

Supporting Information

High binding ability ligands controlled formation of CsPbX₃ (X = Cl/Br, Br, I) perovskite nanocrystals with high quantum yields and enhanced stability

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Purification of CsPbBr₃ NPs used in NMR measurement: The purification process is same as previous report. First, ethyl acetate was added into the as-prepared CsPbBr₃ NPs solution, the precipitate was collected after centrifugation and then redispersed with 2 mL hexane and 6 mL ethyl acetate. The precipitate was collected after centrifugation. The process was repeated once more, and the final product was dried in vacuum oven.

NMR measurement: Firstly, 0.02g obtained CsPbBr₃ NPs was dispersed with 1.6 mL chloroform-d. Then, 3.16×10^{-6} mol oleic acid (or the same amount of palmitic acid) and 3.16×10^{-6} mol oleylamine were mixed and dispersed to 1 mL chloroform-d. Thirdly, 150 uL CsPbBr₃ NPs solution and 50 uL ligands solution were mixed with 300 uL chloroform-d.

The control samples: Firstly, 150 uL CsPbBr₃ NPs solution mentioned above was mixed with 350 uL chloroform-d.

The measurement of the PL intensities and PLQYs of purified CsPbBr₃ NCs with and without different ligands (PA and OA): 0.01g obtained CsPbBr₃ NPs was dispersed with 3 mL n-hexane. Then, the PL intensities and PLQYs of the CsPbBr₃ solution mixed with 100 uL CsPbBr₃ solution, 3 mL n-hexane, 3×10^{-5} mol PA or OA and 3×10^{-5} mol OAm. As a control experiment, 100 uL of the CsPbBr₃ solution mixed with only 3 mL n-hexane was also performed.

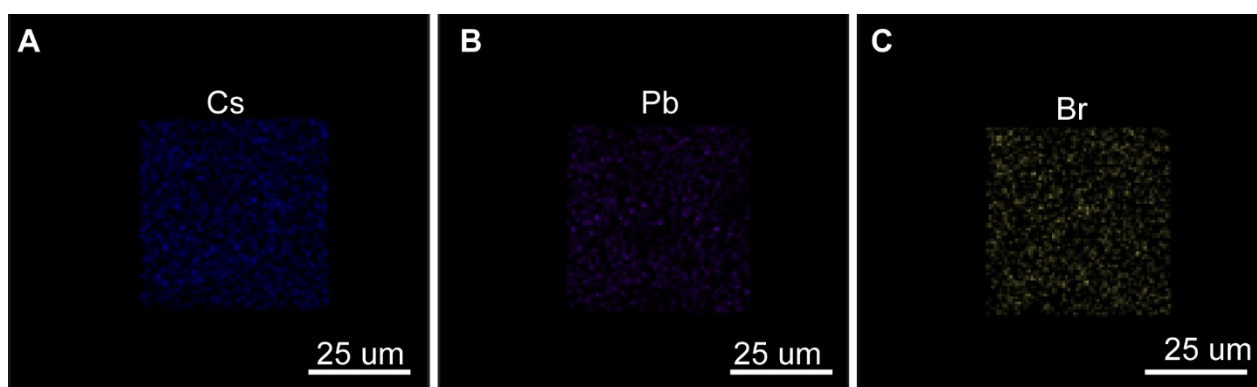


Figure S1. The elemental maps for Cs, Pb, and Br in the product.

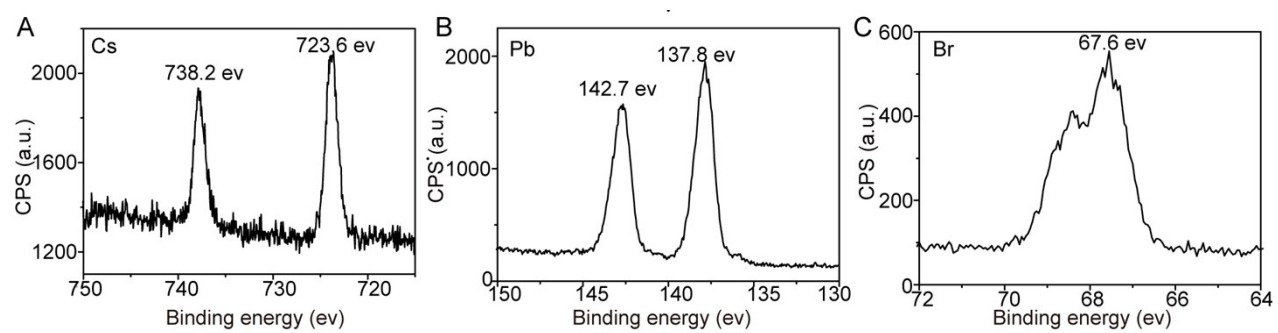


Figure S2. The XPS spectra of sample obtained via palmitic acid.

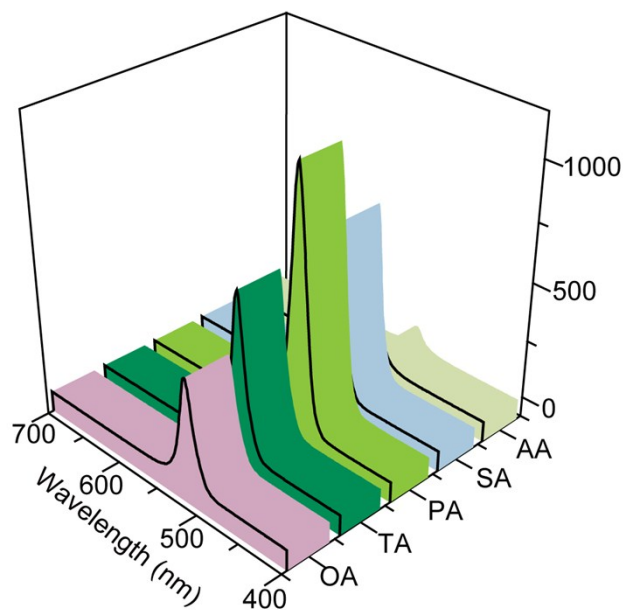


Figure S3. The PL spectra of CsPbBr₃ NCs solutions fabricated by OA, TA, PA, SA, and AA with same concentration.

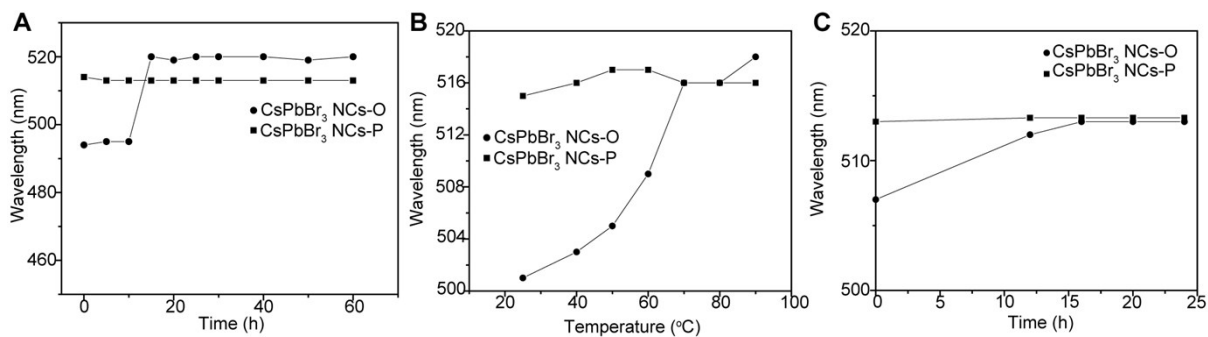


Figure S4. The plots of PL peak about CsPbBr₃ NCs-O and CsPbBr₃ NCs-P during water resistance test (A), temperature resistance (B), and photostability test (C).

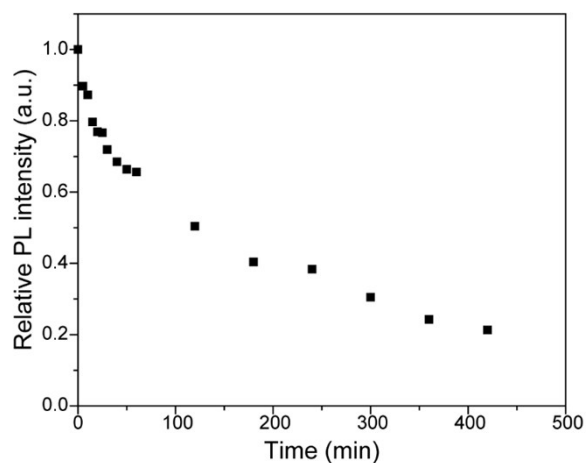


Figure S5. The water resistance test of CsPbBr₃ NCs obtained via tetradecanoic acid.

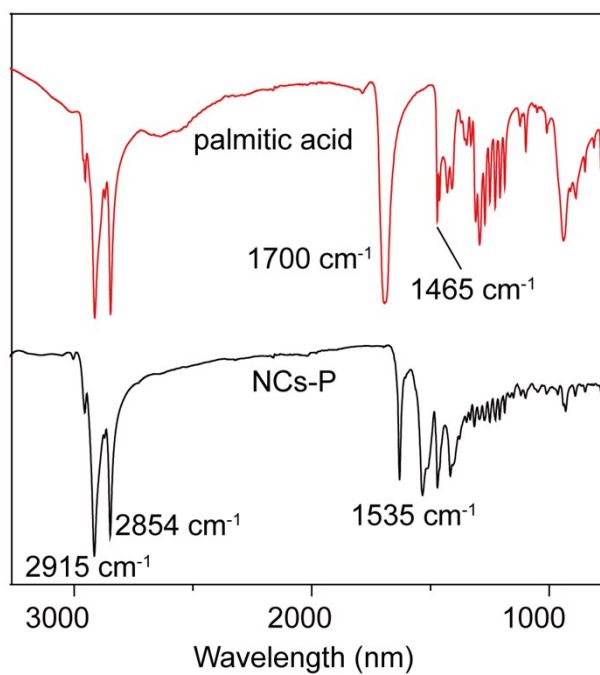


Figure S6. the FTIR spectra of PA and CsPbBr₃ NCs-P

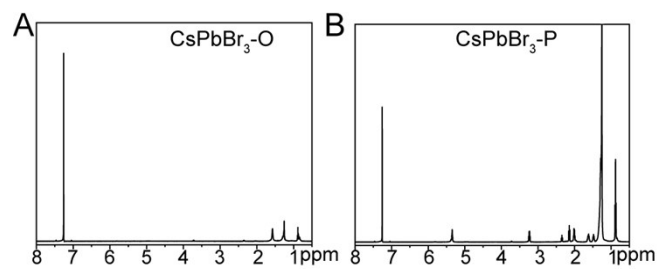


Figure S7. The ^1H NMR spectra of CsPbBr_3 NCs-O and CsPbBr_3 NCs-P purified by n-hexane twice.

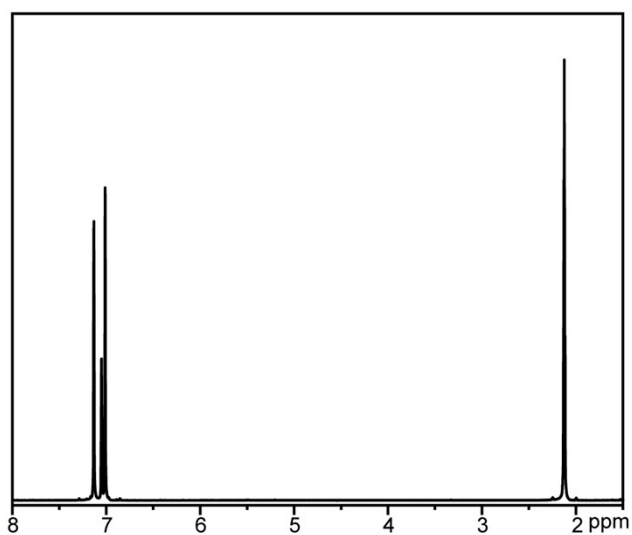


Figure S8. The ^1H NMR spectra of CsPbBr_3 NCs-O purified as previous report.

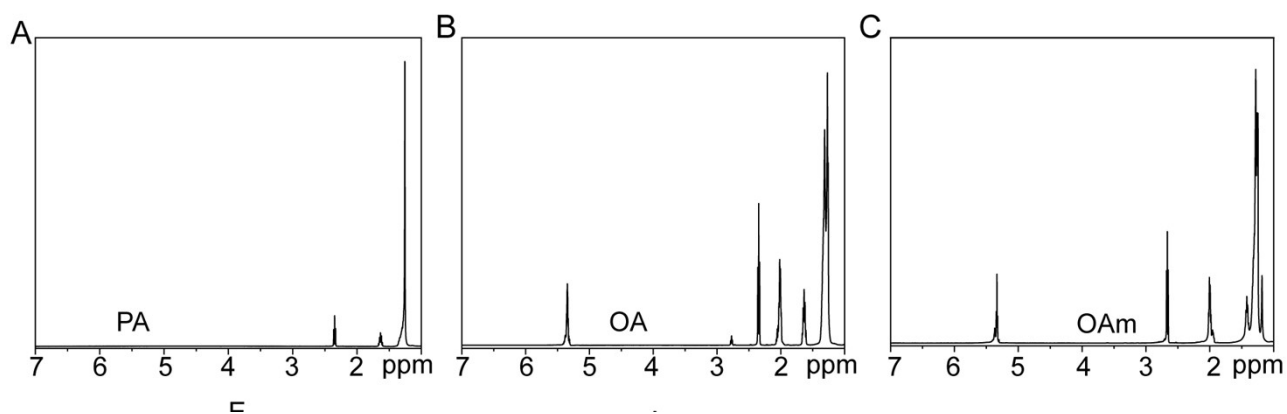


Figure S9. The ^1H NMR spectrum of PA, OA and OAm in chloroform-d.

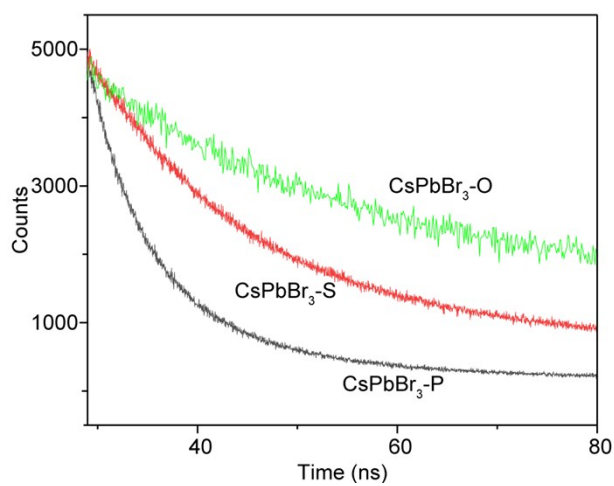


Figure S10. The emission lifetimes of CsPbBr₃-S, CsPbBr₃-O and CsPbBr₃-P.

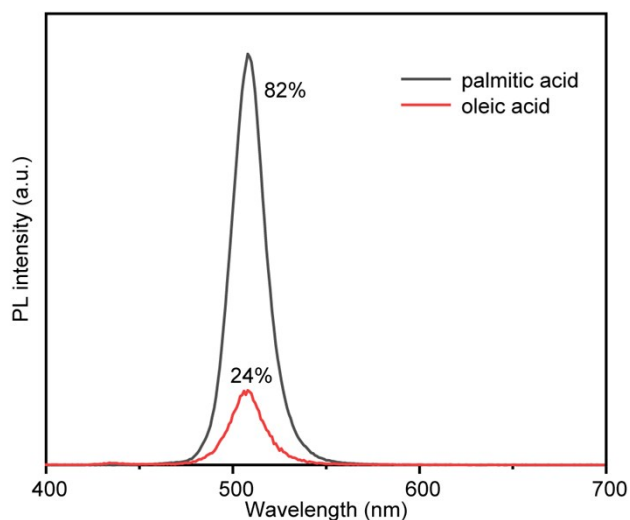


Figure S11. The PL intensities and PL QYs of CsPbBr₃ NCs obtained via palmitic acid and oleylamine or palmitic acid and hexadecylamine.

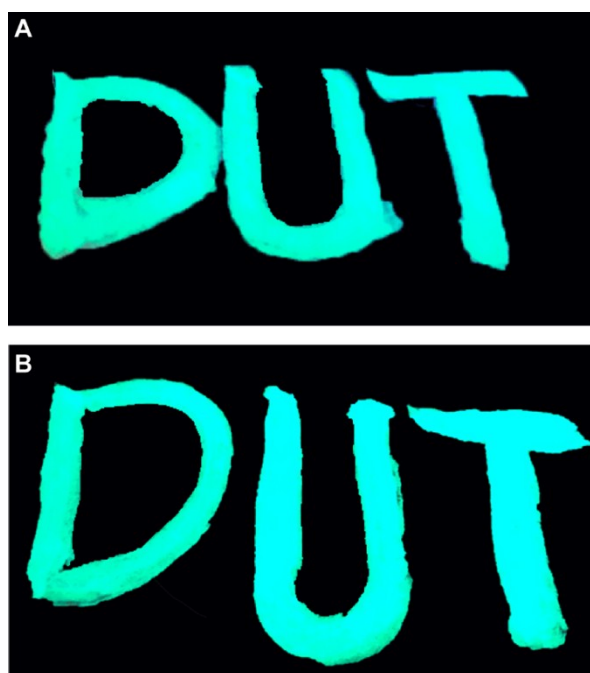


Figure S12. Photographs of handwritten "DUT" patterns on the filter papers via writing brush using CsPbBr₃ NCs-S (A) and CsPbBr₃ NCs-P (B) irradiated by UV light after 7 days without any protection under a relative humidity (RH) of 35-60%.