Electronic Supplementary Information

Ultrathin $CsPbX_3$ (X=Cl, Br, I) nanoplatelets: solvothermal synthesis and optical spectroscopic properties

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Table S1 Comparison of FWHMs for two kinds of $CsPbX_3$ NPLs: one is prepared from anion exchange (**AE**) using $CsPbBr_3$ NPLs as the precursor and the other is directly fabricated via solvothermal reaction (**SR**).

	FWHM (nm)						
	$CsPbCl_3$	$CsPbCl_{1.5}Br_{1.5}$	$CsPbClBr_2$	$CsPbBr_3$	$CsPbBr_{1.5}I_{1.5}$	$CsPbBrI_2$	$CsPbI_3$
AE	19.4	22.8	23.4	26.2	32.7	49.3	56.3
SR	24.2	30.0	29.5	26.2	44.4	56.8	69.9

Table S2 The evaluated PL lifetimes of exciton recombination for ultrathin $CsPbX_3$ (X=Cl, Cl/Br, Br, Br/I, I) NPLs and thick $CsPbX_3$ NPLs.

	Lifetime (ns)				
	$CsPbCl_3$	$CsPb(Cl/Br)_3$	$CsPbBr_3$	$CsPb(Br/I)_3$	$CsPbI_3$
Ultrathin NPLs	0.37	1.00	2.67	4.76	8.40
Thick NPLs	2.76	3.28	5.79	30.08	62.08

* The decay lifetimes are determined via the equation of $\tau = \int I(t)dt / I_0$, where *I(t)* is the time-related luminescence intensity and I_0 is the peak intensity.

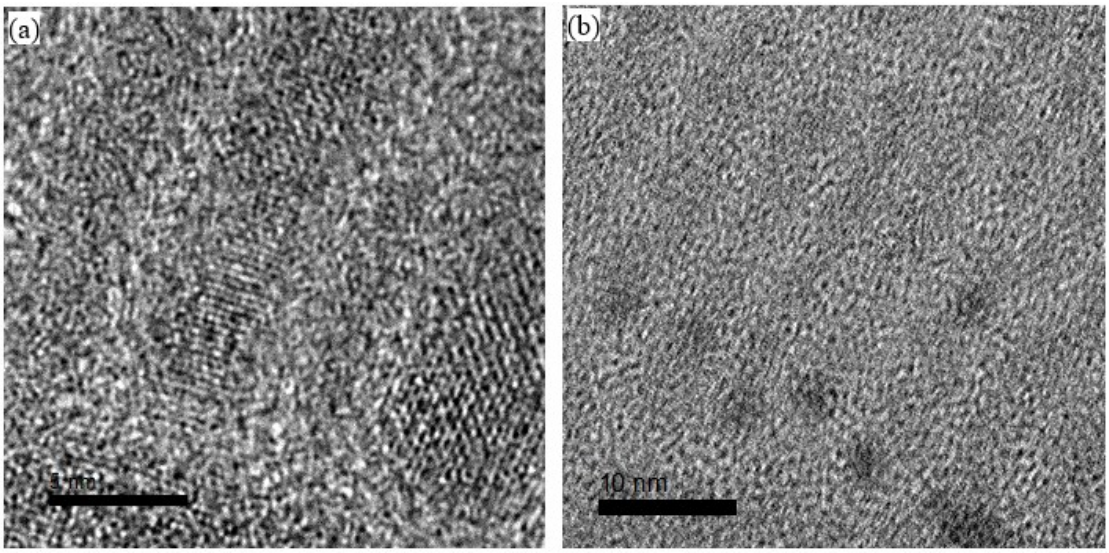

Figure S1 High-resolution TEM (HRTEM) micrographs of ultrathin $CsPbBr_3$ NPLs in lateral view: (a) high magnification, (b) low magnification.

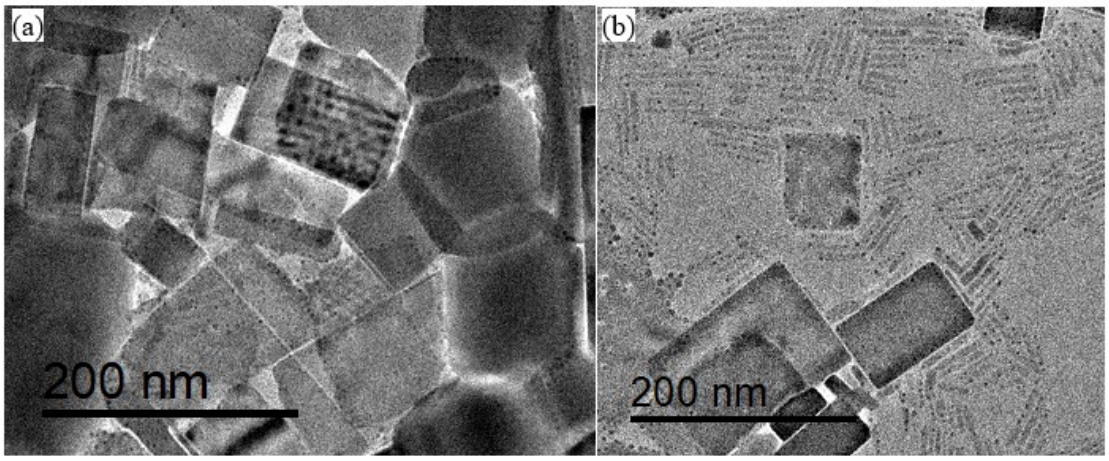

Figure S2 TEM images of thick $CsPbBr_3$ NPLs: (a) in top view, demonstrating that the length and width of the obtained NPLs are in the range of 100~200 nm, (b) in lateral view, revealing that the thickness is about 10 nm.

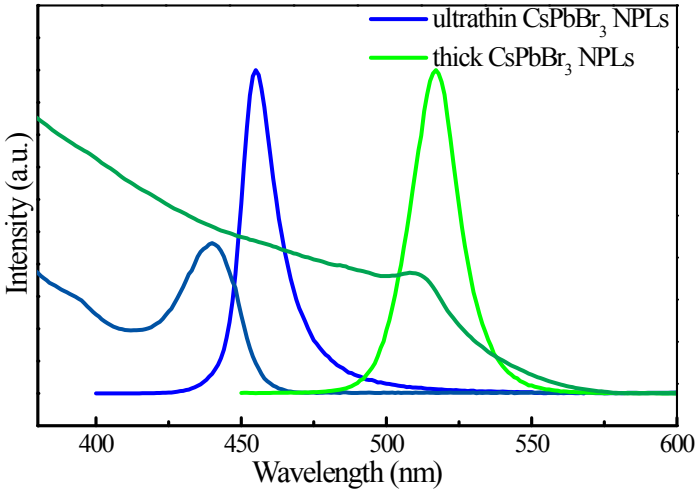

Figure S3 Optical absorption and emission spectra of ultrathin $CsPbBr_3$ NPLs and thick $CsPbBr_3$ NPLs.

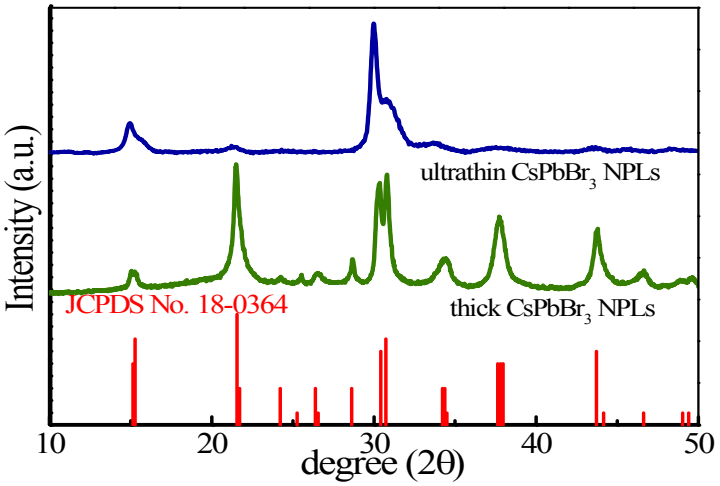

Figure S4 XRD patterns of ultrathin $CsPbBr_3$ NPLs and thick $CsPbBr_3$ NPLs. Bars represent standard diffraction data of monoclinic $CsPbBr_3$ crystal (JCPDS No. 18-0364).

Figure S5 A stepwise anion exchange strategy to prepare $CsPbX_3$ NPLs using $CsPbBr_3$ NPLs as the precursor. $CsPbBr_3$ NPLs toluene solution was divided into several parts. After anion exchange, one part was remained for characterization, the rest for further halogen exchange.

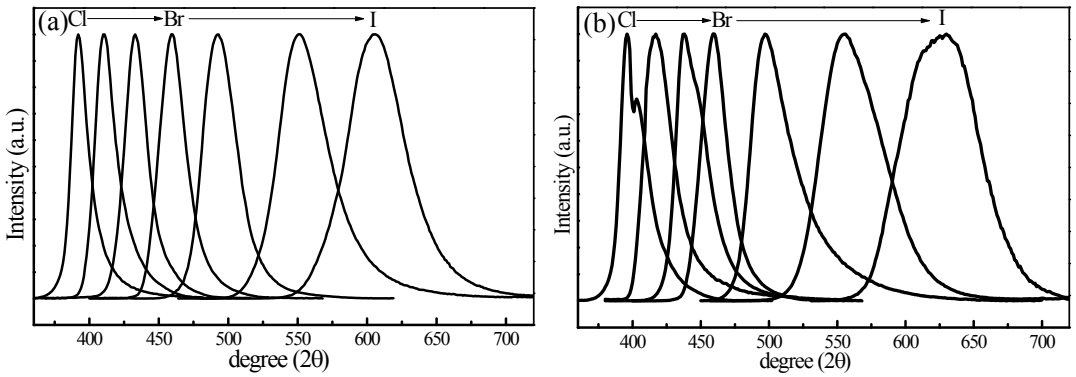

Figure S6 (a) PL spectra for ultrathin $CsPbX_3$ NPLs prepared from anion exchange using $CsPbBr_3$ NPLs as the precursor. (b) PL spectra for $CsPbX_3$ NPLs directly fabricated via solvothermal reaction. The related FWHM values are tabulated in ***Table S1***.

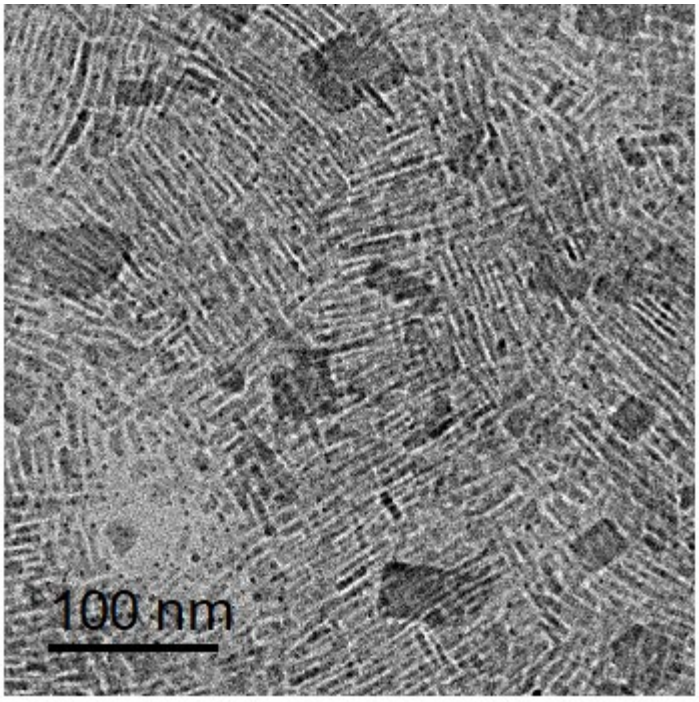

Figure S7 TEM image of $CsPbCl_3$ NPLs prepared from anion exchange using $CsPbBr_3$ NPLs as the precursor.

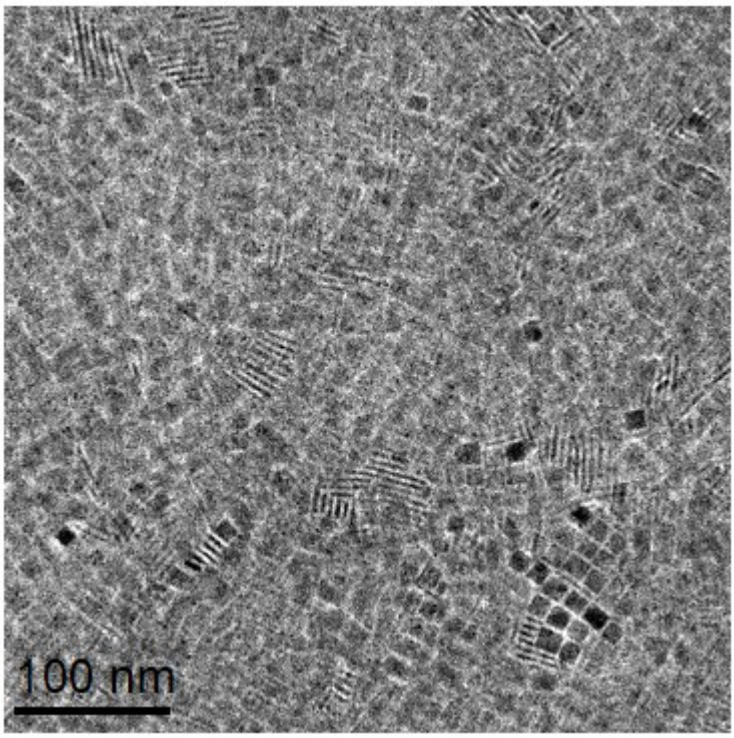

Figure S8 TEM image of $CsPb(Cl/Br)_3$ NPLs prepared from anion exchange using $CsPbBr_3$ NPLs as the precursor.

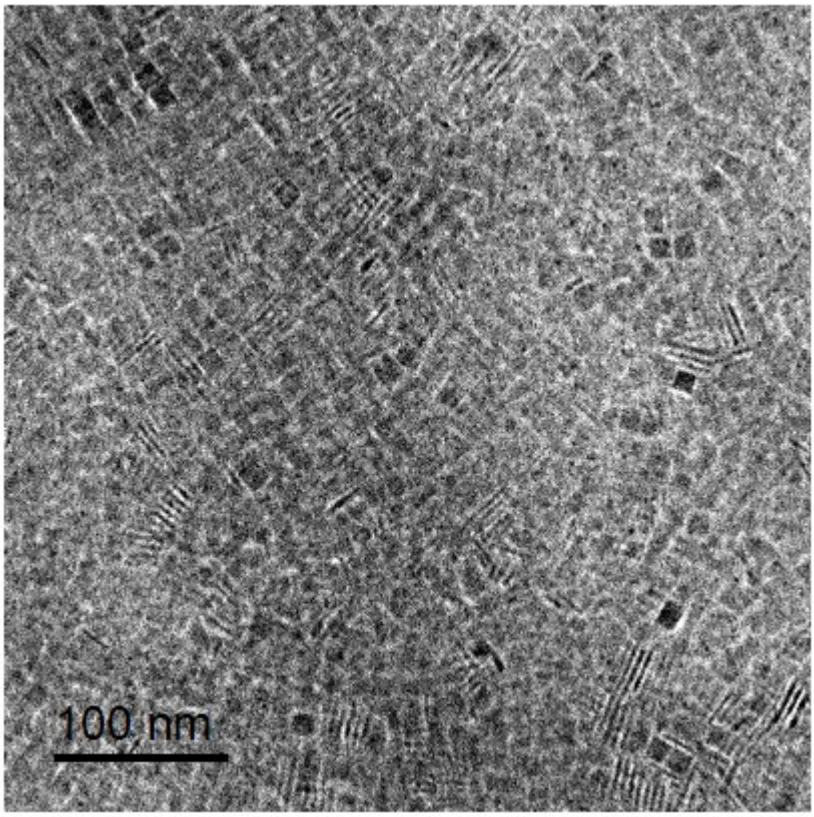

Figure S9 TEM image of $CsPbI_3$ NPLs prepared from anion exchange using $CsPbBr_3$ NPLs as the precursor.

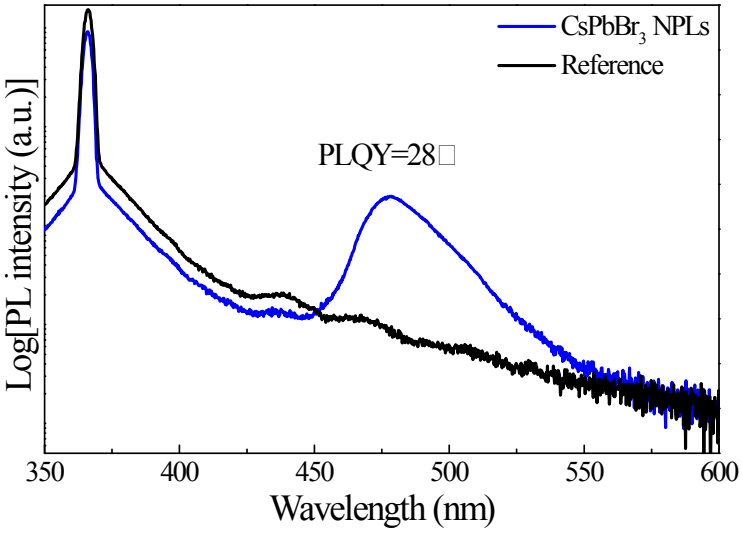

Figure S10 Quantitative excitation and emission spectra (λ_{ex}=365 nm) of the $CsPbBr_3$ NPLs and the reference recorded by a spectrofluoremeter equipped with an integrating sphere for PLQY measurement.

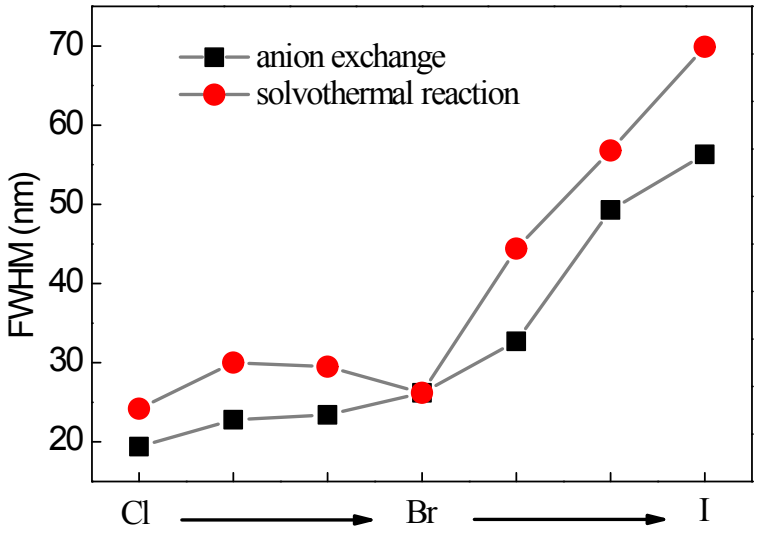

Figure S11 Comparison of FWHM values for the $CsPbX_3$ NPLs prepared by anion exchange and solvothermal reaction, respectively.

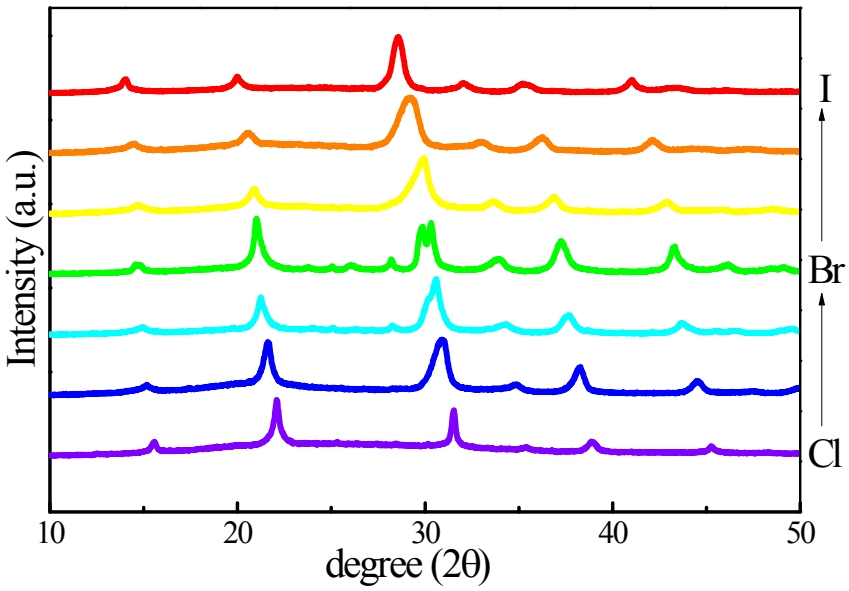

Figure S12 XRD patterns of thick $CsPbX_3$ NPLs prepared from anion exchange.

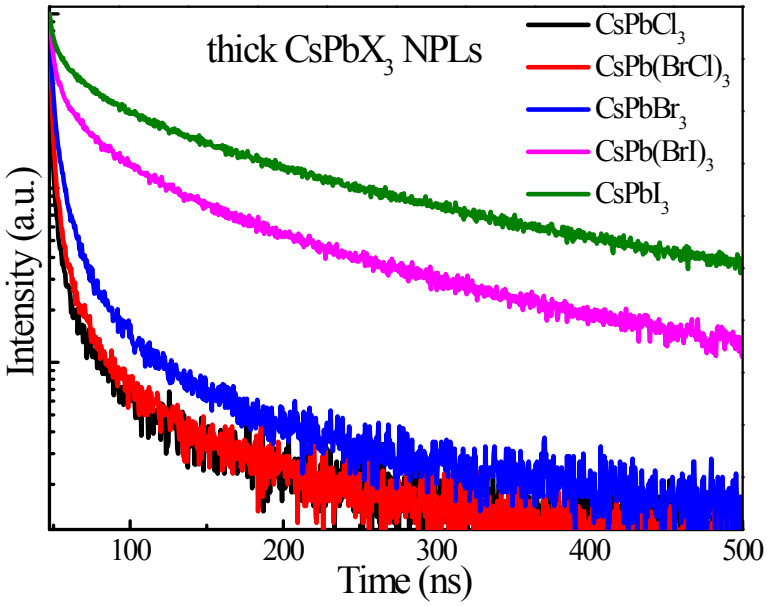

Figure S13 PL decay curves of exciton recombination for thick $CsPbX_3$ (X=Cl, Cl/Br, Br, Br/I, I) NPLs. The decay lifetimes for ultrathin $CsPbX_3$ NPLs and thick $CsPbX_3$ NPLs are tabulated in ***Table S2***.