Supporting Information

Pure Red $CsPbBr_{0.96}I_{2.04}/SiO_2$ Core/Shell Nanocrystals with Simultaneous Efficient and High Stability for Mini-LEDs

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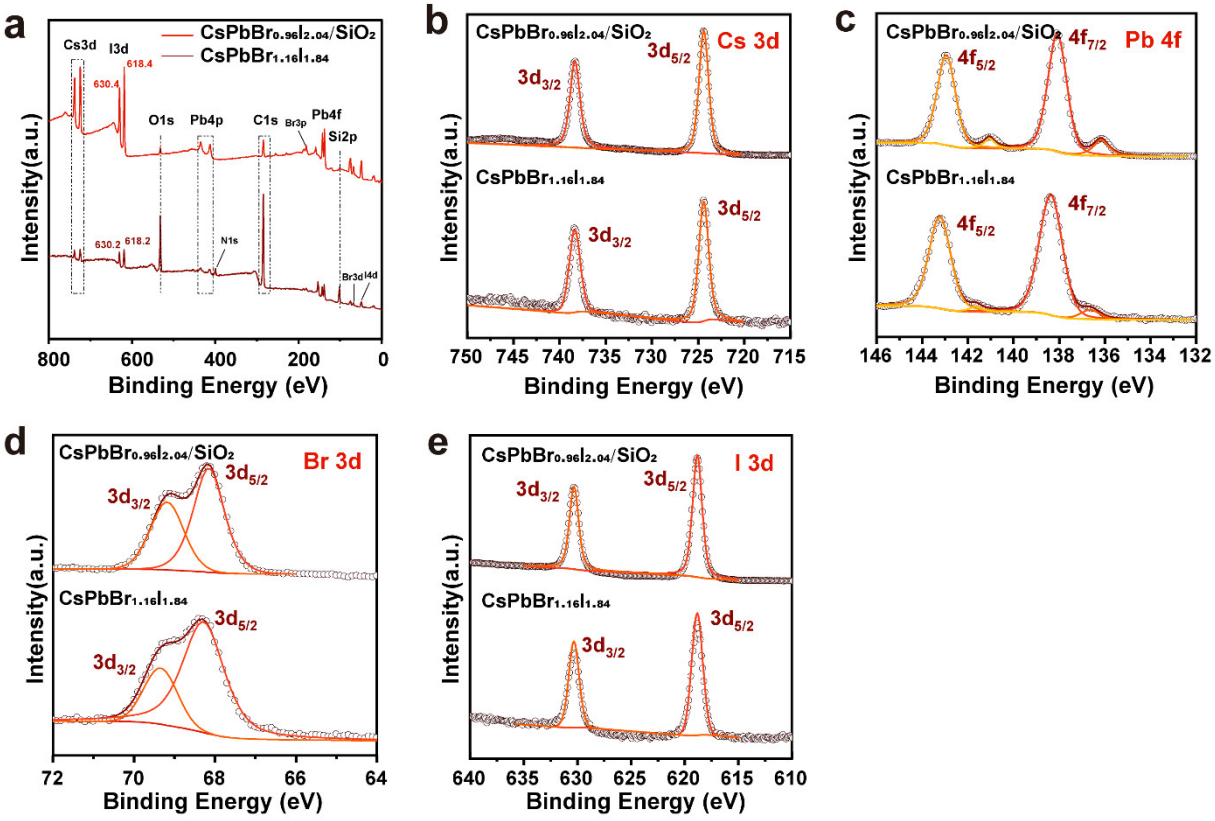

Figure S1. (a) XPS spectra of $CsPbBr_{1.16}I_{1.84}$ NCs and $CsPbBr_{0.96}I_{2.04}/SiO_2$ NCs, (b)-(e) High-resolution XPS spectra of $CsPbBr_{1.16}I_{1.84}$ NCs and $CsPbBr_{0.96}I_{2.04}/SiO_2$ NCs for Cs 3d, Pb 4f, I 3d and Br 3d.

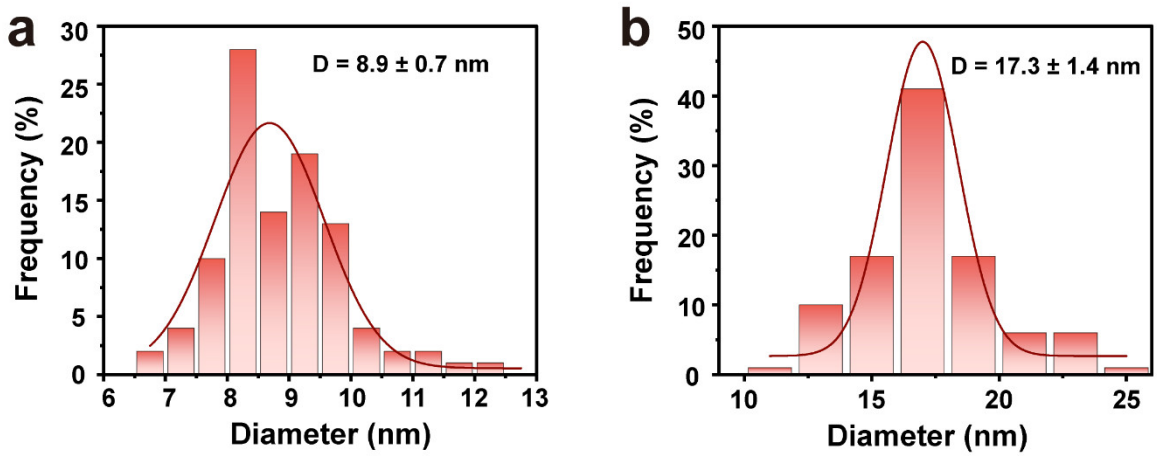

Figure S2. Particle size distribution of (a) $CsPbBr_{1.16}I_{1.84}$ NCs and (b) $CsPbBr_{0.96}I_{2.04}/SiO_2$ NCs.

Table S1. Optical properties of the pure red NCs.

	Emission peak (nm)	FWHM (nm)	A_1	τ_1 (ns)	A_2	τ_2 (ns)	τ_{avg} (ns)
$CsPbBr_{1.16}I_{1.84}$	632	28	0.57	134.98	0.43	375.47	254.6
$CsPbBr_{0.96}I_{2.04}/SiO_2$	631	27	0.37	372.32	0.63	1323.72	1158.9

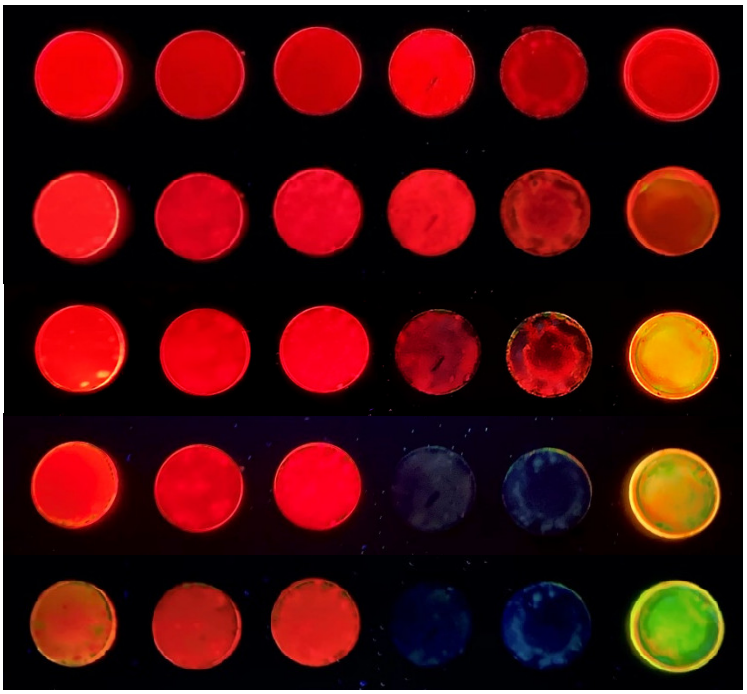

Figure S3. Photograph of NC films synthesized with different contents of APTES after aging under ambient conditions for several days.

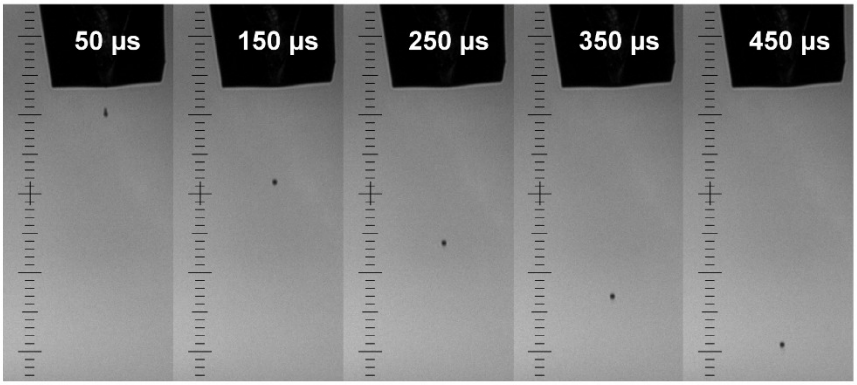

Figure S4. Diagram of the falling state of droplets at different times.

Table S2. Physical properties of the NC inks.

	Solvent	Surface tension (mN m^{-1})	Density (g cm^{-3})	Viscosity (mPa s)	Contact angle (°)	Z value
Ink-0	Dodecane	25.5	0.79	1.68	14.2	14.6
Ink-1	Toluene : Dodecane (V : V = 4:6)	27.1	0.83	1.21	13.2	17
Ink-2	Toluene : Dodecane (V : V = 4:6)	27.2	0.83	1.22	13.1	17

The Z value is an empirical formula used to evaluate the compatibility of ink with nozzle material and size, which can be expressed as the following formula:[1]

$$Z = \frac{1}{Oh} = \frac{\sqrt{\gamma \rho a}}{\eta}$$

where γ is the surface tension (mN/m), ρ is the density (g/cm^3), η is the viscosity (mPa·s), a is the nozzle diameter (μm), and Oh is the Ohnesorge number.

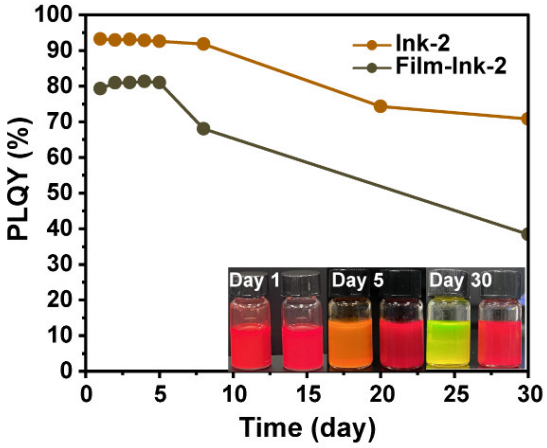

Figure S5. PL QY curves of Ink-1 and Ink-2 as a function of time under ambient conditions (25°C, 70-90% RH), and the inset shows photographs of these two inks.

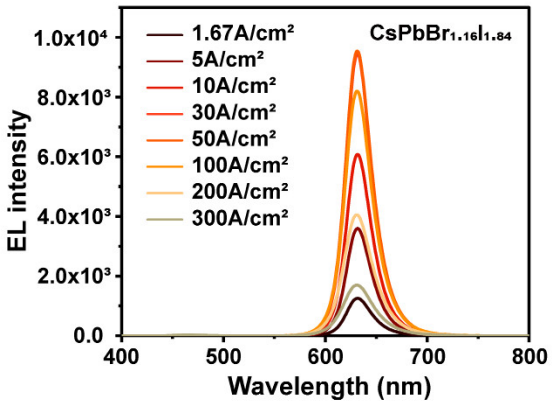

Figure S6. EL spectra of the red-emitting Mini-LED prepared by using $CsPbBr_{1.16}I_{1.84}$ NCs at different current densities from 1.67 A/cm^2 to 300 A/cm^2.

Table S3. Summary of optical properties and stability of red $CsPb(Br/I)_3$ NCs

Perovskite	Method	PL Peak (nm)	FWHM (nm)	PLQY (%)	Stability	Ref.
$CsPbI_{1.5}Br_{1.5}$ film	Hot Injection, Thermal Pressed	618	N.A.	N.A.	12 months in glovebox with Ar	2
CPBI-DMAPbX$_3$-OcAm NCs	Hot Injection, Post Treatment	640	N.A.	92	UV irradiation (20 μw/cm^2) for 48 hours, maintain the initial intensity of 90%, with a blueshift of 10 nm	3
KBr passivated $CsPb(I_xBr_{1-x})_3$ NCs	Hot Injection, Post Treatment	N.A	N.A	95	a colloidal stability of 1 year in ambient conditions (25 °C and 40% humidity)	4
Silica-coated CPBI-Zn-K NCs	High-temperature Solid-state Reaction	631	N.A	64.5	maintain the initial intensity of 41% when heated from 303 K to 373 K	5
GAI passivated $FA_xCs_{1-x}Pb\ (I_yBr_{1-y})_3$ film	In Situ	692	32	N.A	The half-lifetime of the GAI-modified PeLED was 563 min at an initial luminance of 1000 cd m^{-2}	6
Ni^{2+} doping $CsPbBrI_2$	Hot Injection	N.A	N.A	81.05	No phase separation occurred during 4 months of storage	7
KBr passivated $CsPbI_{3-x}Br_x$ NCs	Hot Injection	641	N.A	> 90	UV irradiation (100 mw/cm^2) for 480 s, show a blueshift of 3 nm	8
This work	Hot Injection	630	27	~100	The half-lifetime of the $CsPbBr_{0.96}I_{2.04}/SiO_2$ NC films under UV irradiation (150 mw/cm^2) was 445 min, the PLQY of which still maintained 89% of initial value after storage in air for 100 days	-

Reference

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