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Supporting Information for

Bi^{3+} photoluminescence in $Y_{1-x}Bi_xCa_3(GaO)_3(BO_3)_4$ and the energy transfer to Eu^{3+} and Tb^{3+} in co-doped phsophors

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Table S1. Cationic radii difference percentage (D_r) between Bi^{3+} and host cations in YCGB

Cations in host	**Bi^{3+}**	R_h	R_d	**D_r (%)**
Y^{3+} (CN = 6)	Bi^{3+} (CN = 6)	0.9 Å	1.03 Å	-14.4
Ca^{2+} (CN = 6)	Bi^{3+} (CN = 6)	1 Å	1.03 Å	-0.03
Ga^{3+} (CN = 6)	Bi^{3+} (CN = 6)	0.62 Å	1.03 Å	-66.1

Table S2. Cell lattice parameters for $Y_{1-x}Bi_xCa_3(GaO)_3(BO_3)_4$ ($0.01 \le x \le 0.15$), $Y_{0.95-y}Bi_{0.05}Eu_yCa_3(GaO)_3(BO_3)_4$ ($0.05 \le y \le 0.6$) and $Y_{0.95-y}Bi_{0.05}Tb_zCa_3(GaO)_3(BO_3)_4$ ($0.05 \le z \le 0.6$) obtained from Le Bail fitting on the powder XRD (space group: $P6_3/m$)

***x* in $Y_{1-x}Bi_xCa_3(GaO)_3(BO_3)_4$**	***a* (Å)**	***c* (Å)**	***V* (Å^3)**
0.01	10.5191(1)	5.8157(1)	557.30(2)
0.02	10.5195(1)	5.8158(1)	557.35(1)
0.03	10.5196(1)	5.8161(2)	557.39(1)
0.04	10.5199(2)	5.8164(1)	557.45(2)
0.05	10.5205(1)	5.8163(1)	557.49(2)
0.1	10.5222(2)	5.8169(1)	557.74(2)
0.15	10.5232(1)	5.8178(1)	557.93(2)

***y* in $Y_{0.95-y}Bi_{0.05}Eu_yCa_3(GaO)_3(BO_3)_4$**	***a* (Å)**	***c* (Å)**	***V* (Å^3)**
0.05	10.5228(1)	5.81656(8)	557.77(2)

0.1	10.5243(1)	5.81629(8)	557.91(1)
0.2	10.5279(1)	5.81701(8)	558.36(1)
0.3	10.5330(1)	5.81752(8)	558.95(2)
0.4	10.5367(1)	5.81840(9)	559.43(2)
0.5	10.5410(1)	5.81940(9)	559.98(2)
0.6	10.5448(1)	5.82034(9)	560.48(2)

z in $Y_{0.95-y}Bi_{0.05}Tb_zCa_3(GaO)_3(BO_3)_4$	a (Å)	c (Å)	V (Å^3)
0.05	10.5221(1)	5.81668(8)	557.72(1)
0.1	105230(1)	5.81742(9)	557.88(2)
0.2	10.5251(1)	5.81746(9)	558.10(2)
0.3	10.5279(1)	5.81753(9)	558.41(2)
0.4	10.5307(1)	5.81781(9)	558.74(2)
0.5	10.5320(1)	5.81825(8)	558.91(2)
0.6	10.5339(1)	5.81899(9)	559.19(2)

Table S3. CIE chromaticity coordinates for $Y_{0.95-y}Bi_{0.05}Eu_yCa_3(GaO)_3(BO_3)_4$ ($0 \le y \le 0.6$) and $Y_{0.95-y}Bi_{0.05}Tb_zCa_3(GaO)_3(BO_3)_4$ ($0.05 \le z \le 0.6$) excited by ~280 nm irradiation

y in $Y_{0.95-y}Bi_{0.05}Eu_yCa_3(GaO)_3(BO)_4$	CIE (x, y)
0	(0.162, 0.017)

0.05	(0.208, 0.052)
0.1	(0.259, 0.088)
0.2	(0.363, 0.158)
0.3	(0.451, 0.221)
0.4	(0.513, 0.262)
0.5	(0.559, 0.283)
0.6	(0.583, 0.298)

***z* in $Y_{0.95-z}Bi_{0.05}Tb_zCa_3(GaO)_3(BO)_4$**	
0.05	(0.176, 0.072)
0.1	(0.186, 0.117)
0.2	(0.212, 0.224)
0.3	(0.235, 0.315)
0.4	(0.250, 0.374)
0.5	(0.261, 0.420)
0.6	(0.269, 0.451)

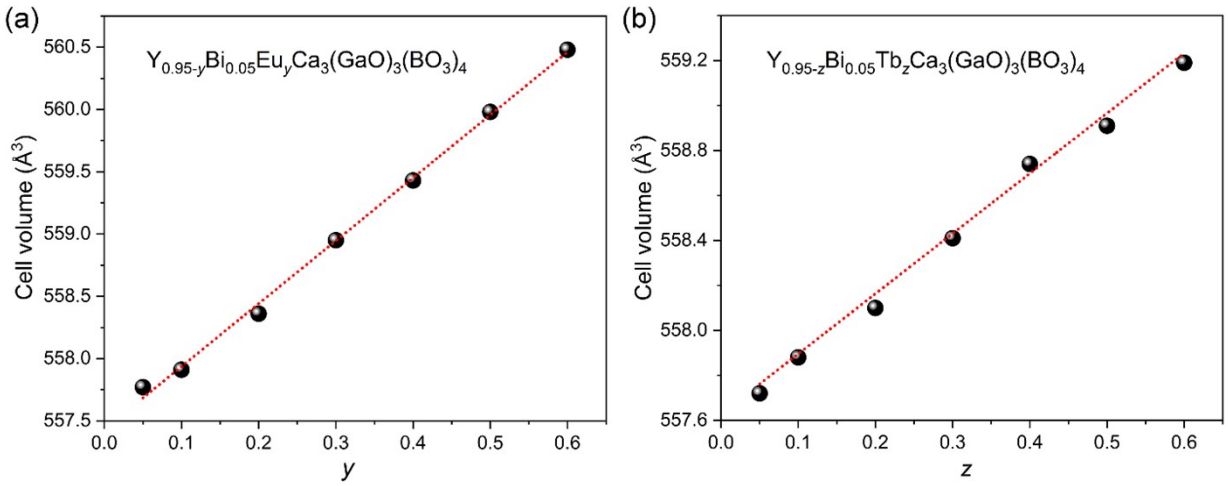

Fig. S1. Plot of unit cell volume for (a) $Y_{0.95-y}Bi_{0.05}Eu_yCa_3(GaO)_3(BO_3)_4$ ($0.05 \le y \le 0.6$), (b) $Y_{0.95-y}Bi_{0.05}Tb_zCa_3(GaO)_3(BO_3)_4$ ($0.05 \le z \le 0.6$) obtained from Le Bail fitting.

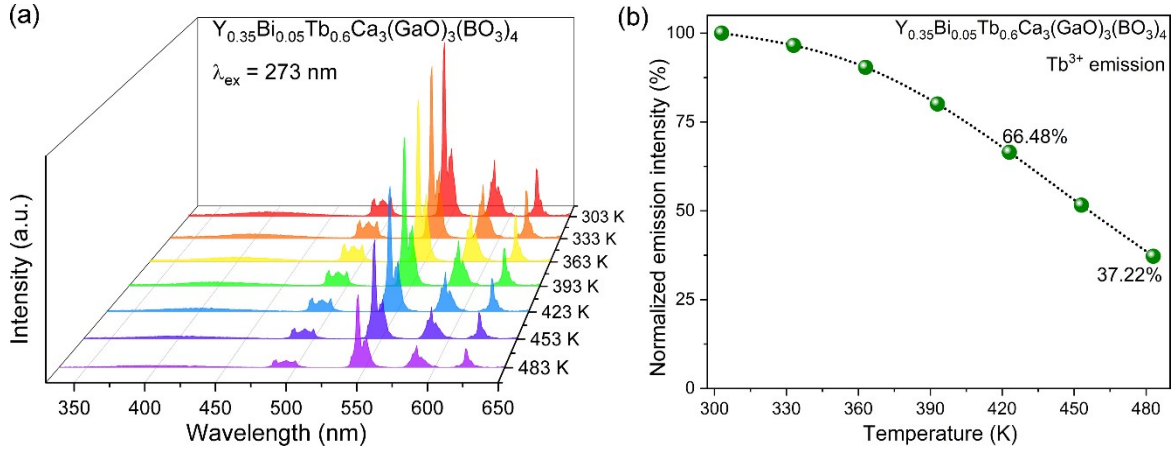

Fig. S2. (a) Temperature-dependent PL emission spectra for $Y_{0.35}Bi_{0.05}Tb_{0.6}Ca_3(GaO)_3(BO_3)_4$ under the irradiation of 273 nm and (b) the normalized emission intensity of Tb^{3+}.

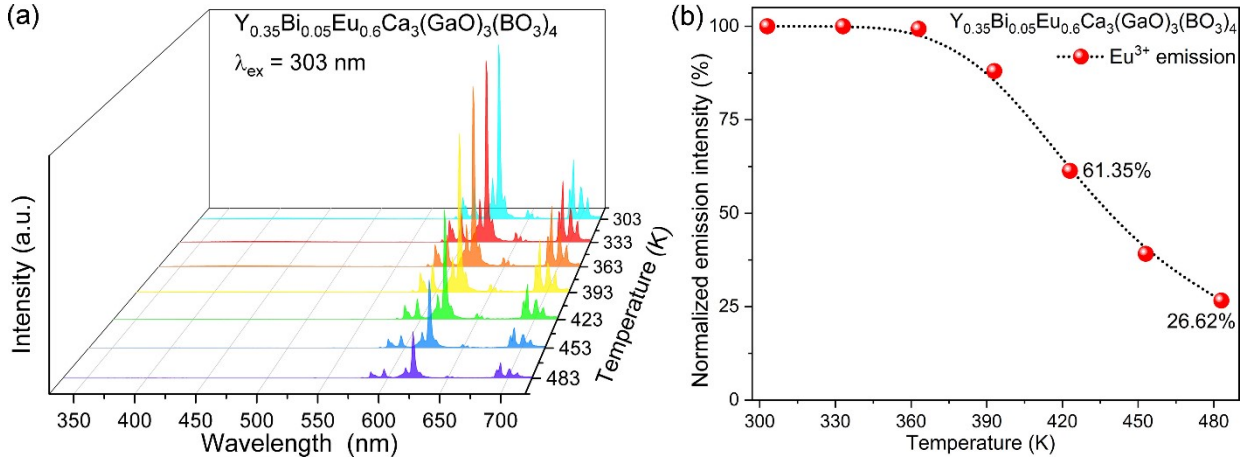

Fig. S3. (a) Temperature-dependent PL emission spectra for $Y_{0.35}Bi_{0.05}Eu_{0.6}Ca_3(GaO)_3(BO_3)_4$ under the irradiation of 273 nm and (b) the normalized emission intensity of Eu^{3+}.