Table S1. Fractional atomic coordinates and isotropic or equivalent isotropic displacement parameters (Å^2) of $CsNa_2Ln_2(BO_3)(PO_4)_2$ (Ln=Y, Gd).

$CsNa_2Y_2(BO_3)(PO_4)_2$				
	x	y	z	Uiso*/Ueq
Cs1	0.000000	0.01686 (3)	0.250000	0.02577 (15)
Na1	0.2439 (2)	0.25485 (13)	0.250000	0.0182 (4)
Y1	−0.500000	−0.11894 (2)	0.46886 (3)	0.00442 (12)
B1	−0.500000	0.0159 (4)	0.750000	0.0069 (11)
P1	0.000000	0.18277 (6)	0.52342 (9)	0.0057 (2)
O1	0.000000	0.26486 (18)	0.6127 (3)	0.0094 (5)
O2	0.000000	0.22414 (18)	0.3912 (3)	0.0105 (6)
O3	0.1794 (3)	0.12575 (13)	0.5476 (2)	0.0132 (4)
O4	−0.500000	−0.02435 (17)	0.6341 (3)	0.0097 (6)
O5	−0.500000	0.1091 (2)	0.750000	0.0116 (8)
$CsNa_2Gd_2(BO_3)(PO_4)_2$				
	x	y	z	Uiso*/Ueq
Cs1	0.500000	0.01515 (4)	0.250000	0.03094 (16)
Na1	0.2435 (3)	0.24546 (14)	0.750000	0.0207 (5)
Gd1	0.000000	0.11946 (2)	0.52940 (2)	0.00548 (11)
B1	0.000000	−0.0173 (5)	0.250000	0.0084 (14)
P1	0.000000	0.31732 (8)	0.47688 (10)	0.0069 (2)
O1	0.000000	0.2376 (2)	0.3868 (3)	0.0126 (7)
O2	0.000000	0.2759 (2)	0.6080 (3)	0.0128 (7)
O3	0.1763 (4)	0.37351 (15)	0.4538 (3)	0.0168 (6)
O4	0.000000	0.0234 (2)	0.3650 (3)	0.0134 (7)
O5	0.000000	−0.1093 (3)	0.250000	0.0135 (10)

Table S2. Atomic displacement parameters (Å^2) of $CsNa_2Ln_2(BO_3)(PO_4)_2$ (Ln=Y, Gd).

$CsNa_2Y_2(BO_3)(PO_4)_2$						
	U^{11}	U^{22}	U^{33}	U^{12}	U^{13}	U^{23}
Cs1	0.0281 (2)	0.0170 (2)	0.0322 (3)	0.000	0.000	0.000
Na1	0.0109 (8)	0.0330 (10)	0.0108 (8)	−0.0013(7)	0.000	0.000
Y1	0.00514(18)	0.00376(18)	0.00435 (19)	0.000	0.000	−0.00012(12)
B1	0.011 (3)	0.003 (2)	0.006 (3)	0.000	0.000	0.000
P1	0.0047 (4)	0.0054 (4)	0.0072 (5)	0.000	0.000	0.0013 (3)
O1	0.0149 (13)	0.0091 (13)	0.0043 (12)	0.000	0.000	0.0012 (10)
O2	0.0141 (14)	0.0110 (13)	0.0064 (13)	0.000	0.000	0.0024 (11)
O3	0.0047 (9)	0.0115 (9)	0.0234 (12)	0.0021(7)	−0.0005(8)	0.0050 (8)
O4	0.0194 (15)	0.0052 (12)	0.0045 (13)	0.000	0.000	−0.0007 (9)
O5	0.023 (2)	0.0058(18)	0.0056 (18)	0.000	0.000	0.000
$CsNa_2Gd_2(BO_3)(PO_4)_2$						

	U^{11}	U^{22}	U^{33}	U^{12}	U^{13}	U^{23}
Cs1	0.0319 (3)	0.0232(3)	0.0377(3)	0.000	0.000	0.000
Na1	0.0111 (10)	0.0387(13)	0.0122 (9)	0.0009 (9)	0.000	0.000
Gd1	0.00515(15)	0.00669(15)	0.00459(14)	0.000	0.000	−0.00015 (8)
B1	0.008 (3)	0.012 (4)	0.005 (3)	0.000	0.000	0.000
P1	0.0047 (5)	0.0085 (6)	0.0076 (6)	0.000	0.000	0.0015 (4)
O1	0.0186 (17)	0.0119 (17)	0.0074 (16)	0.000	0.000	−0.0023(13)
O2	0.0162 (17)	0.0124 (17)	0.0097 (17)	0.000	0.000	0.0000 (13)
O3	0.0067 (14)	0.0160 (14)	0.0277(15)	−0.0028(9)	0.0008(11)	0.0066 (10)
O4	0.0233 (19)	0.0096 (16)	0.0071(15)	0.000	0.000	−0.0020(13)
O5	0.023 (3)	0.011 (2)	0.006 (2)	0.000	0.000	0.000

Table S3. Select bond distances of $CsNa_2Ln_2(BO_3)(PO_4)_2$ (Ln = Y, Gd).

$CsNa_2Y_2(BO_3)(PO_4)_2$			
Cs1—O3^{i}	3.270 (2)	Na1—O3^{ix}	2.841 (2)
Cs1—O3^{ii}	3.270 (2)	Y1—O3^{xi}	2.237 (2)
Cs1—O3^{iii}	3.270 (2)	Y1—O3^{iv}	2.237 (2)
Cs1—O3^{iv}	3.270 (2)	Y1—O4	2.251 (3)
Cs1—O2^{v}	3.435 (3)	Y1—O1^{xii}	2.309 (3)
Cs1—O2	3.435 (3)	Y1—O5^{vii}	2.3290 (5)
Cs1—O4^{iv}	3.6877 (10)	Y1—O4^{vii}	2.400 (3)
Cs1—O4^{vi}	3.6877 (9)	Y1—O2^{xii}	2.480 (3)
Cs1—O4^{i}	3.6877 (10)	B1—O4	1.369 (4)
Cs1—O4^{vii}	3.6877 (9)	B1—O4^{xiii}	1.369 (4)
Na1—O2	2.309 (2)	B1—O5	1.390 (7)
Na1—O2^{v}	2.309 (2)	P1—O3	1.531 (2)
Na1—O1^{viii}	2.319 (2)	P1—O3^{xiv}	1.531 (2)
Na1—O1^{ix}	2.319 (2)	P1—O2	1.534 (3)
Na1—O5^{x}	2.643 (3)	P1—O1	1.548 (3)
Na1—O3^{viii}	2.841 (2)		
O4—B1—O4^{xiii}	128.0 (5)	O3^{xiv}—P1—O2	112.14 (11)
O4—B1—O5	116.0 (2)	O3—P1—O1	109.66 (10)
O4^{xiii}—B1—O5	116.0 (2)	O3^{xiv}—P1—O1	109.66 (10)
O3—P1—O3^{xiv}	109.08 (16)	O2—P1—O1	104.05 (15)
O3—P1—O2	112.14 (11)		
Symmetry codes: (i) −*x*, −*y*, *z*−1/2; (ii) *x*, −*y*, *z*−1/2; (iii) *x*, −*y*, −*z*+1; (iv) −*x*, −*y*, −*z*+1; (v) *x*, *y*, −*z*+1/2; (vi) −*x*−1, −*y*, *z*−1/2; (vii) −*x*−1, −*y*, −*z*+1; (viii) −*x*+1/2, −*y*+1/2, −*z*+1; (ix) −*x*+1/2, −*y*+1/2, *z*−1/2; (x) −*x*−1/2, −*y*+1/2, −*z*+1; (xi) *x*−1, −*y*, −*z*+1; (xii) *x*−1/2, *y*−1/2, *z*; (xiii) *x*, *y*, −*z*+3/2; (xiv) −*x*, *y*, *z*.			
$CsNa_2Gd_2(BO_3)(PO_4)_2$			
Cs1—O3^{i}	3.299 (3)	Na1—O3^{xi}	2.883 (3)
Cs1—O3^{ii}	3.299 (3)	Gd1—O4	2.281 (3)
Cs1—O3^{iii}	3.299 (3)	Gd1—O3^{v}	2.285 (3)

Cs1—O3^{iv}	3.299 (3)	Gd1—O3^{xiii}	2.285 (3)
Cs1—O2^{v}	3.510 (3)	Gd1—O1	2.350 (3)
Cs1—O2^{vi}	3.510 (3)	Gd1—O5^{xii}	2.3631 (4)
Cs1—O4	3.7253 (11)	Gd1—O4^{xii}	2.441 (3)
Cs1—O4^{vii}	3.7253 (11)	Gd1—O2	2.513 (3)
Cs1—O4^{viii}	3.7253 (11)	B1—O4	1.375 (5)
Cs1—O4^{ix}	3.7253 (11)	B1—O4^{viii}	1.375 (5)
Na1—O2^{x}	2.334 (3)	B1—O5	1.393 (9)
Na1—O2	2.334 (3)	P1—O3	1.523 (3)
Na1—O1^{xi}	2.336 (3)	P1—O3^{xiv}	1.523 (3)
Na1—O1^{v}	2.336 (3)	P1—O2	1.535 (4)
Na1—O5^{xii}	2.680 (4)	P1—O1	1.544 (3)
Na1—O3^{v}	2.883 (3)		
O4—B1—O4^{viii}	126.7 (7)	O3^{xiv}—P1—O2	112.08 (13)
O4—B1—O5	116.7 (3)	O3—P1—O1	109.63 (13)
O4^{viii}—B1—O5	116.7 (3)	O3^{xiv}—P1—O1	109.63 (13)
O3—P1—O3^{xiv}	108.9 (2)	O2—P1—O1	104.44 (19)
O3—P1—O2	112.08 (13)		

Symmetry codes: (i) −*x*+1/2, *y*−1/2, −*z*+1/2; (ii) *x*+1/2, *y*−1/2, −*z*+1/2; (iii) −*x*+1/2, *y*−1/2, *z*; (iv) *x*+1/2, *y*−1/2, *z*; (v) −*x*+1/2, −*y*+1/2, −*z*+1; (vi) −*x*+1/2, −*y*+1/2, *z*−1/2; (vii) *x*+1, *y*, *z*; (viii) *x*, *y*, −*z*+1/2; (ix) *x*+1, *y*, −*z*+1/2; (x) *x*, *y*, −*z*+3/2; (xi) −*x*+1/2, −*y*+1/2, *z*+1/2; (xii) −*x*, −*y*, −*z*+1; (xiii) *x*−1/2, −*y*+1/2, −*z*+1; (xiv) −*x*, *y*, *z*.

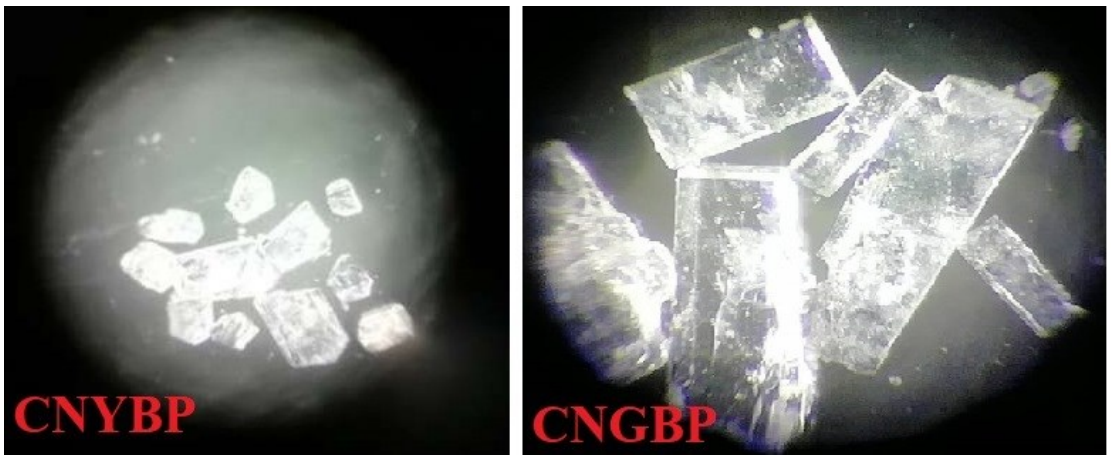

Fig. S1. The picture of the CNRBP (R = Y, Gd, Lu) crystals

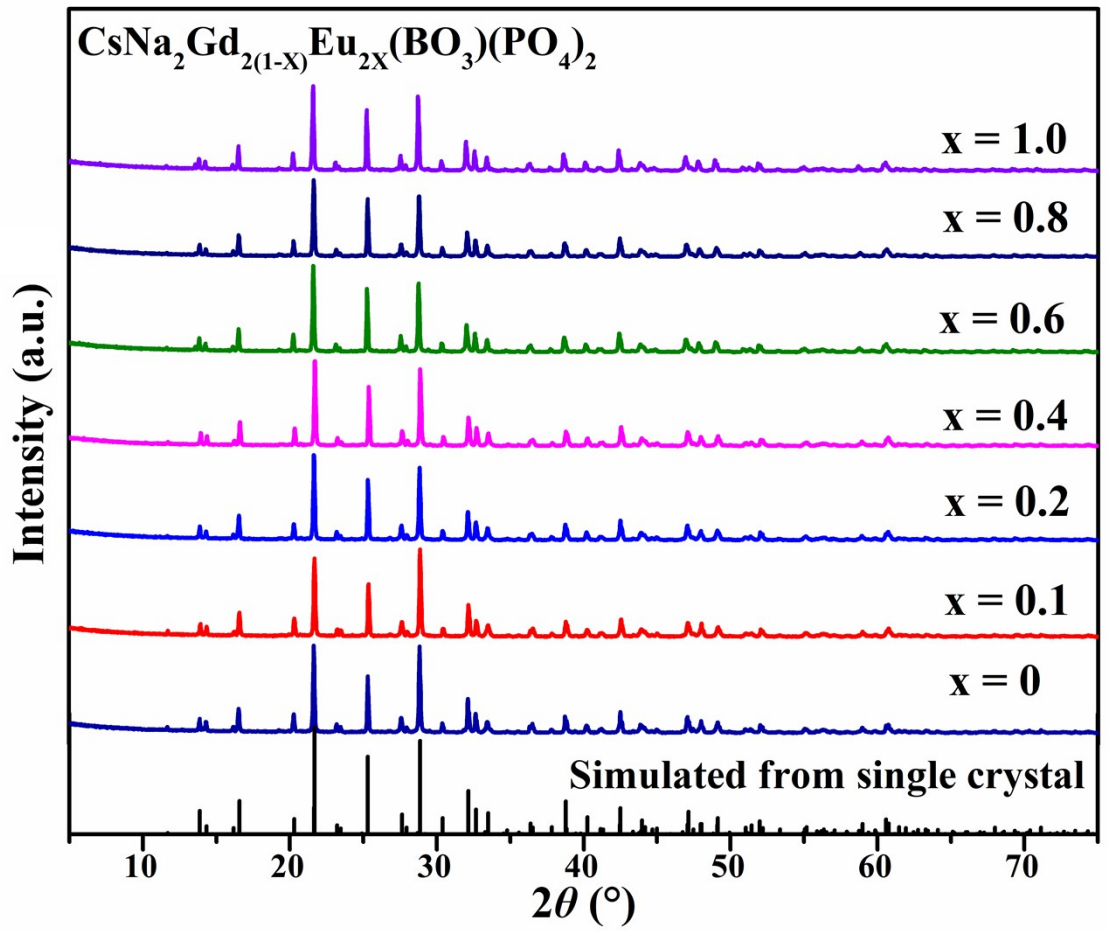

Figure S2. Simulated X-ray powder diffraction pattern of $CsNa_2Gd_2(BO_3)(PO_4)_2$ and experimental XRD patterns of $CsNa_2Gd_{2(1-x)}Eu_{2x}(BO_3)(PO_4)_2$ (x = 0−1) in the 2θ range of 5−75°.

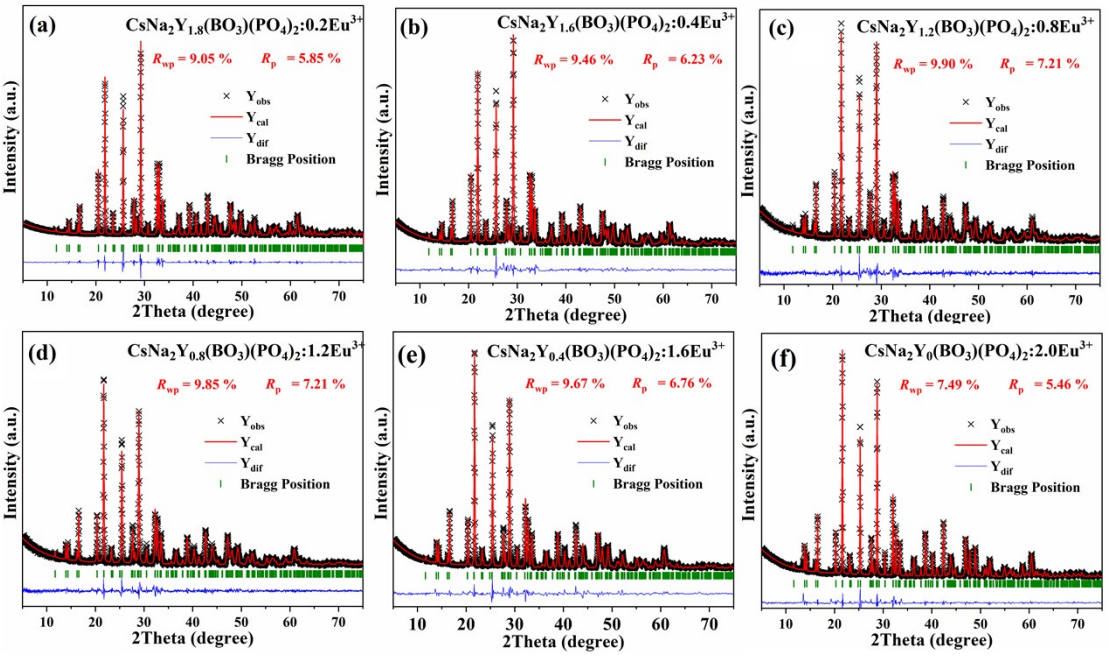

Figure S3. (a), (b), (c), (d), (e) and (f) Rietveld refinements of the XRD files for $CsNa_2Y_{2(1-x)}Eu_{2x}(BO_3)(PO_4)_2$ (x = 0.1, 0.2, 0.4, 0.6, 0.8 and 1.0), respectively.

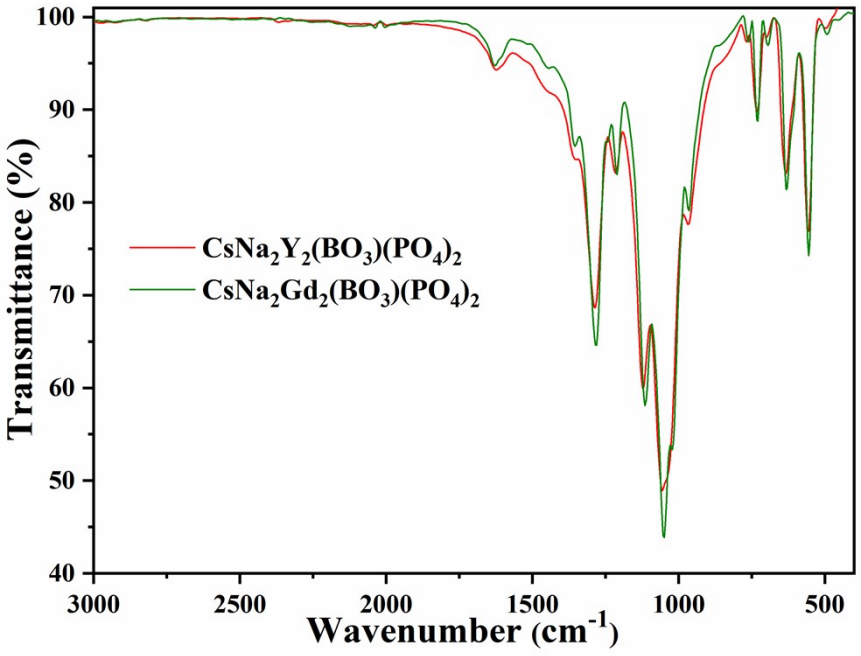

Figure S4. The IR spectra of $CsNa_2REE_2(BO_3)(PO_4)_2$ (REE = Y, Gd).

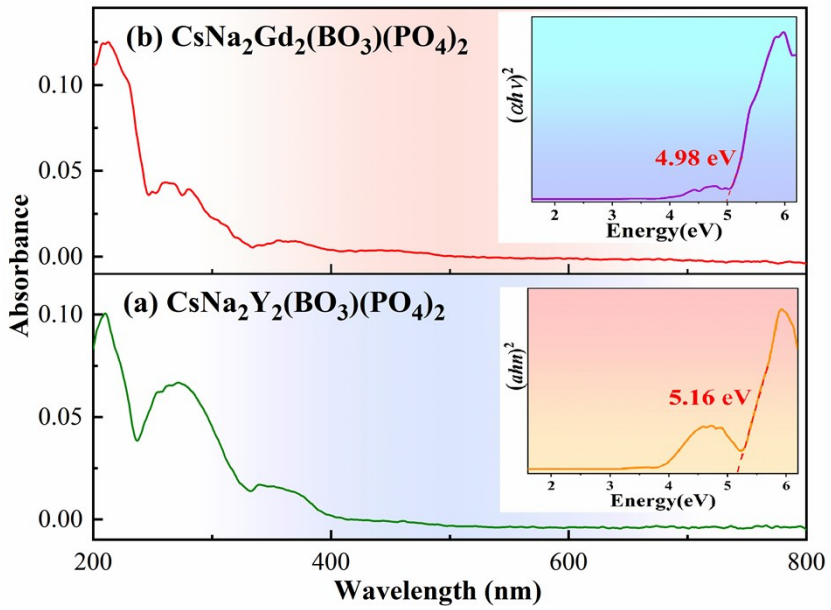

Figure S5. Experimental UV–Vis absorption spectrum of $CsNa_2REE_2(BO_3)(PO_4)_2$ (REE = Y, Gd) ranging from 200 to 800 nm.

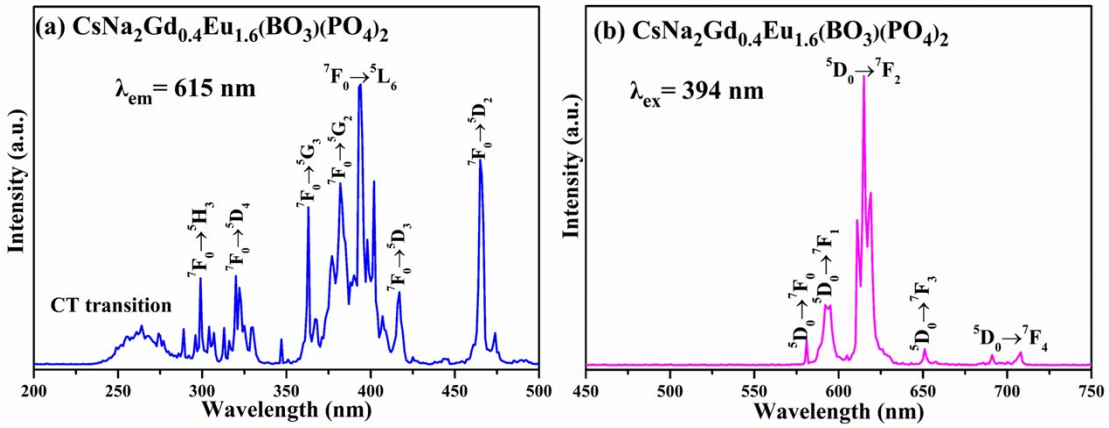

Figure S6. (a) Excitation spectrum of the $CsNa_2Gd_{0.4}Eu_{1.6}(BO_3)(PO_4)_2$ by monitoring the emission wavelength at 615 nm; (b) Emission spectrum of the $CsNa_2Gd_{0.4}Eu_{1.6}(BO_3)(PO_4)_2$ and excited by 394 nm.

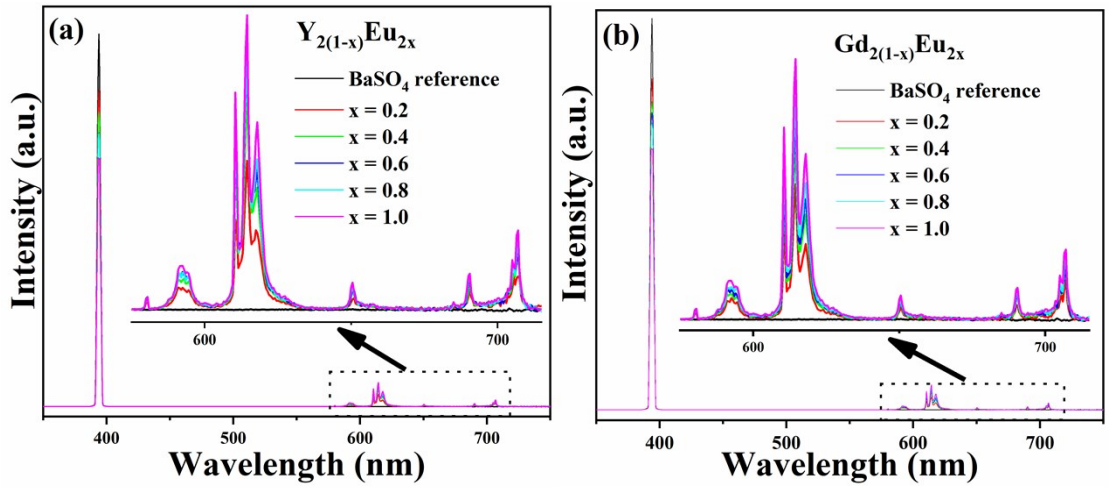

Figure S7. Excitation line of $BaSO_4$ and emission spectra of phosphor $CsNa_2Y_{2(1-x)}Eu_{2x}(BO_3)(PO_4)_2$ (a) and $CsNa_2Gd_{2(1-x)}Eu_{2x}(BO_3)(PO_4)_2$ (b) collected by using an integrating sphere.

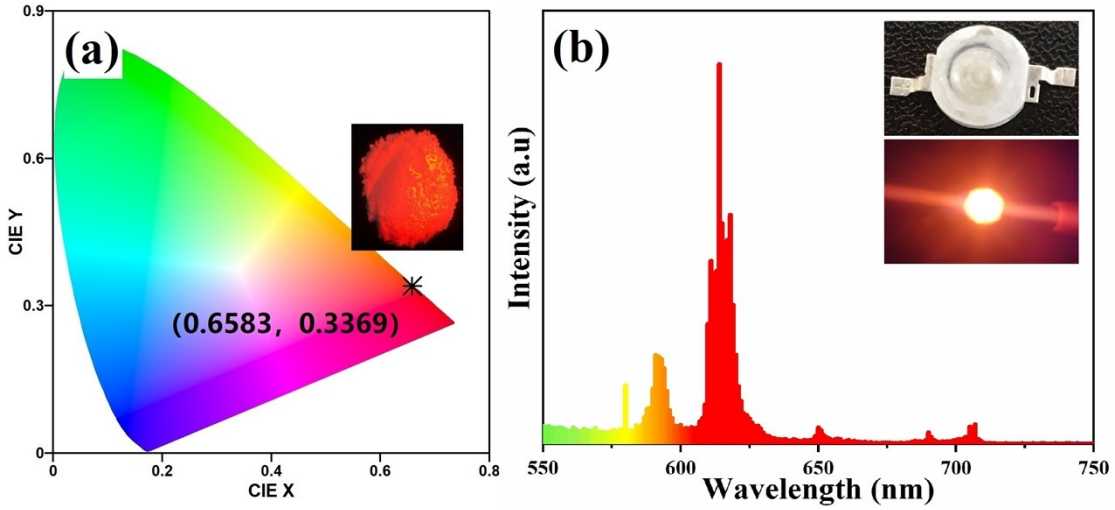

Figure S8. (a) CIE chromaticity coordinates of CNEBP excited at 394 nm light. (b)

Electroluminescent spectrum of fabricated lamp using CNEBP phosphor and a 365 nm LED ship.