Supporting information

Hydrothermal synthesis of ordered β-$NaYF_4$ nanorods self-assemblies with multicolor up- and down-conversions

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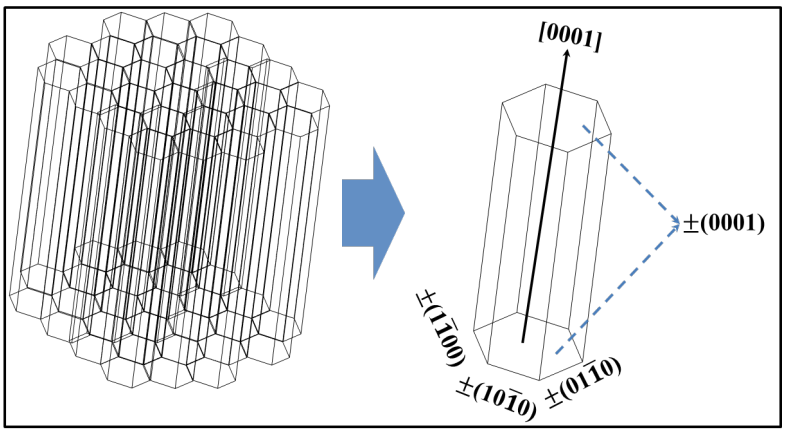

Fig. S1 Schematic diagram showing the anisotropy of the β-$NaYF_4$ nanorods self-assemblies.

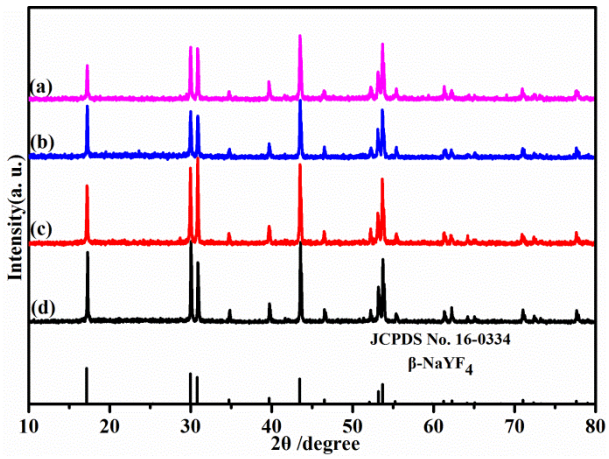

Fig. S2 The XRD patterns of as-prepared β-$NaYF_4$:20%Yb^{3+}, 2%Er^{3+} samples prepared with different molar ratios of sodium oleate:Re^{3+}. (a) 0 (without sodium oleate), (b) 1:1, (c) 4:1, (d) 8:1. All of the samples were hydrothermally treated at 260 ^{o}C for 24 h (molar ratio for NaF:Re^{3+} = 12:1).

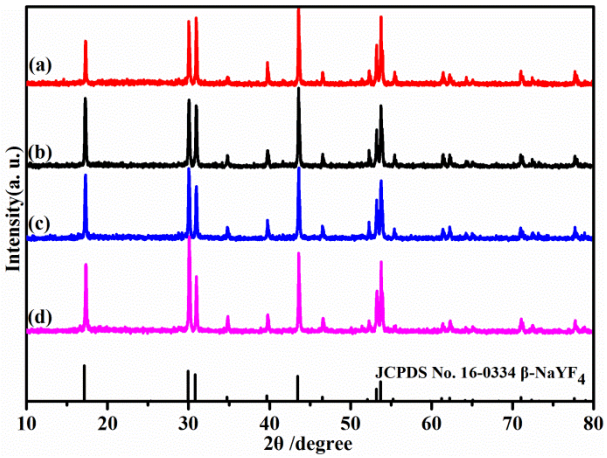

Fig. S3 The XRD patterns of β-$NaYF_4$:20%Yb^{3+}, 2%Er^{3+} samples prepared with different molar ratios of NaF:Re^{3+}. (a) 8:1, (b) 12:1, (c) 14:1, (d) 18:1. All of the samples were hydrothermally treated at 260 °C for 24 h (molar ratio for NaOA:Re^{3+} = 4:1).

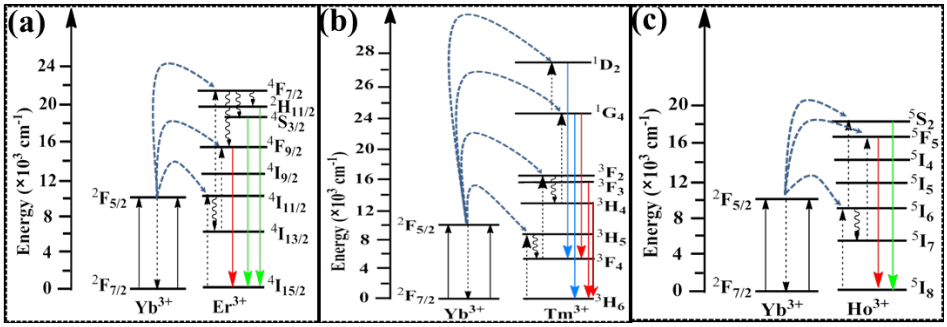

Fig. S4 The proposed UC energy transfer mechanism in Yb^{3+}/Er^{3+} (a), Yb^{3+}/Tm^{3+} (b), Yb^{3+}/Ho^{3+} (c) -doped β-$NaYF_4$ samples.

Table S1. The summary of compositions, emission color and chromaticity coordinates (x, y) of the as-prepared porous microsheets.

Samples	Excitation	Emission colors	Chromaticity Corrdinates
β-$NaYF_4$:5%Eu^{3+}	396 nm	red	(0.5588, 0.3503)
β-$NaYF_4$:5%Tb^{3+}	378 nm	green	(0.3229, 0.4765)
β-$NaYF_4$:5%Sm^{3+}	402 nm	orange	(0.5296, 0.4603)
β-$NaYF_4$:20%Yb^{3+}/2%Er^{3+}	980 nm	yellow	(0.3705, 0.6065)
β-$NaYF_4$:20%Yb^{3+}/1%Tm^{3+}	980 nm	blue	(0.1469, 0.1294)
β-$NaYF_4$:20%Yb^{3+}/1%Ho^{3+}	980 nm	green	(0.2523, 0.7283)