Electronic Supplementary Information for

Tb^{3+} and Eu^{3+} Co-doped $Ba_6Bi_9B_{79}O_{138}$: Color-tunable Phosphors by Utilizing Host-sensitization Effect of Bi^{3+} and Enhancement of Red Emission upon Heating

Yan Gao,[a] Xiaorui Sun,[a] Zhongshan Feng,[b] Liyue Zhu,[a] Jing Zhang,[a] Wenliang Gao,[a] Xianju Zhou,[b] Rihong Cong,[a*] and Tao Yang[a]*

[a] College of Chemistry and Chemical Engineering, Chongqing University, Chongqing 400044, People's Republic of China

[b] School of Science, Chongqing University of Posts and Telecommunications, Chongqing 400065, People's Republic of China

*Corresponding authors: congrihong@cqu.edu.cn, zhouxj@cqupt.edu.cn.

Table S1 The parameters obtained from fitting data using two exponential functions and calculated life time (τ) for **BBBO**, **BBBO**:0.05Tb^{3+}, **BBBO**:0.05Eu^{3+}, **BBBO**:0.05Tb^{3+}, 0.05Eu^{3+} and **BBBO**:0.05Tb^{3+}, 0.005Eu^{3+}.

Compounds	$A1$	$\tau 1$ (ns)	$A2$	$\tau 2$ (ns)	τ (ns)
BBBO: 0.05Tb^{3+},0.05Eu^{3+}	4778.6	353.28	13001.6	49.61	269.32
BBBO: 0.05Tb^{3+},0.005Eu^{3+}	5689.8	382.48	8653.9	66.20	316.57
BBBO: 0.05Tb^{3+}	5809.1	422.60	8250.5	73.19	339.17
BBBO: 0.05Eu^{3+}	4404.6	278.90	16622.6	32.24	203.98
BBBO host	5799.1	404.96	6542.7	64.88	352.90

Table S2 CIE chromaticity coordinates (x, y) for **BBBO**, **BBBO**:0.05Eu^{3+}, and **BBBO**:0.05Tb^{3+}, $x$$Eu^{3+}$ (x = 0-0.05) samples (λ_{ex} = 276 nm).

Sample no.	*Sample composition*	*CIE coordinates (x, y)*
1	**BBBO**	(0.178, 0.129)
2	**BBBO**:0.05Tb^{3+}	(0.224, 0.338)
3	**BBBO**:0.05Tb^{3+}, 0.003Eu^{3+}	(0.322, 0.351)
4	**BBBO**:0.05Tb^{3+}, 0.005Eu^{3+}	(0.354, 0.344)
5	**BBBO**:0.05Tb^{3+}, 0.01Eu^{3+}	(0.388, 0.331)
6	**BBBO**:0.05Tb^{3+}, 0.05Eu^{3+}	(0.466, 0.344)
7	**BBBO**:0.05Eu^{3+}	(0.528, 0.354)

Table S3 CIE chromaticity coordinates (x, y) for **BBBO**:0.05Tb^{3+}, $x$$Eu^{3+}$ (x = 0-0.05),

BBBO:yTb^{3+}, 0.005Eu^{3+} (y = 0.10, 0.03, and 0.01), and **BBBO**:yTb^{3+}, 0.003Eu^{3+} (y = 0.03 and 0.01) samples (λ_{ex} = 268 nm).

Sample no.	*Sample composition*	*CIE coordinates (x, y)*
1	**BBBO**:0.05Tb^{3+}	(0.235, 0.394)
2	**BBBO**:0.05Tb^{3+}, 0.003Eu^{3+}	(0.320, 0.380)
3	**BBBO**:0.05Tb^{3+}, 0.005Eu^{3+}	(0.352, 0.378)
4	**BBBO**:0.05Tb^{3+}, 0.01Eu^{3+}	(0.388, 0.356)
5	**BBBO**:0.05Tb^{3+}, 0.05Eu^{3+}	(0.499, 0.368)
6	**BBBO**:0.01Tb^{3+}, 0.005Eu^{3+}	(0.375, 0.331)
7	**BBBO**:0.03Tb^{3+}, 0.005Eu^{3+}	(0.368, 0.331)
8	**BBBO**:0.10Tb^{3+}, 0.005Eu^{3+}	(0.332, 0.458)
9	**BBBO**:0.01Tb^{3+}, 0.003Eu^{3+}	(0.355, 0.255)
10	**BBBO**:0.03Tb^{3+}, 0.003Eu^{3+}	(0.339, 0.302)

Table S4 CIE chromaticity coordinates (x, y) for **BBBO**:0.05Tb^{3+}, xEu^{3+} (x = 0-0.05), samples (λ_{ex} = 228 nm).

Sample no.	*Sample composition*	*CIE coordinates (x, y)*
1	**BBBO**:0.05Tb^{3+}	(0.232, 0.338)
2	**BBBO**:0.05Tb^{3+}, 0.003Eu^{3+}	(0.305, 0.333)
3	**BBBO**:0.05Tb^{3+}, 0.005Eu^{3+}	(0.333, 0.334)
4	**BBBO**:0.05Tb^{3+}, 0.01Eu^{3+}	(0.369, 0.330)
5	**BBBO**:0.05Tb^{3+}, 0.05Eu^{3+}	(0.433, 0.329)

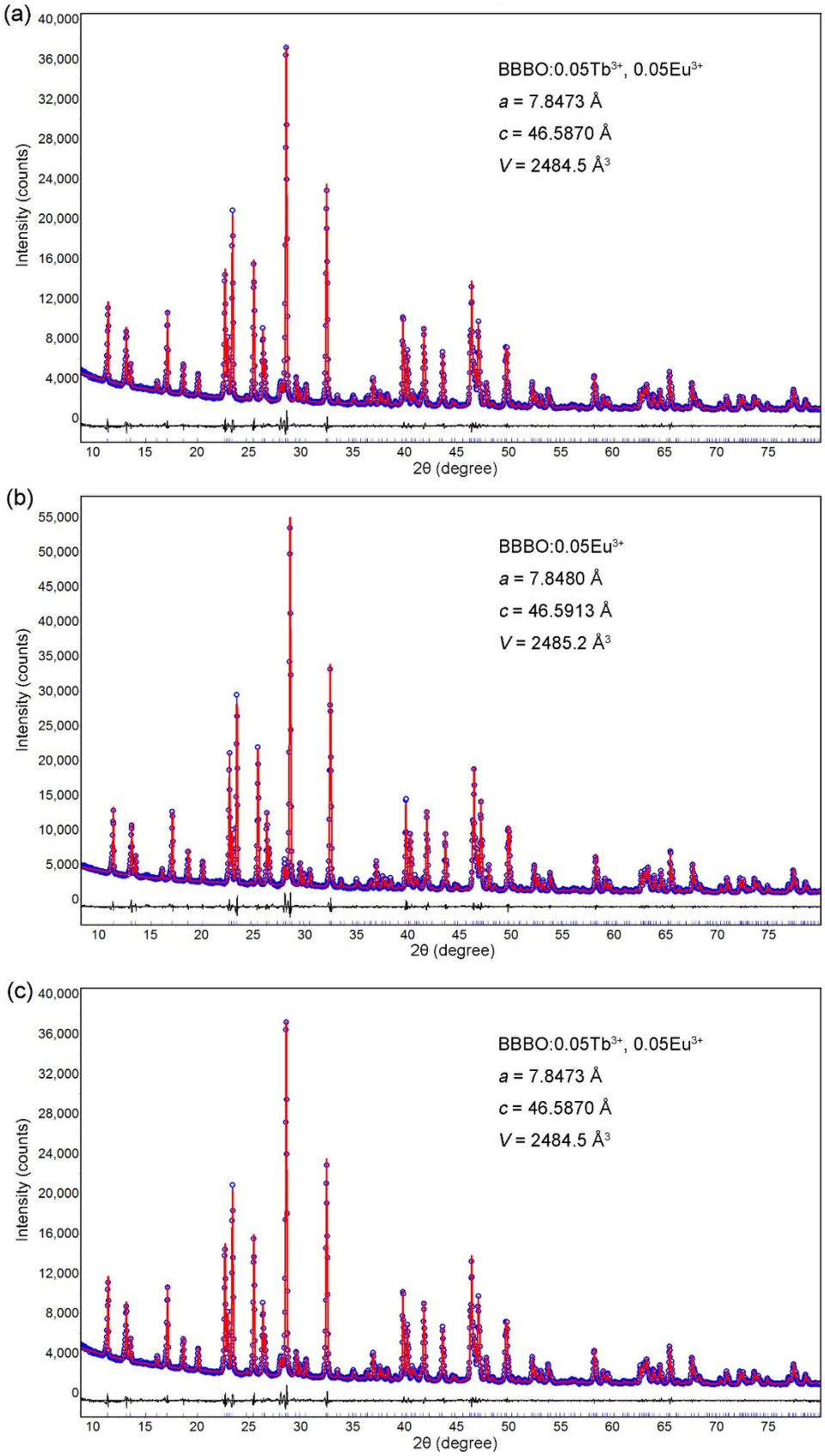

Figure S1 Le Bail fitting to the powder XRD for (a) **BBBO**:0.05Tb^{3+} (b), **BBBO**:0.05Eu^{3+} (c), **BBBO**:0.05Tb^{3+}, 0.05Eu^{3+}. The blue symbol ○ represents observed data and the red solid line

is the calculated pattern; the blue marks below the diffraction patterns are the expected reflection positions, and the difference curve is also shown as black curves at the bottom. The final refined cell parameters are also given.

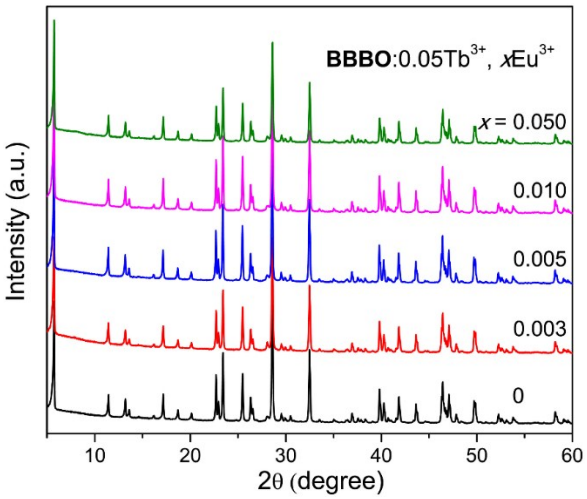

Figure S2 X-ray diffraction patterns for **BBBO**:0.05Tb^{3+}, xEu^{3+} (x = 0, 0.003, 0.005, 0.01 and 0.05).

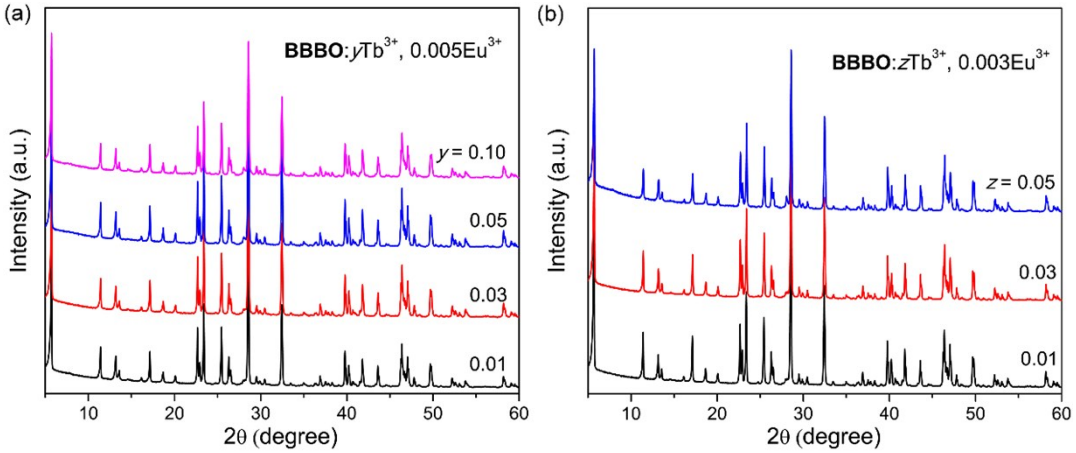

Figure S3 X-ray diffraction patterns for (a) **BBBO**:yTb^{3+}, 0.005Eu^{3+} (y = 0.01, 0.03, 0.05, and 0.10) and (b) **BBBO**:zTb^{3+}, 0.003Eu^{3+} (z = 0.01, 0.03, and 0.05).

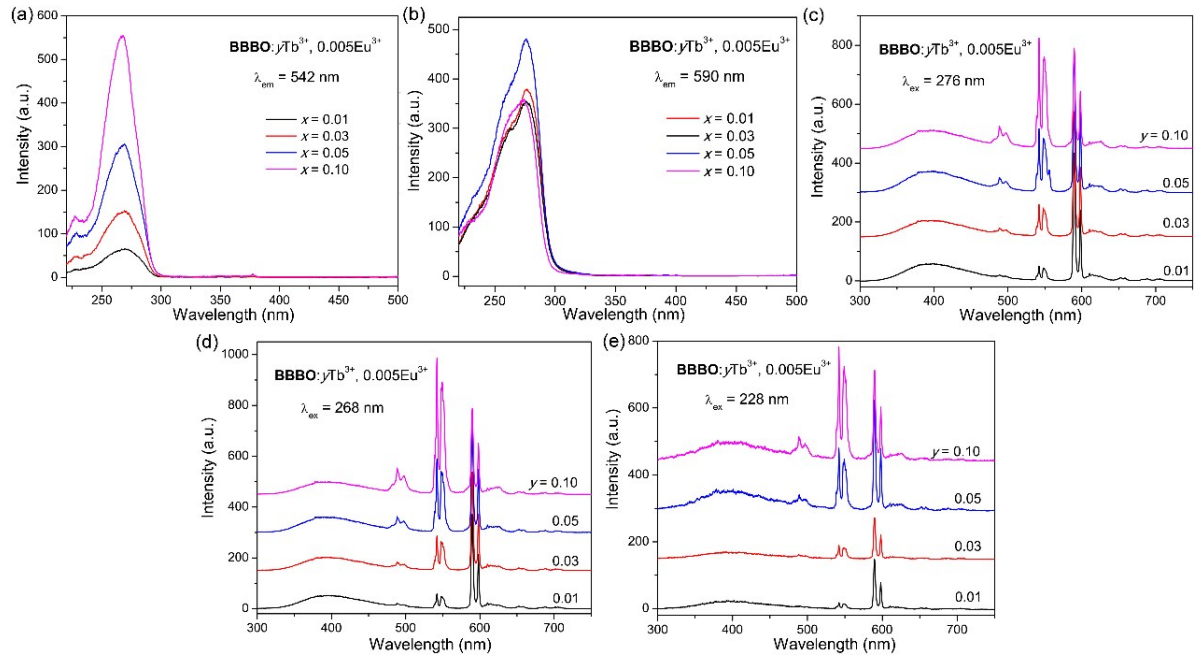

Figure S4 Excitation spectra of **BBBO**:yTb^{3+}, 0.005Eu^{3+} (y = 0.01, 0.03, 0.05, and 0.10) phosphors by monitoring wavelength at (a) 542 nm and (b) 590 nm, respectively; emission spectra under excitation wavelength at (c) 276 nm, (d) 268 nm and (e) 228 nm, respectively.

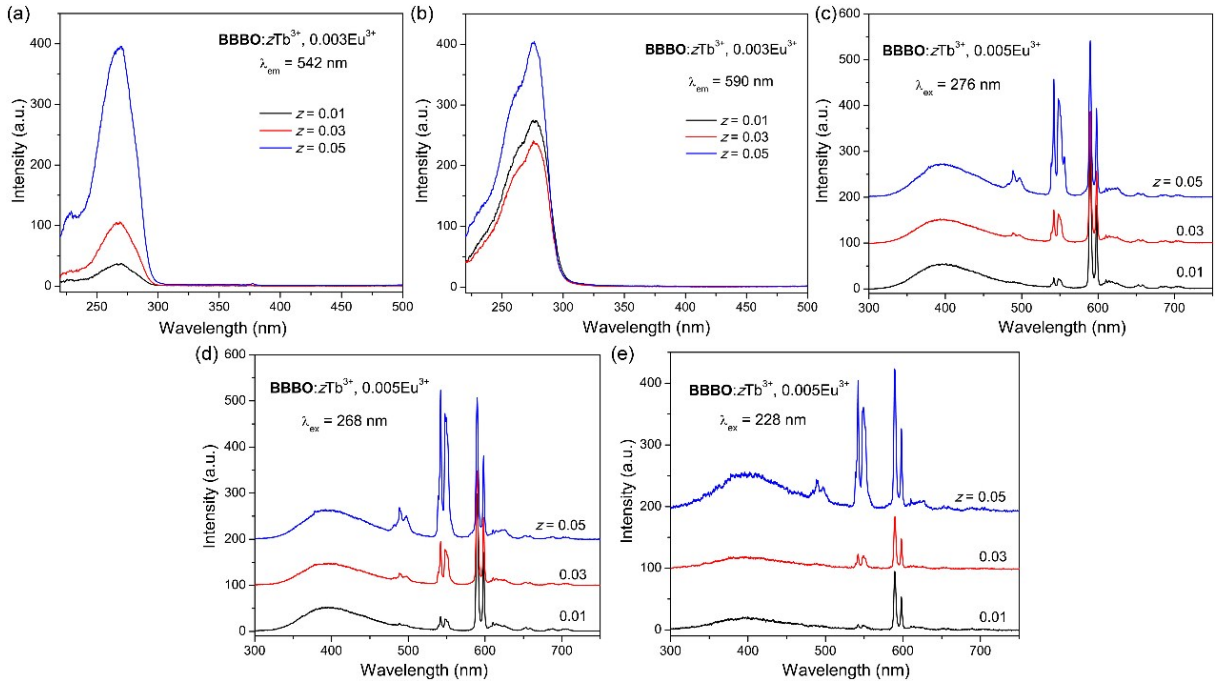

Figure S5 Excitation spectra of **BBBO**:zTb^{3+}, 0.003Eu^{3+} (z = 0.01, 0.03, and 0.05) phosphors by monitoring wavelength at (a) 542 nm and (b) 590 nm, respectively; emission spectra under excitation wavelength at (c) 276 nm, (d) 268 nm and (e) 228 nm, respectively.