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Supporting Information

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

*Chengzhou Zhao,^{a,b} Xianggui Kong,^{*a} Xiaomin Liu,^a Langping Tu,^{a,b} Fei Wu,^{a,b}*

*Youlin Zhang,^a Kai Liu,^{a,b,c} Qinghui Zeng^a and Hong Zhang^{*c}*

^a State Key Laboratory of Luminescence and Applications, Changchun Institute of Optics, Fine Mechanics and Physics, Chinese Academy of Sciences, Changchun 130033, P. R. China.

^b Graduate University of the Chinese Academy of Sciences, Beijing 100049, P. R. China.

^c Van't Hoff Institute for Molecular Sciences, University of Amsterdam, Science Park 904, 1098 XH Amsterdam, The Netherlands.

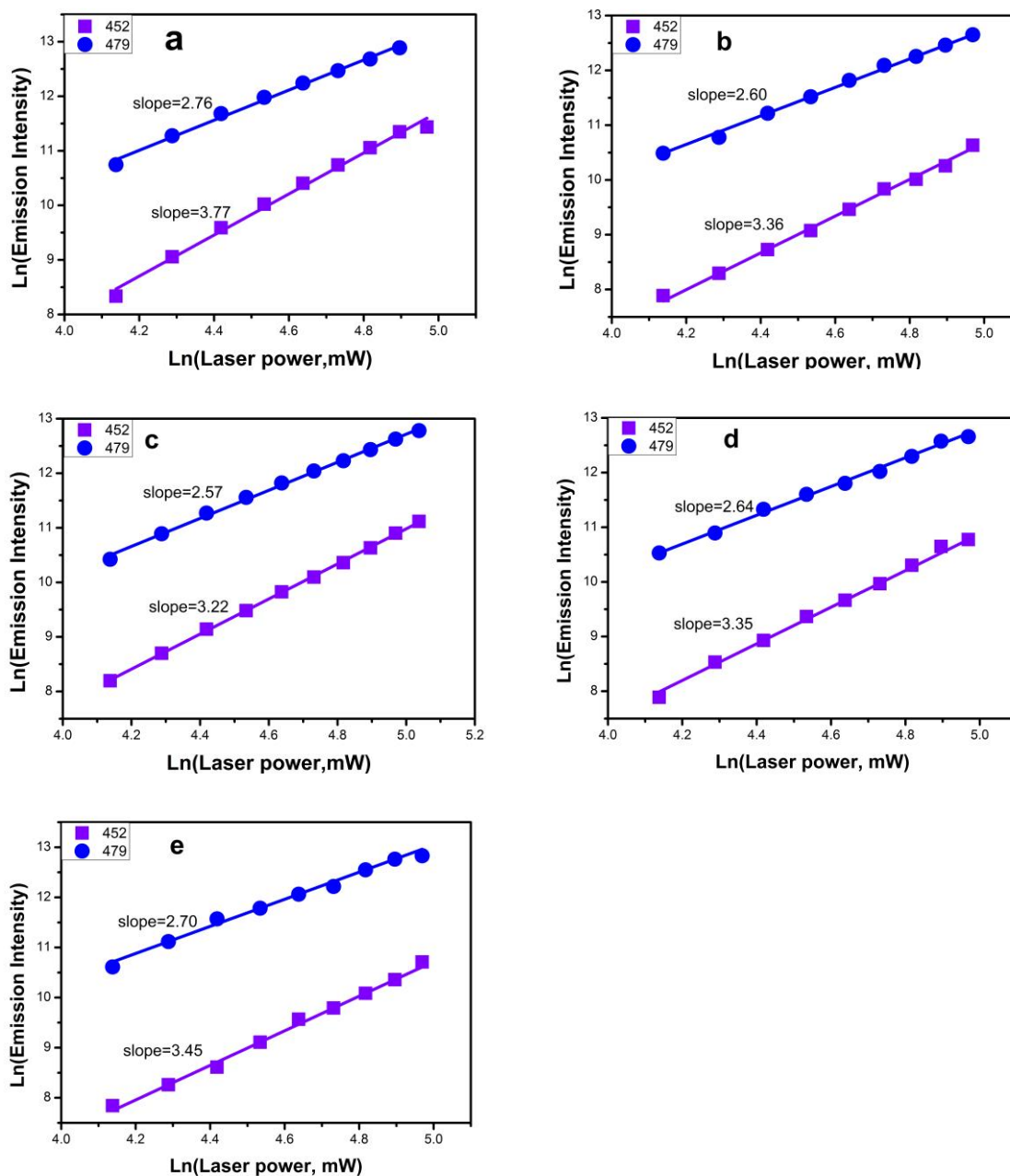


Figure S1. Pump power dependence of the violet(452 nm) and blue(479 nm) emission of NaYF₄: Yb³⁺, Tm³⁺ nanocrystals: (a) 0 mol% Li⁺, (b) 5 mol% Li⁺, (c) 7 mol% Li⁺, (d) 10 mol% Li⁺, (e) 15 mol% Li⁺.

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.

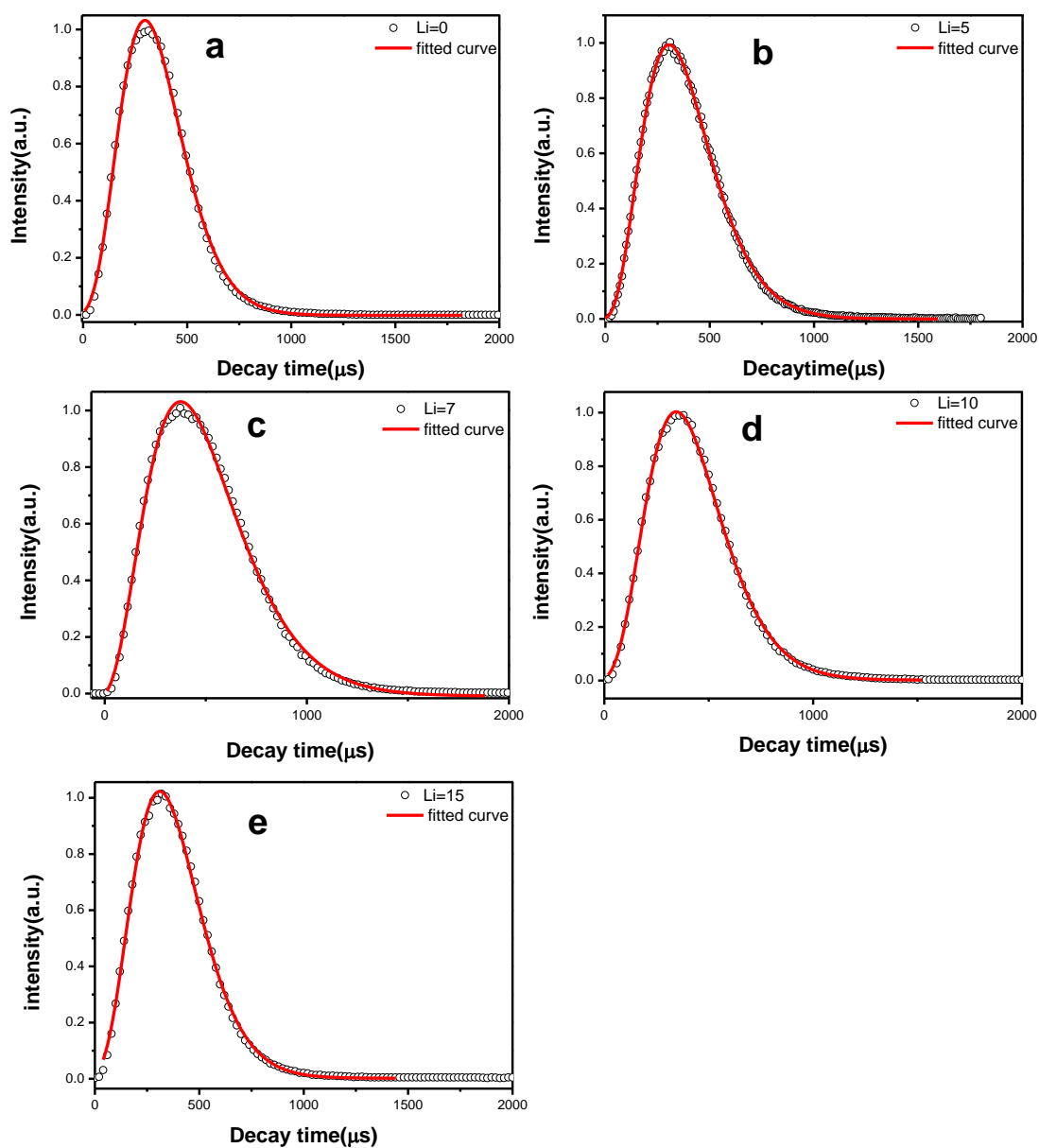


Figure S2. Temporal evolutions of UC luminescence from ¹D₂ levels of Tm³⁺ ions in NaYF₄: Yb³⁺, Tm³⁺ co-doped with Li⁺ ions (0, 5, 7, 10, 15 mol%) corresponding to (a–e) by monitoring the UC emissions centered at 452 nm under excitation of a 980 nm laser, black circles experimental data; coloured solid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

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

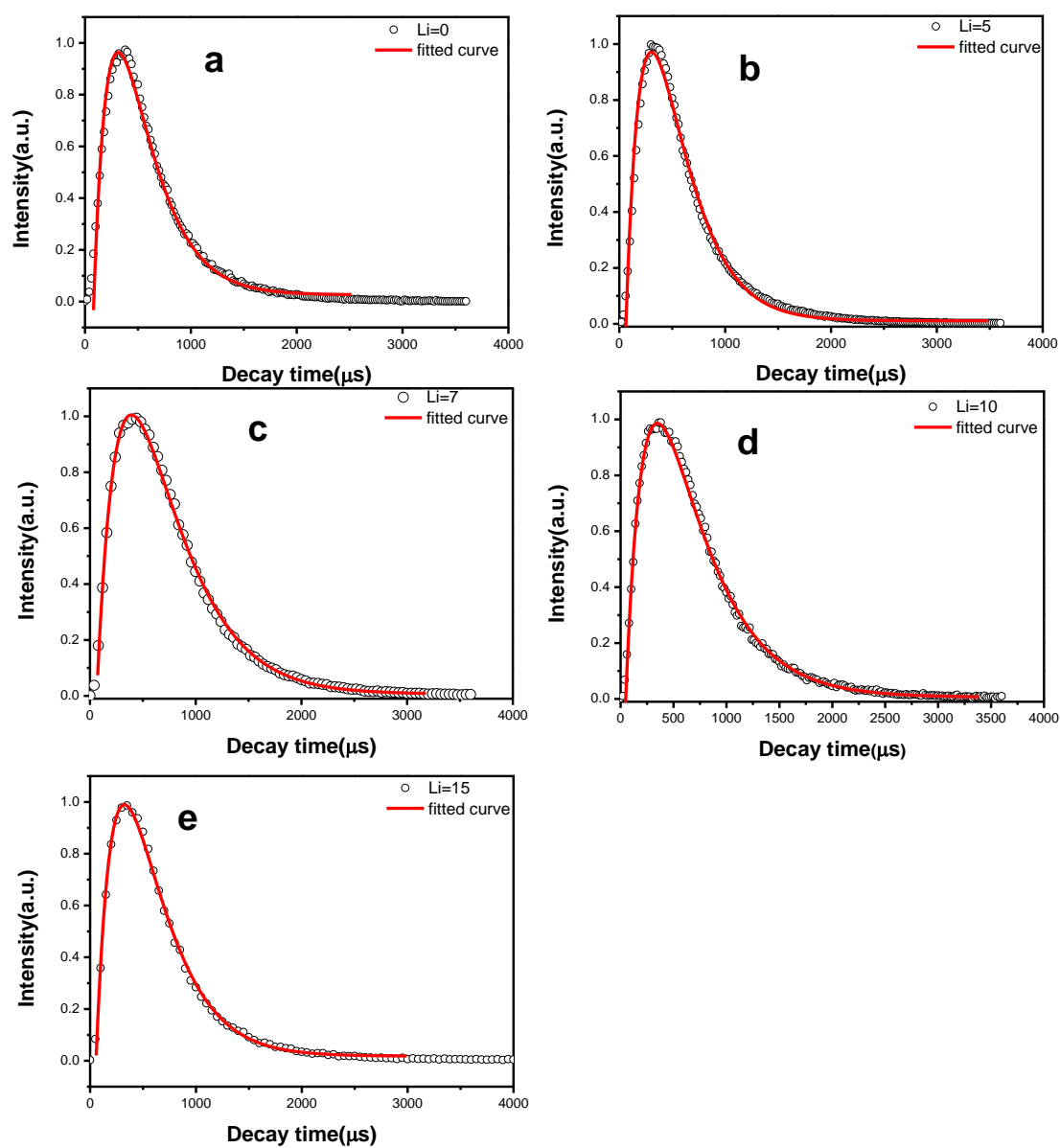


Figure S3. Temporal evolutions of UC luminescence from $^1\text{G}_4$ levels of Tm^{3+} ions in $\text{NaYF}_4: \text{Yb}^{3+}, \text{Tm}^{3+}$ co-doped with Li^+ ions (0, 5, 7, 10, 15 mol%) corresponding to (a–e) by monitoring the UC emissions centered at 479nm under excitation of a 980 nm laser, black circles experimental data; coloured solid line: fitting by:

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