Rare Earth Hydroxide as Precursor for Controlled Fabrication of Uniform β-$NaYF_4$ Nanoparticles: A Novel, Low Cost and Facile Method

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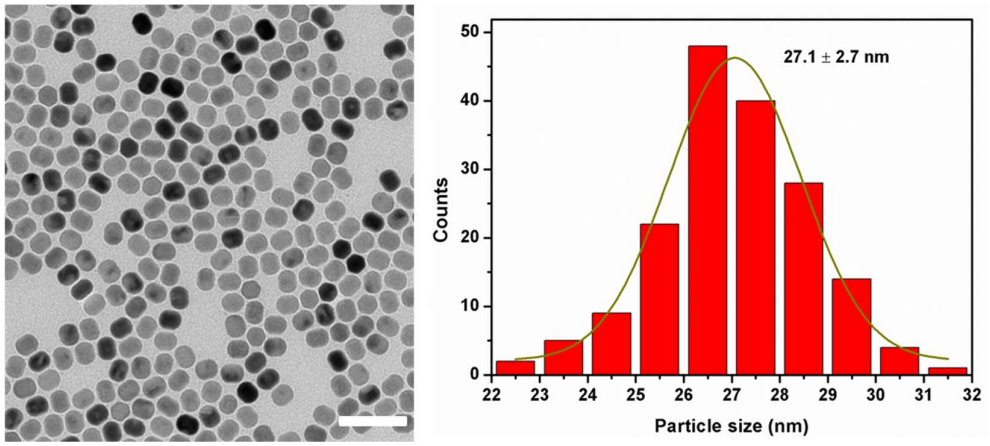

Figure S1 TEM image (A) and the corresponding width histogram (B) of $NaYF_4:Yb^{3+}/Er^{3+}$ nanocrystals synthesized with NaOH as sodium source. Scale bars, 100 nm.

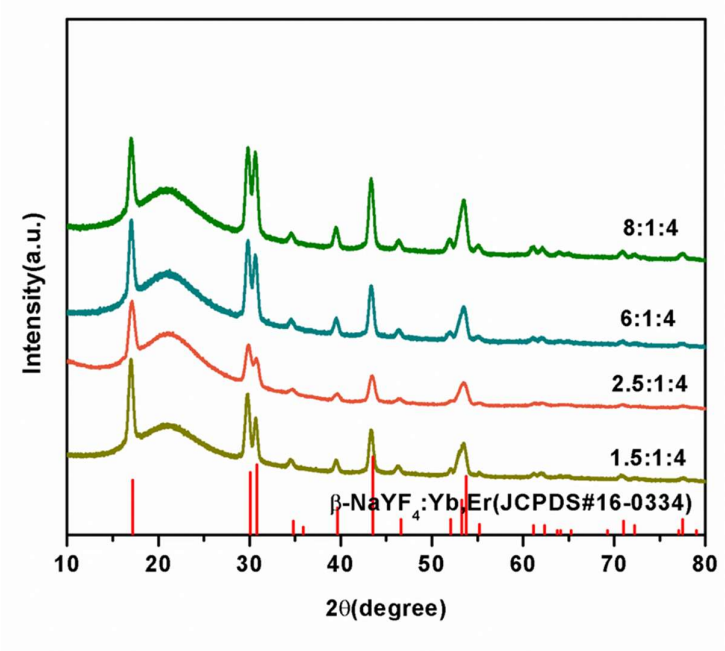

Figure S2 XRD patterns of the as-synthesized $NaYF_4:Yb^{3+}/Er^{3+}$ nanocrystals with NaOA at varied molar ratio of $Na^+/Ln^{3+}/ F^-$. The standard diffraction patterns of the β-$NaYF_4$ (JCPDS16-0334) depicted at the bottom for reference.

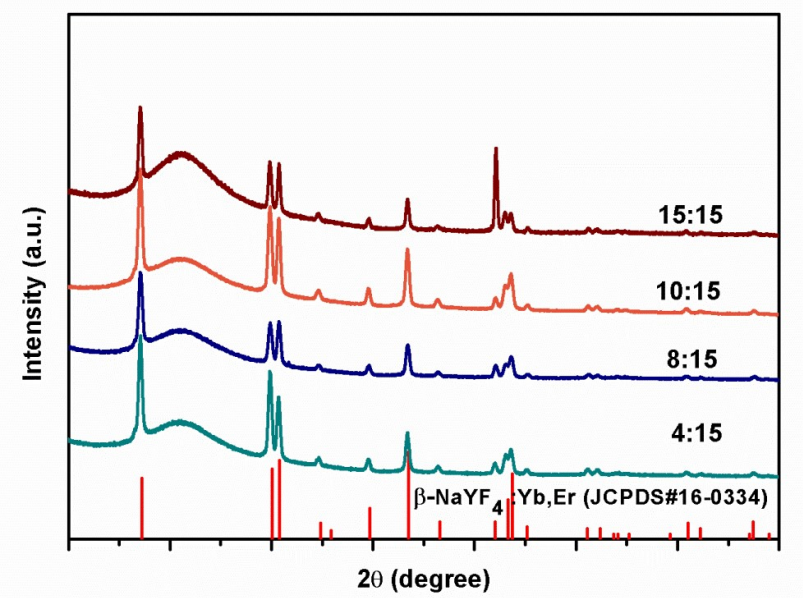

Figure S3 XRD patterns of the as-synthesized $NaYF_4:Yb^{3+}/Er^{3+}$ nanocrystals at varied amounts of oleic acid. The volume rations of oleic acid and octadecene are 15:15, 10:15, 8:15, and 4:15, respectively. The diffraction pattern at the bottom is the literature reference for hexagonal $NaYF_4$ nanocrystal (JCPDS16-0334).

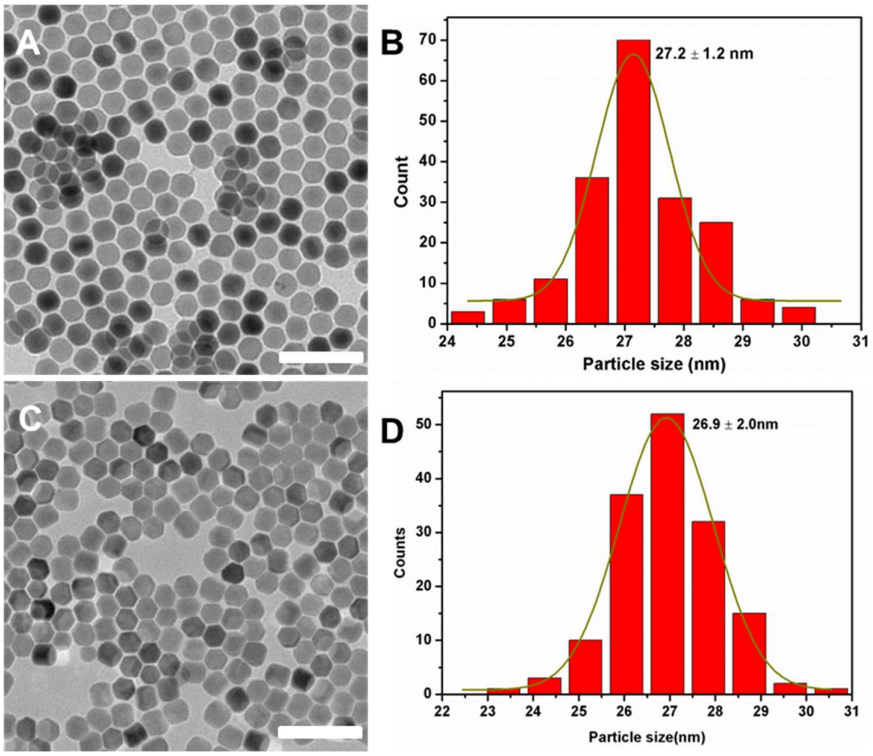

Figure S4 TEM images and size histograms of the $NaYF_4$:Yb^{3+}/Tm^{3+} (A, B) and $NaYF_4$: Yb^{3+}/Ho^{3+} (C, D), respectively. Scale bars, 100 nm.