

Supporting information for
A Versatile Fabrication of Upconversion Nanophosphors with
Functional-surface Tunable Ligands

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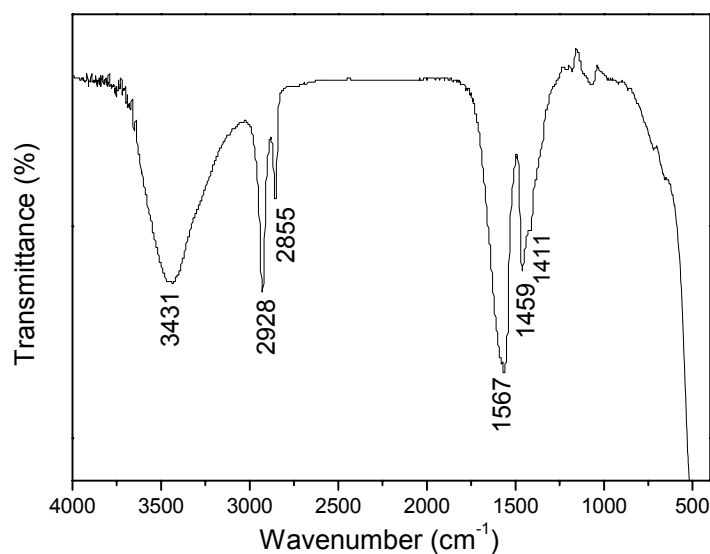


Figure S1. FT-IR spectrum of UCNPs-ADA

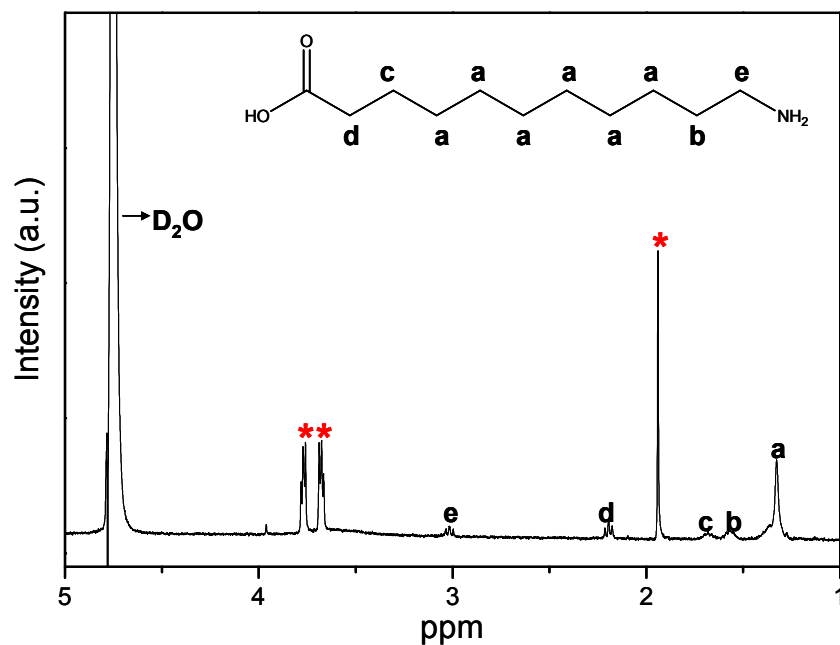


Figure S2. ^1H NMR spectrum of UCNPs-ADA dissolved in D_2O . Peaks belonging to UCNPs-DEG are marked with asterisks.

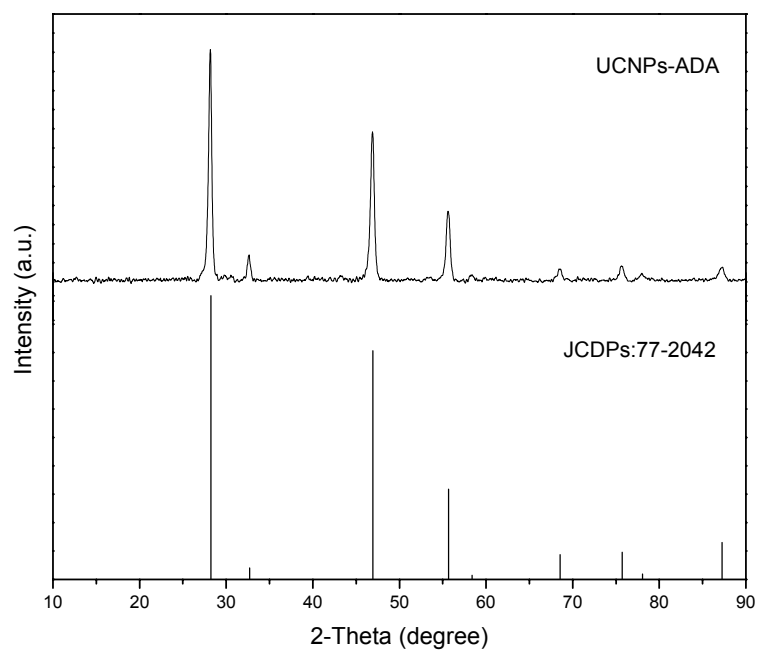


Figure S3. XRD patterns of (A) UCNPs-ADA samples and (B) the standard pattern of pure cubic NaYF_4 (JCPDS card No. 77-2042).

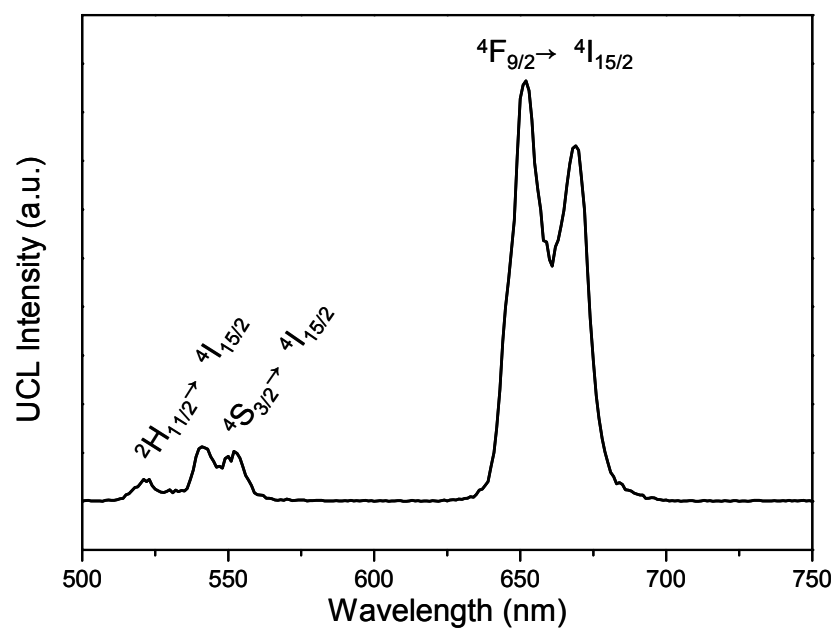


Figure S4. Room temperature upconversion emission spectrum of UCNPs-ADA sample (1 mg/mL dissolved in water) excited with a CW 980 nm laser (power $\approx$ 800 mW).

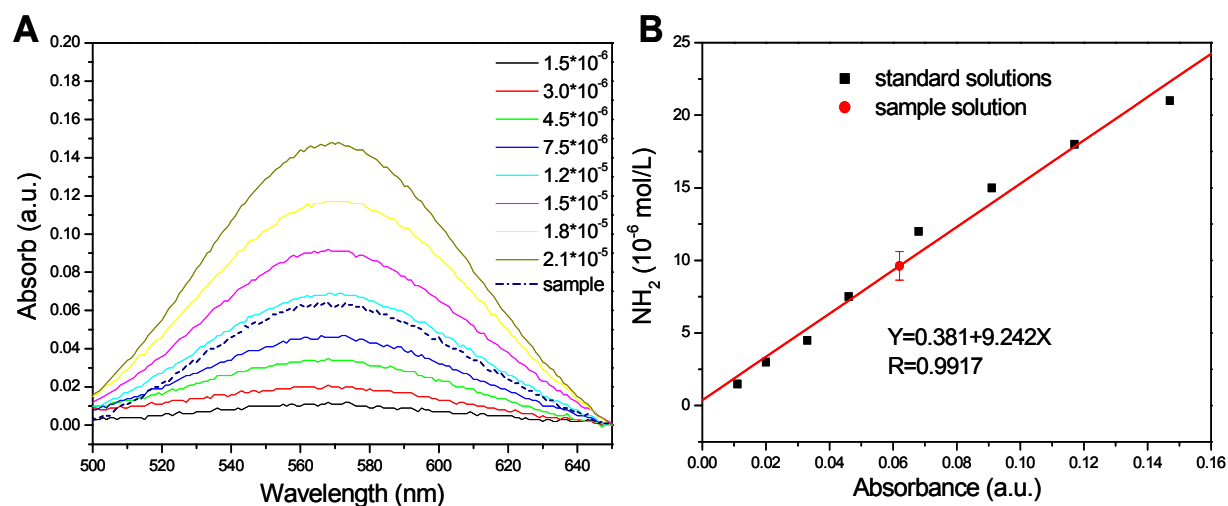


Figure S5. Absorption spectra (A) of sample solution and standard solutions containing different concentration of NH_2 . (B) NH_2 concentration vs absorption at $\lambda = 570$ nm.

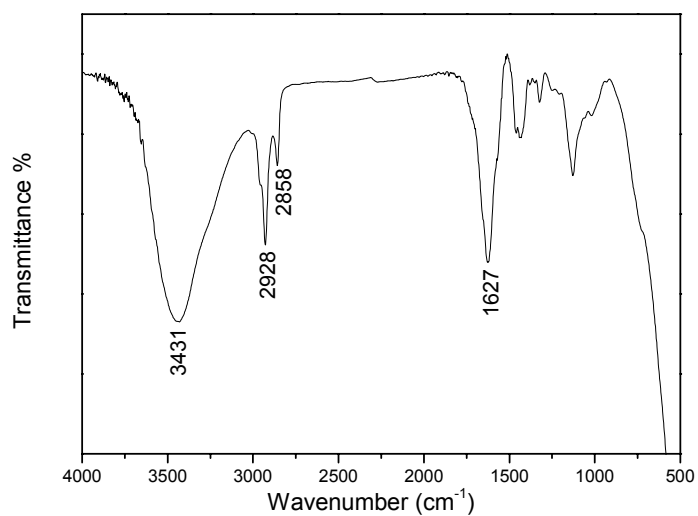


Figure S6. FT-IR spectrum of UCNPs-PEGBA.

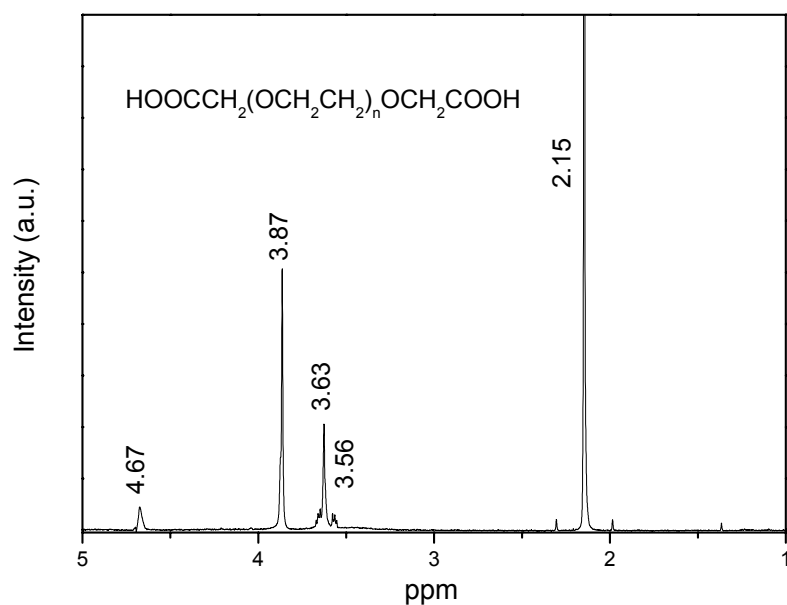


Figure S7. ¹H NMR spectrum of UCNPs-PEGBA dissolved in D₂O.

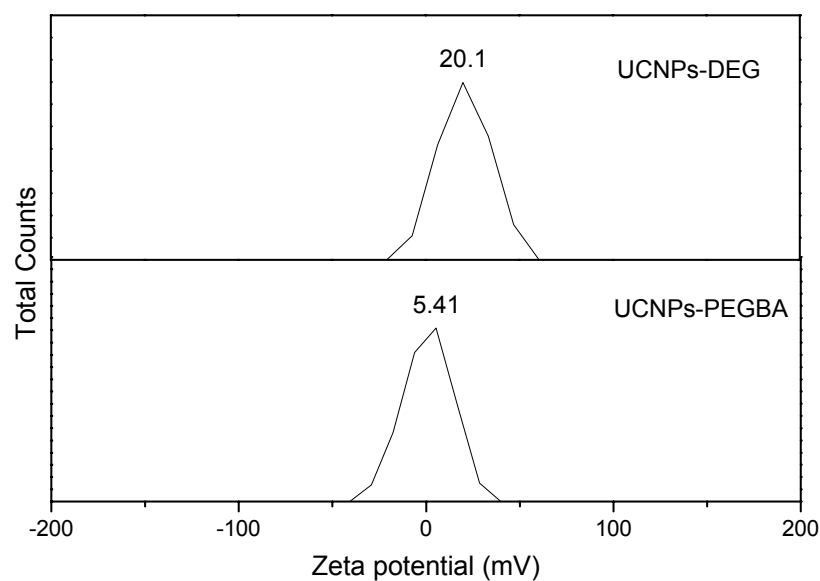


Figure. S8 Zeta potential of UCNPs-DEG and UCNPs-PEGBA samples dissolved in water.

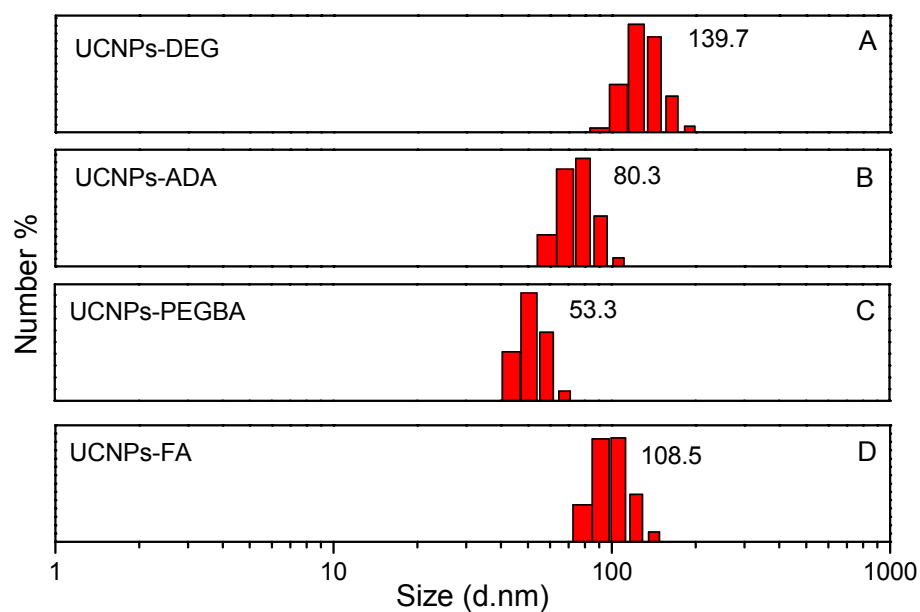


Figure S9. Diameter distribution of (A) UCNPs-DEG, (B) UCNPs-ADA, (C) UCNPs-PEGBA and (D)UCNPs-FA samples dissolved in water.

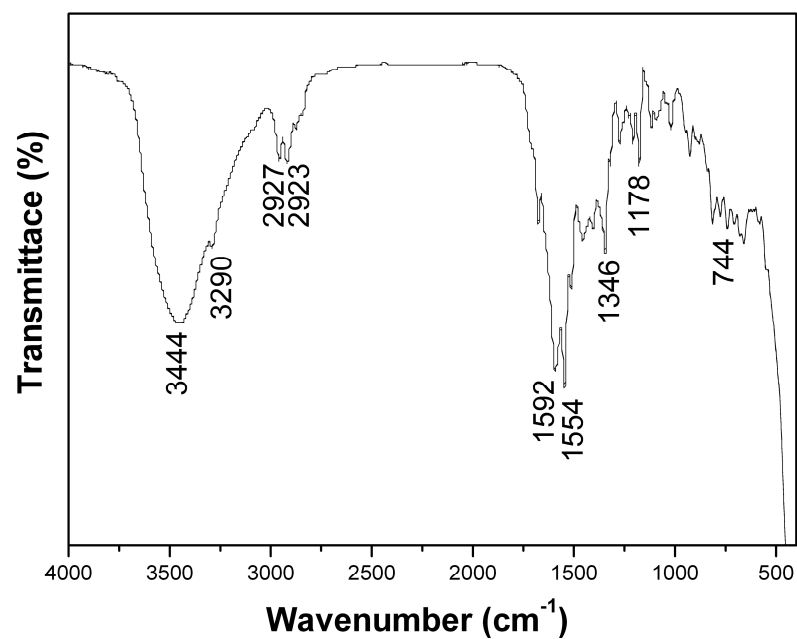


Figure S10. FT-IR spectrum of UCNPs-FA

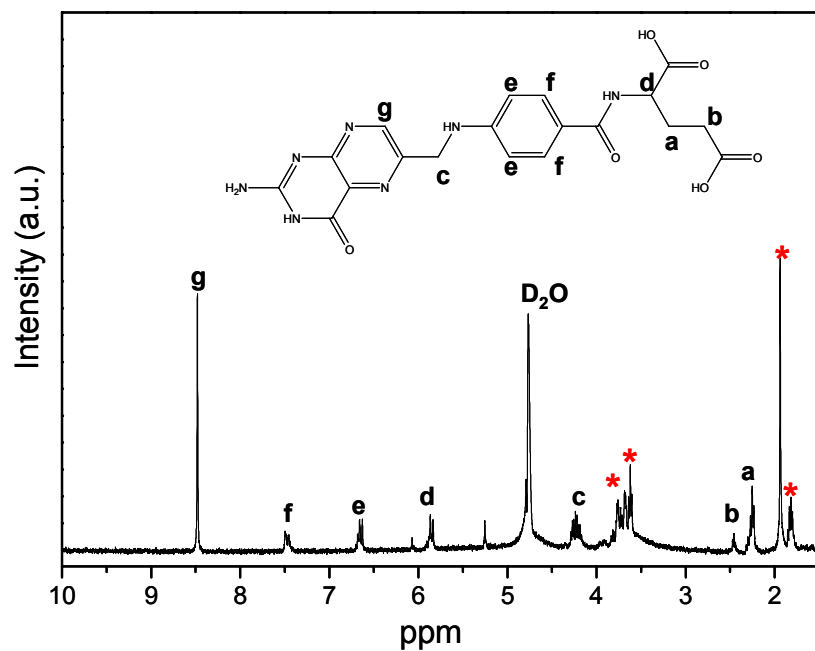


Figure S11. ¹H NMR spectrum of UCNPs-FA dissolved in D₂O. Peaks belonging to UCNPs-DEG are marked with asterisks.