Electronic Supplementary Information

Ionic liquid assisted preparation and modulation photoluminescence kinetics for high efficient CsPbX$_3$ nanocrystals with improved stability

Ting Chen,*[a,b] Yanqiao Xu,[a] Zhixiang Xie,[b] Weihui Jiang,[a,b] Lianjun Wang *[b,c] and Wan Jiang [b,c]

[a]*School of Material Science and Engineering, Jingdezhen Ceramic Institute, Jingdezhen 333001, China*

[b]*National Engineering Research Center for Domestic & Building Ceramics, Jingdezhen 333001, China*

[c]*State Key Laboratory for Modification of Chemical Fibers and Polymer Materials College of Materials Science and Engineering, Donghua University, Shanghai 201620, China*
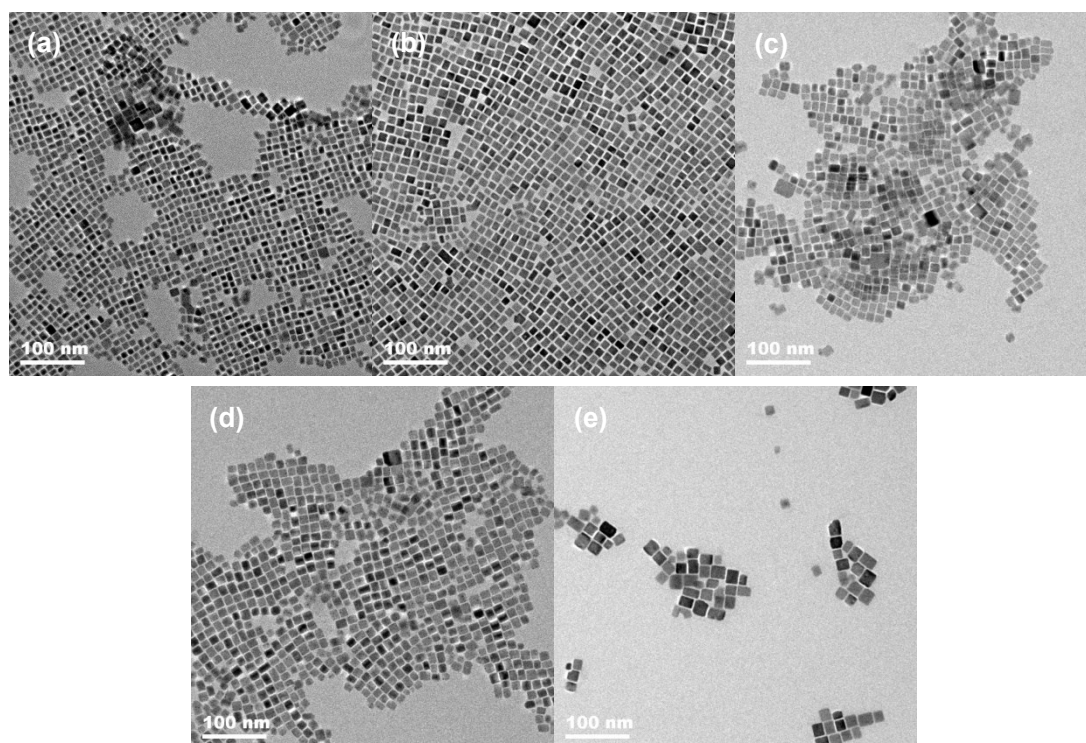
Fig. S1 TEM images of CsPbBr$_3$ NCs with n_{IL}/n_{Pb}= (a) 0, (b) 0.125, (c) 0.25, (d) 0.375, and (e) 0.5.
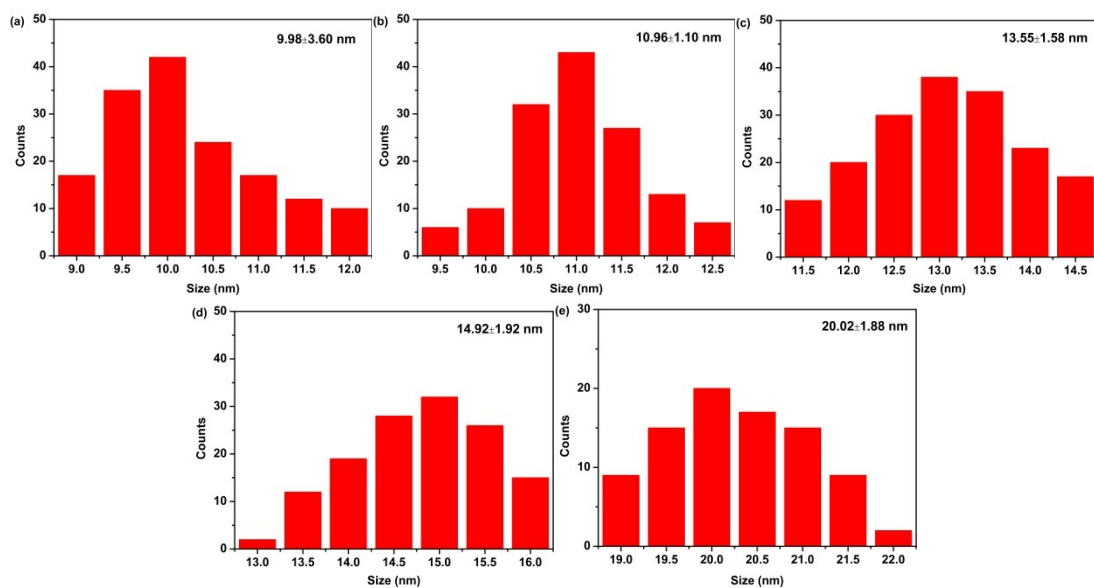
Fig. S2 Size distributions of CsPbBr$_3$ NCs with n_{IL}/n_{Pb}= (a) 0, (b) 0.125, (c) 0.25, (d) 0.375, and (e) 0.5.
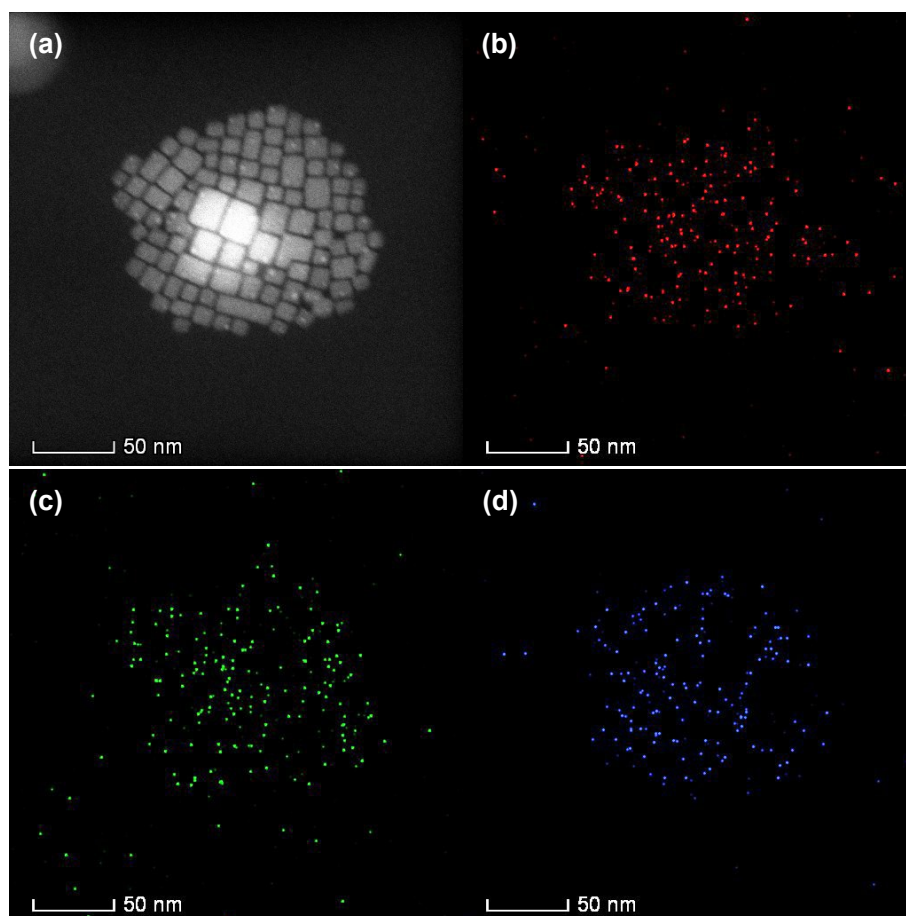

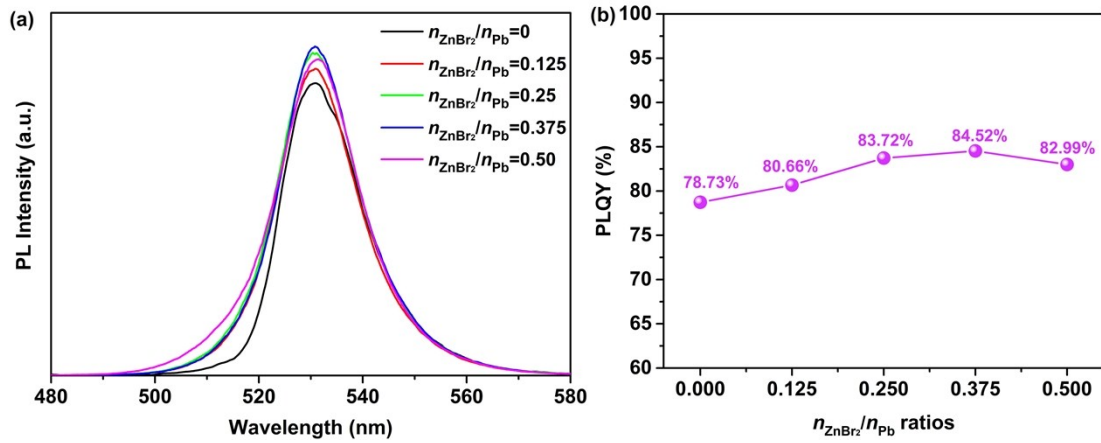**Fig. S3** (a) HAADF-STEM image of CsPbBr$_3$ NCs, and the (b) Cs, (c) Pb, (d) Br elemental maps (n_{IL}/n_{Pb}=0).

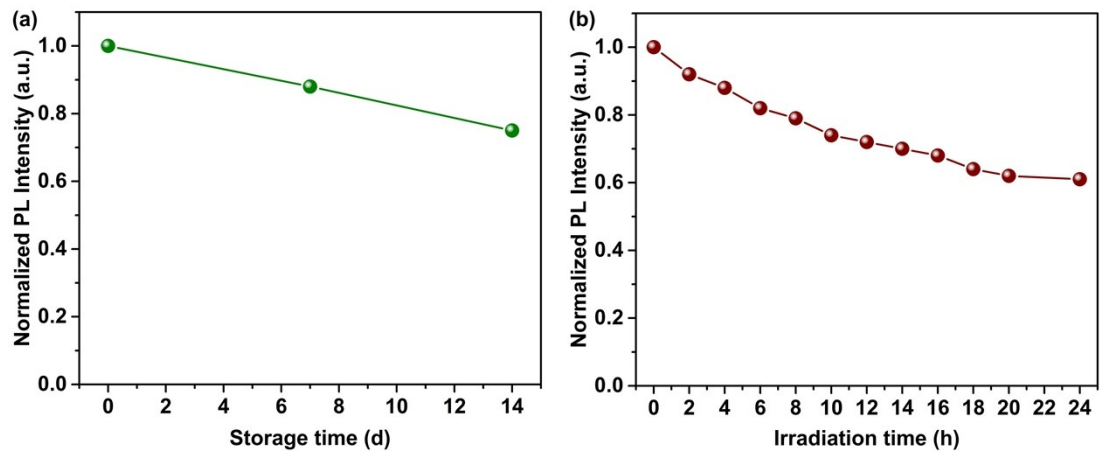**Fig. S4** (a) PL spectra and (b) PLQYs of CsPbBr$_3$ NCs with different amount of ZnBr$_2$ treatment.

Fig. S5 (a) Storage- and (b) photo-stability of CsPbBr$_3$ NCs after treating with ZnBr$_2$ ($n_{\text{ZnBr2}}/n_{\text{Pb}}$=0.375).
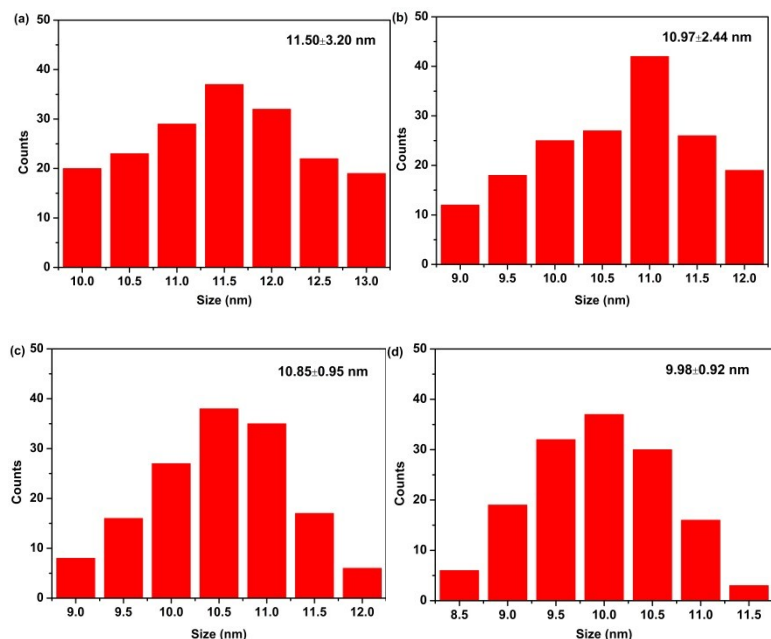
Fig. S6 Size distributions of CsPbBr$_3$ NCs with cation concentration: (a) 0.06 mol/L, (b) 0.12 mol/L, (c) 0.15 mol/L, and (d) 0.18 mol/L.

Table S1 FWHM data and intensity comparison of CsPbBr$_3$ NCs with different molar ratios of n_{IL}/n_{Pb}

n_{IL}/n_{Pb}	Plane	FWHM/°	Calculated Size[a]/nm	Intensity
0	(-200)	0.642	12.69	120
0.125	(-200)	0.628	12.96	125
0.250	(-200)	0.581	14.02	132
0.375	(-200)	0.484	16.83	122
0.500	(-200)	0.363	22.44	146

[a] Calculated size is obtained from Scherrer equation: D=Kλ/Bcosθ, where D represents the particle size of NCs, B represents the FWHM of (-200) plane, and θ represents the diffraction angle. K is equal to 0.89.

Table S2 EDS results of CsPbBr$_3$ NCs with different molar ratios of n_{IL}/n_{Pb}

n_{IL}/n_{Pb}	Cs	Pb	Br	Cs:Pb:Br
0	20.66	22.20	57.14	1.00:1.07:2.76
0.125	18.53	20.04	61.43	1.00:1.08:3.32

Table S3 XPS results of CsPbBr$_3$ NCs with different molar ratios of n_{IL}/n_{Pb}

n_{IL}/n_{Pb}	Cs	Pb	Br	Cs:Pb:Br
0	20.39	21.93	57.68	0.93:1.00:2.63
0.125	17.79	18.73	63.48	0.95:1.00:3.39

Table S4 FWHM data and intensity comparison of CsPbBr$_3$ NCs with different cation concentration

Cation concentration	Plane	FWHM/°	Calculated Size[a]/nm	Intensity
0.06	(-200)	0.586	13.89	226
0.09	(-200)	0.608	13.39	153
0.12	(-200)	0.615	13.24	123
0.15	(-200)	0.632	12.89	128
0.18	(-200)	0.635	12.80	120

[a] Calculated size is obtained from Scherrer equation: D=Kλ/Bcosθ, where D represents the particle size of NCs, B represents the FWHM of (-200) plane, and θ represents the diffraction angle. K is equal to 0.89.