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Supporting Information

Achieving the white emission by site-selective occupation of Eu^{2+} in $K_2BaSr(PO_4)_{2-x}(BO_3)_x:Eu^{2+}$

Guo-Dong Xie[a], Jia-Yong Si[*a], Gui-Hua Li[b], Ge-Mei Cai[*b], Zhi-Peng Wang[c] and Xiao-Jun Wang[*d]

[a]College of Mechanical and Electrical Engineering, Central South University of Forestry and Technology, Changsha, Hunan 410004, China

[b]School of Materials Science and Engineering, Central South University, Changsha, Hunan 410083, China

[c]State Key Laboratory of Advanced Design and Manufacturing for Vehicle Body, Hunan University, Changsha, Hunan 410082, China

[d]Department of Physics, Georgia Southern University, Statesboro, Georgia 30460, United States

*Correspondence: sjy98106@163.com (J.-Y. Si) or caigemei@csu.edu.cn (G.-M. Cai) or xwang@georgiasouthern.edu (X.-J. Wang).

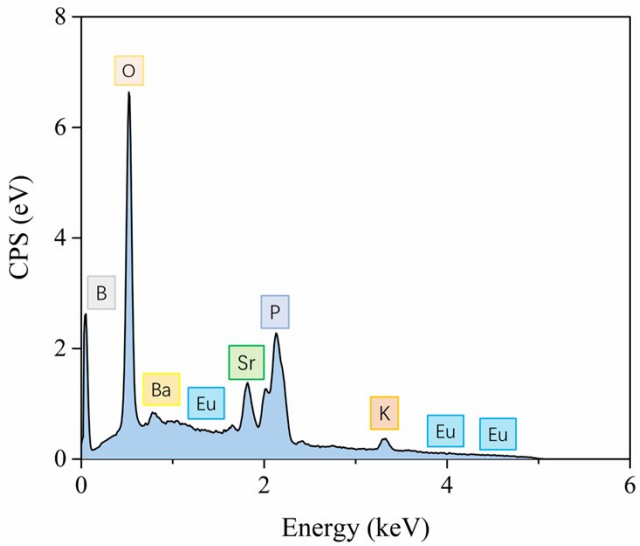

Figure S1. The elemental mapping spectrum of $KBaSP_{1.8}B_{0.2}$:$0.04Eu^{2+}$.

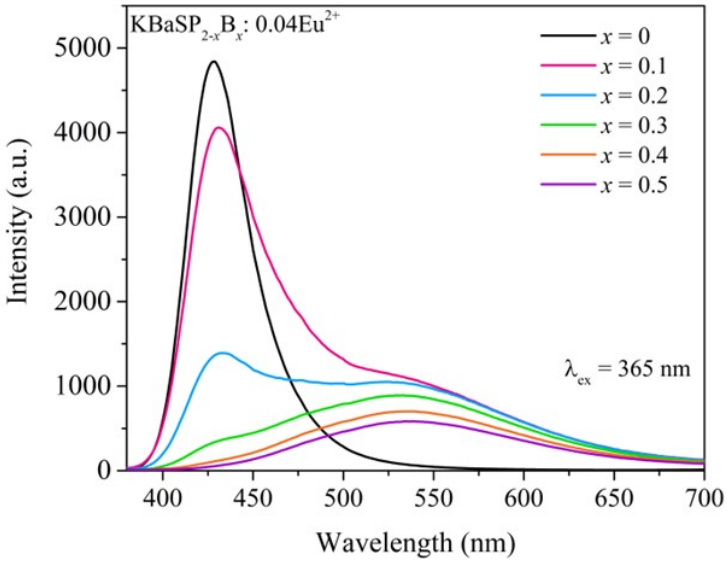

Figure S2. The photoluminescence spectra of $KBaSP_{2-x}B_x$:$0.04Eu^{2+}$ (x = 0, 0.1, 0.2, 0.3, 0.4, 0.5) samples.

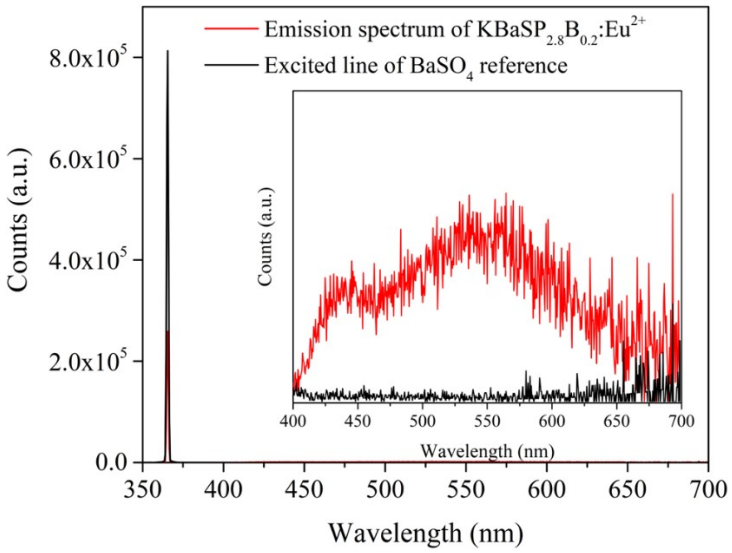

Figure S3. Excitation line of $BaSO_4$ and the emission spectra of $KBaSP_{1.8}B_{0.2}:0.04Eu^{2+}$ sample collected by using an integrating sphere. The inset shows the magnification of the $BaSO_4$ and x = 0.2 emission spectra.

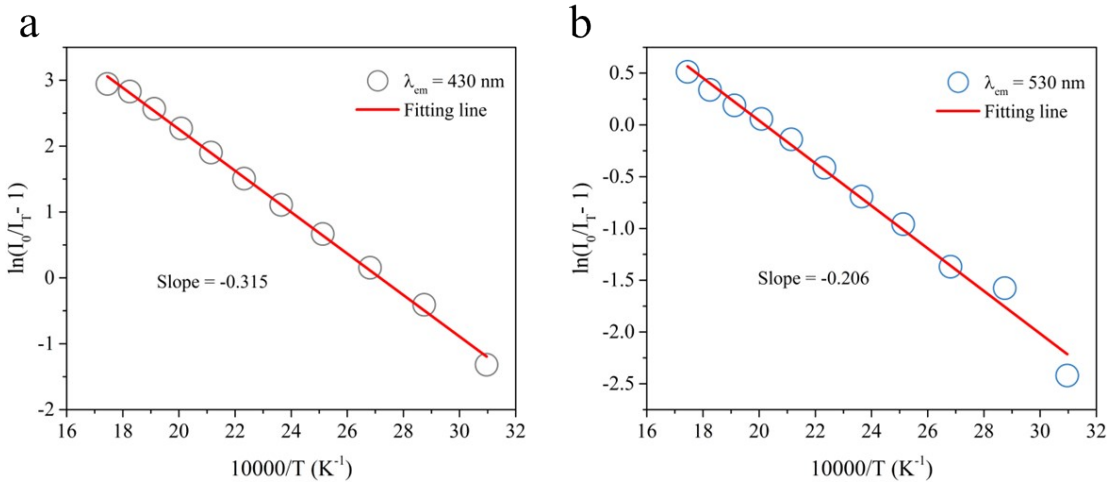

Figure S4. The plot of ln (I_0/I_T - 1) versus $10^4/T$ at two emission band centered at 430 nm and 530 nm, respectively.

Table S1. Lattice parameters obtained from XRD Rietveld refinements of $KBaSP_{1.8}B_{0.2}:0.04Eu^{2+}$.

Compound	$KBaSP_{1.8}B_{0.2}:0.04Eu^{2+}$
space group	*P n m a*
a (Å)	7.702(5)
b (Å)	10.002(9)
c (Å)	5.6422(2)
V ($Å^3$)	434.5(3)
R_{wp} (%)	8.372
R_p (%)	6.011

Table S2 The refined atomic positions of $KBaSP_{1.8}B_{0.2}:0.04Eu^{2+}$ obtained from the Rietveld analysis.

Atom	Site	X	Y	Z	B_{iso} ($Å^2$)	Occ.
Ba1	4c	-0.00474	0.25000	0.19835	0.06773	0.24750
Sr1	4c	-0.00474	0.25000	0.19835	0.06773	0.24750
P1	4c	0.23162	0.25000	0.90553	0.0000	0.45000
K1	4c	0.16367	0.25000	0.58470	0.0000	0.48000
O1	8d	0.19955	-0.04708	0.33765	0.10273	1.00000
O2	4c	0.02705	0.25000	0.90451	1.34007	0.50000
O3	4c	0.30910	0.25000	0.05182	0.0000	0.50000
Eu1	4c	-0.00474	0.25000	0.19835	0.06773	0.00500
Eu2	4c	0.16367	0.25000	0.58470	0.0000	0.02000
B1	4c	0.23162	0.25000	0.90553	0.0000	0.05000

Table S3. The chromaticity coordinates of $KBaSP_{2-x}B_x$:0.04Eu^{2+} (x = 0, 0.1, 0.2, 0.3, 0.4, 0.5) samples excited at 365 nm.

Compounds	C_x	C_y	CCT(K)
KBaSP: Eu^{2+}	0.1598	0.0376	/
$KBaSP_{1.9}B_{0.1}$: Eu^{2+}	0.2164	0.1958	/
$KBaSP_{1.8}B_{0.2}$: Eu^{2+}	0.2620	0.3066	10857
$KBaSP_{1.7}B_{0.3}$: Eu^{2+}	0.3071	0.4089	6381
$KBaSP_{1.6}B_{0.4}$: Eu^{2+}	0.3312	0.4531	5594
$KBaSP_{1.5}B_{0.5}$: Eu^{2+}	0.3423	0.4708	5329

The correlated color temperature (CCT) is an important index to evaluate the phosphor performance, and its value can be calculated by McCamy's theoretical formula:

$$CCT = -449n^3 + 3525n^2 - 6823.3n + 5520.33 \quad (1)$$

where n = (x - $_{xe}$)/(y - y_e) is the reciprocal of the slope, and x_e and y_e are constants equal to 0.332 and 0.186, respectively.