Supporting Information for

Pressure sensitive Ce^{3+} photoluminescence in $LiCaY_5(BO_3)_6$: High internal quantum yields and energy transfer to Tb^{3+}

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Table S1. Unit cell lattice parameters for $LiCa(Y_{1-x}Ce_x)_5(BO_3)_6$ ($0 \leq x \leq 0.15$) and $LiCa(Y_{0.99-y}Ce_{0.01}Tb_y)_5(BO_3)_6$ ($0.05 \leq y \leq 0.40$) obtained by Le Bail refinements in the space group $P6_522$

x	a (Å)	c (Å)	V (Å^3)
0	7.0101(1)	25.4325(2)	1082.36(1)
0.01	7.0129(1)	25.4319(4)	1083.18(4)
0.03	7.0164(1)	25.4399(4)	1084.61(3)
0.05	7.0216(2)	25.4568(6)	1086.93(6)
0.07	7.0280(1)	25.4771(6)	1089.80(5)
0.10	7.0356(2)	25.5023(7)	1093.23(6)
0.15	7.0469(3)	25.5291(1)	1097.61(9)

y	a (Å)	c (Å)	V (Å^3)
0.05	7.0132(1)	25.4354(3)	1083.43(3)
0.10	7.0147(1)	25.4418(5)	1084.18(4)
0.20	7.0186(1)	25.4746(4)	1086.77(3)
0.30	7.0208(1)	25.4972(5)	1088.41(4)
0.40	7.0264(2)	25.5296(7)	1091.54(6)

Table S2. CIE color coordinates and internal quantum yields (IQYs) for $LiCa(Y_{0.99-y}Ce_{0.01}Tb_y)_5(BO_3)_6$ ($0 \le y \le 0.40$) under the excitation at 336 nm

y	**CIE coordinate**	**IQY (%)**
0	(0.157，0.045)	51
0.05	(0.231，0.312)	79
0.10	(0.257，0.408)	77
0.20	(0.289，0.528)	89
0.30	(0.296，0.550)	60
0.40	(0.297，0.548)	30

Table S3. Parameters obtained by fitting the decay curves using double exponential functions and the calculated life time (τ) and energy transfer efficiency (η_{ET}) for $LiCa(Y_{0.99-y}Ce_{0.01}Tb_y)_5(BO_3)_6$ ($0 \le y \le 0.40$) phosphors

y	A_1	τ_1 **(ns)**	A_2	τ_2 **(ns)**	τ **(ns)**	$\eta_{ET}=1-\tau/\tau_0$
0	570	6.98	415	28.11	22.74	
0.05	841	5.37	391	23.66	17.66	22.34%
0.1	1086	4.86	368	21.52	14.86	34.66%
0.15	5415	2.43	400	14.51	6.13	73.05%
0.2	25326	1.63	363	12.3	2.67	88.25%
0.3	70046	1.37	264	12.28	1.73	92.41%

Table S4. CIE color coordinate of $LiCa(Y_{0.99}Ce_{0.01})_5(BO_3)_6$ under different pressures (λ_{ex} = 375 nm)

Pressure (GPa)	CIE coordinate
0.5	(0.195, 0.124)
1.2	(0.194, 0.125)
2.1	(0.180, 0.113)
2.6	(0.177, 0.112)
3.5	(0.179, 0.120)
4	(0.175, 0.118)
4.5	(0.170, 0.111)
5.2	(0.172, 0.122)
7	(0.168, 0.124)
8.7	(0.176, 0.157)
10.2	(0.1762, 0.158)
11.6	(0.171, 0.150)
13.2	(0.177, 0.171)
14.9	(0.182, 0.190)
16.1	(0.191, 0.215)
17.6	(0.229, 0.264)
19.8	(0.234, 0.282)
20.1	(0.255, 0.305)
release	(0.190, 0.117)

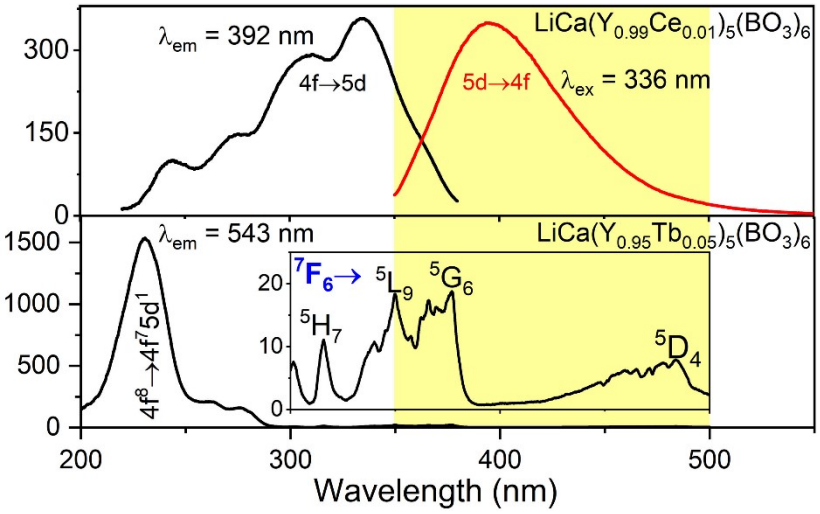

Fig. S1. Spectral comparison between two singly doped phosphors. The yellow area highlights the overlap between the PL spectrum for $LiCa(Y_{0.99}Ce_{0.01})_5(BO_3)_6$ and the PLE spectrum for $LiCa(Y_{0.95}Tb_{0.05})_5(BO_3)_6$.

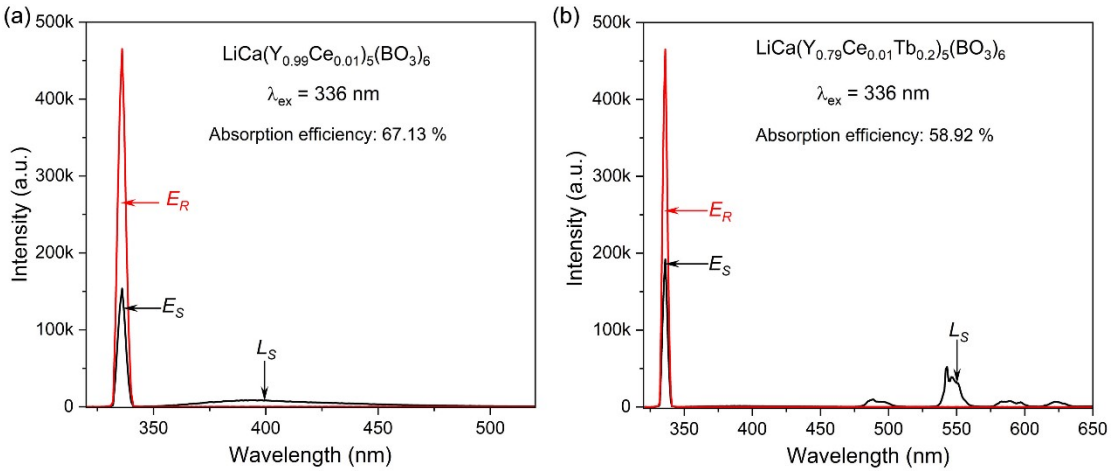

Fig. S2. Absorption efficiency monitored at 336 nm excitation for $LiCa(Y_{0.99}Ce_{0.01})_5(BO_3)_6$ and $LiCa(Y_{0.79}Ce_{0.01}Tb_{0.2})_5(BO_3)_6$.

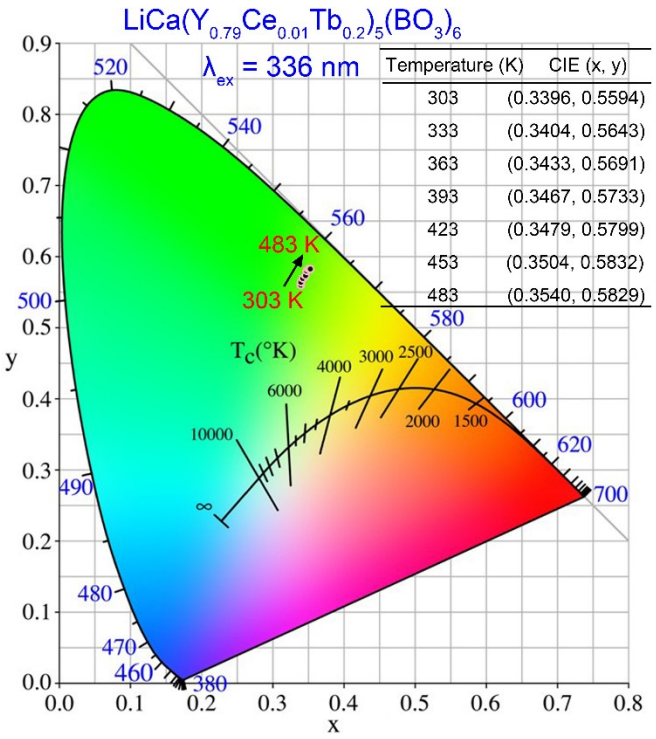

Fig. S3. Calculated CIE chromaticity coordinate for $LiCa(Y_{0.79}Ce_{0.01}Tb_{0.2})_5(BO_3)_6$ at high temperatures (λ_{ex} = 336nm).

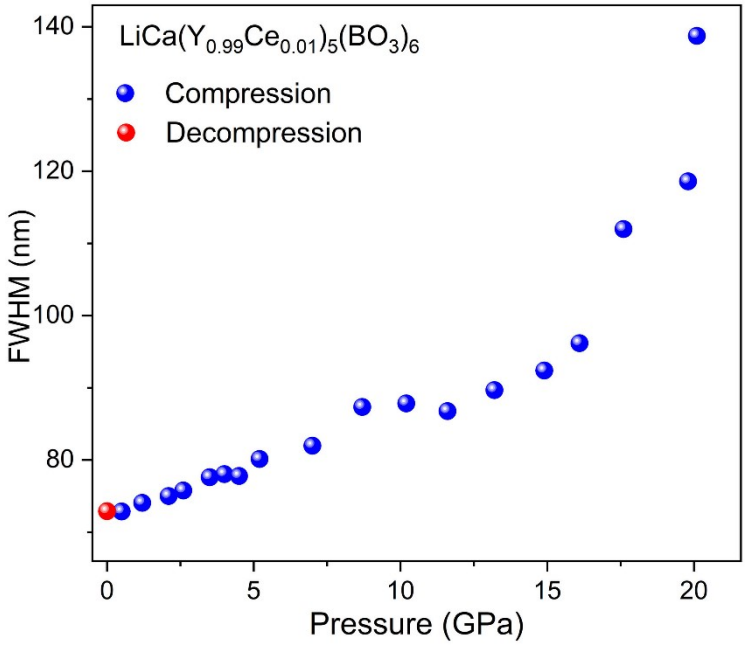

Fig. S4. Full width at half maximum (FWHM) of Ce^{3+} emission band for $LiCa(Y_{0.99}Ce_{0.01})_5(BO_3)_6$ at different pressures (λ_{ex} = 375 nm).