Supporting information for

KF-mediated controlled-synthesis of potassium ytterbium fluorides (doped with Er^{3+}) with phase-dependent upconversion luminescence

Mingye Ding,[a] Fei Zhu,[a] Danyang Ma,[a] Xiaoyong Huang,[*b] Peng Liu,[c] Kaixin Song,[c] Jiasong Zhong,[a] Junhua Xi,[a] Zhenguo Ji,[a] Daqin Chen[*a]

[a] College of Materials & Environmental Engineering, Hangzhou Dianzi University, Hangzhou, 310018 P. R. China

[b] Key lab of Advanced Transducers and Intelligent Control System, Ministry of Education and Shanxi Province, College of Physics and Optoelectronics, Taiyuan University of Technology, Taiyuan 030024, P. R. China

[c] College of Electronic Information and Engineering, Hangzhou Dianzi University, Hangzhou, 310018 P. R. China

E-mail address: dqchen@hdu.edu.cn (D. Chen), huangxy04@126.com (X. Huang).

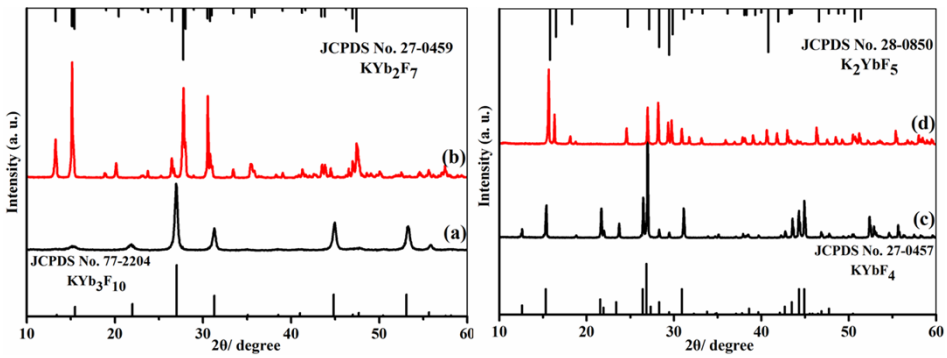

Fig. SI1 XRD patterns of potassium ytterbium fluorides synthesized with different molar ratio of KF to Ln^{3+} (Ln = Yb, Er): (a) KF/Ln^{3+} = 3, (b) KF/Ln^{3+} = 12.5, (c) KF/Ln^{3+} = 20 and (d) KF/Ln^{3+} = 50. The standard data of KYb_3F_{10} (JCPDS No. 77-2204), KYb_2F_7 (JCPDS No. 27-0459), $KYbF_4$ (JCPDS No. 27-0457) and K_2YbF_5 (JCPDS No. 28-0850) are given as references.

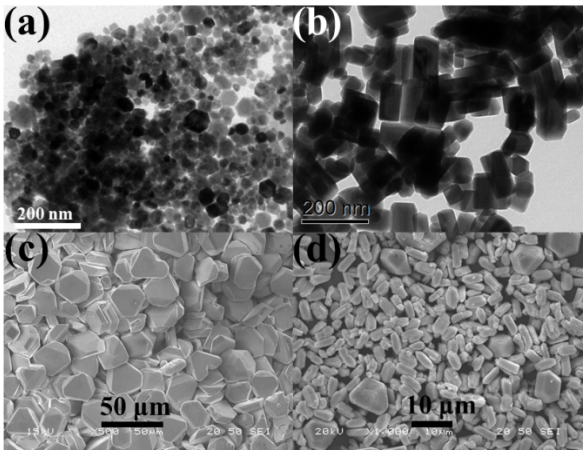

Fig. SI2 SEM images of potassium ytterbium fluoride samples synthesized with different molar ratio of KF to Ln^{3+} (Ln = Yb, Er): (a) KF/Ln^{3+} = 3, (b) KF/Ln^{3+} = 12.5, (c) KF/Ln^{3+} = 20 and (d) KF/Ln^{3+} = 50.

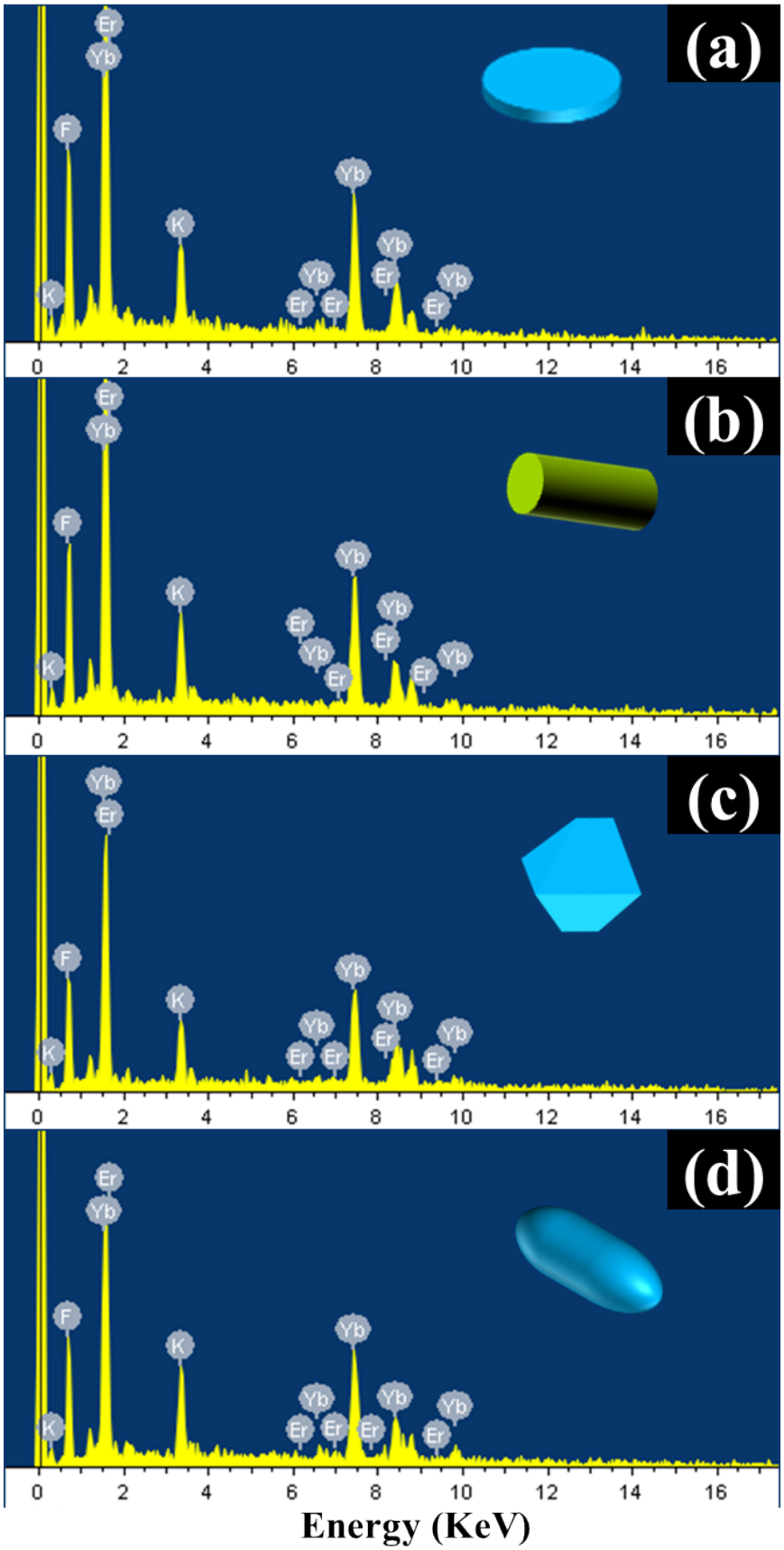

Fig. SI3 The EDS spectra of potassium ytterbium fluoride samples synthesized with different molar ratio of KF to Ln^{3+} (Ln = Yb, Er): (a) $KF/Ln^{3+} = 3$, (b) $KF/Ln^{3+} = 12.5$, (c) $KF/Ln^{3+} = 20$ and (d) $KF/Ln^{3+} = 50$.

Table SI1 EDS analysis results of sample S1, S2, S3 and S4.

Sample	KF/Ln^{3+}	K (at%)	Yb (at%)	Er (at%)	F (at%)
S1	3	6.8	21.54	0.63	71.03
S2	12.5	9.22	23.91	0.56	66.31
S3	20	16.56	15.56	0.32	67.56
S4	50	21.02	15.01	0.35	65.42

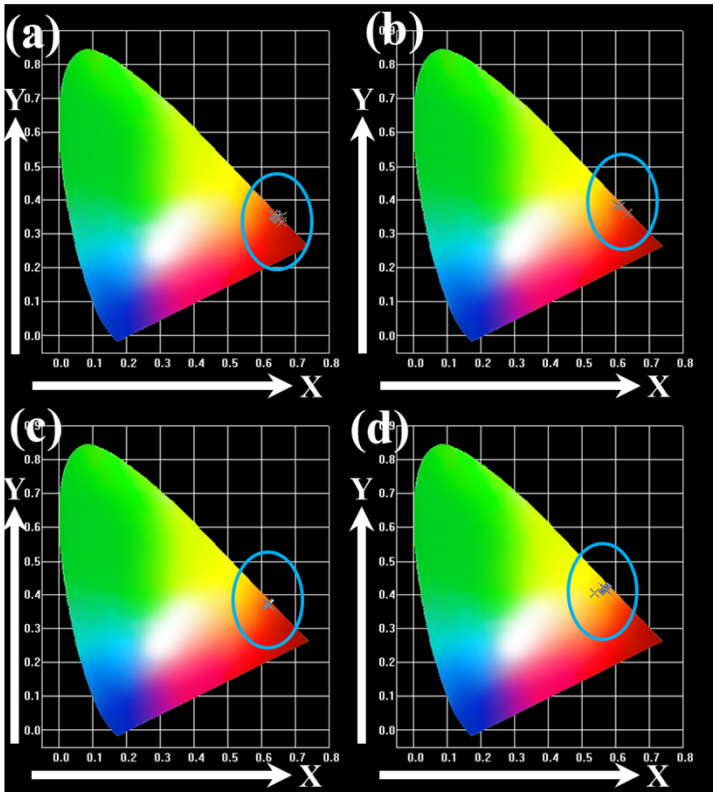

Fig. SI4 The CIE chromaticity coordinates of sample S1, S2, S3 and S4 under 980 nm laser excitation with different excitation power at the range of 50 to 500 mW.