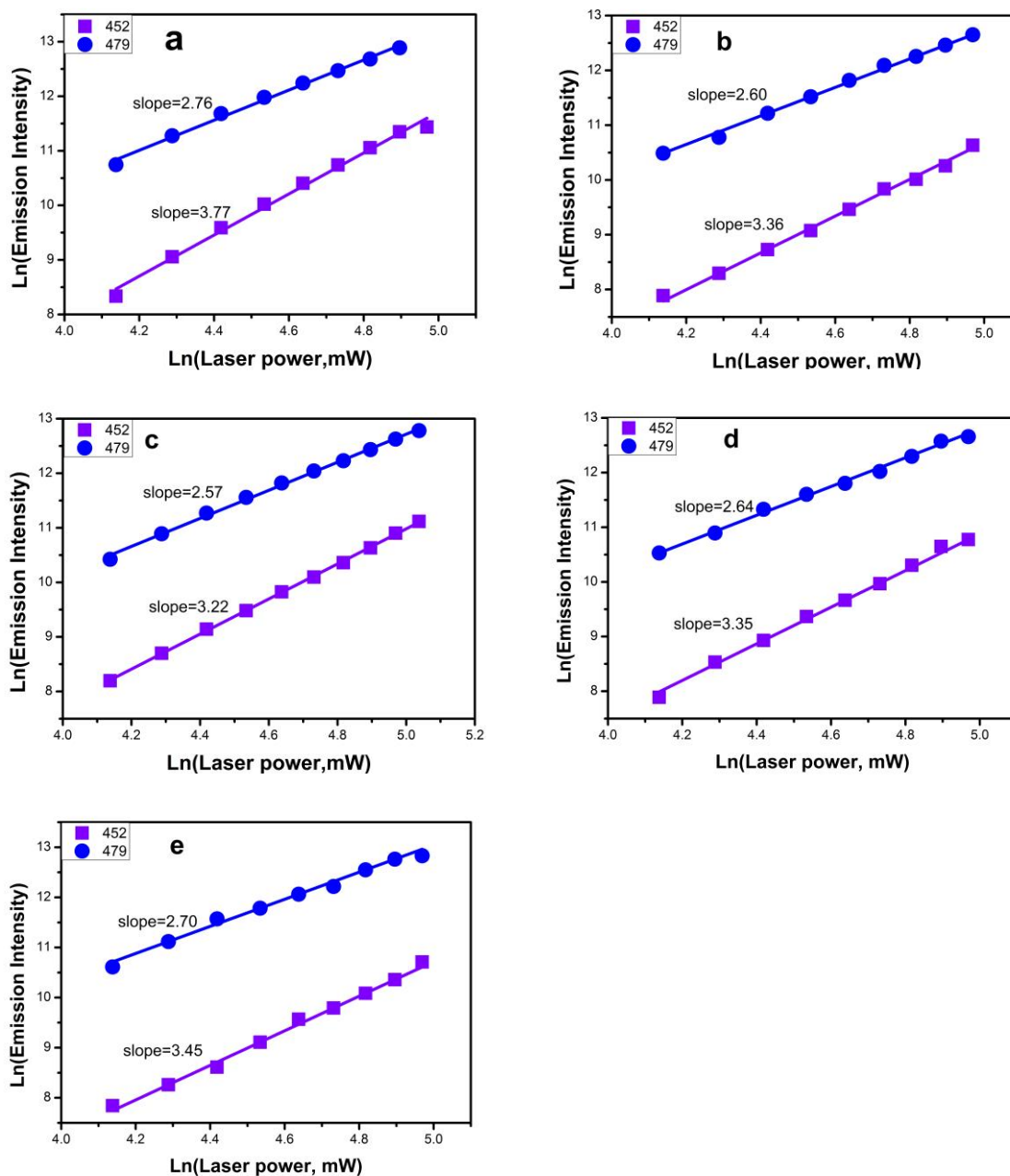


Figure S1. Pump power dependence of the violet(452 nm) and blue(479 nm) emission of NaYF₄: Yb³⁺, Tm³⁺ nanocrystals: (a) 0 mol% Li⁺, (b) 5 mol% Li⁺, (c) 7 mol% Li⁺, (d) 10 mol% Li⁺, (e) 15 mol% Li⁺.

As shown in Fig. S1, the n values of all the samples of NaYF₄: Yb³⁺, Tm³⁺ nanocrystals introducing Li⁺ ions were smaller than that of NaYF₄: Yb³⁺, Tm³⁺ nanocrystals.

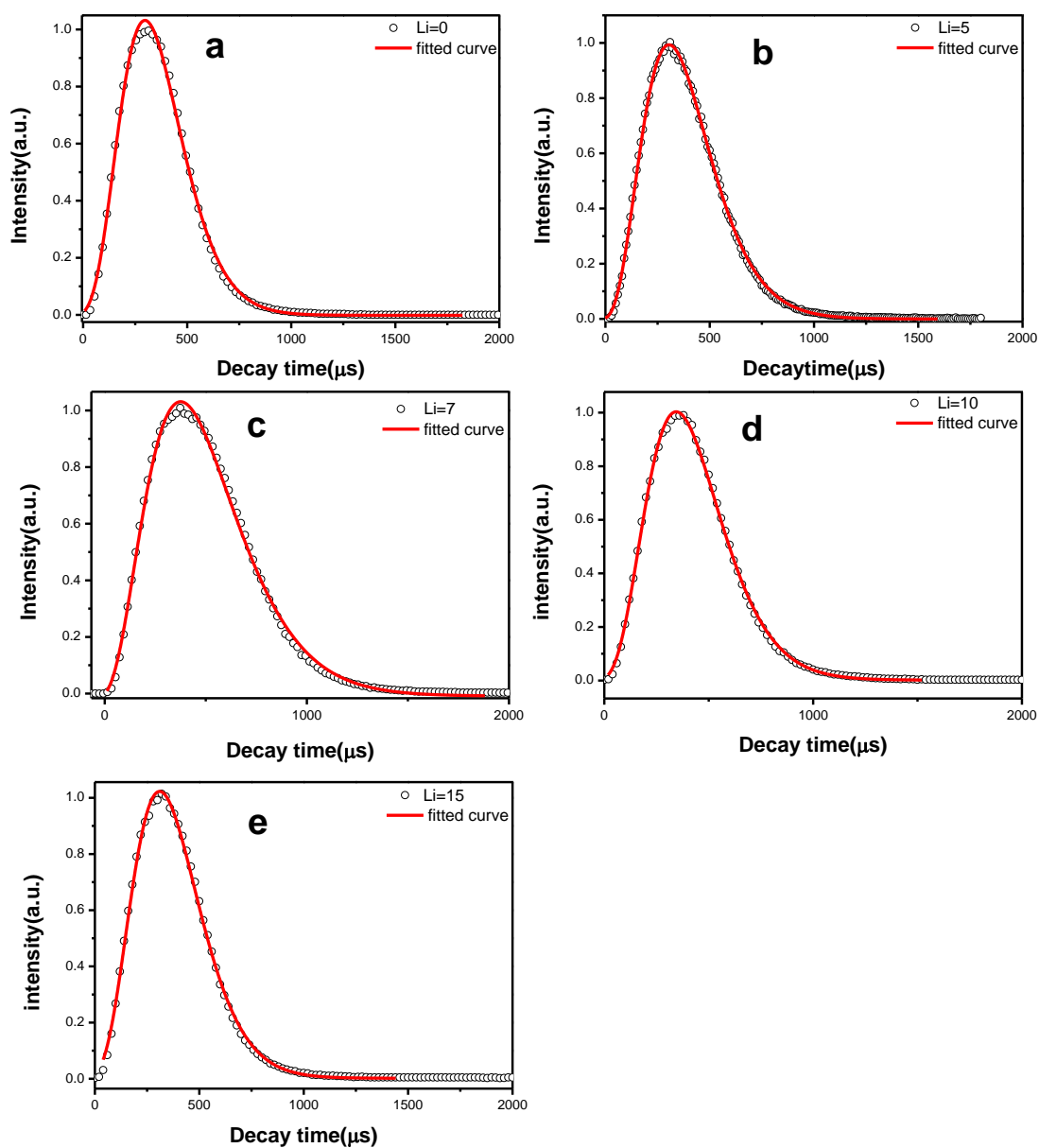


Figure S2. Temporal evolutions of UC luminescence from ¹D₂ levels of Tm³⁺ ions in NaYF₄: Yb³⁺, Tm³⁺ co-doped with Li⁺ ions (0, 5, 7, 10, 15 mol%) corresponding to (a–e) by monitoring the UC emissions centered at 452 nm under excitation of a 980 nm laser, black circles experimental data; coloured solid line fitting by:

$$I(t) = I_0 - A_1 \exp(-t / \tau_1) + A_2 \exp(-t / \tau_2)$$

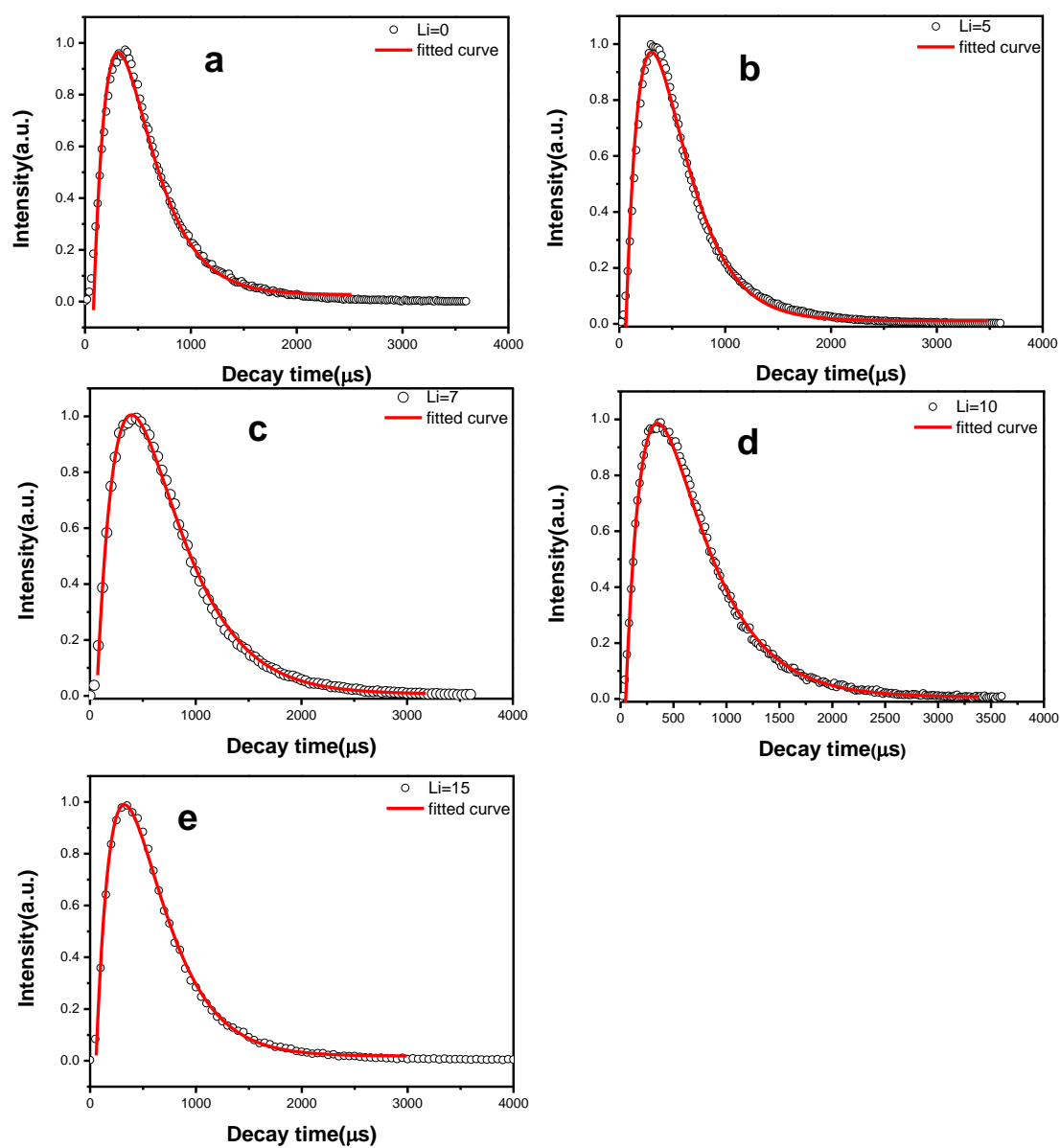


Figure S3. Temporal evolutions of UC luminescence from ¹G₄ levels of Tm³⁺ ions in NaYF₄: Yb³⁺, Tm³⁺ co-doped with Li⁺ ions (0, 5, 7, 10, 15 mol%) corresponding to (a–e) by monitoring the UC emissions centered at 479nm under excitation of a 980 nm laser, black circles experimental data; coloured solid line: fitting by:

$$I(t) = I_0 - A_1 \exp(-t/\tau_1) + A_2 \exp(-t/\tau_2)$$