

Supporting Information

Ultrathin Yttrium Fluoride Nanostructures: Controlled Synthesis and Polarized Up-Conversion Emission Property

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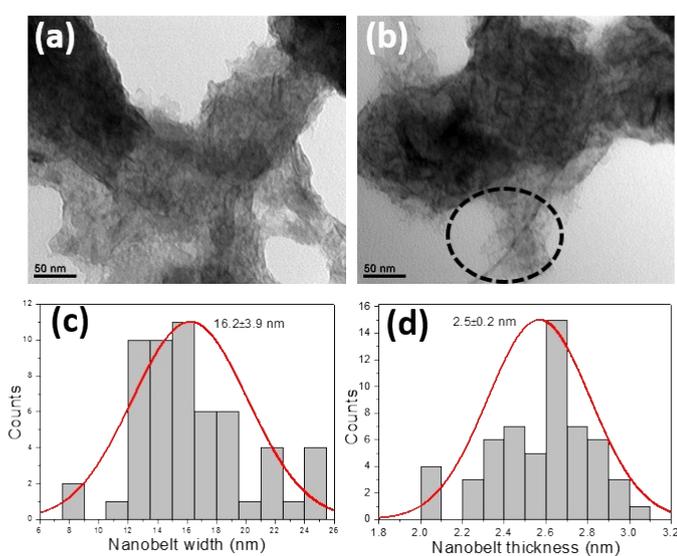


Fig. S1. TEM image of sample taken at (a) 2 h and (b) 4 h reaction time. Histograms of YF₃ ultrathin nanobelts (c) width and (d) thickness based on the TEM images taken for the 8 h reaction sample (Reaction temperature: 240 °C).

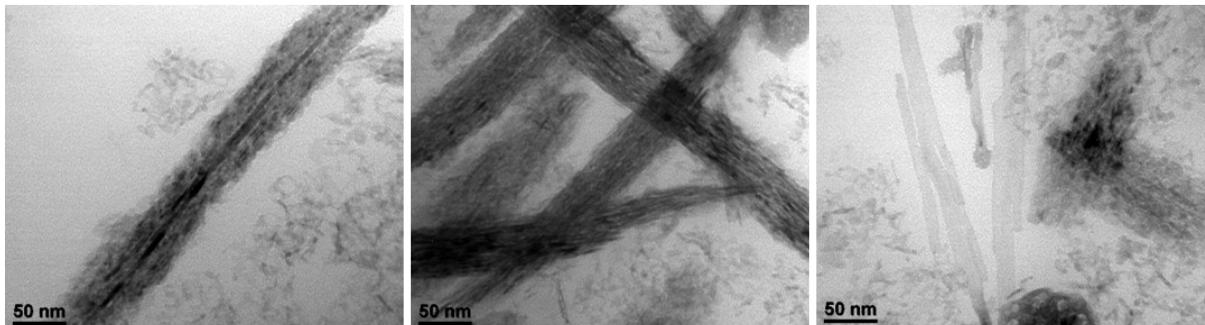


Fig. S2. TEM images of YF_3 nanocrystals prepared at a reaction temperature of 220°C with 20 h reaction time.

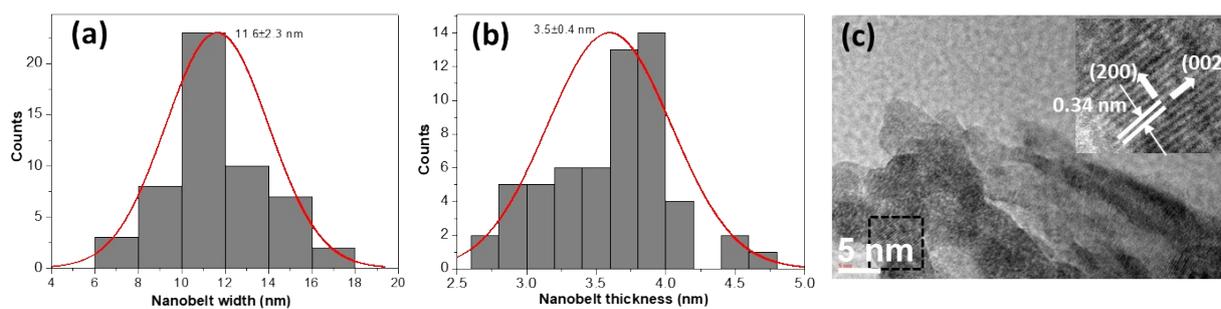


Fig. S3. Histograms of YF_3 ultrathin nanobelts (a) width and (b) thickness based on the TEM images taken for the 2 h reaction sample. (C) TEM and HRTEM (inset) images of sample taken at 30 min reaction time (Reaction temperature: 260°C).

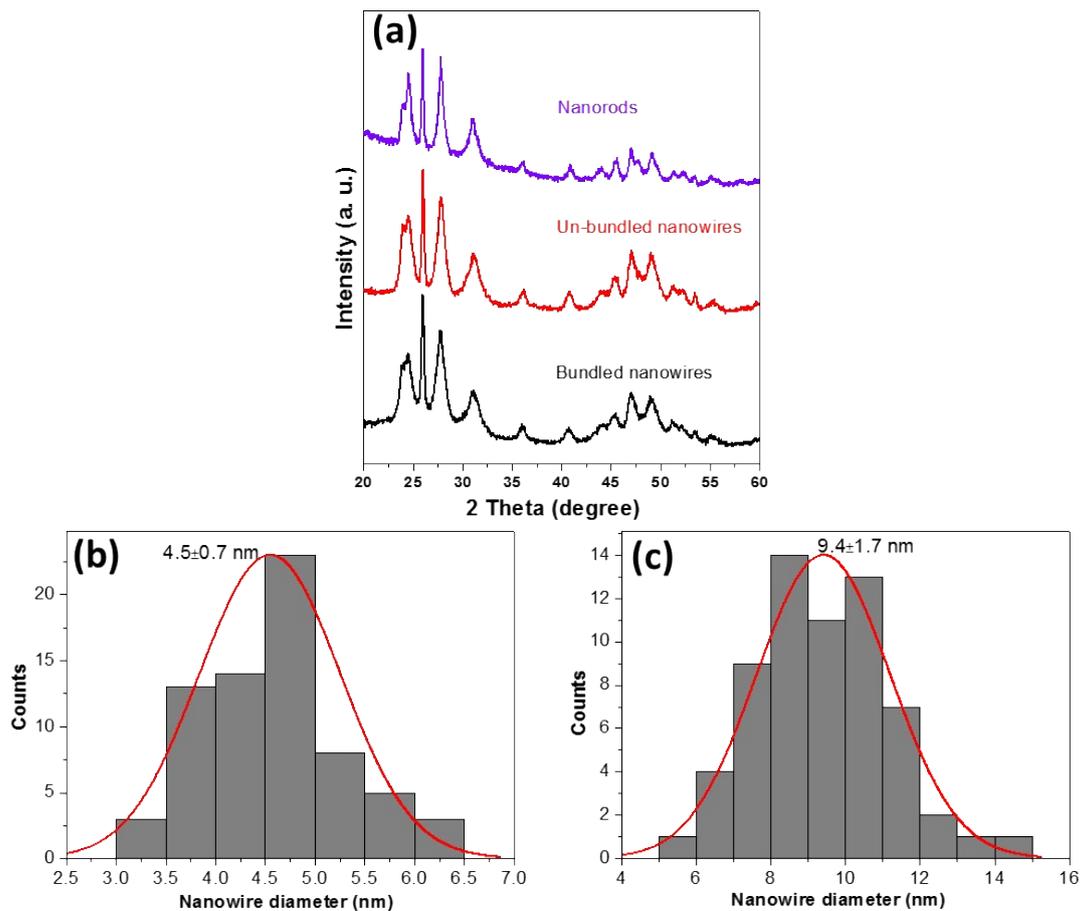


Fig. S4. (a) XRD patterns of YF_3 bundled nanowires, un-bundled nanowires and nanorods. Histograms of YF_3 nanowires diameters in the case of (b) bundled nanowires and (c) un-bundled nanowires (Reaction temperature: 280°C).

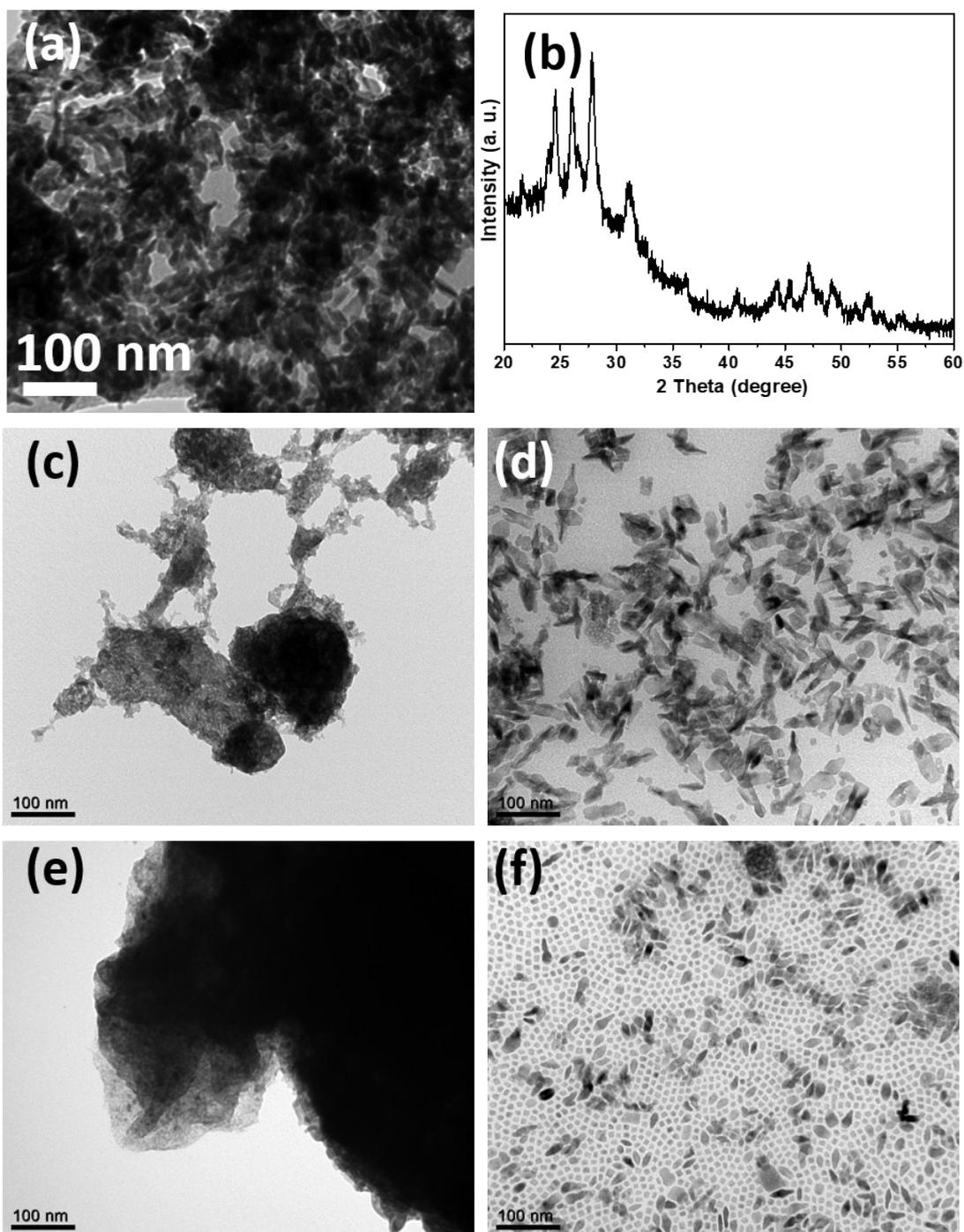


Fig. S5. (a) TEM image and (b) XRD pattern of YF_3 nanostructures synthesized using 5 mmol NH_4F with a reaction time of 2 h; TEM images of samples synthesized using 7 mmol NH_4F with (c) 1 h and (d) 2 h reaction time, and 9 mmol NH_4F with a reaction time of (e) 1 h and (f) 2 h. (Reaction temperature: 280 °C).

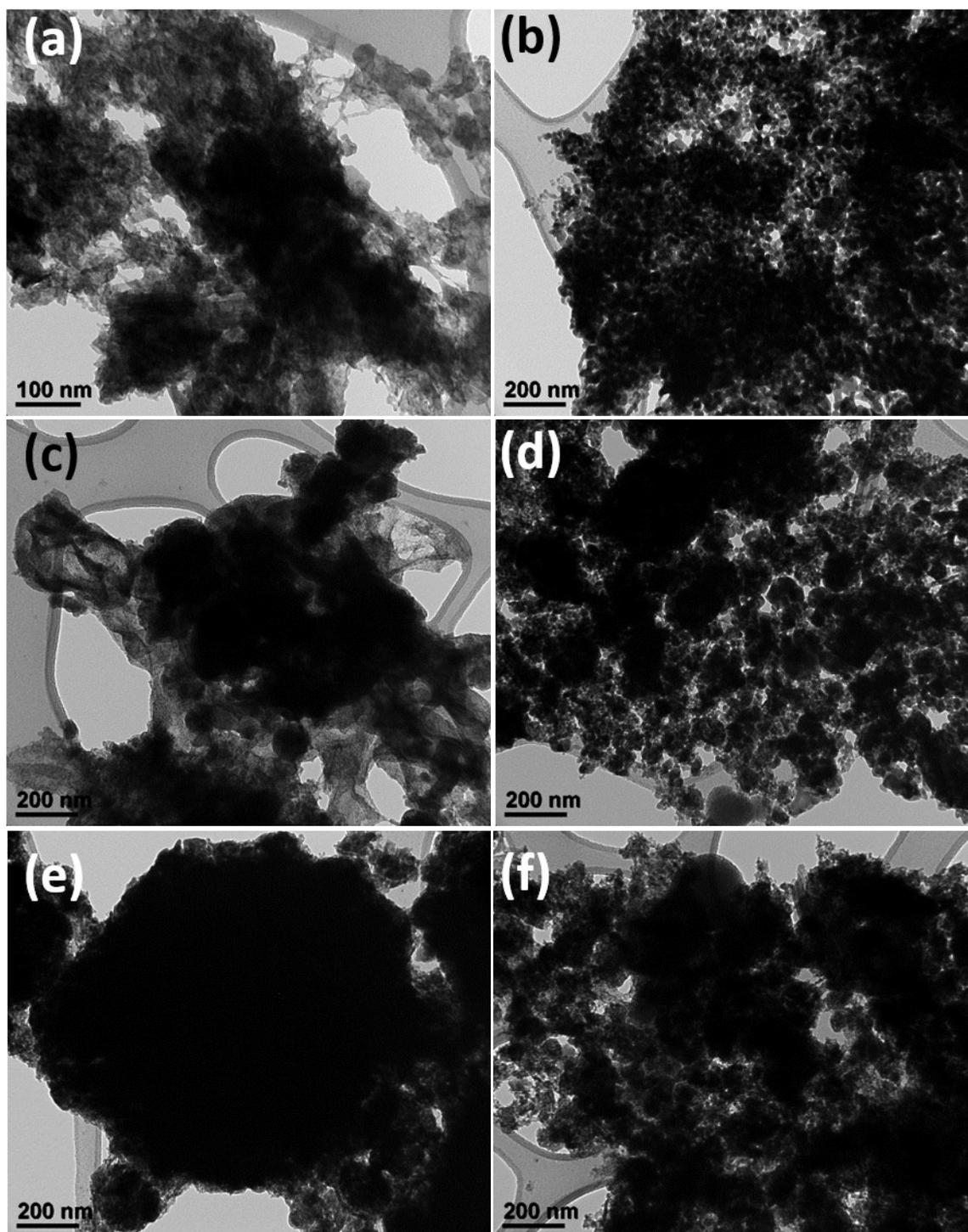


Fig. S6. TEM images of nanostructures synthesized using 5 mmol NH_4F with a reaction time of (a) 30 min and (b) 2 h, 7 mmol NH_4F with a reaction time of (c) 1 h and (d) 2 h, and 9 mmol NH_4F with a reaction time of (e) 1 h and (f) 2 h. (Reaction temperature: 260 °C).

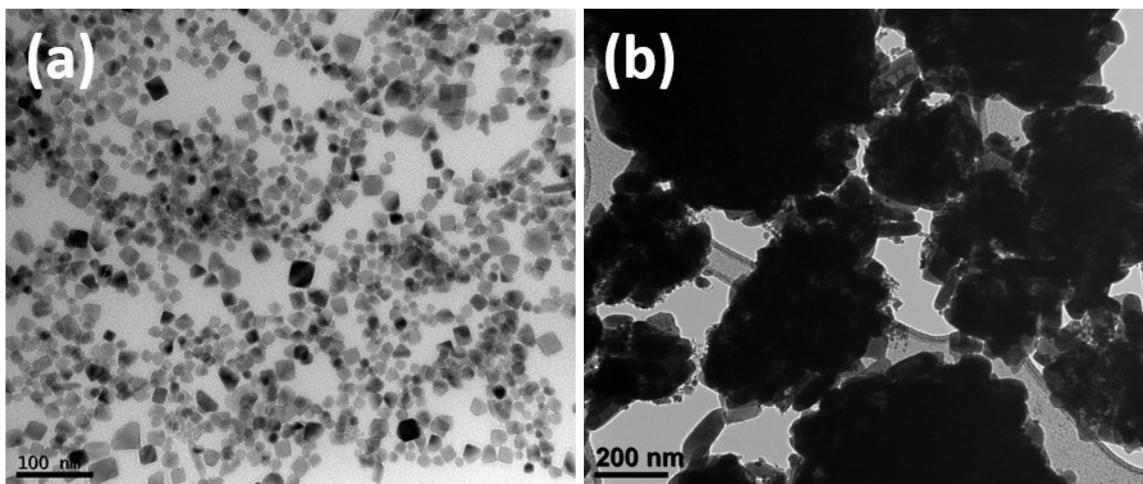


Fig. S7. TEM images of nanostructures synthesized using (a) 3 mmol KF and (b) 3 mmol NaF as fluoride source (Reaction temperature: 280 °C, and reaction time: 1 h).

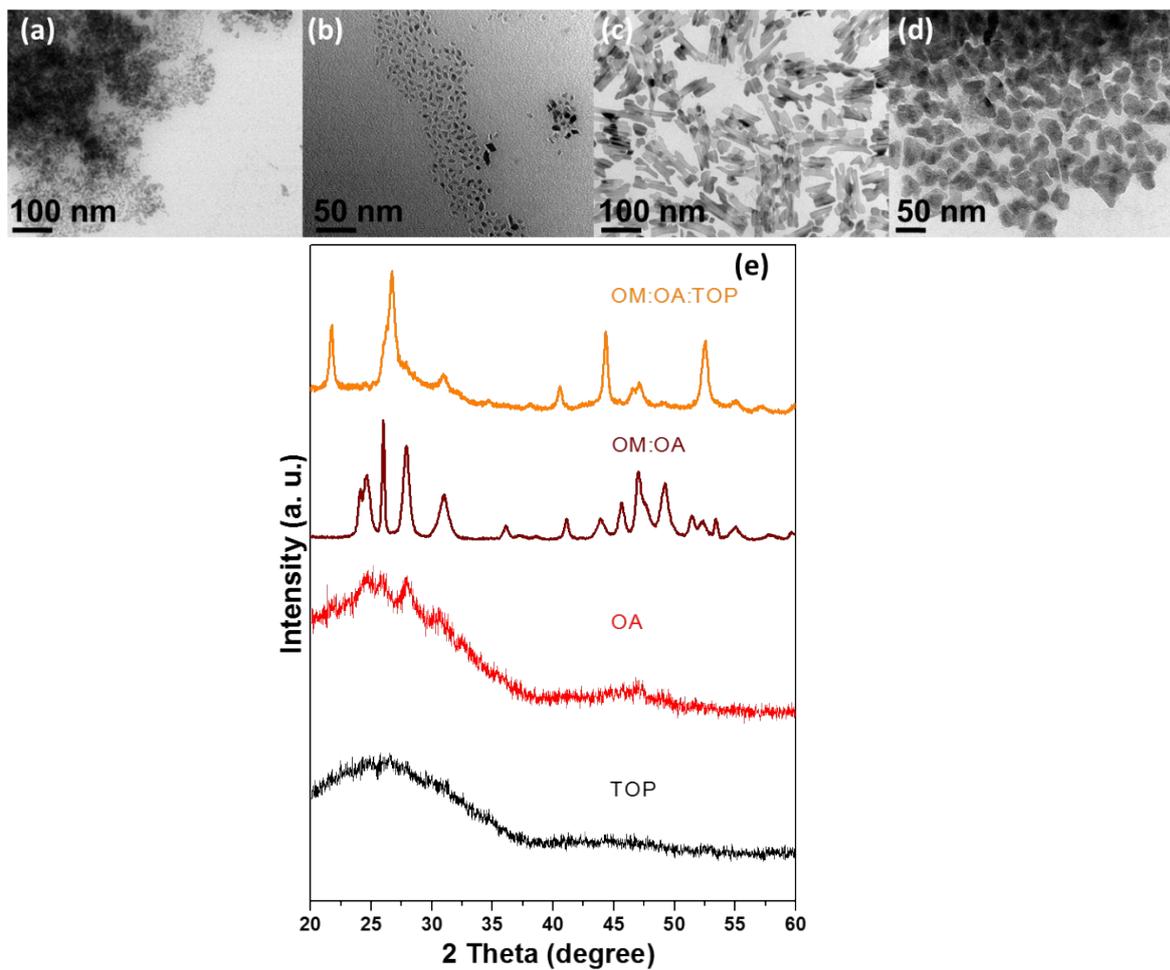


Fig. S8. TEM images of YF₃ nanostructures prepared with different surfactant compositions: (a) 100% TOP, (b) 100% OA, (c) 1:1 OM/OA mixture and (d) 1:1:1 OM/OA/TOP mixture. (e) XRD patterns of nanostructures shown in (a-d) (Reaction temperature: 280 °C).

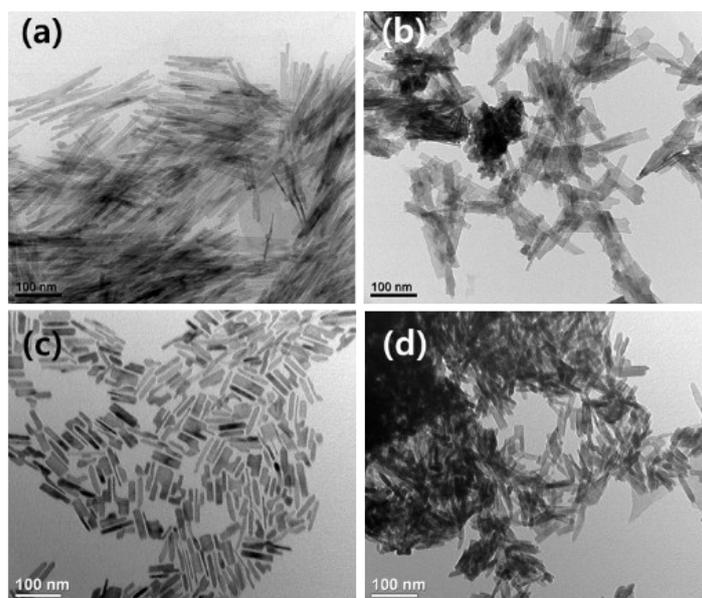


Fig. S9. YF_3 nanostructures synthesized at (a) 260 °C using 20 mL OM solvent with 2 h and (b) 3 h reaction time; at 280 °C with 2 h reaction time using (c) 15ODE:5OM and (d) 12ODE:8OM solvent composition.

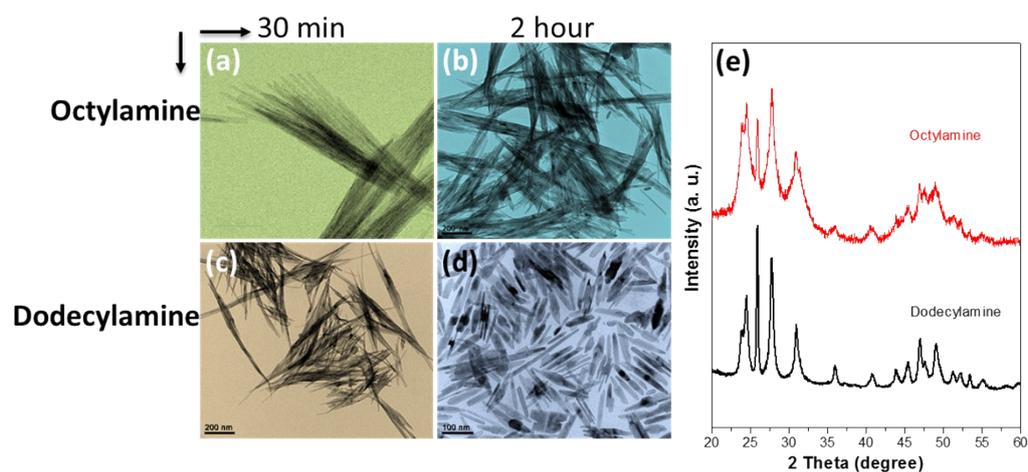


Fig. S10. (a-d) TEM images of YF_3 nanostructures prepared with amines of different hydrocarbon chain length as surfactants with 30 min and 2 h reaction times. (e) XRD patterns of nanostructures shown in (a, c).

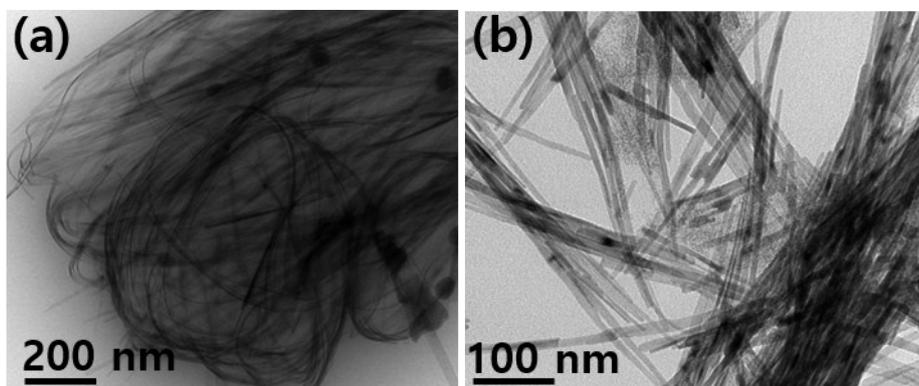


Fig. S11. TEM images of YF₃:Yb³⁺/Er³⁺ (a) nanobelts (b) nanowires.

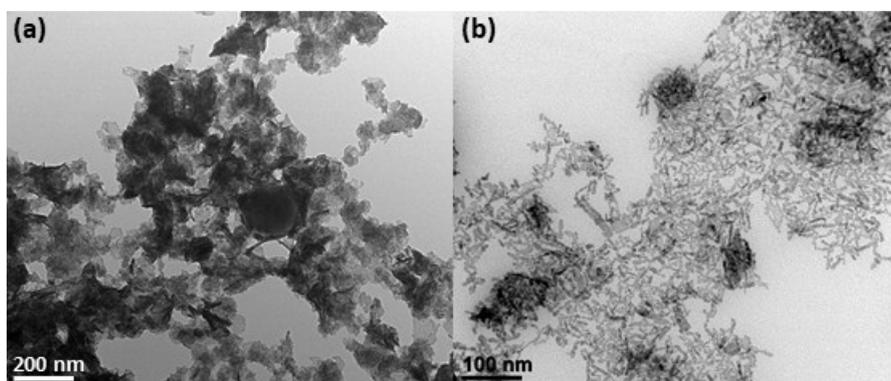


Fig. S12. TEM image of (a) NdF₃ (b) LaF₃ nanostructures prepared at 260 °C with a solvent composition of ODE:OM = 17:3.