

Supporting Information

Nd³⁺-doped LiYF₄ nanocrystals for the bio-imaging in the second near-infrared window

Xinyi Jiang^a, Cong Cao^a, Wei Feng^{a*}, Fuyou Li^{a*}

^a Department of Chemistry & Institutes of Biomedical Science & State Key Laboratory of Molecular Engineering of Polymers, Fudan University, 220 Handan Road, Shanghai 200433, P. R. China

*Corresponding author.

Fax: +86 21 6564 3270, E-mail: fengweifd@fudan.edu.cn (W. Feng), fyli@fudan.edu.cn (F. Y. Li)

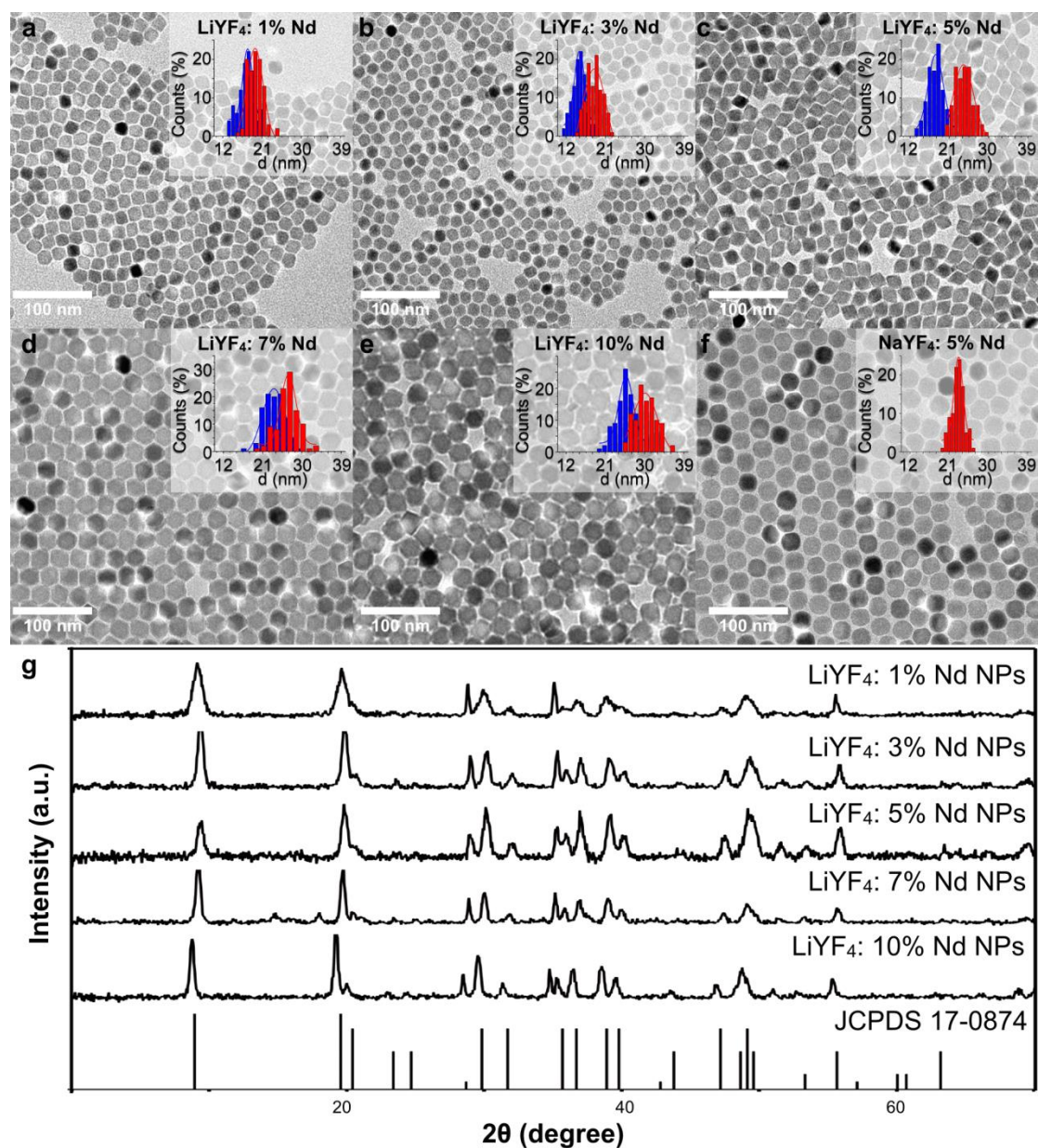


Fig. S1 (a-e) TEM images of LiYF_4 : $x\%$ Nd^{3+} NPs, $x = 1.0, 3.0, 5.0, 7.0, 10.0$. Scale bar = 100 nm. Inset: size distribution. Red bars represent the length and blue bars represent the width of the NPs. (f) TEM image of NaYF_4 : 5% Nd^{3+} . Scale bar = 100 nm. (g) XRD pattern of LiYF_4 : $x\%$ Nd^{3+} NPs, $x = 1.0, 3.0, 5.0, 7.0, 10.0$, and the standard PDF card of tetragonal LiYF_4 .

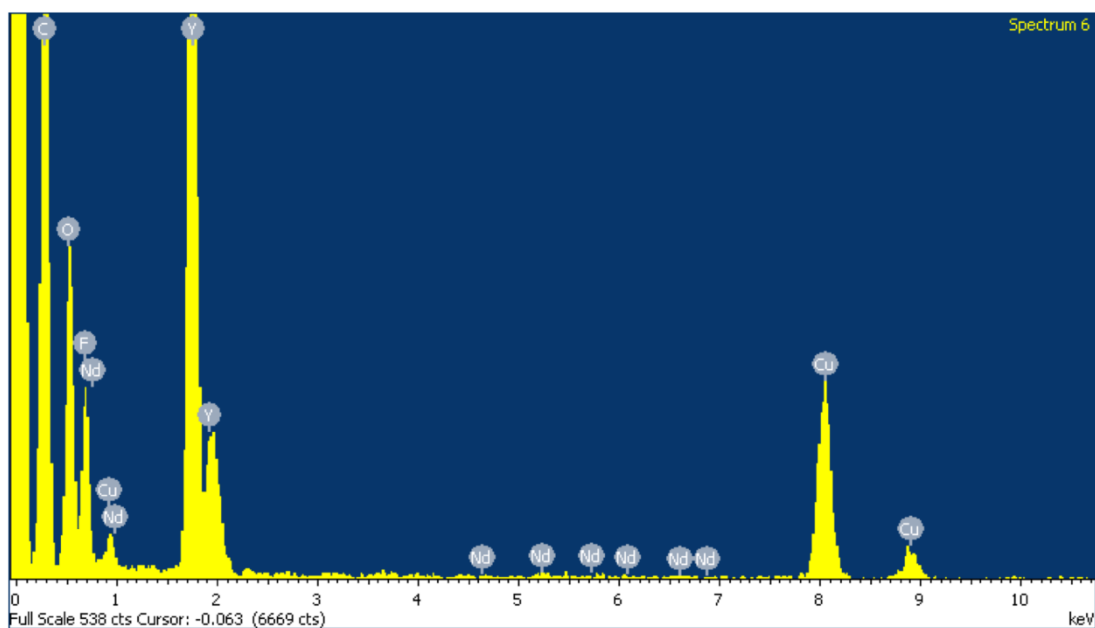


Fig. S2. EDXA analysis of LiYF₄: Nd³⁺ NPs.

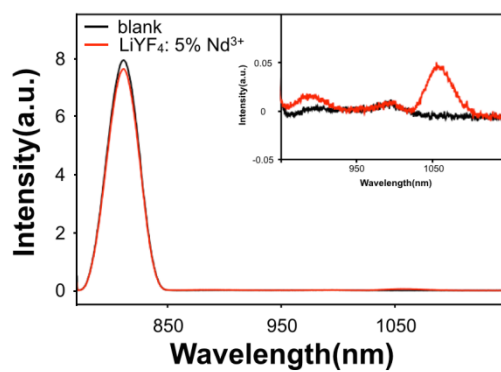


Fig. S3. The testing result of the quantum yield of LiYF₄: 5% Nd³⁺ NPs. The blank solution was pure cyclohexane. Inset: the enlarged spectrum from 850 nm to 1150 nm.

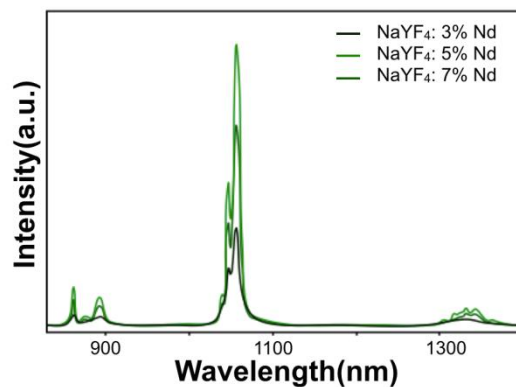


Fig. S4. Fluorescence spectra of cyclohexane solution of OA-NaYF₄: x% Nd³⁺ NPs, x=3.0, 5.0, 7.0.

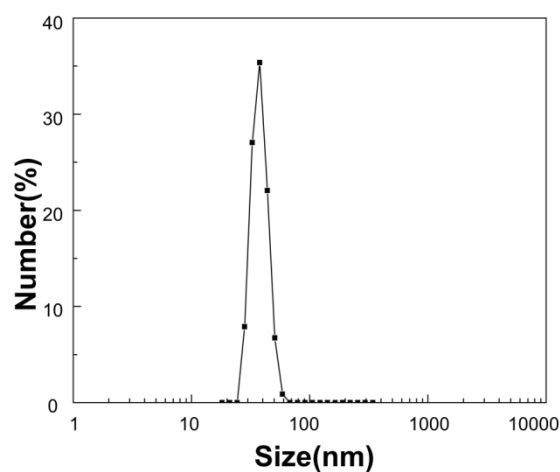


Fig. S5. Dynamic light scattering (DLS) analysis of EDTMP-LiYF₄: 5% Nd³⁺ NPs.

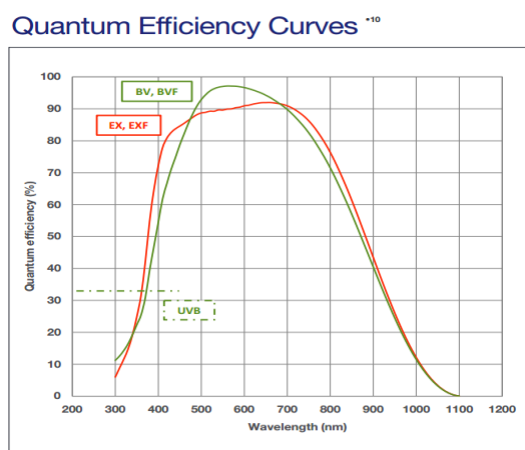


Fig. S6 The quantum efficiency of the CCD. This figure was obtained from the instrument manual.

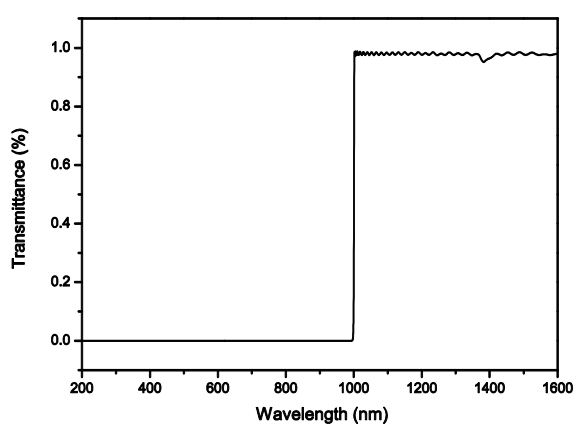


Fig. S7 The transmittance of the 980 nm long-pass edge filter. This figure was obtained from the website of manufacturer. (<http://www.semrock.com/FilterDetails.aspx?id=BLP01-980R-25>)

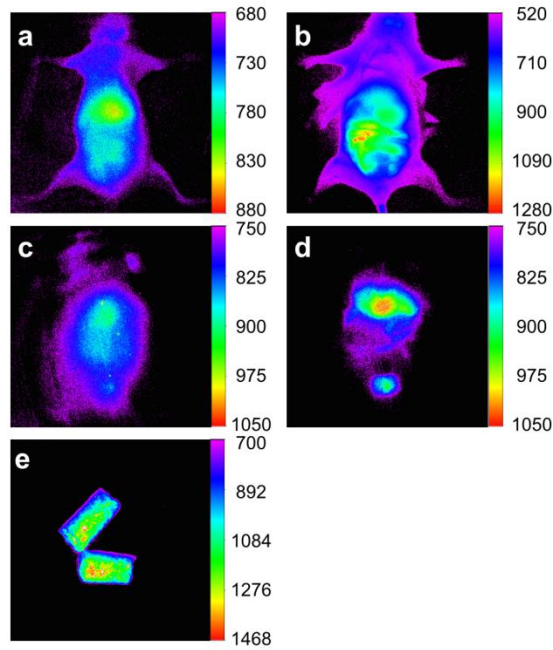


Fig. S8 NIR II images of a (a) nude mouse, (b) nude mouse after removal of skin and fat tissues above, (c) Kunming mouse, (d) Kunming mouse after removal of skin and fat tissues above, (e) mouse food..

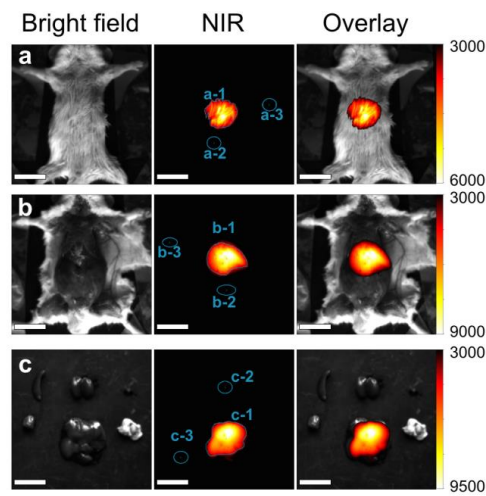


Fig. S9. (a) *In vivo* blood vessel NIR II imaging of a Kunming mouse immediately after intravenous injection. (b) The NIR II imaging after removal of skin and fat tissues. (c) The NIR II imaging of removed heart, liver, spleen, lung and kidneys. Scale bar = 1 cm. The regions of interest (ROI) are marked using blue areas. The mean intensity of ROI 1 (specific uptake), ROI 2 (nonspecific uptake) and ROI 3 (background) were collected for the signal-to-noise ratio (SNR) calculation (see Table S1)

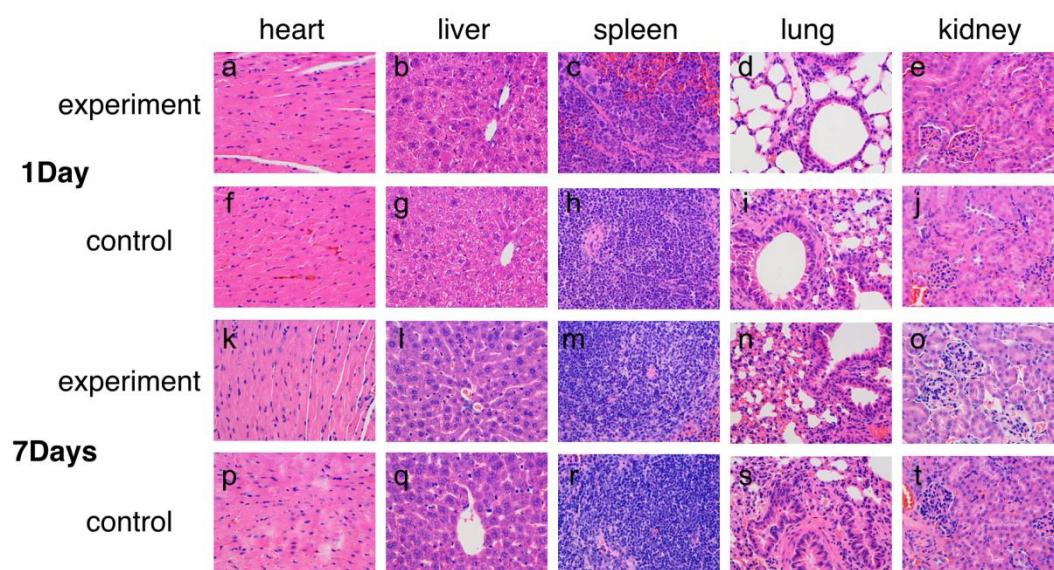


Fig. S10. Histology test of $\text{LiYF}_4:\text{Nd}^{3+}$ NPs. (a-j) 1 day after injection, (k-t) 7 days after injection.

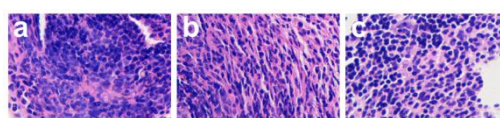


Fig. S11. Histology analysis of the lymph nodes taken out in lymphatic imaging. (a) The axillary lymph node, (b-c) the lymph nodes at leg.

Fig.	ROI	Intensity	SNR
Fig. 5.	a-1	43756.300	14.8
	a-2	7085.399	/
	a-3	4422.621	/
	b-1	56193.610	18.9
	b-2	5853.926	/
	b-3	3035.600	/
	c-1	60492.190	113.9
	c-2	1156.357	/
	c-3	630.939	/
	d-1-1	35599.050	13.2
	d-1-2	28844.880	10.5
	d-2	5144.828	/
	d-3	2651.378	/
	e-1-1	42494.360	11.0
	e-1-2	44104.910	11.4
	e-2	5966.592	/
	e-3	2303.210	/
	f-1-1	50666.520	51.1
	f-1-2	51395.770	51.9
	f-2	2186.726	/
	f-3	1219.451	/
Fig. S9.	a-1	4332.542	12.8
	a-2	1538.827	/
	a-3	1301.266	/
	b-1	6289.621	9.8
	b-2	1607.336	/
	b-3	1077.212	/
	c-1	6247.757	27.4

Fig.	ROI	Intensity	SNR
	c-2	985.229	/
	c-3	785.677	/

Table S1.The SNR (signal-to-noise ratio) of bio-imaging in Fig. 5 and Fig. S6. The regions of interest (ROI) are marked using blue areas in the figures. The mean intensity of ROI 1(specific uptake), ROI 2 (nonspecific uptake) and ROI 3 (background) were collected for the SNR calculation. $SNR = (I_{ROI1} - I_{ROI3}) / (I_{ROI2} - I_{ROI3})$.