

Supporting Information

CsPbBr₃ Nanocrystals Light Emitting Diodes with Efficiency Up to 13.4% Achieved by Careful Surface Engineering and Device Engineering

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Table S1 EDS of Br and Pb for pristine CsPbBr₃ and DDAB treated CsPbBr₃ NC samples

| Sample | Br/at% | Pb/at% | Br/Pb |
|--|--------------------|-------------------|------------------|
| Pristine CsPbBr₃ NCs | 51.98 | 20.38 | 2.55 |
| | 48.55 | 19.77 | 2.46 |
| | 44.91 | 18.07 | 2.49 |
| | 52.92 | 19.97 | 2.65 |
| | 51.96 | 22.28 | 2.33 |
| Mean | 50.06±3.33 | 20.09±1.51 | 2.49±0.12 |
| CPB-1M NCs | 54.34 | 21.34 | 2.55 |
| | 57.75 | 21.64 | 2.67 |
| | 35.66 | 14.21 | 2.51 |
| | 43.08 | 15.44 | 2.79 |
| | 43.61 | 17.52 | 2.49 |
| Mean | 46.89±9.01 | 18.03±3.37 | 2.60±0.13 |
| CPB-2M NCs | 60.64 | 20.79 | 2.92 |
| | 56.22 | 18.74 | 3.00 |
| | 59.86 | 20.68 | 2.89 |
| | 55.99 | 19.28 | 2.90 |
| | 56.79 | 20.36 | 2.79 |
| Mean | 57.90±2.18 | 19.97±0.91 | 2.90±0.08 |
| CPB-5M NCs | 34.47 | 12.13 | 2.84 |
| | 33.33 | 11.71 | 2.85 |
| | 55.18 | 19.79 | 2.79 |
| | 54.60 | 19.28 | 2.83 |
| | 54.69 | 18.81 | 2.91 |
| Mean | 46.45±11.47 | 16.34±4.06 | 2.84±0.04 |

As shown in Table S1, we provided the elemental analysis of Pb and Br for DDAB treated CsPbBr₃ NCs via EDS. To guarantee the accuracy of the data, we analyzed five locations in each sample. All samples exhibited good signal for Br and Pb, with Br/Pb ratio of 2.49±0.12 (for pristine CsPbBr₃ NCs), 2.60±0.13 (for CPB-1M NCs), 2.90±0.08% (for CPB-2M NCs) and 2.84±0.04% (for CPB-5M NCs), respectively.

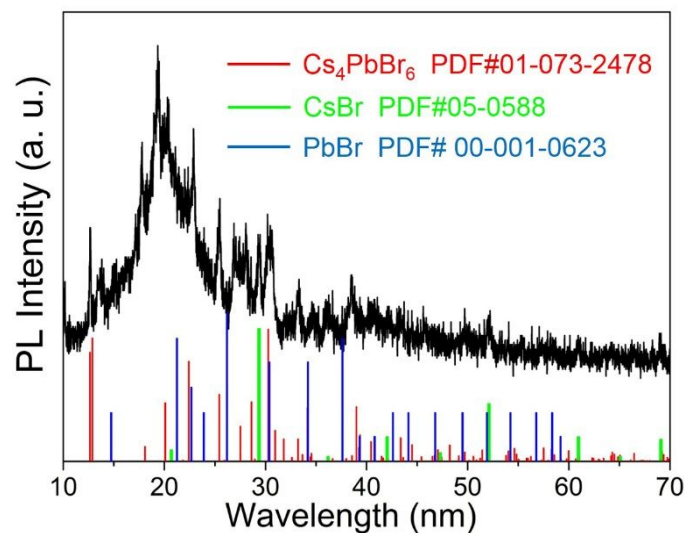


Figure S1 XRD patterns of 0.10M DDAB treated CsPbBr₃ NCs

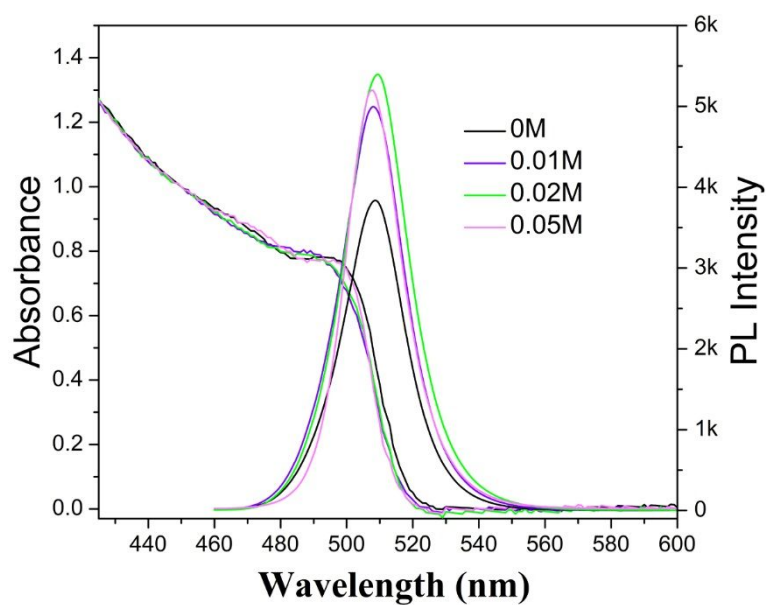


Figure S2 PL and UV-vis absorption spectra of 0M DDAB, 0.01M DDAB, 0.02M DDAB, and 0.05M DDAB treated CsPbBr₃ NCs.

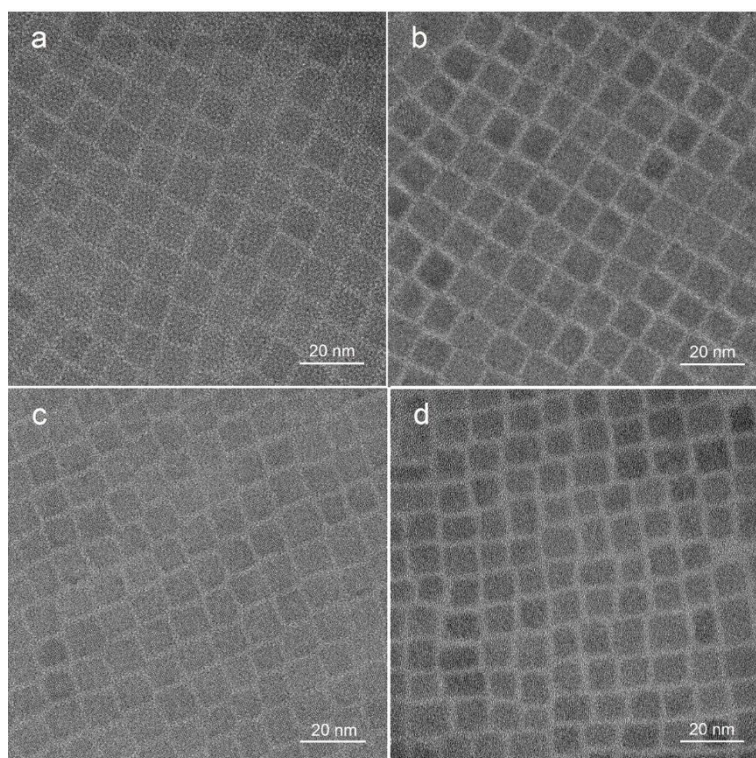


Figure S3 TEM images of a) 0M DDAB, b) 0.01M DDAB, c) 0.02M DDAB, and d) 0.05M DDAB treated CsPbBr₃ NCs.

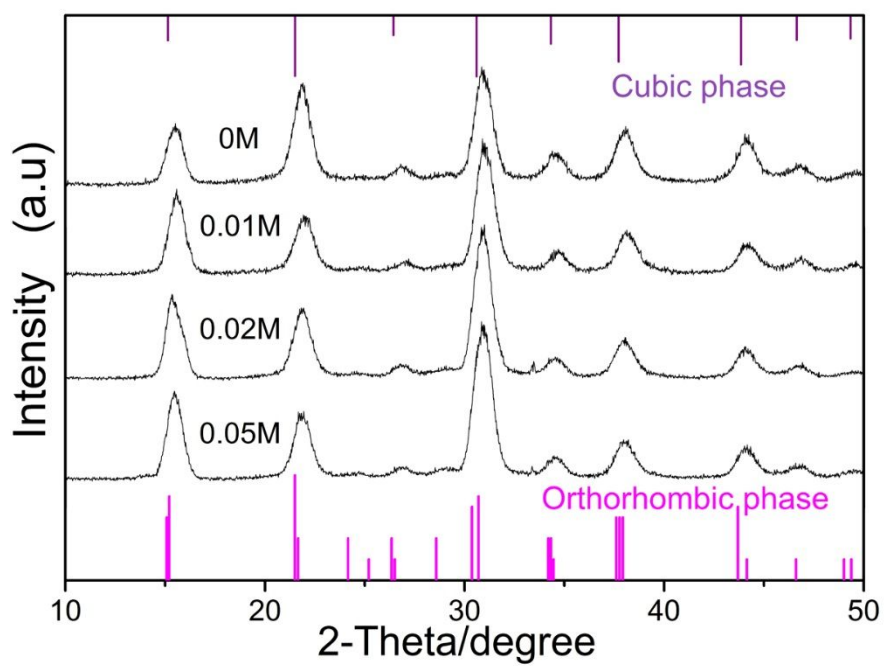


Figure S4 XRD patterns of 0M DDAB, 0.01M DDAB, 0.02M DDAB, and 0.05M DDAB treated

CsPbBr₃ NCs.

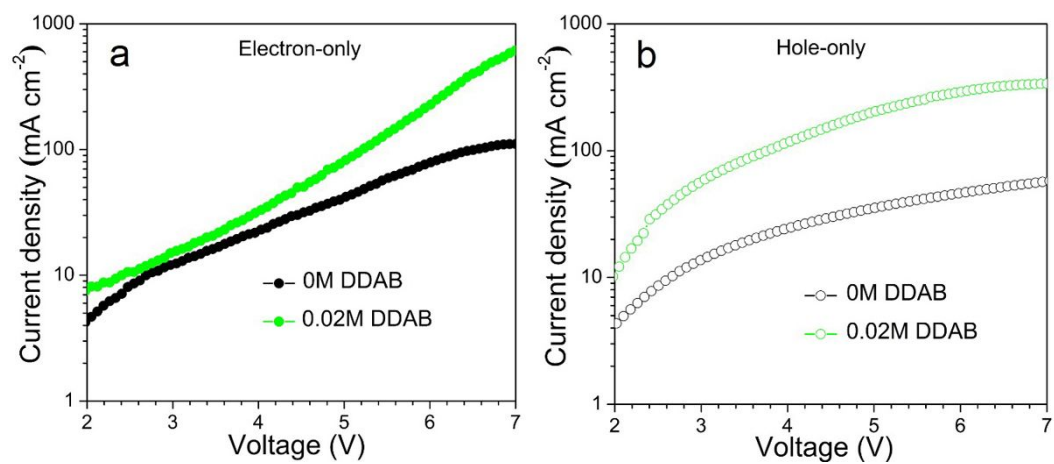


Figure S5 Current density–voltage (J–V) characteristics of a) electron-only and b) hole-only LED devices with 0M DDAB and 0.02M DDAB treated CsPbBr₃ films.

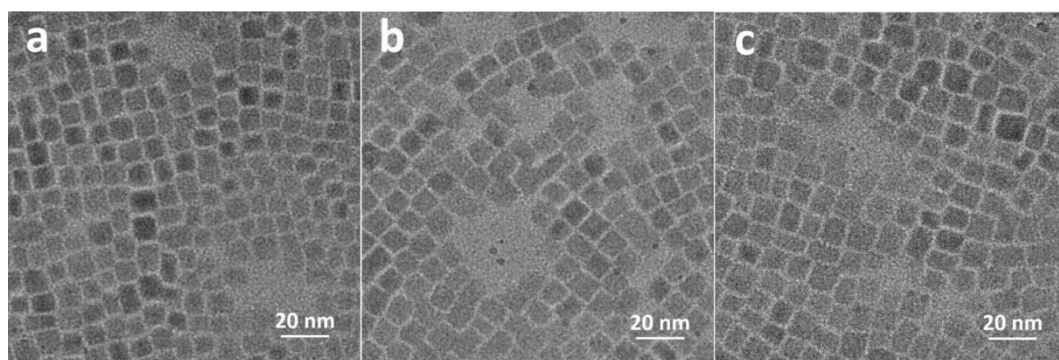


Figure S6 TEM images of CPB-2M NCs purified with different amount of methyl acetate in one cycle, and the volume ratios of methyl acetate to CPB-2M NC solution were a)1:1, b)1.5:1, and c) 2:1, respectively.

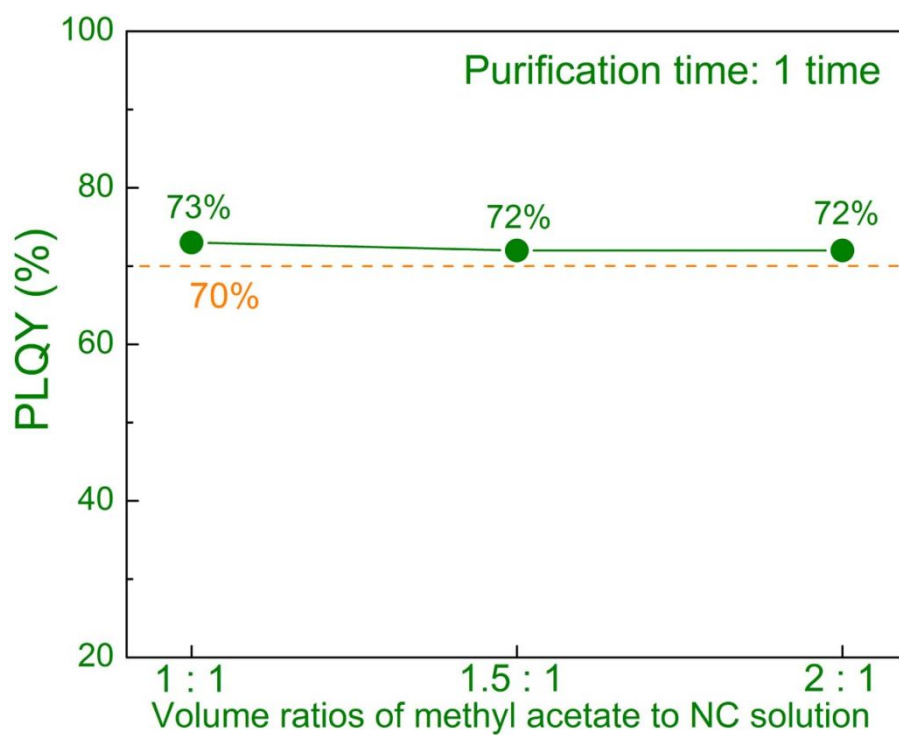


Figure S7 PLQY of CPB-2M NCs with different amount of methyl acetate in one purification cycle.



Figure S8 Photographs of CPB-2M NCs in 1-octane after two purification cycles.

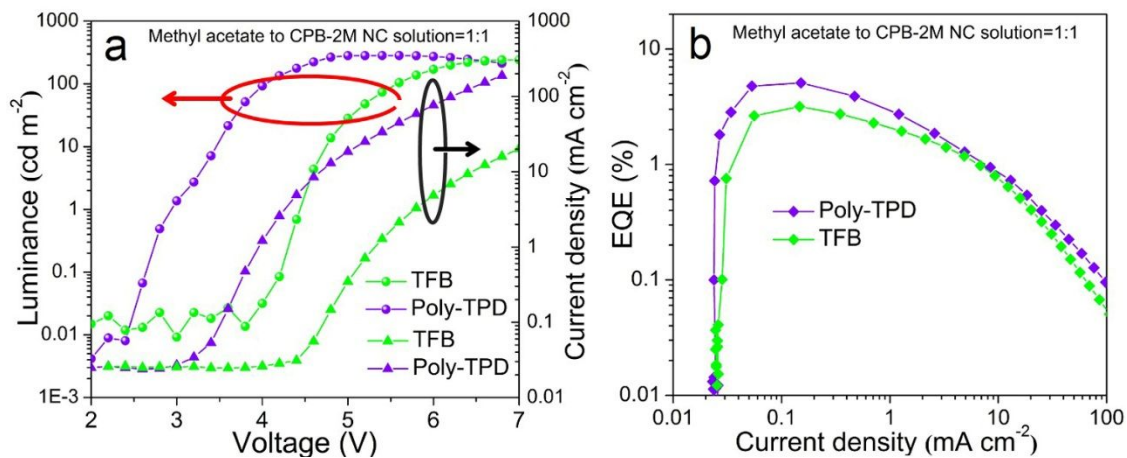


Figure S9 a) Voltage dependent current density and luminance curves of LEDs based on CPB-2M film with 1:1 volume ratios of methyl acetate to CPB-2M NC, b) EQE versus current density characteristics.

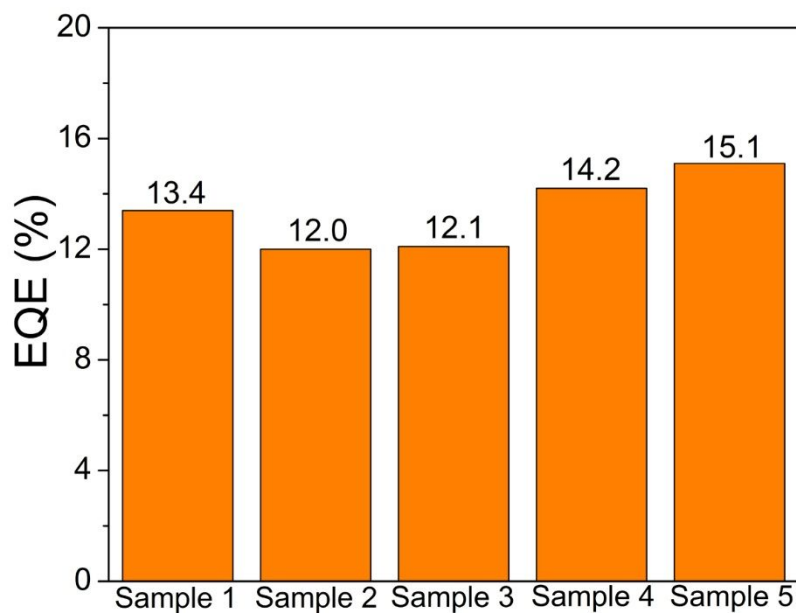


Figure S10 EQE values of LEDs fabricated with different batches of CPB-2M NCs.