Supporting Information

Insight into the Ligand-Mediated Synthesis of Colloidal $CsPbBr_3$ Perovskite Nanocrystals: The Role of Organic Acid, Base and Cs Precursors

Authors: Aizhao Pan, Bo He, Xiaoyun Fan, Zeke Liu, Jeffrey J. Urban, A. Paul Alivisatos, Ling He, Yi Liu**

Correspondence
One Cyclotron Rd, MS 67R6110 **The Molecular Foundry** **Lawrence Berkeley National Laboratory** **Berkeley, California 94720** **United States** **Email: yliu@lbl.gov**

Table S1. Summary of shape and photoluminescent quantum yield (PLQY) of nanocrystals from different Cs precursors and reaction temperatures.

Cs precursor	Temp/^{o}C	Shape	PLQY%
Cs_2CO_3	170	nanocube	90%
	140	nanoplatelet	84%
CsOAc	170	nanocube	87%
	140	nanoplatelet	86%

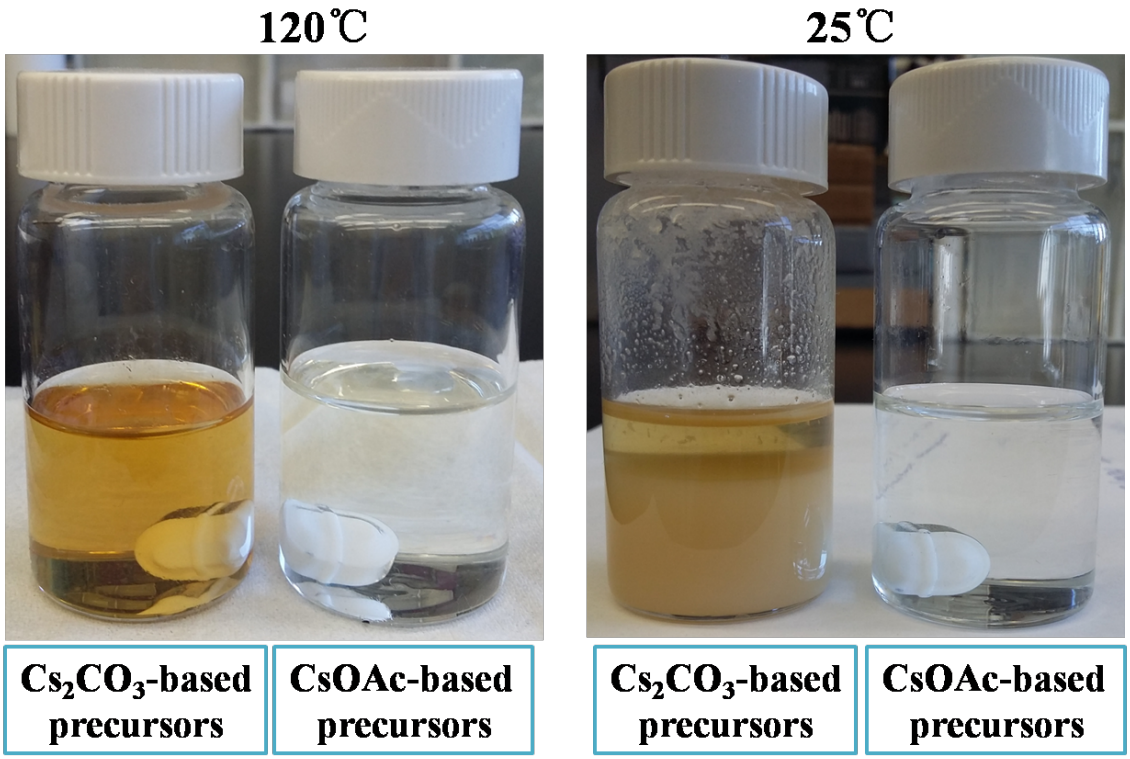


Figure S1: Left: at 120 ^{o}C, homogeneous solutions of Cs_2CO_3 and CsOAc in a mixture of ODE and OA are formed; Right: at 25 ^{o}C, precipitation occurs in Cs_2CO_3 solution while CsOAc solution remains clear.

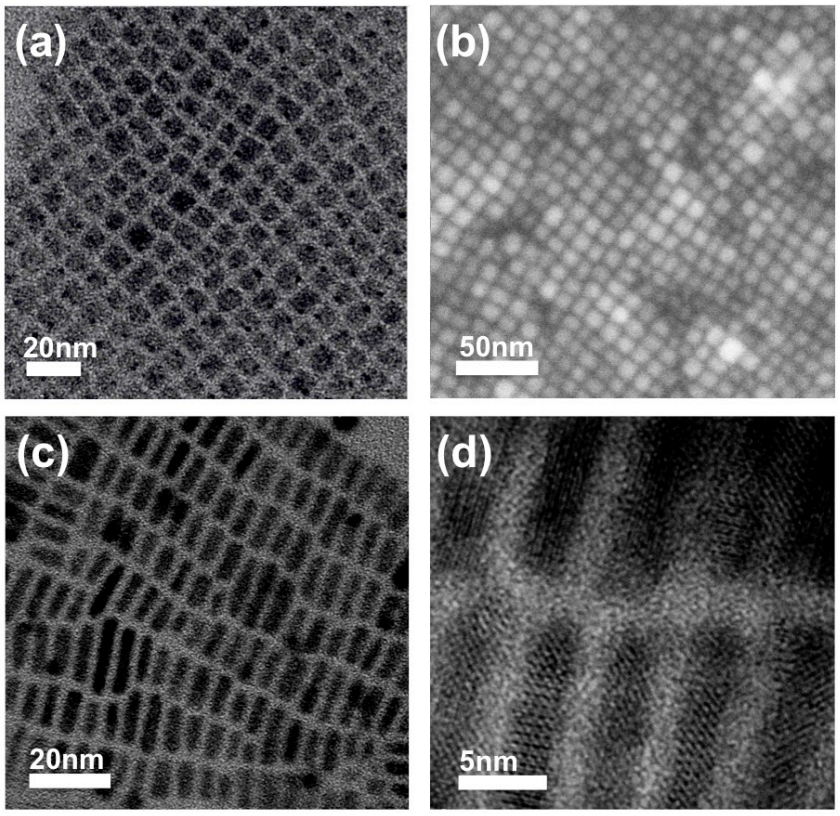


Figure S2: (a) SEM and (b) TEM of nanocubes from Cs_2CO_3 precursors. (c) TEM and (d) HR-TEM of nanoplatelets from Cs_2CO_3 precursors.

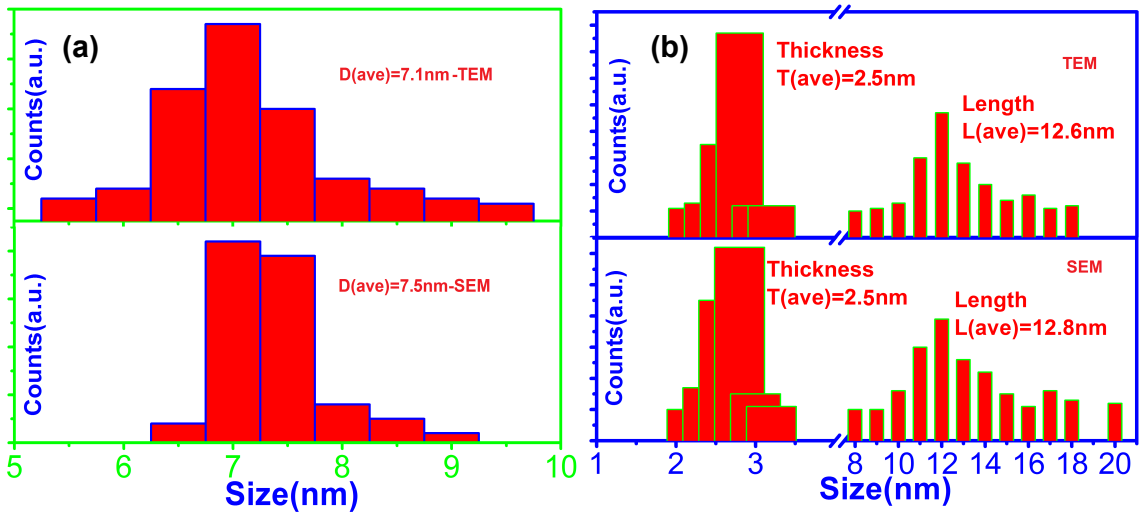


Figure S3: Size analysis and distributions of CsOAc derived (a) nanocubes by TEM and SEM, and (b) nanoplatelets by TEM and SEM.

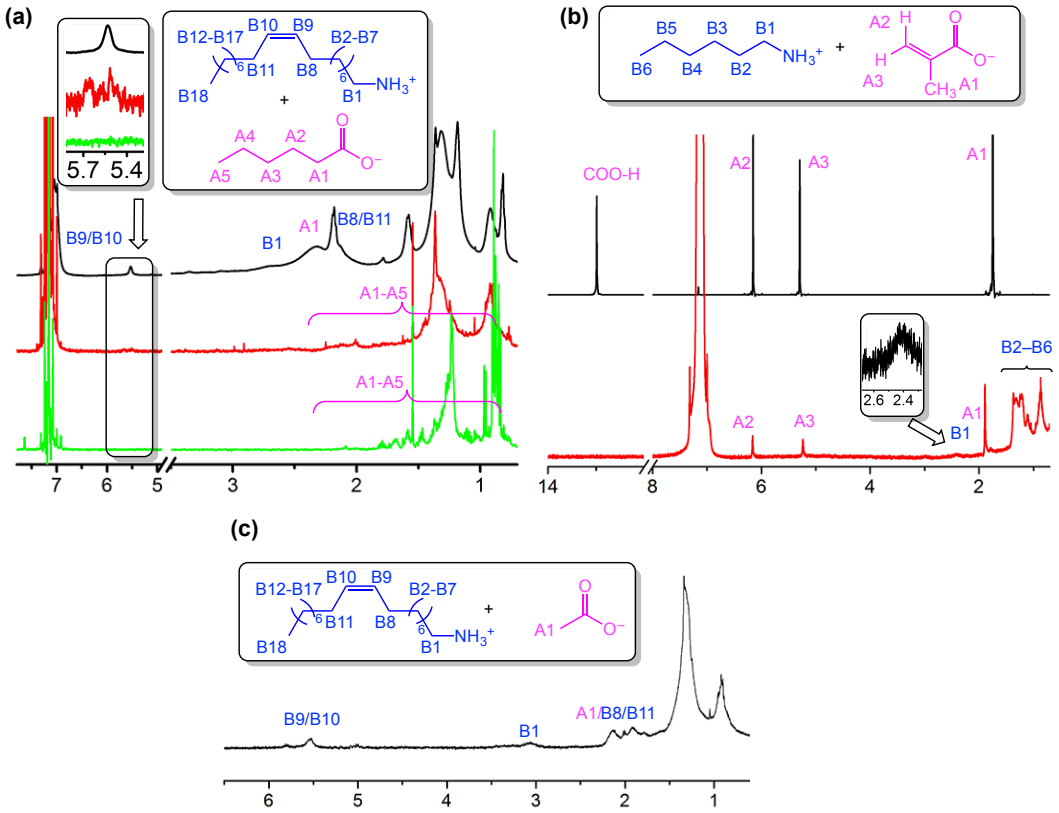


Figure S4: ^{1}HNMR spectra (C_6D_6, 298 K, 500 MHz) of $CsPbBr_3$ nanocrystals (a) from C6A-C18B after hexane (black) wash, and one-time (red) and five-time hexane/acetone (green) wash; (b) from MA-C6B after hexane wash; and (c) from C2A-C18B after hexane wash. The spectrum of MA was also shown in 3b for comparison.

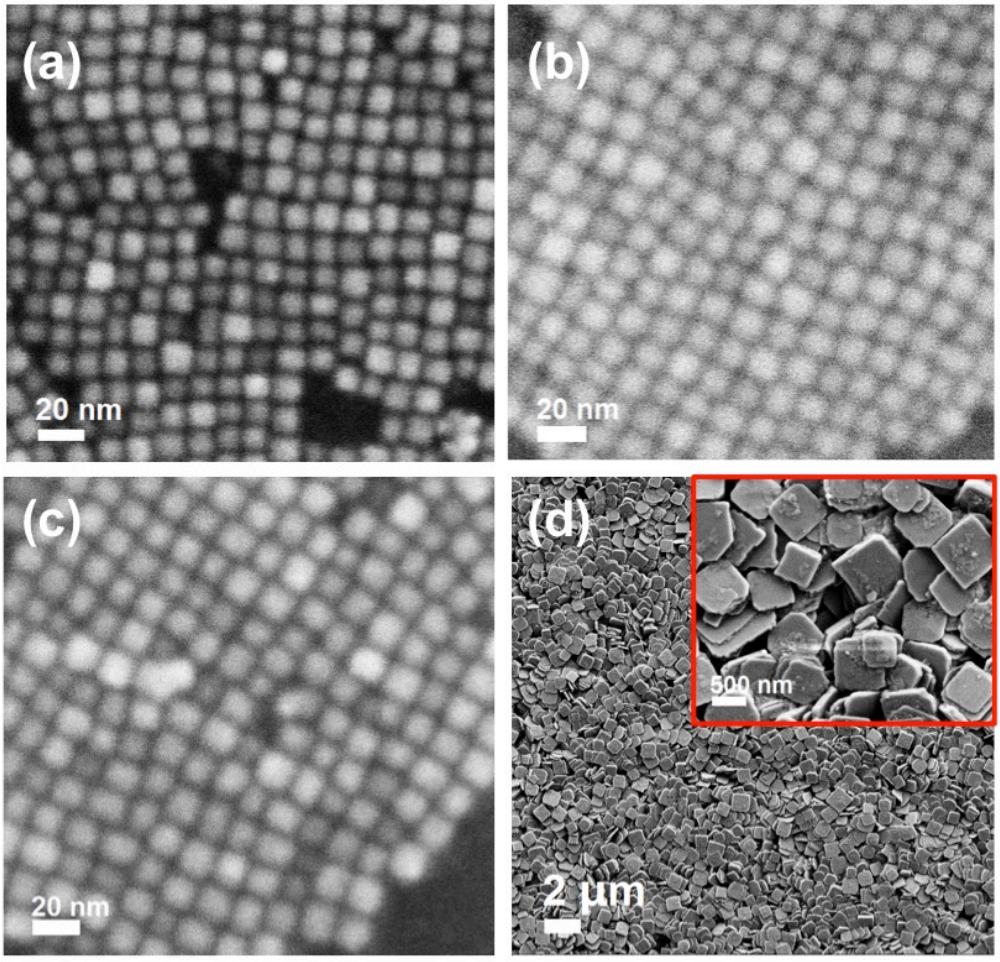


Figure S5: SEM images of nanocrystals synthesized using (a) C12A-C18B, (b) C8A-C18B, (c) C6A-C18B, and (d) C2A-C18B.

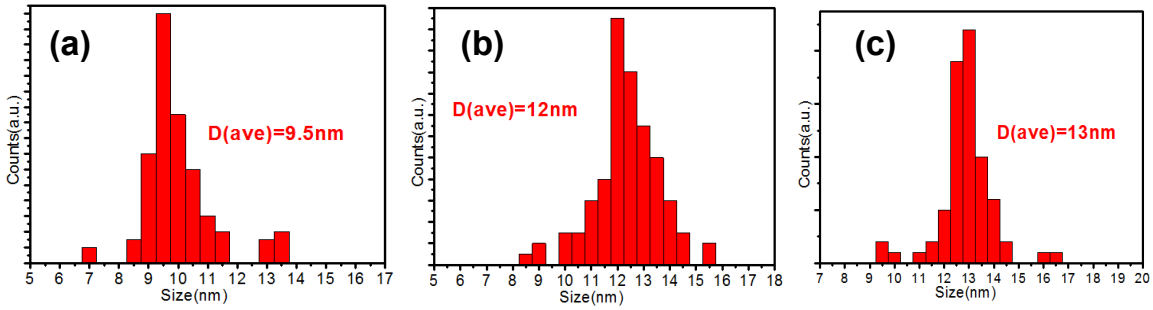


Figure S6: TEM size analysis and distributions of nanocubes derived from (a) C12A-C18B, (b) C8A-C18B, and (c) C6A-C18B.

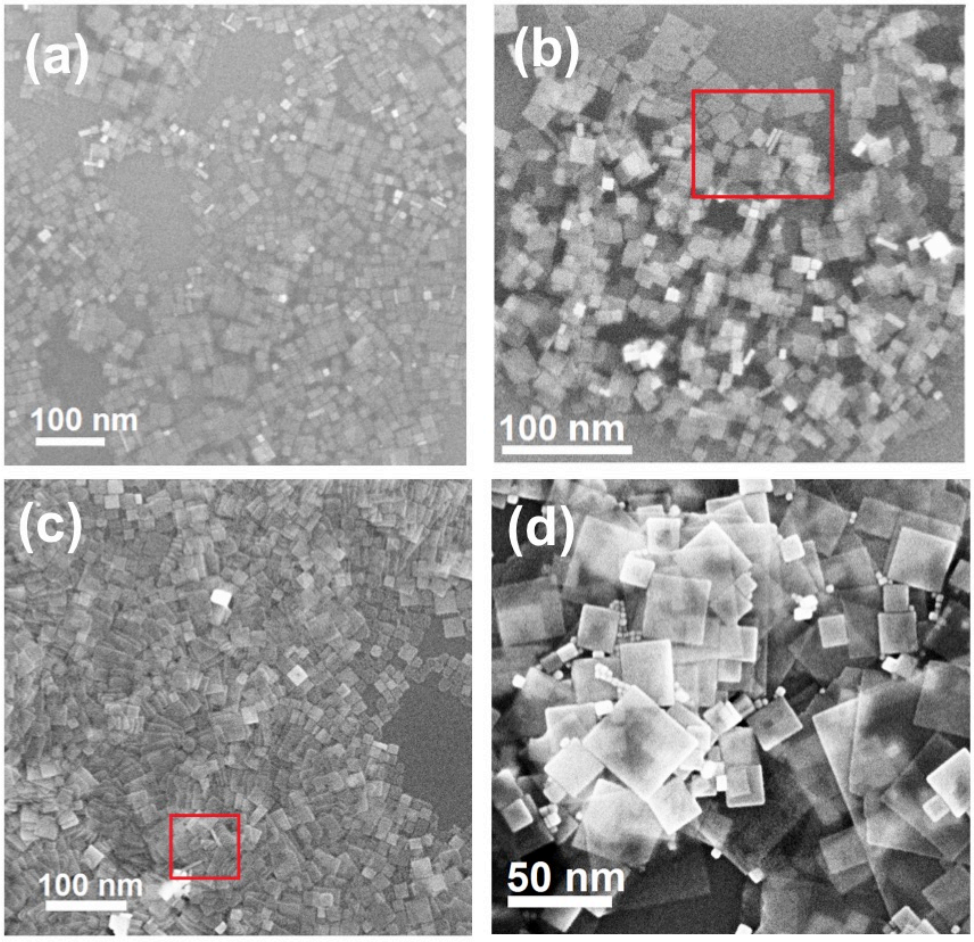


Figure S7: SEM images of nanoplatelets synthesized using different amines at. (a) from C18A-C12B at 170 ^{o}C, (b) from C18A-C8B at 170 ^{o}C, (c) from C18A-C8B at 140 ^{o}C, (d) from C18A-C6B at 140 ^{o}C. The red boxes in (b) and (c) highlight the coexisted face-on and edge-on platelets.

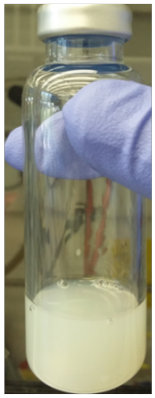
Ligands	CsOAc-based reactions		Cs_2CO_3-based reactions	
C6A-C18B	(a) 	(b) 	(c) 	
C18A-C6B	(d) 	(e) 	(f) 	(g) 

Figure S8: Tabulated comparison showing the contrasting results using CsOAc or Cs_2CO_3 together with short carboxylic acid or bases. (a), (c), (d) and (f) are pictures of the reaction mixtures taken immediately after quenching. (b) and (e) show the pictures of the reaction mixtures 1 day after reaction quenching. (g) shows the picture of the reaction mixture after 5 hours after reaction quenching. (f) is weakly fluorescent, and is a lot more short-lived compared to the CsOAc-based product in (e).