Electronic Supplementary Information

Figure S1 XRD patterns of $\text{Y(OH)}_{1.63}\text{F}_{1.37}$ prepared by using CTAB as additive.

Figure S2 XRD patterns of $\text{Y}_6\text{O}_5\text{F}_8$ prepared by using CTAB as additive.

Figure S3 SEM images of evolution for $\text{Y(OH)}_{1.63}\text{F}_{1.37}$ at different hydrothermal times: (a, b) 3 h, (c, d) 8 h, (e, f) 15 h, (g, h) 24 h, and (i, j) 48 h.

Figure S4 XRD patterns of $\text{Y(OH)}_{1.63}\text{F}_{1.37}$ prepared by using PVP as additive.
Figure S5 XRD patterns of $Y_6O_5F_8$ prepared by using PVP as additive.

Figure S6 SEM images of evolution for $Y(OH)_{1.63}F_{1.37}$ at different hydrothermal times (using PVP as additive): (a, b) 5 h, (c, d) 10 h, (e, f) 21 h, and (g, h) 48 h.

Figure S7 XRD patterns of both $Y(OH)_{1.63}F_{1.37}$ and $Y_6O_5F_8$ prepared by using EDTA as additive.

Figure S8 UC emission spectra of $Y_{5.34}O_5F_8:0.6Yb^{3+}, 0.06Er^{3+}$ using PVP as additive under DL excitation of 980 nm.

Figure S9 UC emission spectra of $Y_{5.34}O_5F_8:0.6Yb^{3+}, 0.06Er^{3+}$ using EDTA as additive under DL excitation of 980 nm.
Figure S10 Decay curves of both YOF: 1%Ho\textsuperscript{3+} and YOF: 10%Yb\textsuperscript{3+}, 1%Ho\textsuperscript{3+}.