Electronic Supplementary Material (ESI) for RSC Advances.

Electronic Supporting Information

for

Surface Functionalization of Up-Converting $NaYF_4$ Nanocrystals with Chiral Molecules

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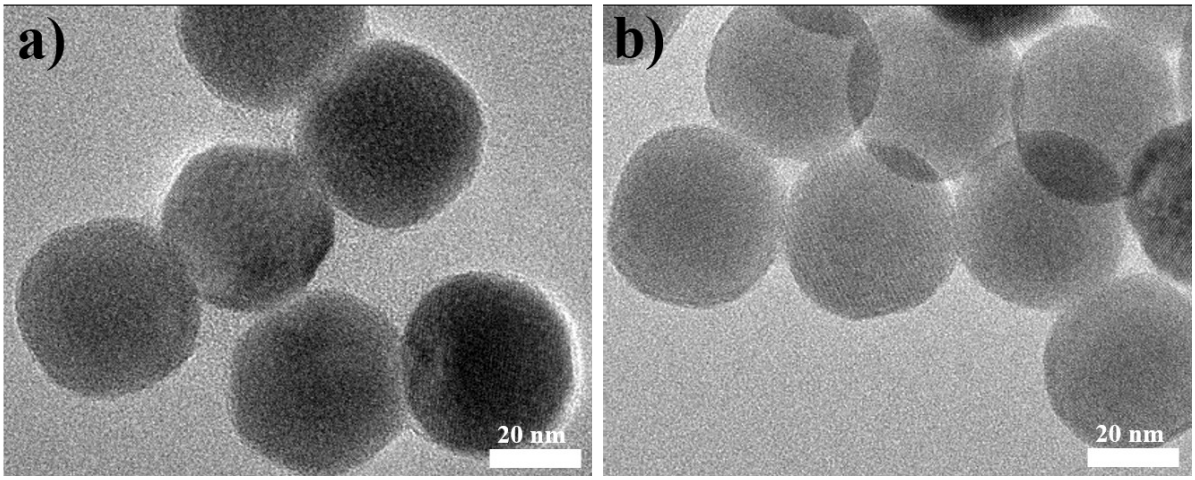

Fig.S1. TEM images of $NaYF_4$:2%Er,20%Yb NPs before (a) and after (b) treatment with 3-Chloroperoxybenzoic acid.

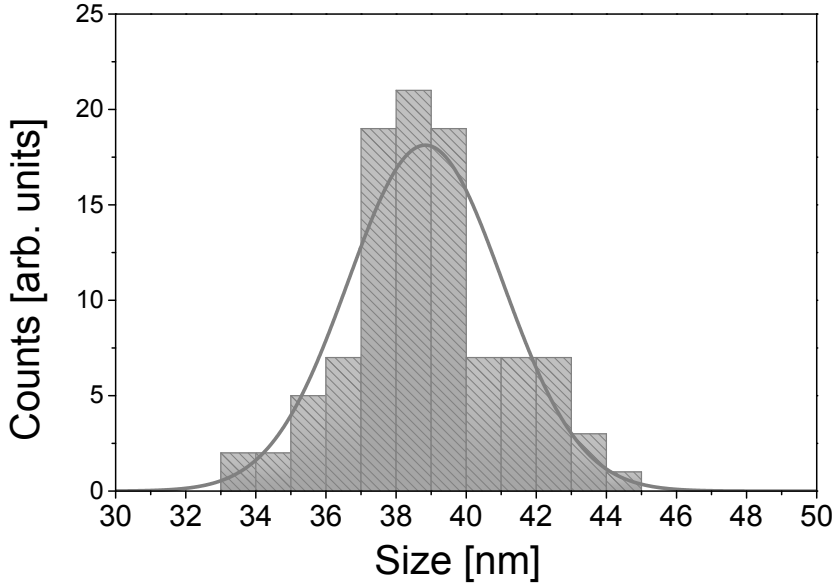

Fig.S2. Size distribution histogram of $NaYF_4$:2%Er,20%Yb NPs obtained based on measuring the sizes of over 100 particles in the TEM images.

Table S1. Characterization of colloidal stability of $NaYF_4$:2%Er,20%Yb NPs before and after surface treatment.

System	D_H [nm]	PdI	ς [mV]
T=0 days			
NPs (in $CHCl_3$)	82	0.157	-
NPs-LCys	164	0.327	14.1
NPs-LPen	209	0.213	25.6
NPs-LArg	301	0.619	-9.81
NPs-LGlu	377	0.632	-13.75
T=30 days			
NPs-LCys	407	0.551	0.8
NPs-LPen	277	0.287	24.3
NPs-LArg	379	0.731	-8.38
NPs-LGlu	419	0.773	-7.72

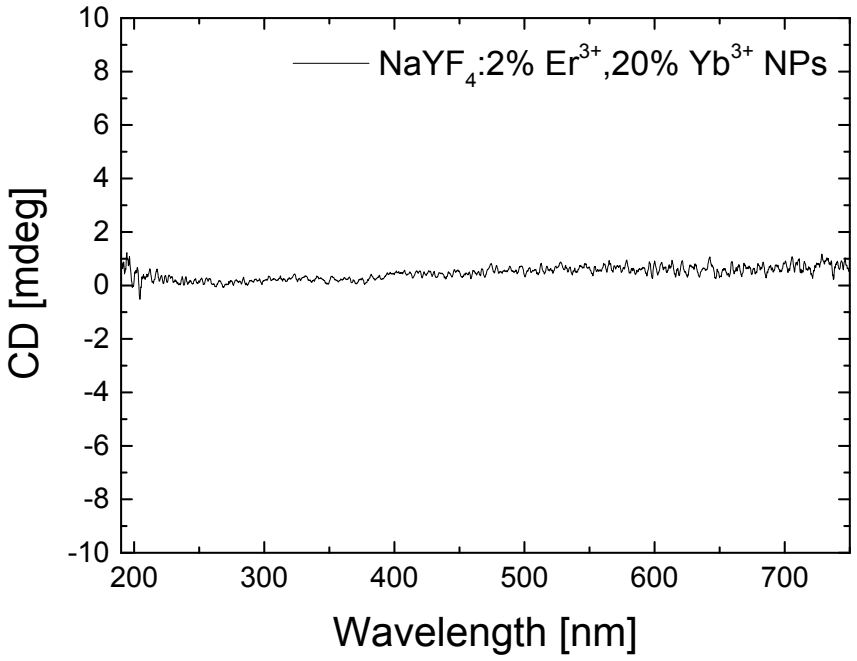

Fig.S3. CD spectra of as synthesized $NaYF_4$:2%Er,20%Yb NPs.

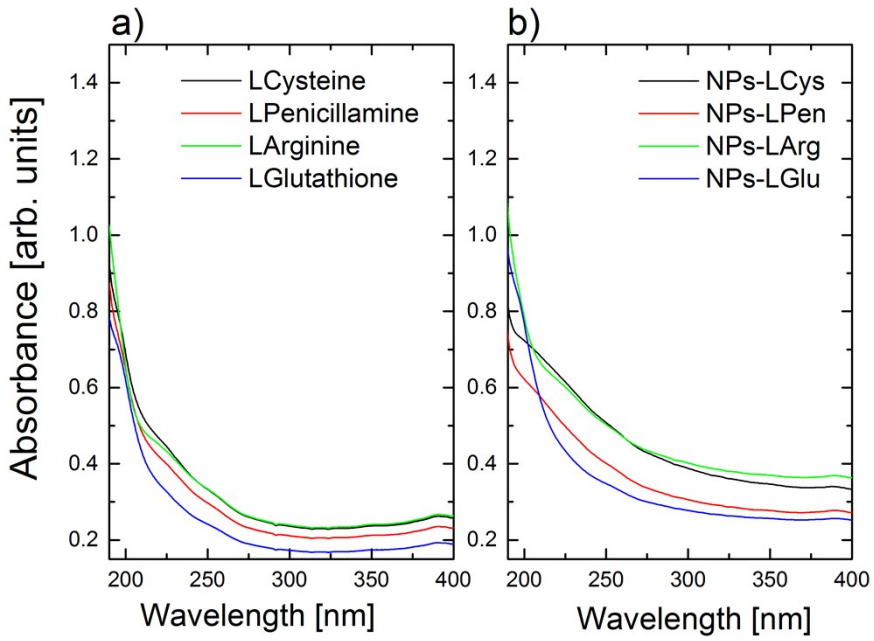

Figure S4. Absorption spectra of free chiral molecules in water solution (a) together with those for functionalized NPs (b).

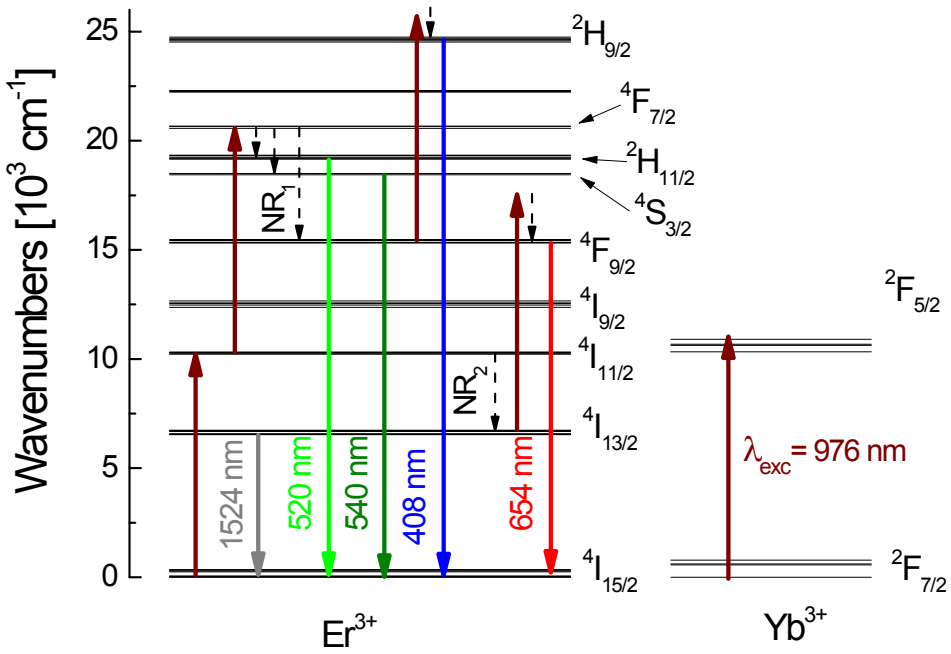

Fig.S5. Energy level diagram and proposed energy transfer mechanisms for as-synthesized and surface functionalized $NaYF_4$:2%Er,20%Yb NPs after 976 nm laser diode excitation.

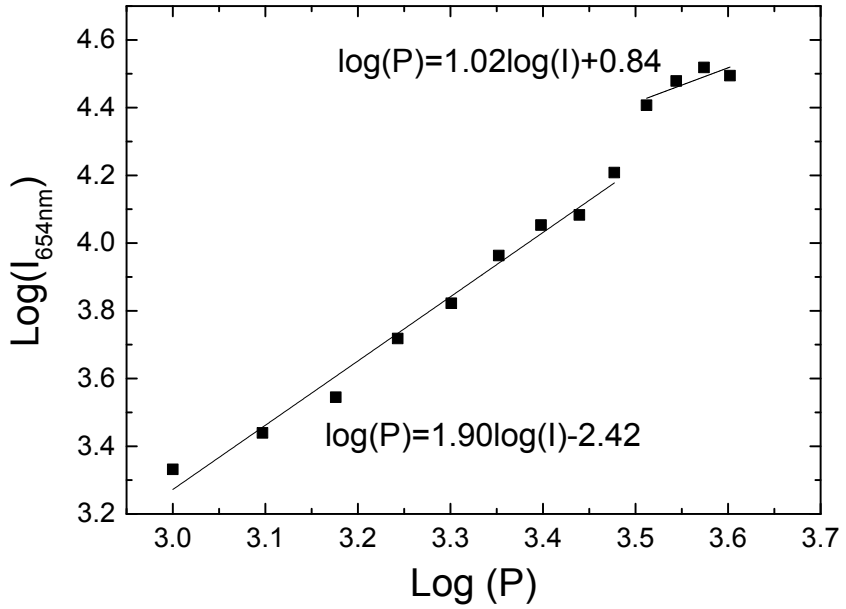

Fig.S6. Double logarithmic plot of the red ($^4F_{9/2}\rightarrow{}^4I_{15/2}$) band luminescence integral intensity for as-synthesized $NaYF_4$:2%Er,20%Yb NPs vs. power of the excitation laser beam with saturation regime fitted separately.