Electronic supplementary information

Facile Synthesis, Growth Mechanism and Luminescence Properties of Uniform $La(OH)_3$: Ho^{3+}- /Yb^{3+} and La_2O_3: Ho^{3+}- /Yb^{3+} Nanorods

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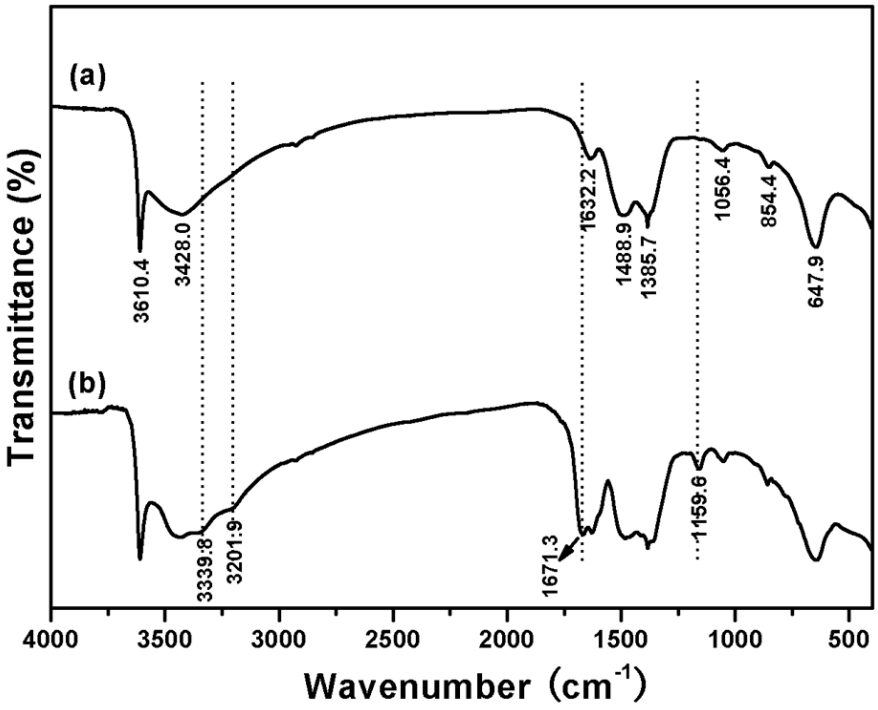

Figure S1. FT-IR spectra of the as-prepared $La(OH)_3$ (a) **P1** and (b) **P5** samples.

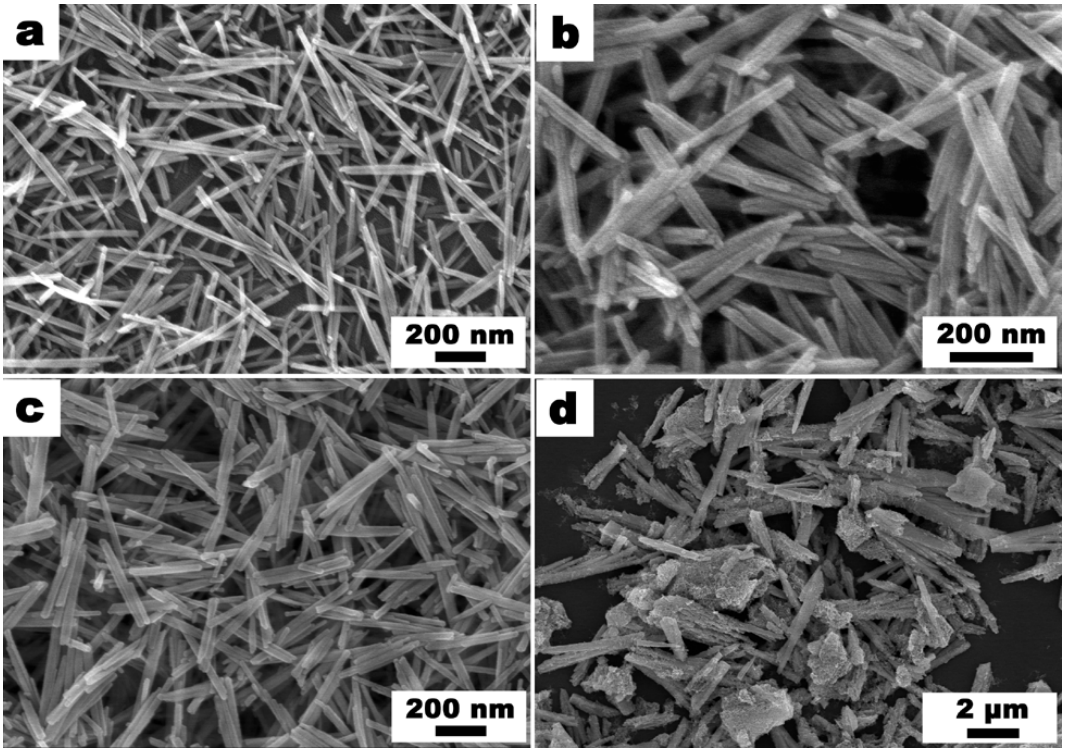

Figure S2. SEM images of $La(OH)_3$ samples prepared at homogeneous precipitation condition at 90 ^oC without urea (a, b) and with urea (c, d), respectively. The pH value of the initial solution are adjusted to 12 by $NH_3 \cdot H_2O$ (25 wt-%) (a, c) and NaOH (2 M). (b, d). The samples shown in a-d are noted as **P1**, **P6**, **P3**, and **P7**, respectively.

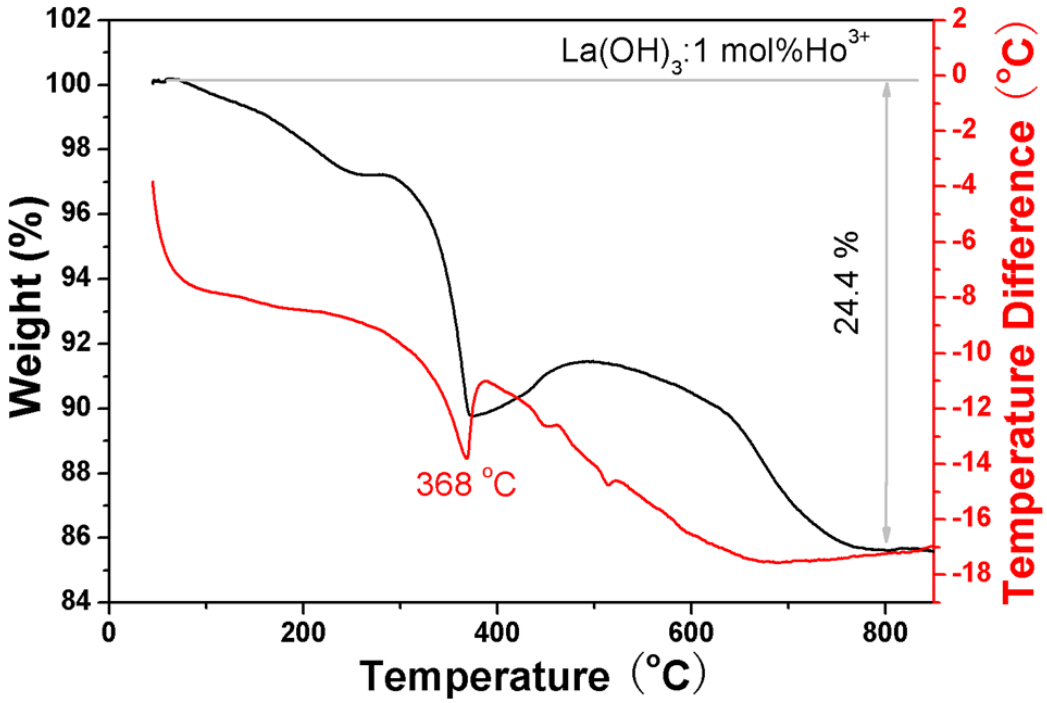

Figure S3. TG-DTA curves of $La(OH)_3$:1 mol% Ho^{3+} sample prepared by homogeneous precipitation reaction at 90 ^{o}C.

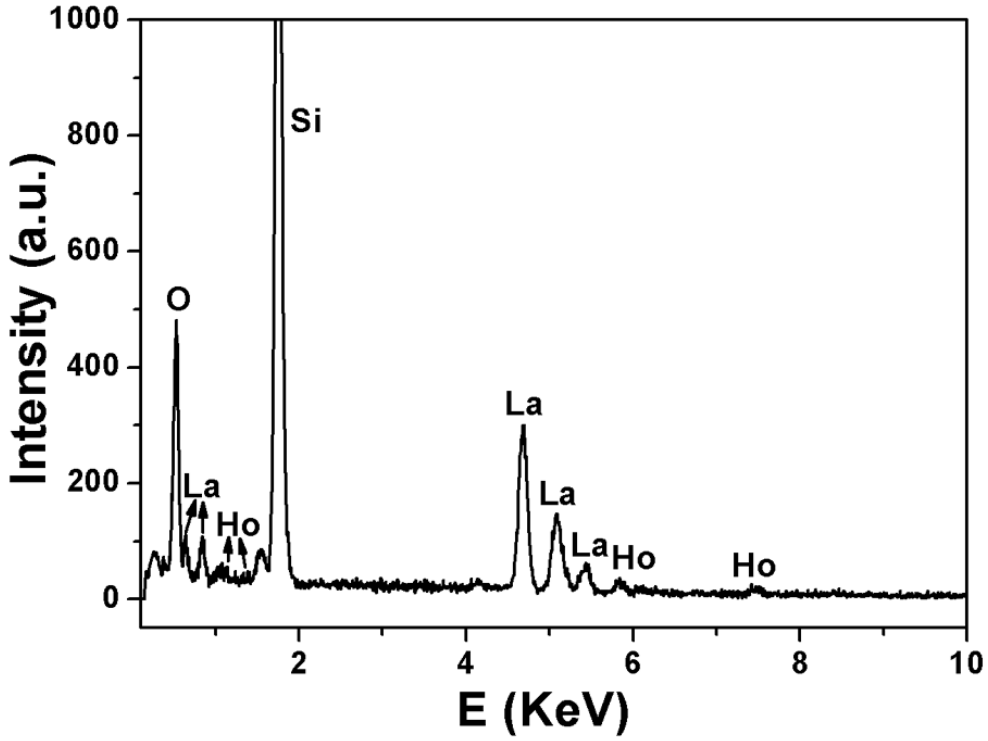

Figure S4. The EDX spectrum of La_2O_3:1 mol% Ho^{3+} sample caclined at 800 ^oC.

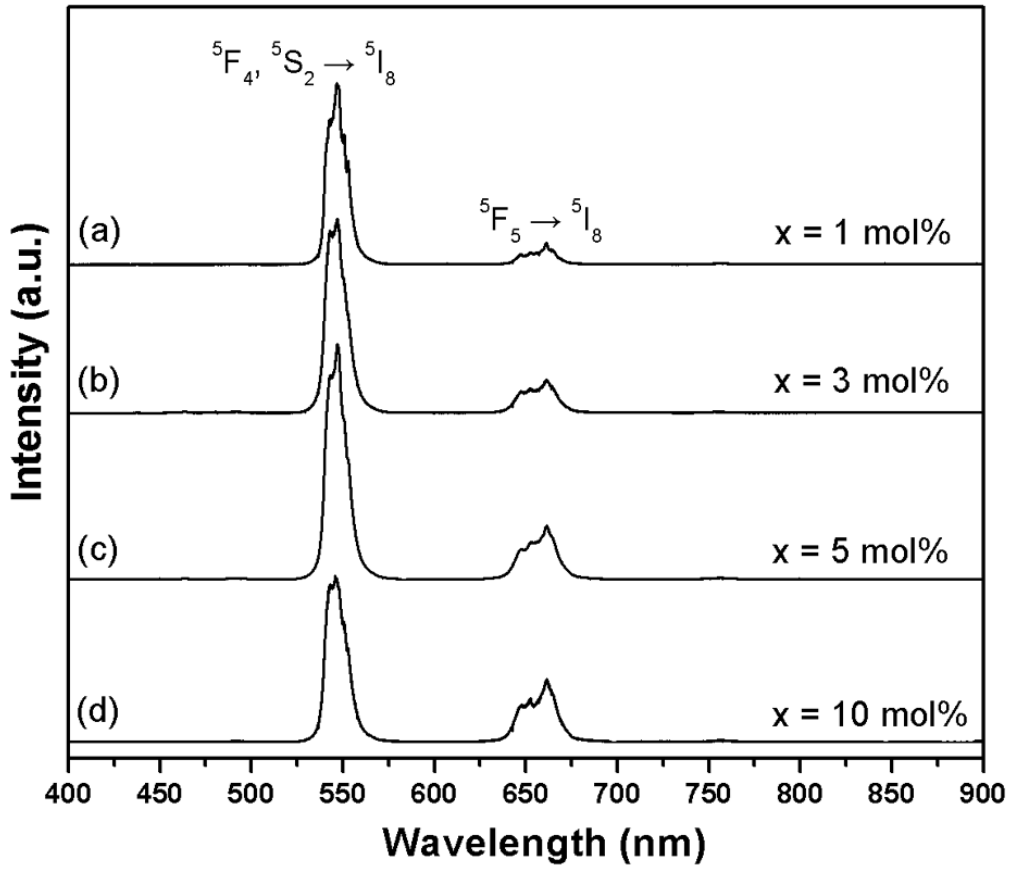

Figure S5. Upconversion emission spectra of La_2O_3 samples co-doped with Ho^{3+}/Yb^{3+} (a) 1 mol% Ho^{3+}/1 mol% Yb^{3+}, (b) 1 mol% Ho^{3+}/3 mol% Yb^{3+}, (c) 1 mol% Ho^{3+}/5 mol% Yb^{3+}, (d) 1 mol% Ho^{3+}/10 mol% Yb^{3+}.

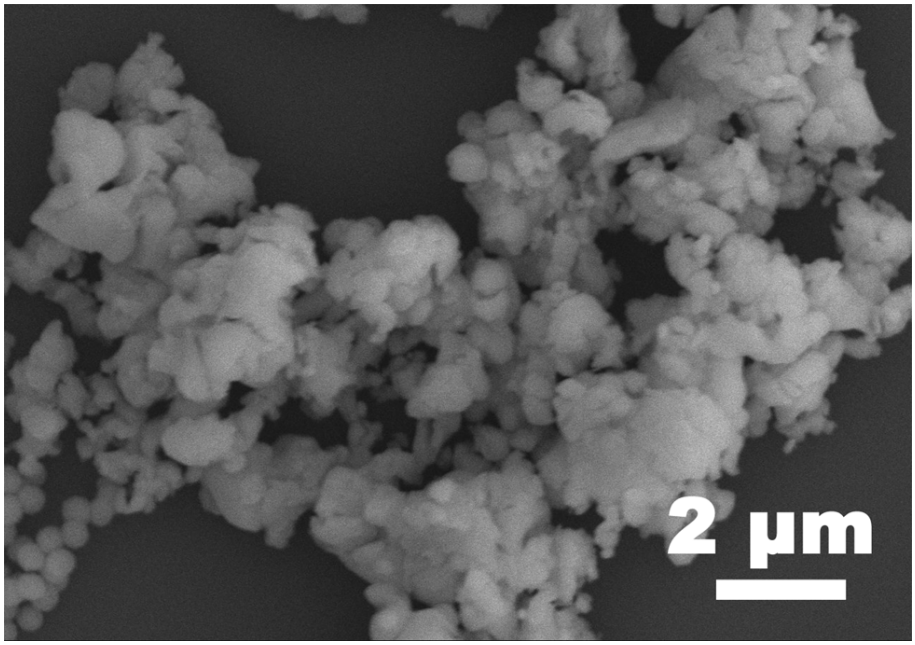

Figure S6. The SEM image of La_2O_3:1 mol% Ho^{3+} bulk sample prepared by solid state reaction and annealed at 800 ^{o}C.