

Electronic Supplementary Information

Facile synthesis of small-sized and monodisperse hexagonal NaYF₄:Yb³⁺, Er³⁺ nanocrystals

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Experimental section

1. Materials: yttrium (III) acetate hydrate (99.9%), ytterbium (III) acetate tetrahydrate (99.9%), erbium (III) acetate hydrate (99.9%), ammonium fluoride (99.8%), sodium hydroxide (99.8%), oleic acid (90%) and 1-octadecene (90%), were all purchased from Sigma-Aldrich, and used without further purification.
2. Synthesis of 11.86 nm β -NaYF₄:Yb³⁺, Er³⁺ UCNPs: 0.3 mmol rare-earth acetates (Y/Yb/Er=78:20:2) with 20 ml of oleic acid and 100 ml of 1-octadecene were added to a flask to form a mixed solution under vigorous stirring. The solution was heated to 100 °C for 30 min before cooling to 50 °C to remove oxygen and residual water. Then a methanol solution (10 ml) containing NH₄F (1.2 mmol) and NaOH (0.75 mmol) was added, and the resulting solution was kept at 50 °C for 30 min. After methanol was evaporated, the solution was heated to 300 °C under an argon atmosphere for 90 min and then cooled down to room temperature. The nanoparticles were precipitated by the addition of ethanol and isolated via centrifugation.

Characterization

The particle morphology was recorded on a Tecnai G2 transmission electron microscopy. The crystal structure was characterized by the corresponding high-resolution TEM image and selected-area electron diffraction pattern. The UCL spectra were obtained by a portable spectrometer (Maya2000, Ocean Optics Co.) using a commercial 980 nm NIR laser as the excitation source.