The role of 2-Ethylhexanoic acid in manipulating the morphology and upconversion of the flame-made Y$_2$O$_3$:Yb$^{3+}$/Ho$^{3+}$ nanoparticles toward remote temperature sensing

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**Fig. S1** Average size of Y$_2$O$_3$:Yb$^{3+}$(8 mol%)/Ho$^{3+}$(1 mol%) UCNPs with different 2-EHA/RE$^{3+}$ molar ratios (x/1, x = 0, 0.5, 1, 1.5, 2, 2.5, 3) calculated by XRD.
**Fig. S2** TEM images of Y₂O₃:Yb³⁺(8 mol%)/Ho³⁺(1 mol%) UCNPs with 2-EHA/RE³⁺ molar ratios: x/1, (a) x = 3; (b) x = 5; (c) x = 10. The corresponding particle size distribution based on TEM images (a) (b) and (c) recorded as (d), (e) and (f), respectively.

**Fig. S3** UCL spectra of Y₂O₃:Yb³⁺(8 mol%)/Ho³⁺(1 mol%) UCNPs with 2-EHA/RE³⁺ molar ratio (x/1, x = 3, 5, 10) under the excitation of 976 nm laser with the power density of 159.09 W cm⁻²;