

Supporting Information

Core-spacer-shell Structured NaGdF₄: Yb³⁺/Er³⁺@NaGdF₄@Ag Nanoparticles for Plasmon-enhanced Upconversion

Luminescence

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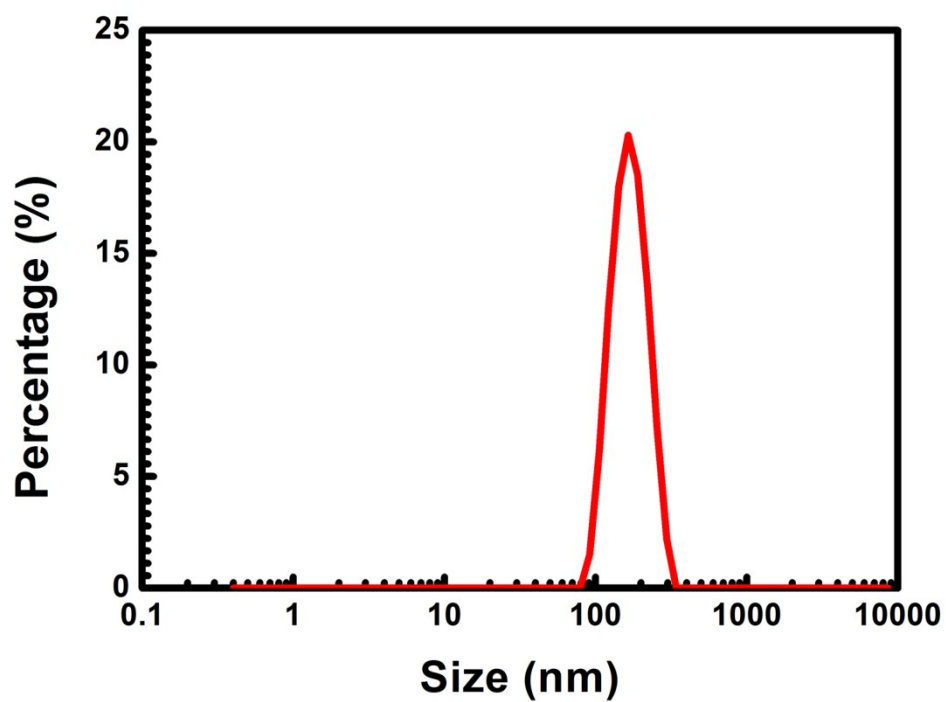


Figure S1. Dynamic light scattering measurements (DLS) of core-spacer-shell UCNPs in deionized water.

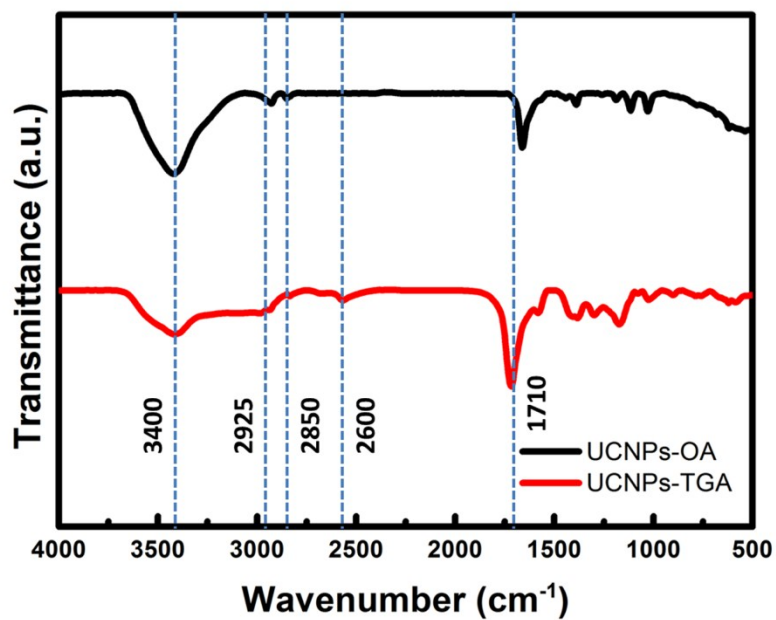


Figure S2. FT-IR spectra of UCNPs-OA (black line) and UCNPs-TGA (red line).

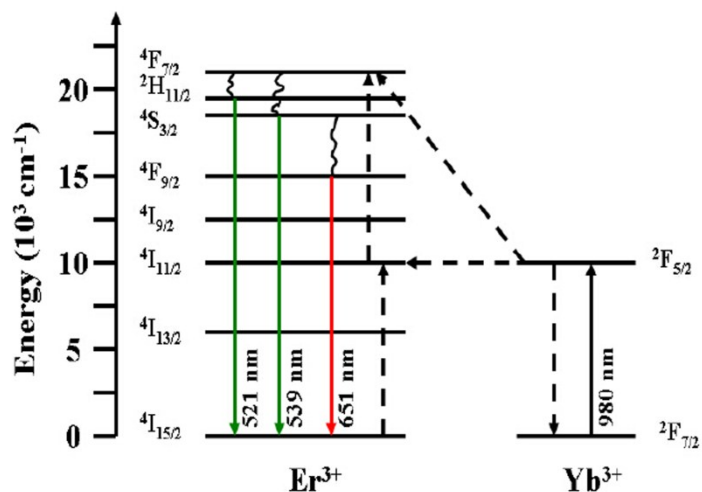


Figure S3. Energy diagram and simplified mechanism for energy-transfer upconversion between Yb^{3+} and Er^{3+} .

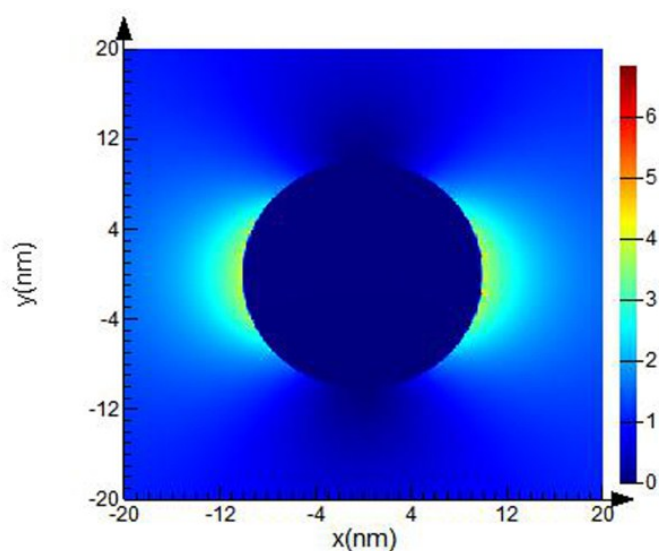


Figure S4. FDTD simulations of electric field intensity enhancement at 980 nm a single of core-spacer-shell structured UCNPs model: a 14 nm NaGdF_4 core ($n = 1.29$), with a 1.75 nm NaGdF_4 spacer layer ($n = 1.29$) and a 1.5 nm Ag shell ($n = 0.20$), color bar indicates E/E_0 .

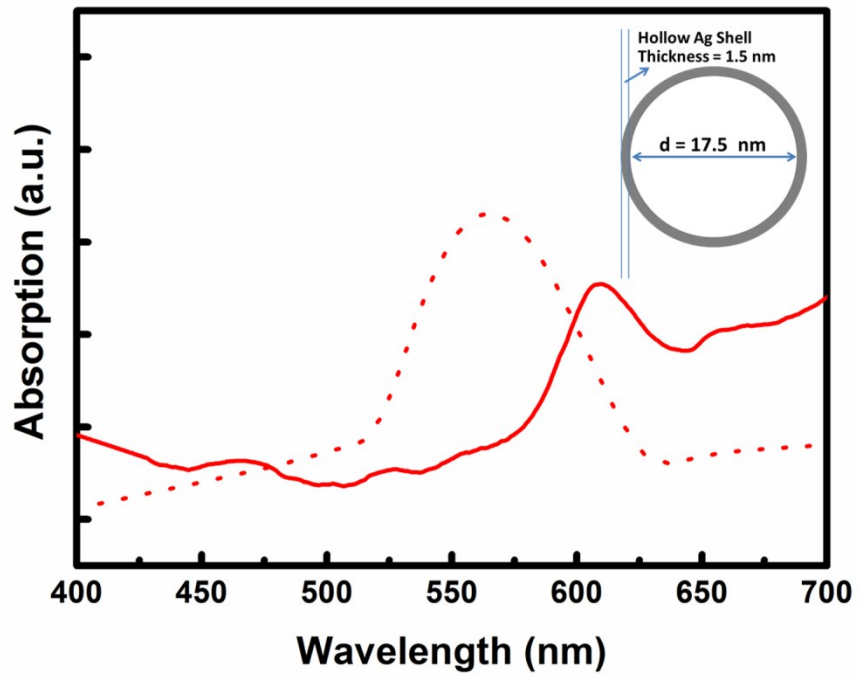


Figure S5. Dotted line: FDTD simulated absorption of a hollow Ag shell, inset is the picture of hollow Ag shell; Solid line: absorption of core-spacer-shell UCNPs.