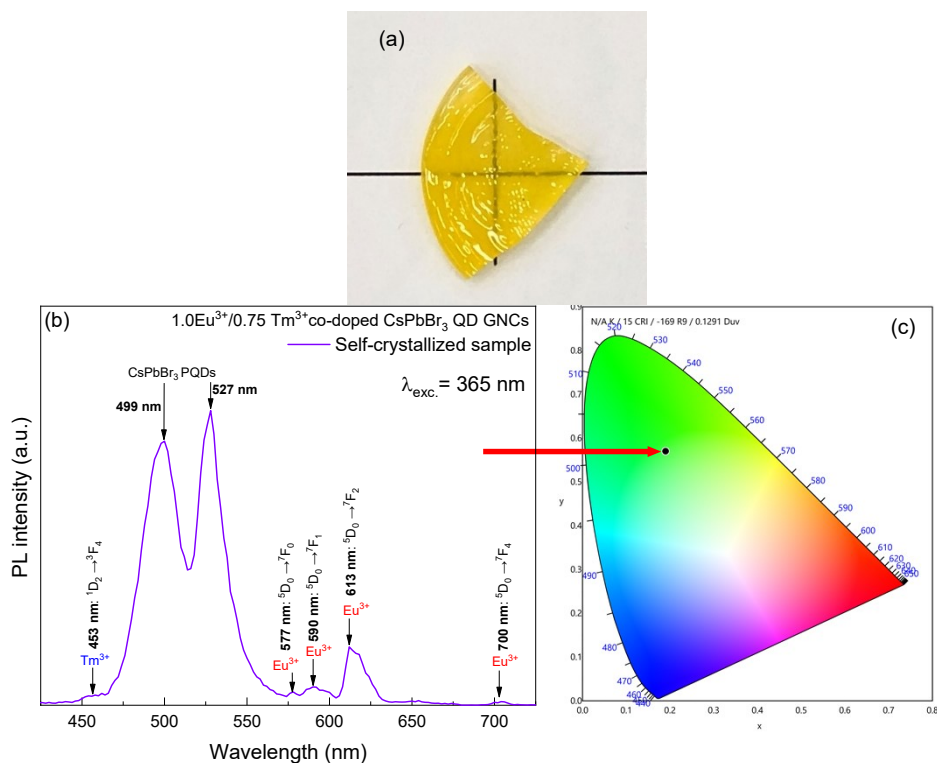
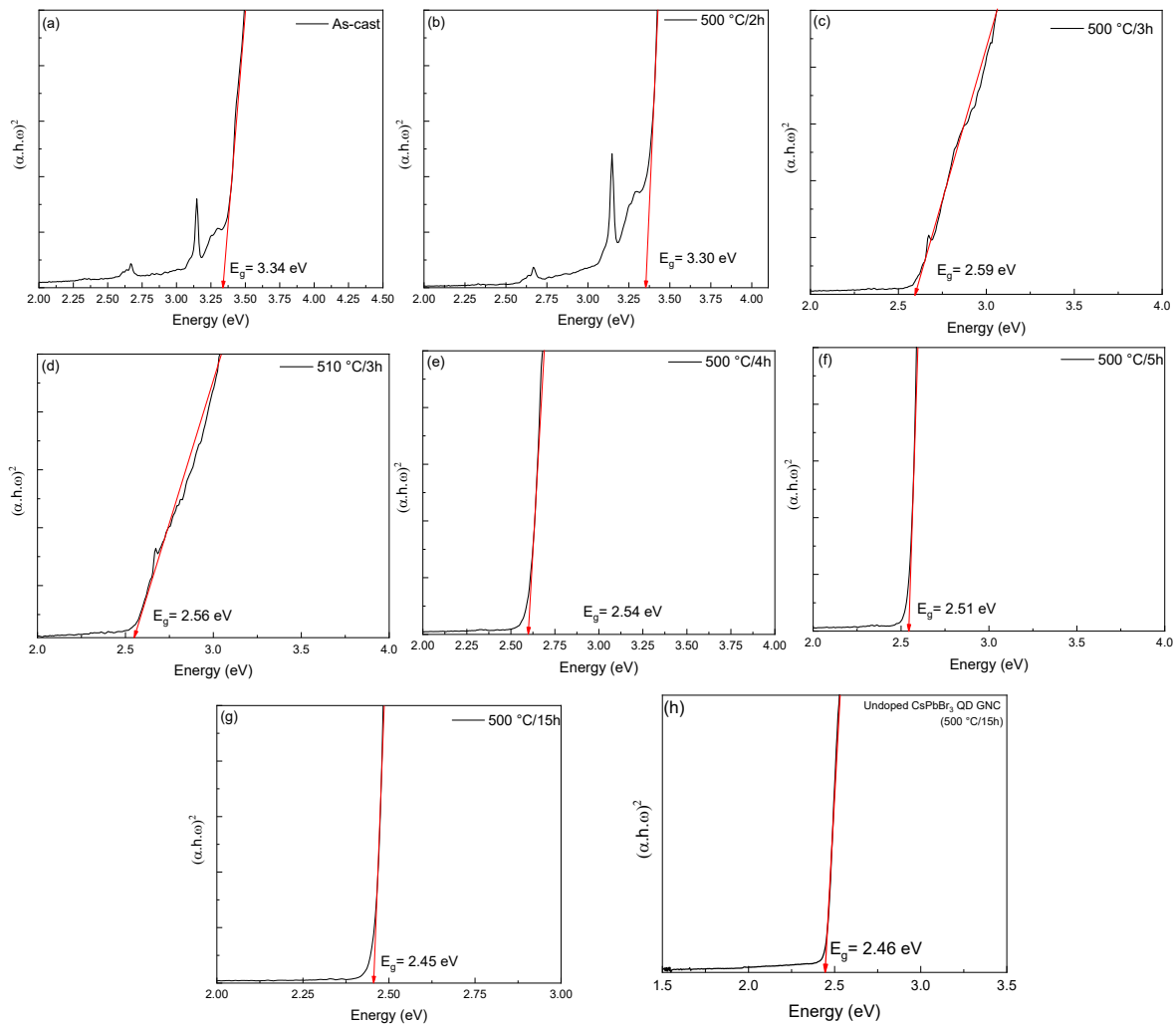


## Supporting Information

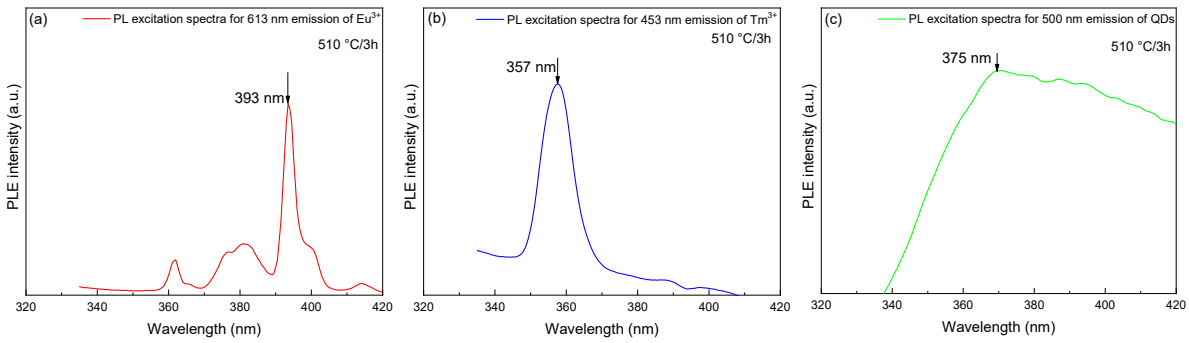


**Fig. S1.** Undesired self-crystallization of CsPbBr<sub>3</sub> QDs in glass matrix occurs when the ratio of Eu<sup>3+</sup> and Tm<sup>3+</sup> is selected as 1 and 0.75 mol%, respectively. (a) Digital images of self-crystallized sample under ambient light without surface preparation. (b) PL spectra and (c) the corresponding CIE color chromaticity diagram.

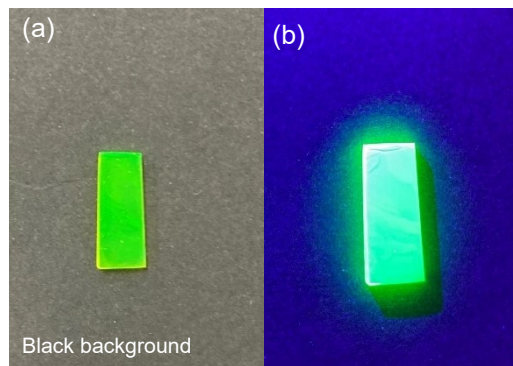
**Note:** The self-crystallized sample appears opaque and emits greenish light when excited under 365 nm light.



**Fig. S2.** Tauc plots of (a) as-cast sample, and (b) 500 °C/2h, (c) 500 °C/3h, (d) 510 °C/3h, (e) 500 °C/4h, (f) 500 °C/5h, (g) 500 °C/15h and (h) un-doped (500 °C/15h) samples.

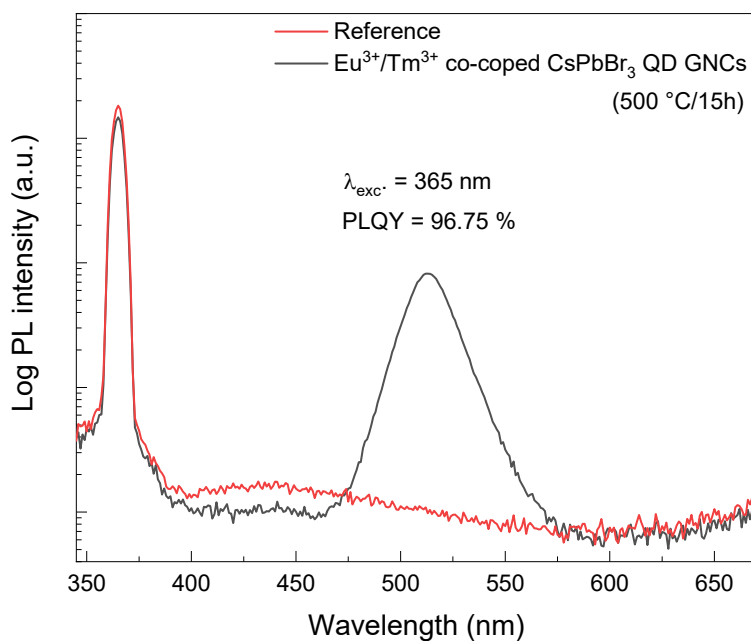


**Fig. S3.** PL excitation spectra of  $\text{Eu}^{3+}/\text{Tm}^{3+}$  co-doped  $\text{CsPbBr}_3$  QD GNCs heat-treated at 510 °C for 3h are recorded by monitoring the characteristic emission bands of  $\text{Eu}^{3+}$ ,  $\text{Tm}^{3+}$ , and  $\text{CsPbBr}_3$  QDs at (a) 613, (b) 453, and (c) 500 nm, respectively.

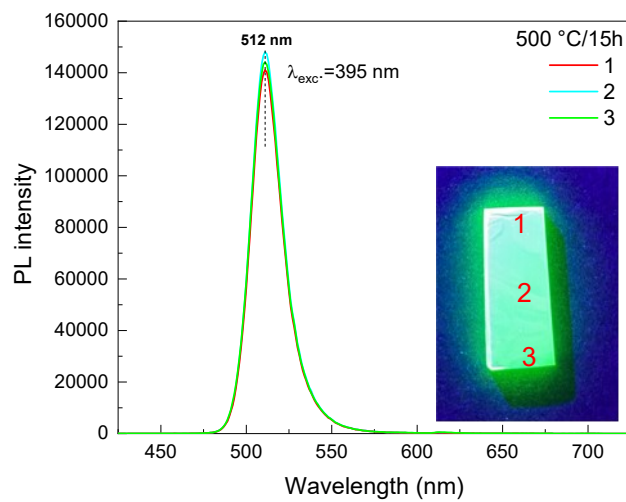


**Fig. S4.** Digital image of  $\text{Eu}^{3+}/\text{Tm}^{3+}$  co-doped  $\text{CsPbBr}_3$  QD GNCs heat-treated at  $500\text{ }^\circ\text{C}$  for 15h (a) under ambient light and (b) under 395 nm light.

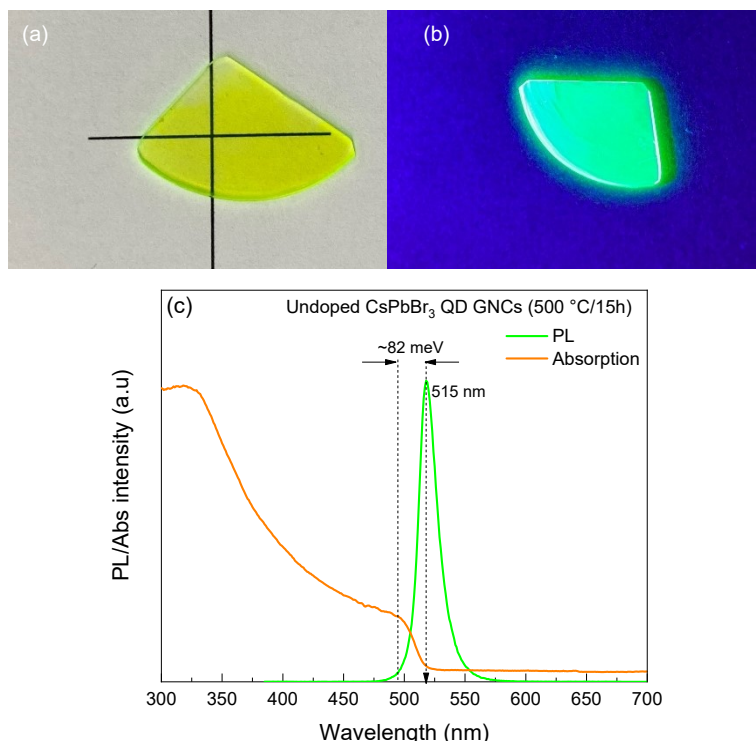
**Note:** The photos provided in Fig. S4a are taken by placing the sample on a black background to reveal the excellent bright green emission even under ambient light.



**Fig. S5.** PLQY spectra of the reference and  $\text{Eu}^{3+}/\text{Tm}^{3+}$  co-doped  $\text{CsPbBr}_3$  QD GNCs heat-treated at  $500\text{ }^\circ\text{C}$  for 15h.



**Fig. S6.** PL spectra of  $\text{Eu}^{3+}/\text{Tm}^{3+}$  co-doped  $\text{CsPbBr}_3$  QD GNC heat-treated at 500 °C for 15h taken from different parts of the sample. The measured parts are marked on the macro photo provided as an inset.



**Fig. S7.** Digital images of undoped CsPbBr<sub>3</sub> QD GNCs heat-treated at 500 °C for 15h (a) under ambient light, (b) under 395 nm light and (c) absorption and PL spectra ( $\lambda_{\text{exc}} = 365$  nm).

**Note:** PL spectra of undoped CsPbBr<sub>3</sub> QD GNCs display a narrow emission band located at ~515 nm with FWHM of 22 nm. Stokes shift and band gap are calculated as 82 meV and 2.46 eV, respectively.

**Table S1.** Nominal and final chemical composition of as-cast sample

<b>Nominal composition (mol%)</b>	<b>SiO<sub>2</sub></b>	<b>Al<sub>2</sub>O<sub>3</sub></b>	<b>ZnO</b>	<b>CaO</b>	<b>B<sub>2</sub>O<sub>3</sub></b>	<b>NaBr</b>	<b>PbBr<sub>2</sub></b>	<b>Cs<sub>2</sub>O</b>	<b>Tm<sub>2</sub>O<sub>3</sub></b>	<b>Eu<sub>2</sub>O<sub>3</sub></b>
	33.75	2	12	5	3	6	3	7	0.5	0.75
<b>Nominal composition (wt%)</b>	<b>Si</b>	<b>Al</b>	<b>Zn</b>	<b>Ca</b>	<b>B</b>	<b>Na</b>	<b>Pb</b>	<b>Cs</b>	<b>Tm</b>	<b>Eu</b>
	16.608	1.891	13.749	3.512	11.366	2.417	10.894	32.608	2.961	3.995
<b>Final composition (wt%)</b>	<b>Si</b>	<b>Al</b>	<b>Zn</b>	<b>Ca</b>	<b>B</b>	<b>Na</b>	<b>Pb</b>	<b>Cs</b>	<b>Tm</b>	<b>Eu</b>
	18.456	2.0126	12.978	3.034	10.894	2.161	11.104	33.452	2.563	3.346

**Note:** The comparison of nominal and final compositions reveal that the composition of glasses slightly changes during melting process in open crucibles due to evaporation of volatile components. However, no significant deviation from batch composition is detected.

**Table S2.** CIE color coordinates of samples excited with changing excitation wavelengths.

As-cast sample		
Excitation Wavelength (nm)	CIE-x	CIE-y
355 nm	0.1828	0.1126
365 nm	0.3036	0.1954
375 nm	0.5651	0.3280
385 nm	0.6075	0.3418
395 nm	0.6431	0.3491
500 °C/2h		
Excitation Wavelength (nm)	CIE-x	CIE-y
355 nm	0.1592	0.1051
365 nm	0.2759	0.2009
375 nm	0.5294	0.3160
385 nm	0.5767	0.3292
395 nm	0.6365	0.3442
500 °C/3h		
Excitation Wavelength (nm)	CIE-x	CIE-y
355 nm	0.1676	0.1629
365 nm	0.2414	0.2229
375 nm	0.3943	0.2779
385 nm	0.4197	0.2902
395 nm	0.5643	0.3279
500 °C/4h		
Excitation Wavelength (nm)	CIE-x	CIE-y
355 nm	0.1124	0.2173
365 nm	0.1123	0.2320
375 nm	0.1340	0.2444
385 nm	0.1522	0.2497
395 nm	0.2128	0.2712
500 °C/5h		
Excitation Wavelength (nm)	CIE-x	CIE-y
355 nm	0.0838	0.4225
365 nm	0.0846	0.4360
375 nm	0.1062	0.4386
385 nm	0.1217	0.4443
395 nm	0.1719	0.4354
500 °C/15h		
Excitation Wavelength (nm)	CIE-x	CIE-y
355 nm	0.0829	0.7386
365 nm	0.0830	0.7384
375 nm	0.0832	0.7371
385 nm	0.0833	0.7363
395 nm	0.0842	0.7343
510 °C/3h		
Excitation Wavelength (nm)	CIE-x	CIE-y
355 nm	0.1745	0.3464
365 nm	0.2322	0.3464
375 nm	0.3840	0.3543
385 nm	0.3920	0.3519
395 nm	0.5536	0.3507



**Table S3.** CCT, CRI and CIE color coordinate values of some recent studies on Eu<sup>3+</sup>-doped CsPbBr<sub>3</sub> QD GNCs for solid-state-lighting.

Eu <sup>3+</sup> doped CsPbBr <sub>3</sub> QD GNCs	Chromaticity Coordinates (x, y)	CCT (K)	CRI (R <sub>a</sub> )	Excitation wavelength (nm)	Reference
Eu <sup>3+</sup> /Tb <sup>3+</sup> co-doped	0.3335, 0.3413	4945	85.7	460	1
Eu <sup>3+</sup> -doped	0.4103, 0.4215	9413-2403	11-42.5	365	2
Eu <sup>3+</sup> -doped	0.384, 0.404	4075	34.3-88.9	365-395	3
Eu <sup>3+</sup> -doped	0.384, 0.404	5656-7931	60.9-92.4	365	4
Eu <sup>3+</sup> /Tm <sup>3+</sup> co-doped	0.3840, 0.3543	3692	30.7	375	This work

## References

1. Y. Cheng, C. Shen, L. Shen, W. Xiang and X. Liang, *ACS Appl. Mater. Interfaces*, 2018, **10**, 21434-21444.
2. R. Yuan, L. Shen, C. Shen, J. Liu, L. Zhou, W. Xiang and X. Liang, *Chem. Commun.*, 2018, **54**, 3395-3398.
3. P. Li, Y. Duan, Y. Lu, A. Xiao, Z. Zeng, S. Xu and J. Zhang, *Nanoscale*, 2020, **12**, 6630-6636.
4. R. Yuan, J. Liu, H. Zhang, Z. Zhang, G. Shao, X. Liang and W. Xiang, *J. Am. Ceram. Soc.*, 2018, **101**, 4927-4932.