Electronic Supplementary Material (ESI) for Journal of Materials Chemistry

Supporting Information

Rapid Microwave Reflux Process for the Synthesis of Pure Hexagonal $NaYF_4$:Yb^{3+},Ln^{3+},Bi^{3+} (Ln^{3+} = Er^{3+}, Tm^{3+}, Ho^{3+}) and its Enhanced UC Luminescence

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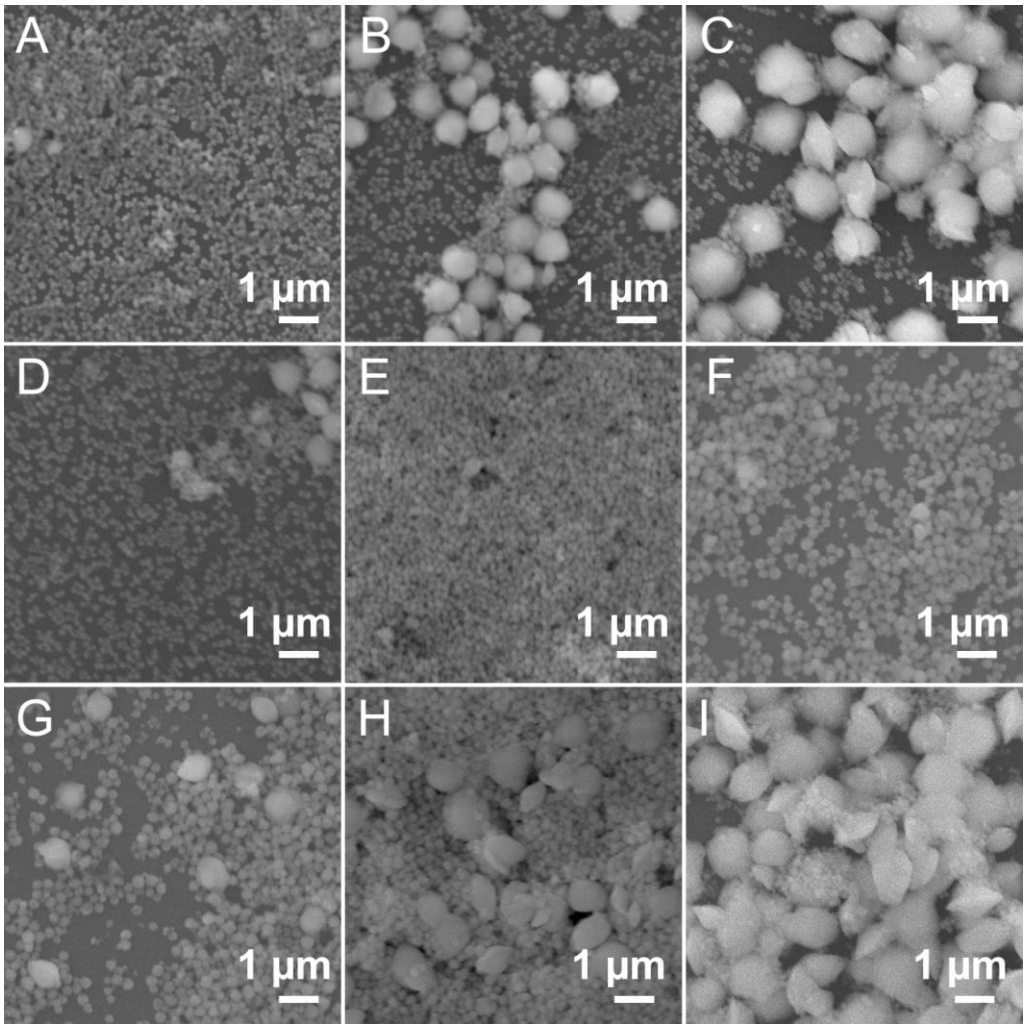

Figure S1. SEM images of $NaYF_4$:20%Yb^{3+},2%Er^{3+} prepared under different conditions: (A–D) sample S1–S4, (E–G) sample T1–T3 , and (H–I) sample H1–H2.

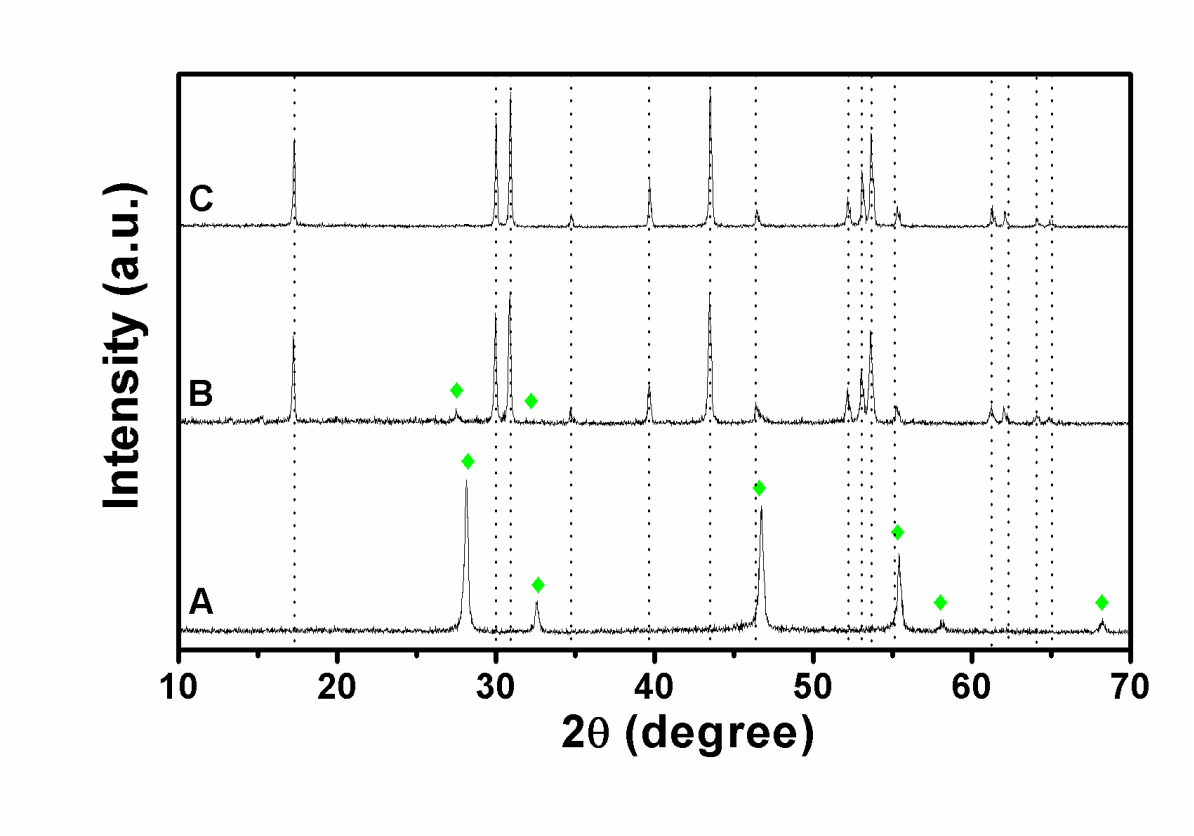

Figure S2. XRD patterns of $NaYF_4$:20%Yb^{3+},2%Tm^{3+} prepared with different amount of NH_4F under MW irradiation at 160 ºC for 50 min: (A) 12 mmol, (B) 36 mmol, and (C) 60 mmol.

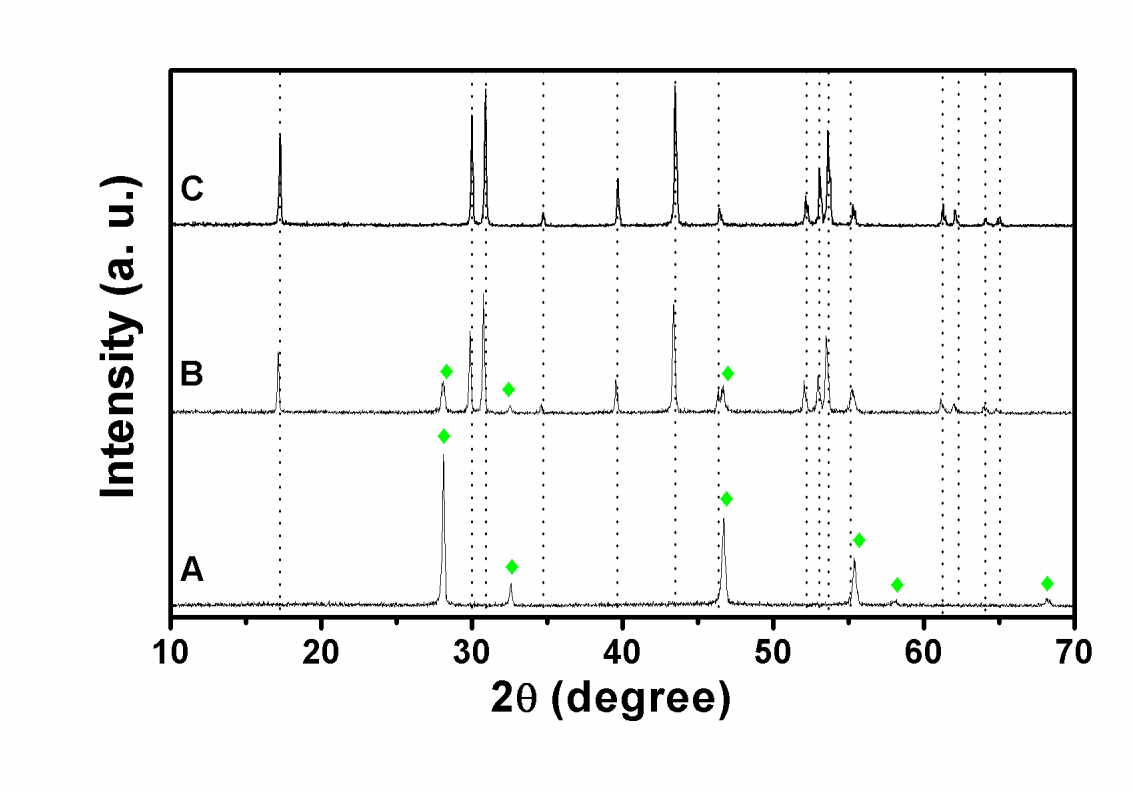

Figure S3. XRD patterns of $NaYF_4$:20%Yb^{3+},2%Ho^{3+} prepared with different amount of NH_4F under MW irradiation at 160 ºC for 50 min: (A) 12 mmol, (B) 36 mmol, and (C) 60 mmol.

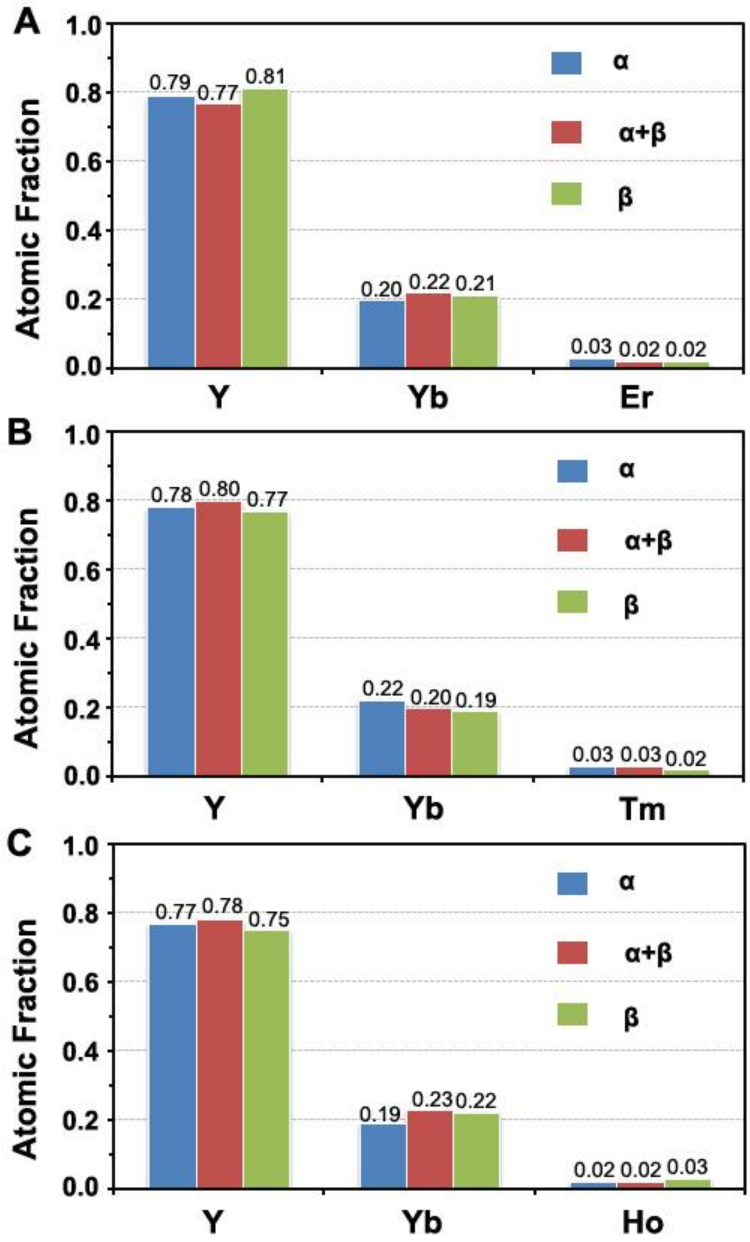

Figure S4. EDS based elemental composition of $NaYF_4:Yb^{3+},Ln^{3+}$ crystals with different phases: (A) $NaYF_4:Yb^{3+},Er^{3+}$, (B) $NaYF_4:Yb^{3+},Tm^{3+}$,(C) $NaYF_4:Yb^{3+},Ho^{3+}$. The fraction was gained by comparing relative peak intensities together with the corresponding sensitivity factors of each element.

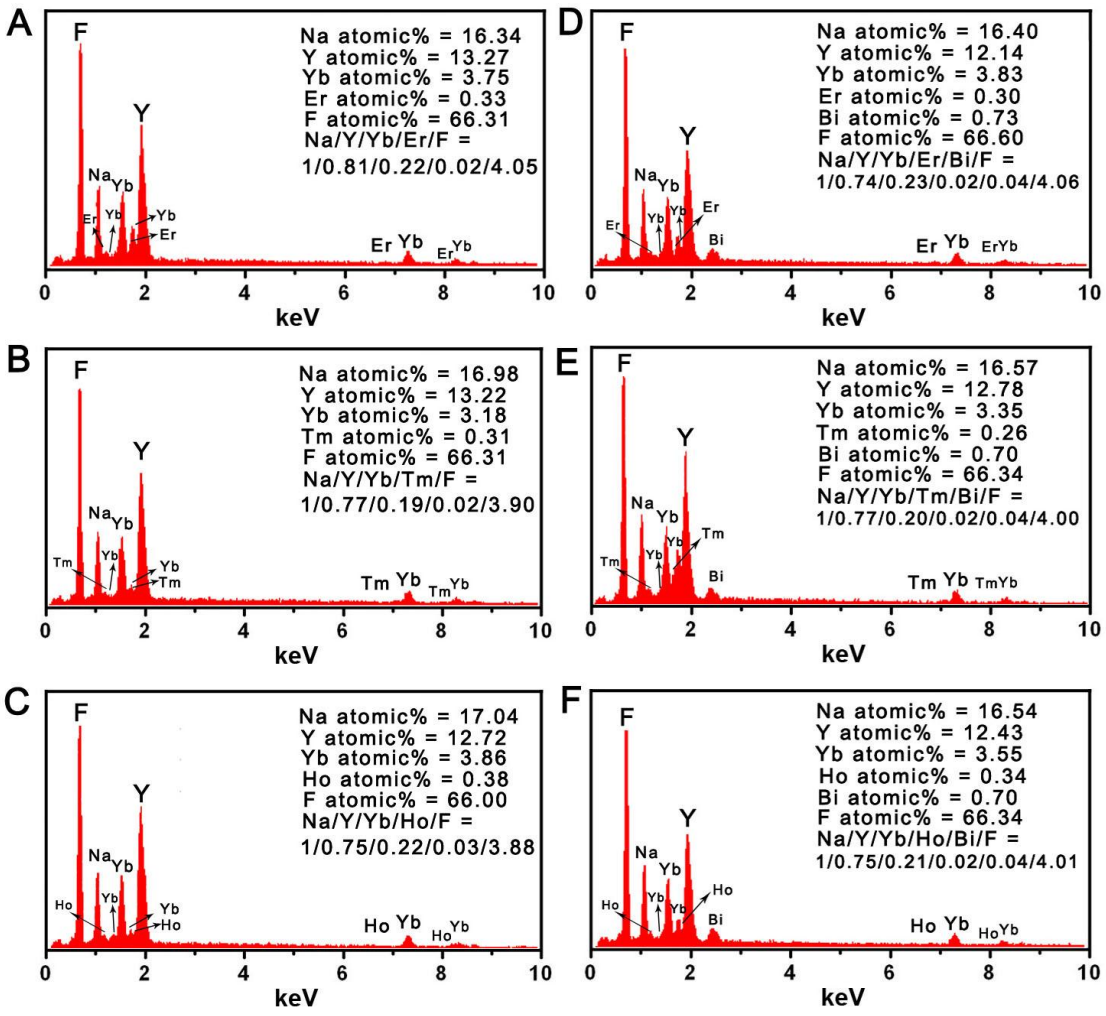

Figure S5. EDS of $NaYF_4$:20%Yb^{3+},2%Er^{3+} (A), $NaYF_4$:20%Yb^{3+},2%Tm^{3+} (B), $NaYF_4$:20%Yb^{3+},2%Ho^{3+} (C), $NaYF_4$:20%Yb^{3+},2%Er^{3+},4%Bi^{3+} (D), $NaYF_4$:20%Yb^{3+},2%Tm^{3+},4%Bi^{3+} (E), and $NaYF_4$:20%Yb^{3+},2%Ho^{3+},4%Bi^{3+} (F) prepared with 60 mmol NH_4F under MW irradiation at 160 ºC for 50 min.

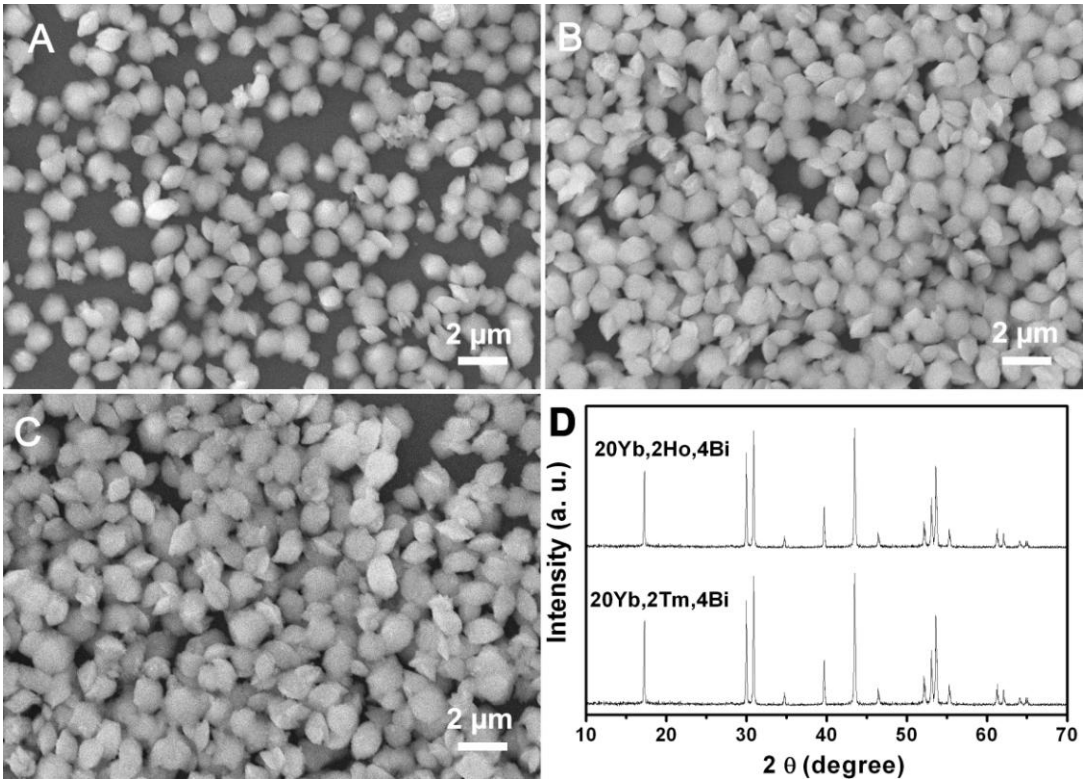

Figure S6. SEM images of $NaYF_4$:20%Yb^{3+},2%Er^{3+},4%Bi^{3+} (A), $NaYF_4$:20%Yb^{3+},2%Tm^{3+},4%Bi^{3+} (B), and $NaYF_4$:20%Yb^{3+},2%Ho^{3+},4%Bi^{3+} (C); and the XRD patterns of $NaYF_4$:20%Yb^{3+},2%Ho^{3+},4%Bi^{3+} and $NaYF_4$:20%Yb^{3+},2%Tm^{3+},4%Bi^{3+} (D). All the samples were prepared with 60 mmol NH_4F under MW irradiation at 160 ºC for 50 min.