

Supporting Information

Bright CsPbBr₃ perovskite nanocrystals with improved stability by in-situ Zn-doping

Yong-Tang Zeng¹, Zhan-Rong Li¹, Sheng-Po Chang², Arjun Ansay³, Zi-Hao Wang^{2,4,*},
and Chun-Yuan Huang^{1,*}

¹ Department of Applied Science, National Taitung University, Taitung 950, Taiwan

² Department of Electrical Engineering, Institute of Microelectronics, Advanced Optoelectronic Technology Center, Academy of Innovative Semiconductor and Sustainable Manufacturing, National Cheng Kung University, Tainan 70101, Taiwan

³ Integrated Research and Training Center, Technological University of the Philippines, Manila 1004, Philippines

⁴ Green Energy Technology Research Center, Kun Shan University, Yongkang 710, Taiwan

* Correspondence: 10801013@gs.ncku.edu.tw (Z.-H.W); laputa@nttu.edu.tw (C.-Y.H.)

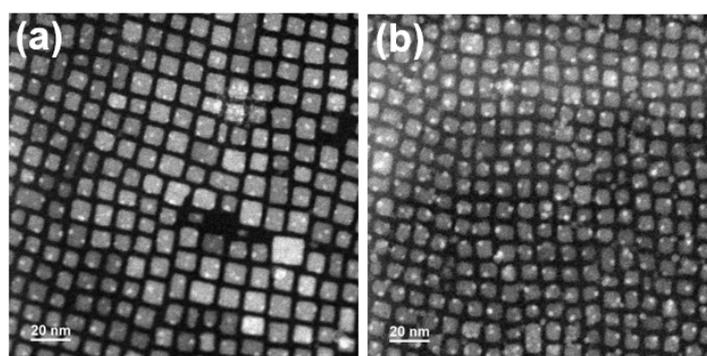


Figure S1. HAADF-STEM images of (a) CsPbBr₃ and (b) CsPbBr₃:Zn NCs.

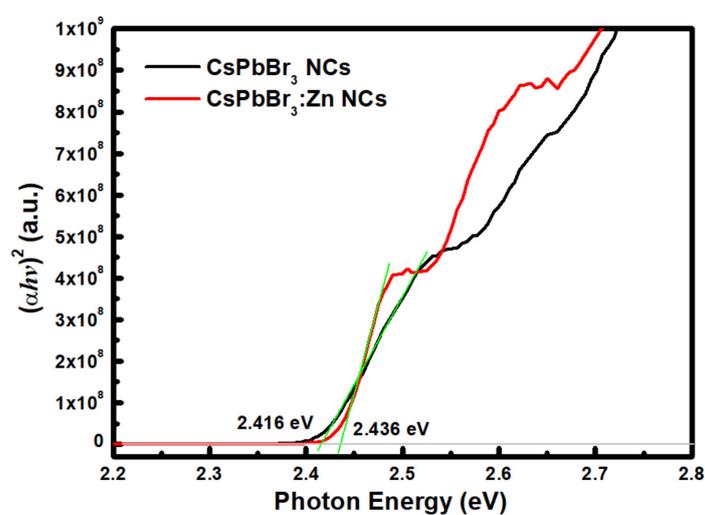


Figure S2. Tauc plot of CsPbBr₃ and CsPbBr₃:Zn NCs from their absorption spectra.

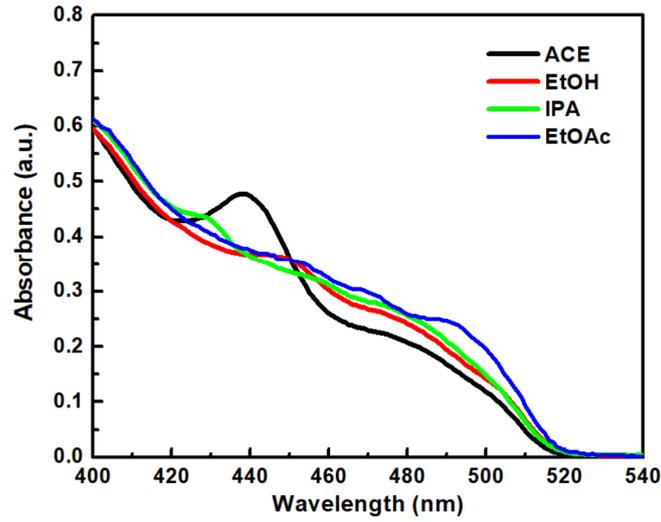


Figure S3. Absorption spectra of CsPbBr₃ NCs purified by different solvents.

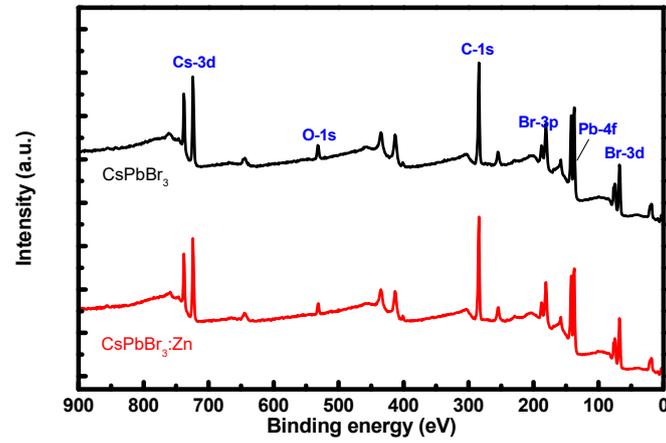


Figure S4. Full XPS survey scan spectra of CsPbBr₃ and CsPbBr₃:Zn NCs from their absorption spectra.

The PL decay curves of NCs were fitted by a triple-exponential decay model expressed as the following:

$$I(t) = I_0(A_x e^{-t/\tau_x} + A_{x^*} e^{-t/\tau_{x^*}} + A_{xx} e^{-t/\tau_{xx}}) \quad (1)$$

Where τ_x , τ_{x^*} , τ_{xx} and A_x , A_{x^*} , A_{xx} are the decay time constants of the exciton, trion, and biexciton and their relative generation probabilities, respectively. The average time constant can be calculated by:

$$\tau_{avg} = (A_x \tau_x^2 + A_{x^*} \tau_{x^*}^2 + A_{xx} \tau_{xx}^2) / (A_x \tau_x + A_{x^*} \tau_{x^*} + A_{xx} \tau_{xx}) \quad (2)$$

The fitted parameters are shown in Table S1.

Table S1. Parameters for the bi-exponential decay fitting of the TRPL spectra.

Sample	A_x	τ_x (ns)	A_{x^*}	τ_{x^*} (ns)	A_{xx}	τ_{xx} (ns)	τ_{avg} (ns)
CsPbBr ₃	0.04	7.33	0.37	1.79	0.59	0.68	2.66
CsPbBr ₃ :Zn	0.06	10.37	0.21	1.67	0.82	0.54	5.14