

## Supplementary Information

### **Molten salt synthesized $\text{LaTa}_7\text{O}_{19}:\text{Er}^{3+}/\text{Yb}^{3+}$ with superior upconversion luminescence by KCl flux**

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### **Table of Contents**

#### **1. Instruments and Measurements**

#### **2. Materials and Synthesis**

#### **3. Supporting Figures**

#### **1. Instruments and Measurements**

XRD is Rigaku D/MAX RE with Cu K $\alpha$  radiation as the source of X-ray radiation (incident wavelength,  $\lambda = 1.5406 \text{ \AA}$ ). SEM is JSM-7610F Plus. Spectrophotometer is UV3600, Shimadzu, Japan. Emission spectrum is Hitachi F-4600. An external 980 nm laser is Changchunxinchanye Company, China. The temperature controlled is homemade DMU-TC 450.

#### **2. Materials and Synthesis**

All the raw materials were purchased from Aladdin company. All the materials were prepared by molten salt method using KCl flux. Holding temperature is from 800 to 1150°C. Holding time is from 2 to 48 h. The mass of KCl is from 5 to 30 g. The target material formula is  $\text{La}_{0.5}\text{Er}_{0.1}\text{Yb}_{0.4}\text{Ta}_7\text{O}_{19}$ .

### 3. Supporting Figures

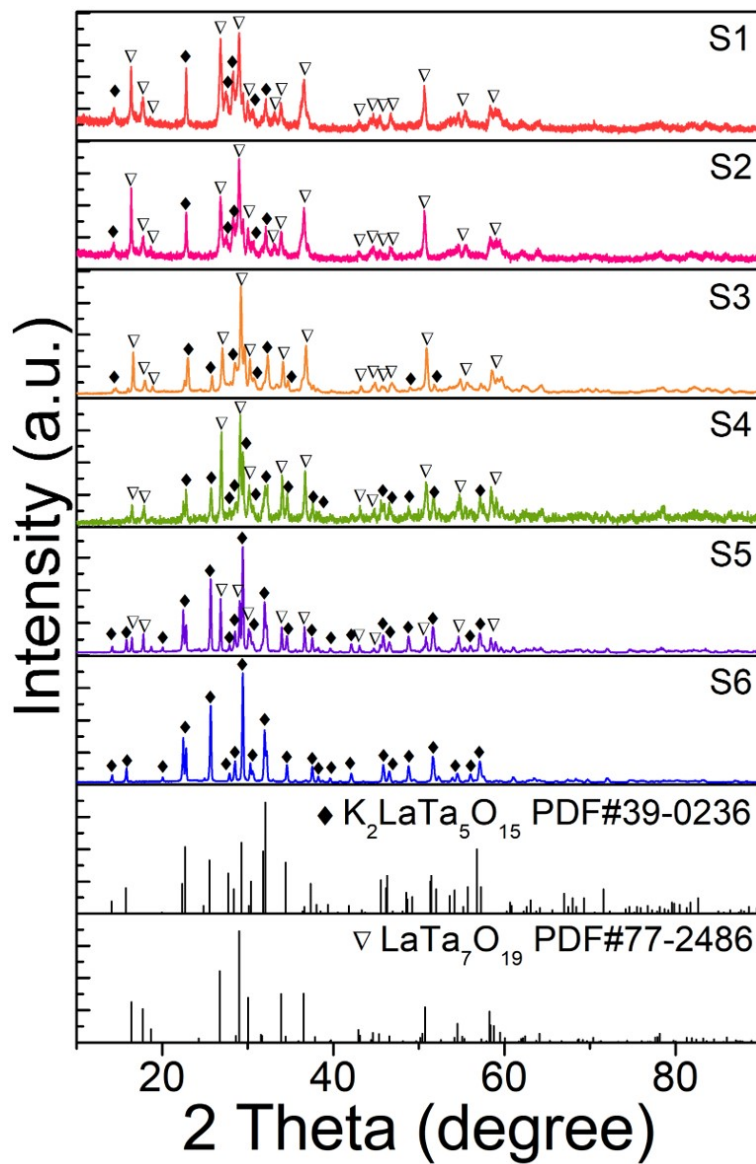


Figure S1. XRD results of S1-S6 samples.

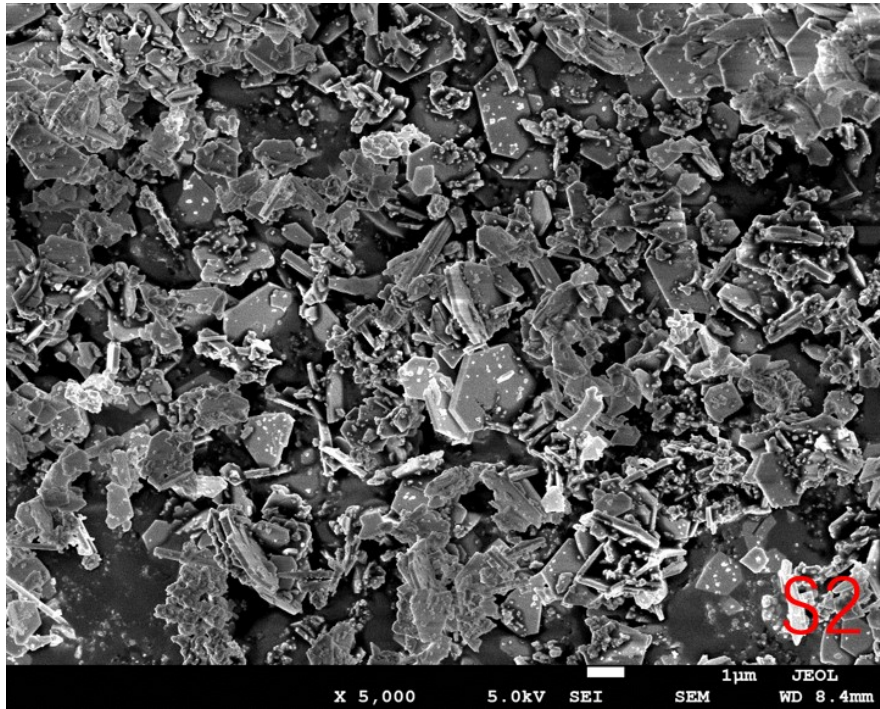


Figure S2. SEM result of S2 sample.

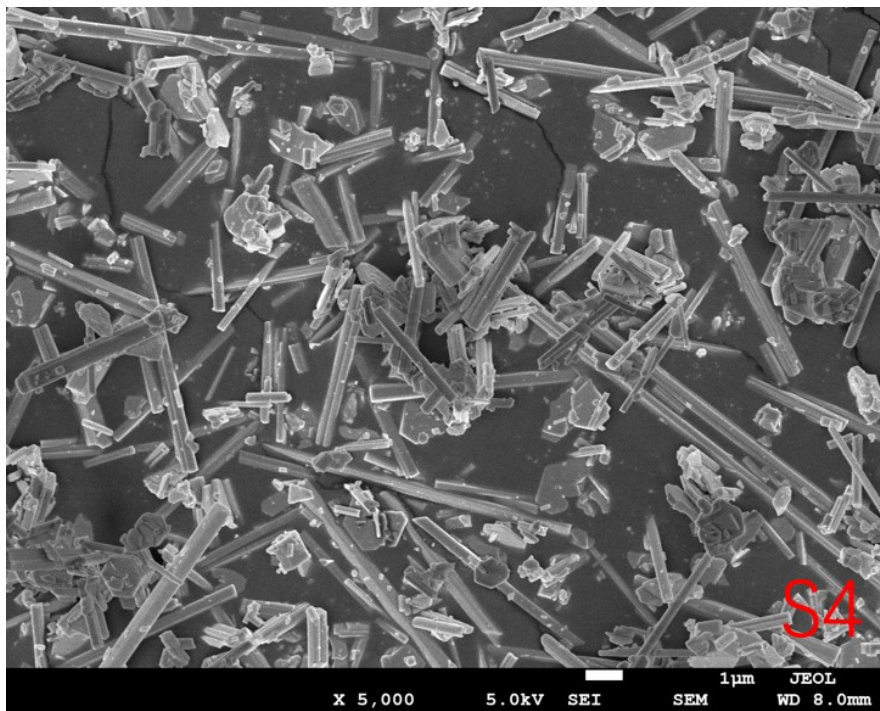


Figure S3. SEM result of S4 sample.

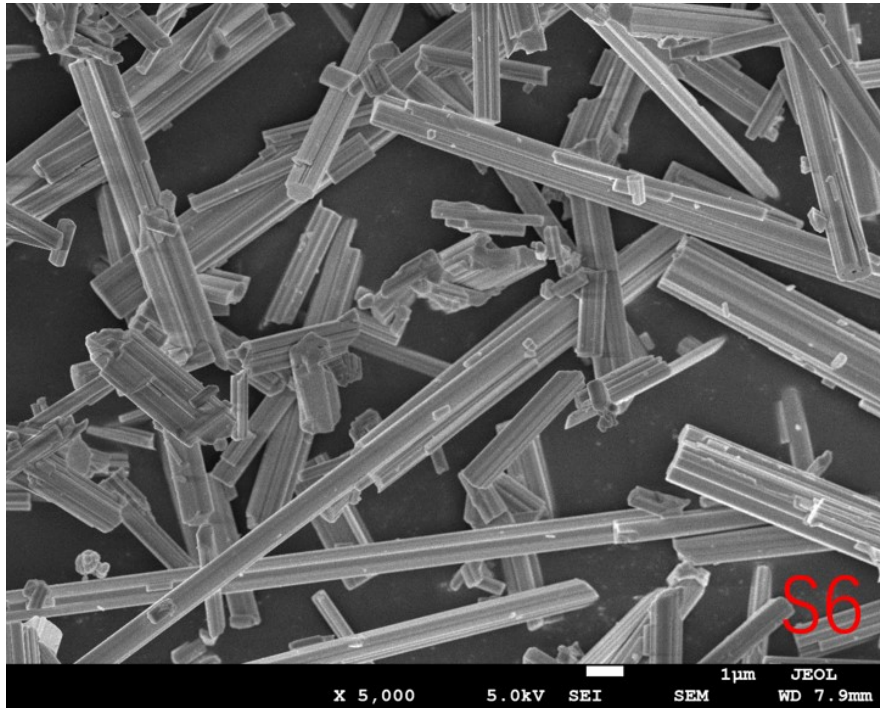


Figure S4. SEM result of S6 sample.

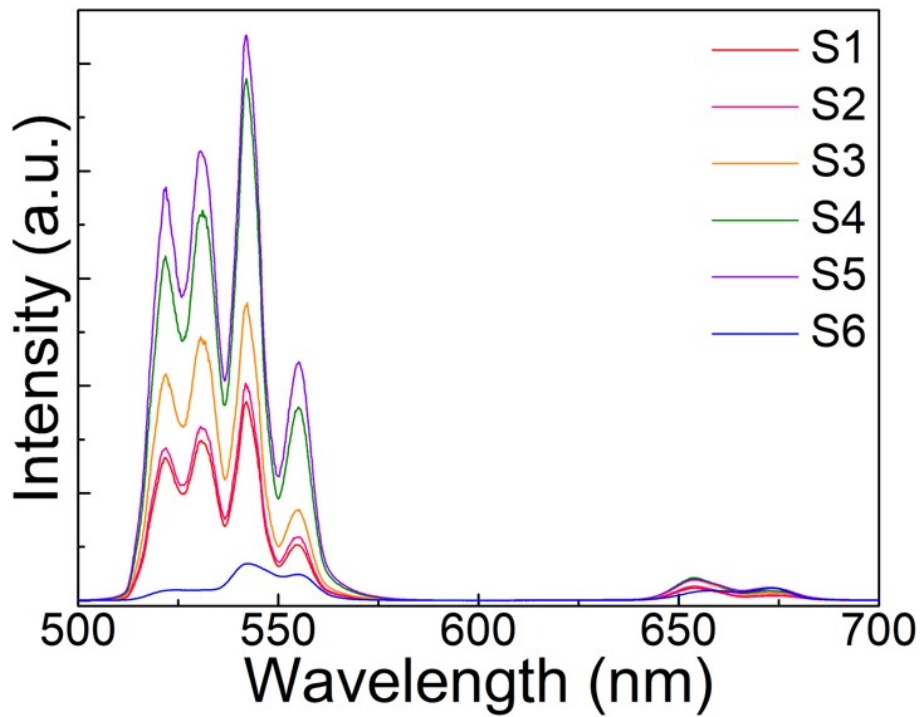


Figure S5. The emission spectra of S1-S6 samples under 980 nm laser excitation.



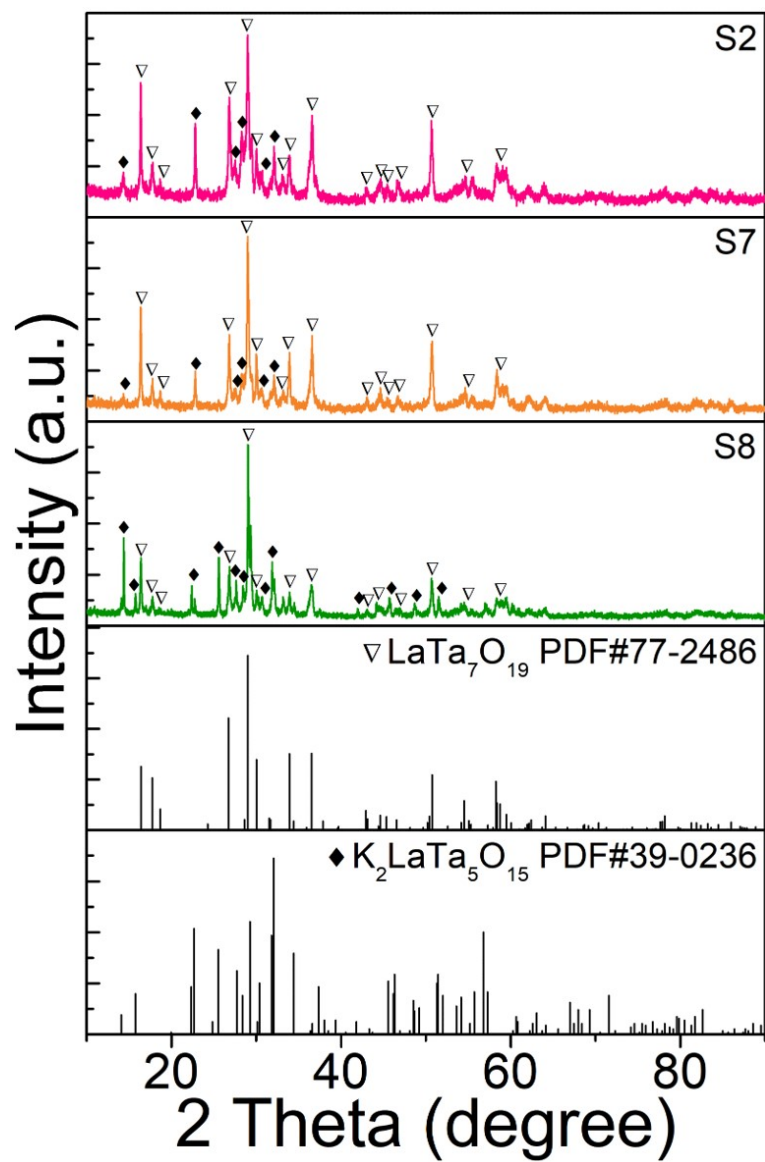


Figure S6. XRD results of S2, S7, S8 samples.

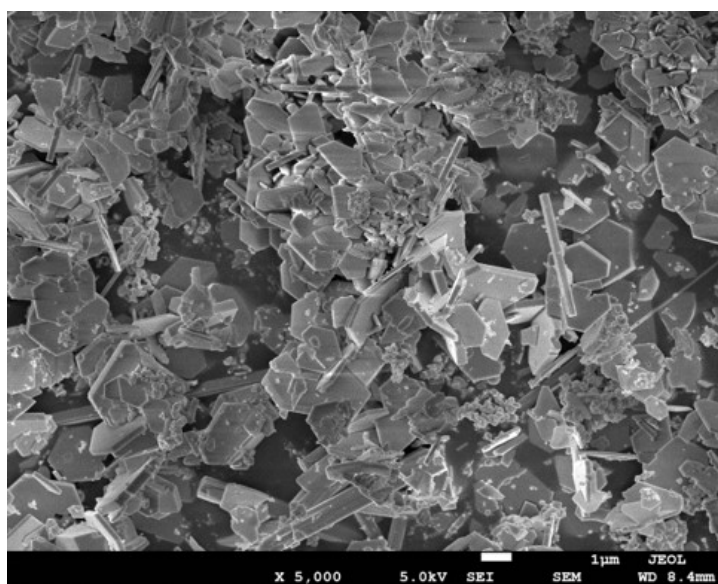


Figure S7. SEM results of S7 sample.

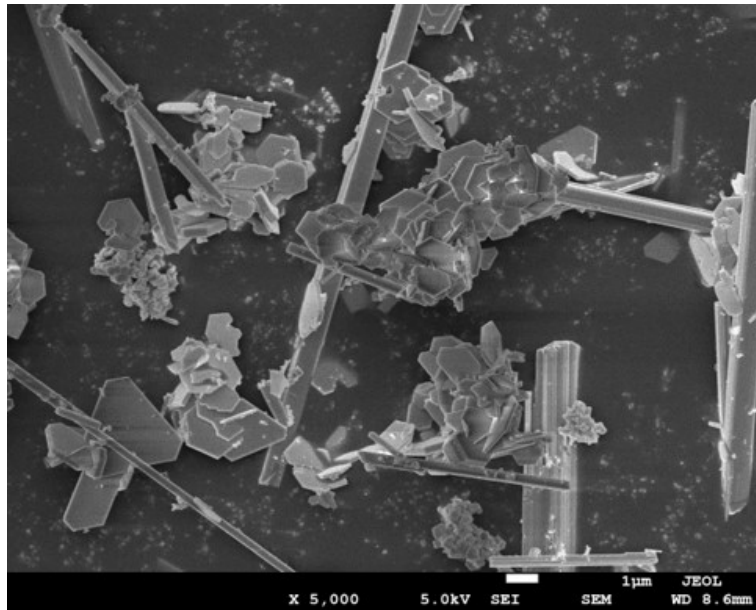


Figure S8. SEM results of S8 sample.

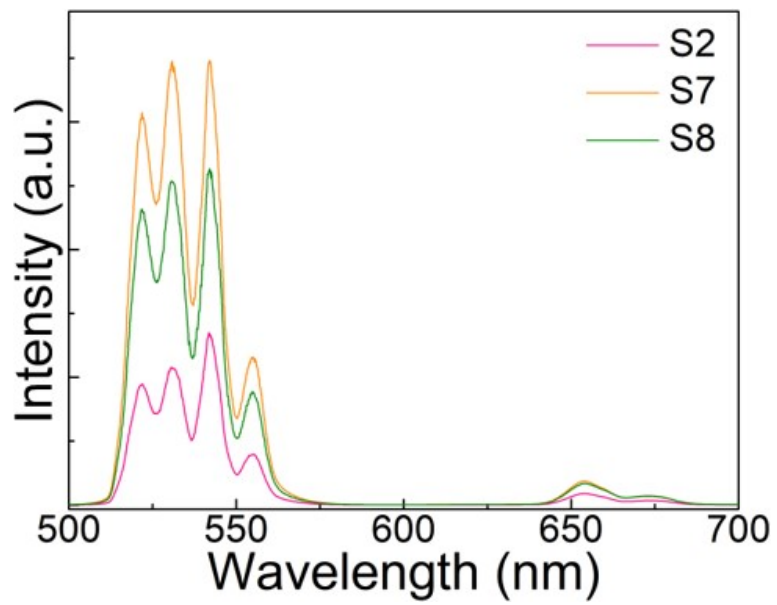


Figure S9. The emission spectra of S2, S7, S8 samples under 980 nm laser excitation.

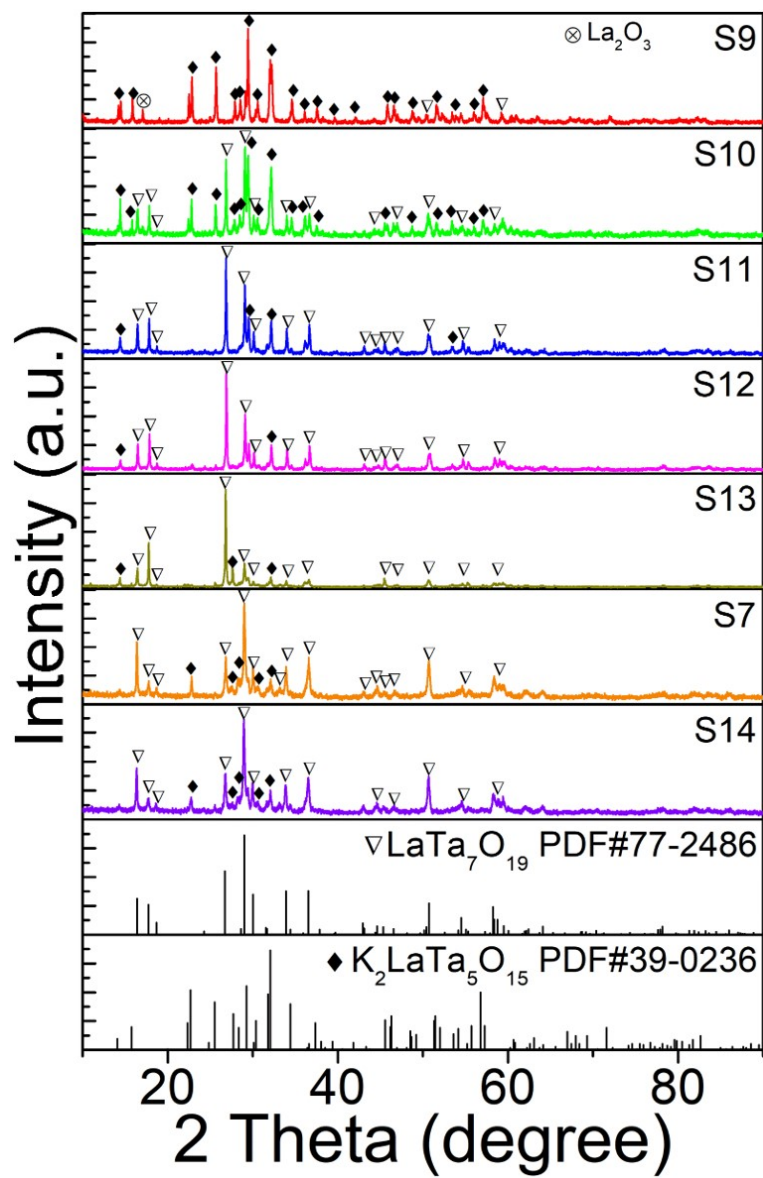


Figure S10. XRD results of S7, S9-S14 samples.

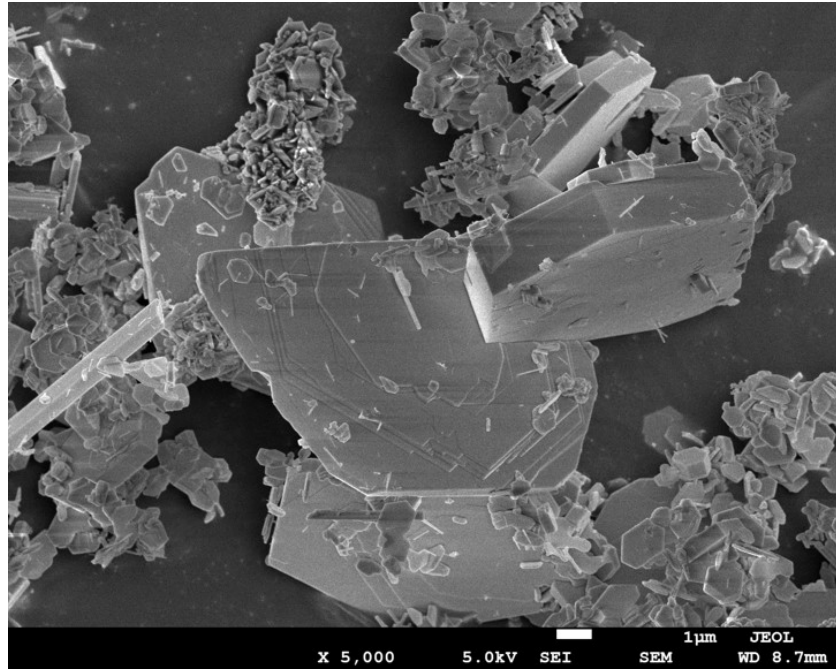


Figure S11. SEM results of S12 samples.

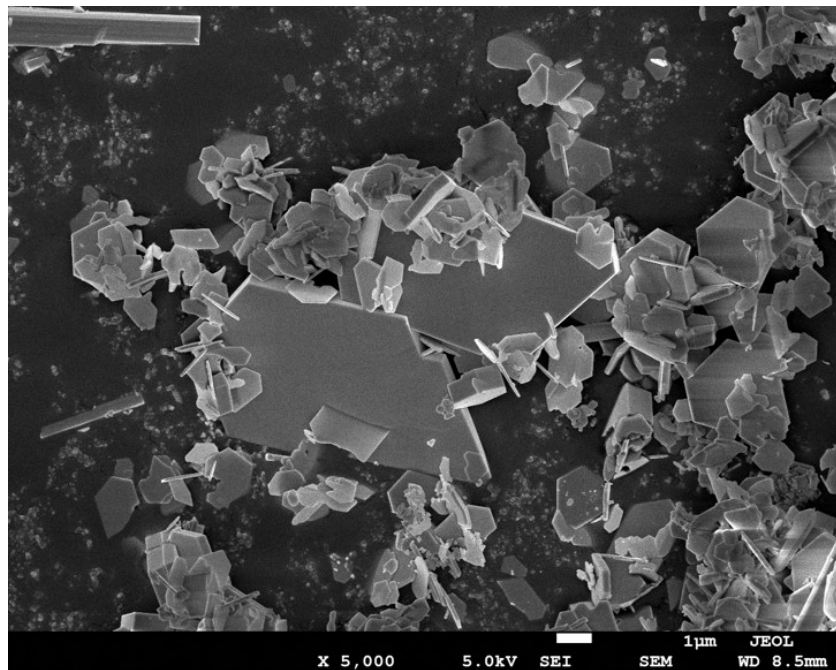


Figure S12. SEM results of S13 samples.



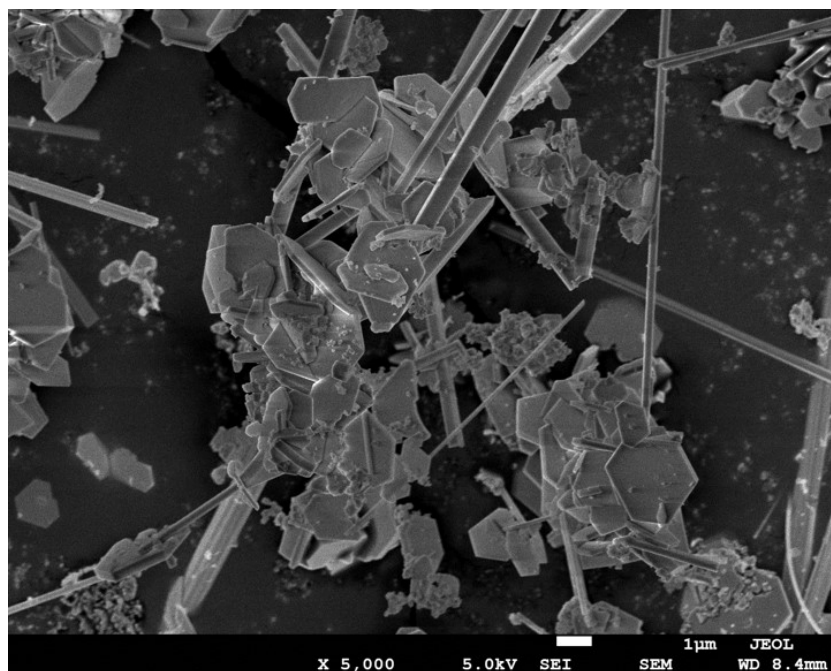


Figure S13. SEM results of S14 samples.

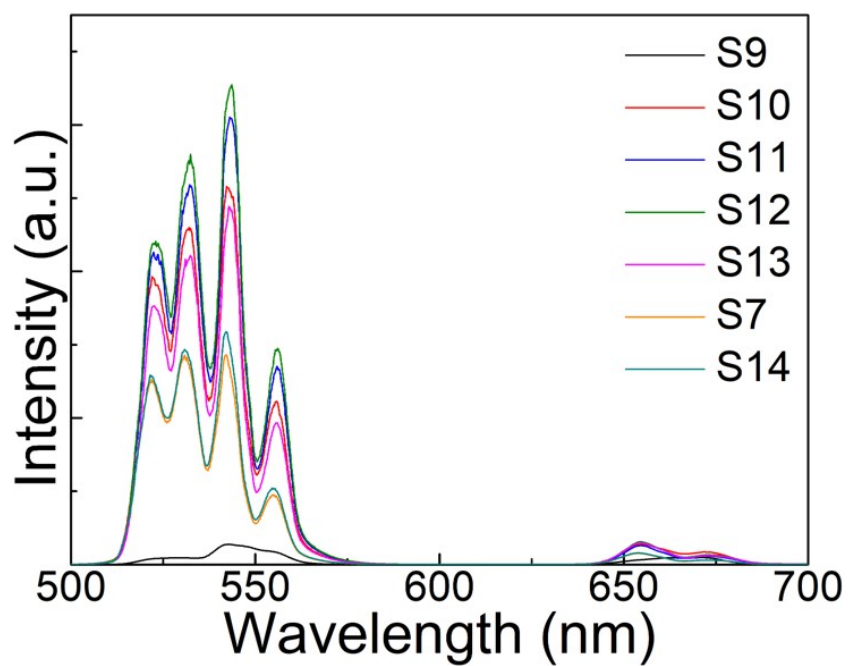


Figure S14. The emission spectra of S7, S9-S14 samples under 980 nm laser excitation.

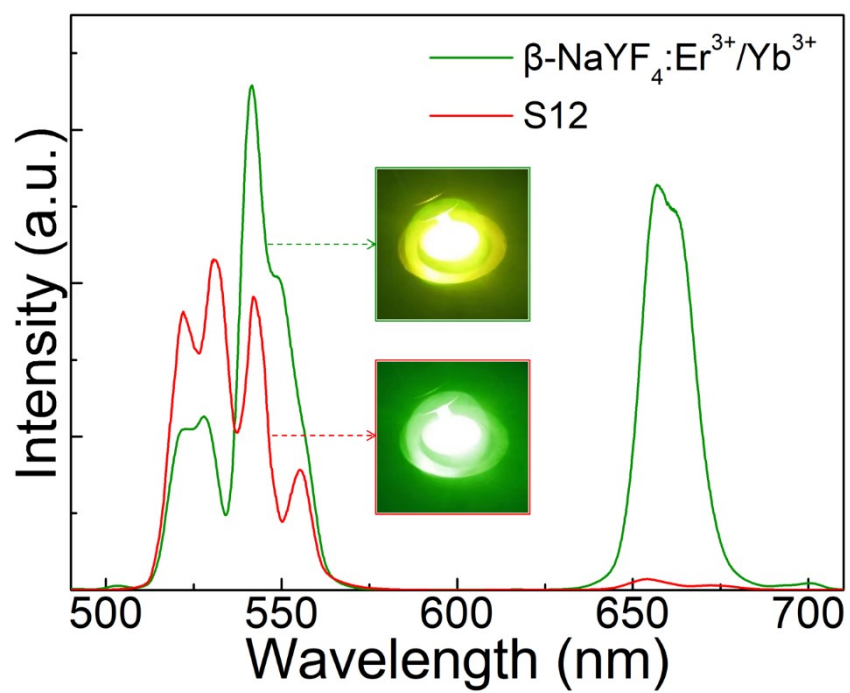


Figure S15. UCL emission spectra of S12 and  $\beta\text{-NaYF}_4\text{:Er}^{3+}/\text{Yb}^{3+}$  phosphors under 980 nm laser excitation.