

Supporting Information

Nucleation-Controlled Growth of Ultra-Small Perovskite Quantum Dots for Bright Blue Light-Emitting Diodes

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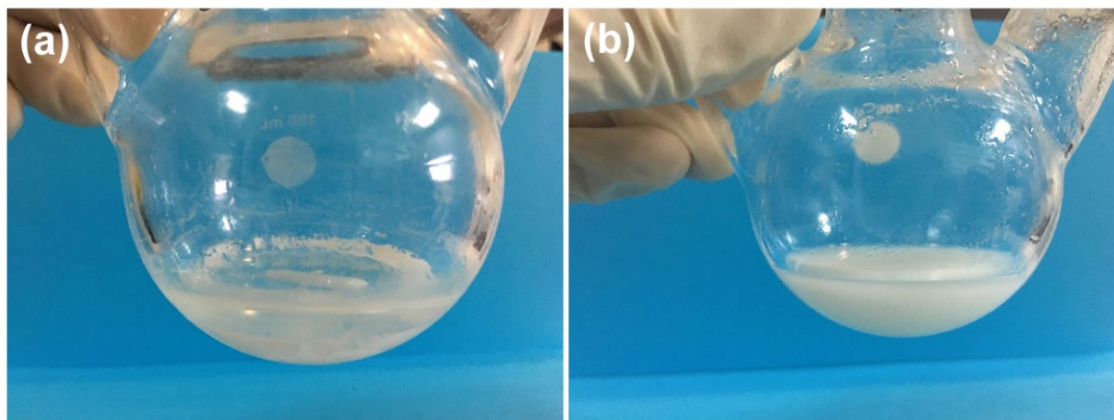


Figure S1 (a) The photograph of PbBr_2 , OA and ODE after heating and cooling down to room temperature, (b) the photograph of PbBr_2 , OAm and ODE after heating and cooling down to room temperature.

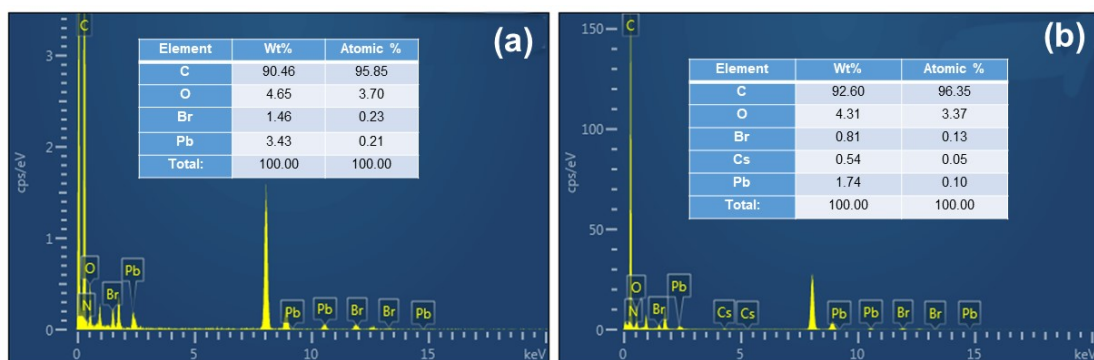


Figure S2 (a) The energy dispersive X-ray (EDX) scan of PbBr_2 clusters and its elemental contents, (b) the EDX spectrum of CsPbBr_3 QDs and its elemental contents.

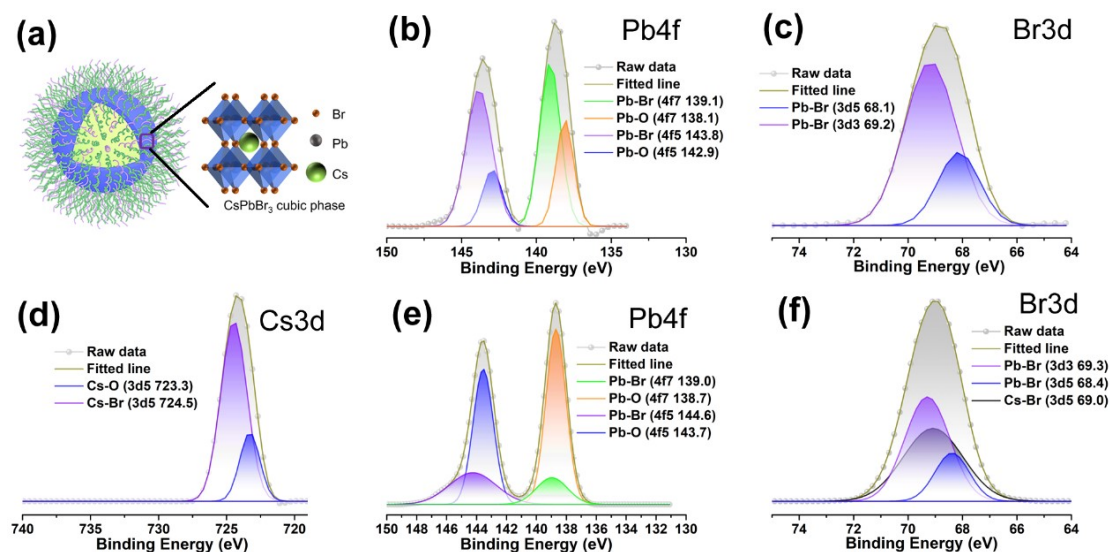


Figure S3 (a) The schematic illustration of CsPbBr_3 QDs and the crystal structure of typical cubic perovskite. High resolution XPS spectra of (b) $\text{Pb}4f$ and (c) $\text{Br}3d$ of PbBr_2 clusters. High resolution XPS spectra of (d) $\text{Cs}3d$, (e) $\text{Pb}4f$, (f) $\text{Br}3d$ of CsPbBr_3 QDs.

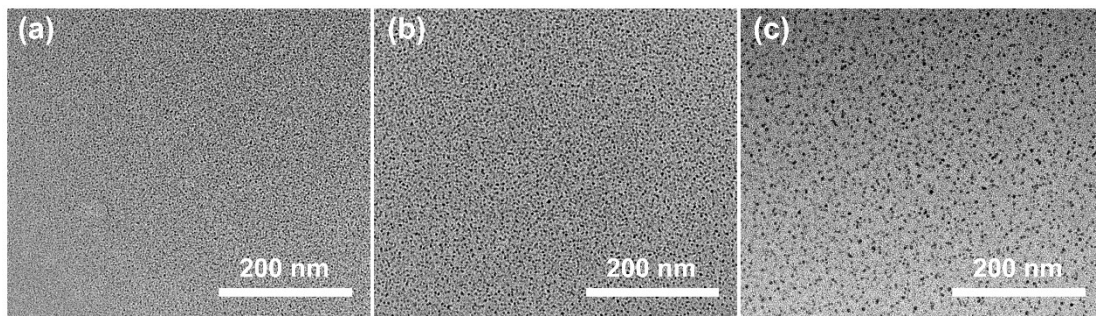


Figure S4 The TEM images of CsPbBr₃ QDs prepared with Cs : Pb molar ratio of (a) 3.75%, (b) 7.5%, and (c) 22.5%.

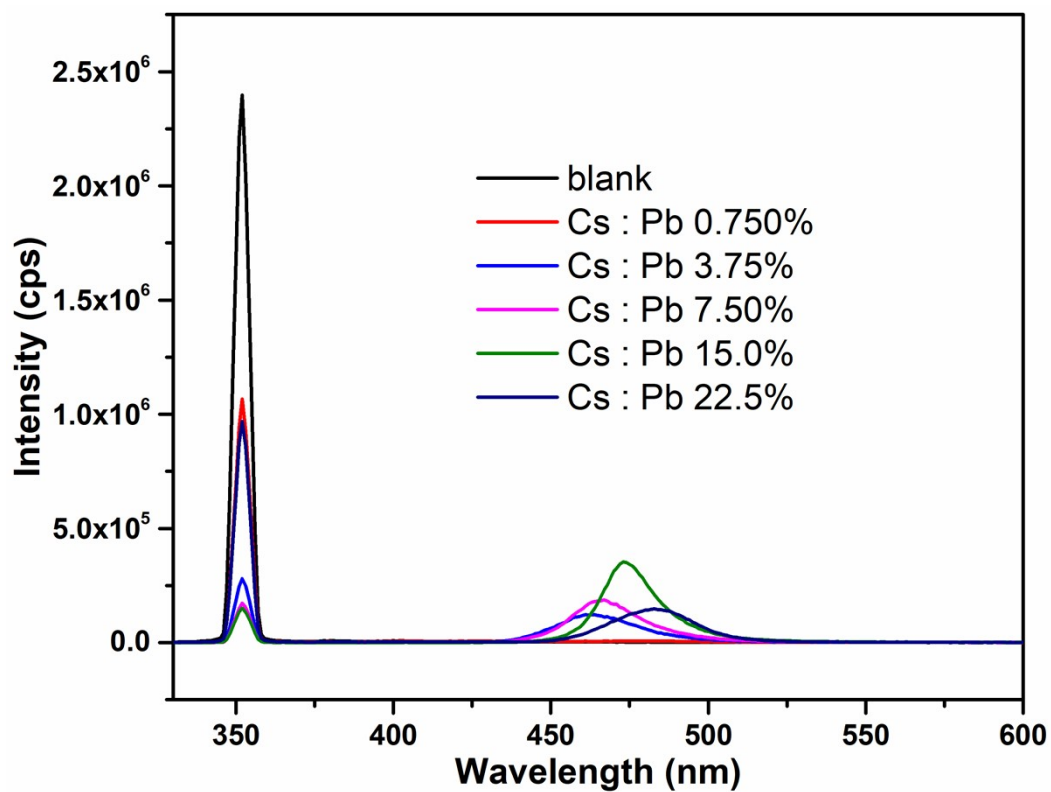


Figure S5 The PL QY spectra of CsPbBr₃ QDs synthesized with different molar ratio of Cs to Pb (0.750%, 3.75%, 7.50%, 15.0%, 22.5%).

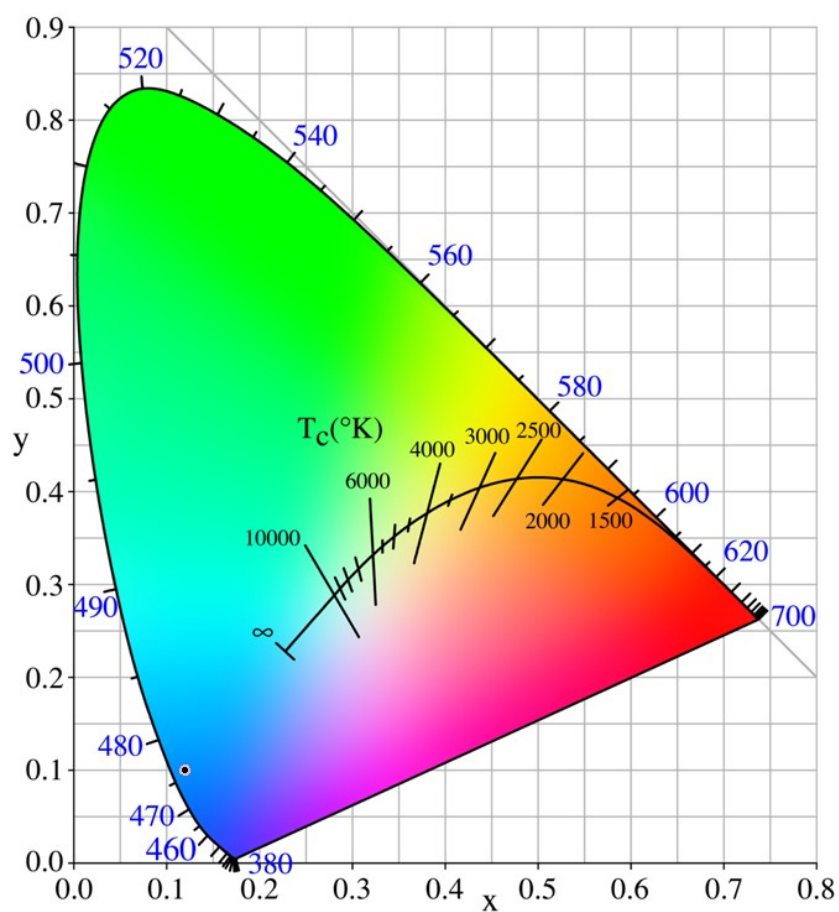


Figure S6 The CIE chromaticity coordinate of the blue LED made with CsPbBr₃ QDs/FSiO₂ particles.

Table S1. The emission peaks, size and PL QYs of various blue perovskite quantum dots and nanosheets.

Composition	Emission peaks (nm)	Size (nm)	PL QYs (%)	Purification methods	References
CsPbCl ₃	405	~11.0	10.0	precipitation, wash	[1]
CsPbCl _{1.5} Br _{1.5}	455	~11.0	37.0	precipitation, wash	[1]
CsPbClBr ₂	478	~11.0	70.0	precipitation, wash	[1]
CsPbClBr ₂	470	N/A	~60.0	N/A	[2]
CsPbCl ₂ Br	~435	~14.0	22.0	centrifugation, redispersed by sonication	[3]
CsPbBr ₃	457	3.1	40.3	N/A	[4]
CsPbBr ₃	465	3.5	51.7	N/A	[4]
CsPbBr ₃	474	4.1	69.5	N/A	[4]
CsPbBr ₃	458	~7.0	97.0	centrifugation, redispersed	[5]
CsPbBr ₃	453	2.4	50.4	N/A	[6]
Al:CsPbBr ₃	456	10.5	42.0	centrifugation	[7]
Cs ₃ Cu ₂ I ₅	440	N/A	58.0	filtration	[8]
MAPbCl ₃	407	~6.0	--	centrifugation	[9]
MAPbBr ₃	475	1.8	74.0	centrifugation	[10]
MAPbBr ₃	~465	3.3	1.2	N/A	[11]
FAPbCl ₃	415	22.0	< 1.0	centrifugation	[12]
FAPbCl _{1.5} Br _{1.5}	~478	--	21.0	centrifugation	[12]
CsPbBr ₃	471	3.8	64.8	no need	this work

Table S2. The maximum absorption transition peaks, emission peaks, FWHMs, PL

QYs and PL lifetime of CsPbBr₃ QDs synthesized under different temperature with 0.2 mL Cs-oleate.

Temperature (°C)	Absorption (nm)	Emission (nm)	FWHM (nm)	PL QY (%)
30	446	463	18	26.05
50	448	466	19	29.06
70	450	471	26	64.84
90	455	477	28	51.87
110	463	497	29	19.56

Table S3. The PL emission peaks and FWHM of the mixture solution of blue CsPbBr₃ QDs and green CsPbBr₃ QDs synthesized by hot injection at 0, 10, 20, 30, 40 min.

N/A	Emission (nm)	FWHM (nm)
Blue CsPbBr ₃ QDs	467	21
Green CsPbBr ₃ QDs (hot injection)	510	18
0 min	468, 507	21
10 min	468, 507	21
20 min	468, 507	21
30 min	468, 507	21
40 min	468, 507	21

References

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