Supporting Information

Boosting the Performance of $CsPbBr_3$-Based Perovskite Light-Emitting Diodes via Constructing Nanocomposite Emissive Layers

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Table S1. The average crystal sizes of $CsPbBr_3$ determined from the XRD results.

CsBr:PbBr$_2$	**2θ (degree)**	**FWHM (degree)**	**Average crystal sizes (nm)**
1:1	30.51	0.42	19.4
1.6:1	30.51	0.63	12.9

Table S2. The detailed fitting parameters of the TRPL decay curves.

CsBr:PbBr$_2$	**A_1**	**τ_1 [ns]**	**A_2**	**τ_2 [ns]**	**A_3**	**τ_3 [ns]**	**τ_{avg} [ns]**
1:1	0.42	7.9	0.40	66.4	0.18	346.2	92.2
1.6:1	0.14	10.4	0.46	102.7	0.40	561.9	273.4

Table S3. The performance parameters obtained from the EL characteristics as shown in Figure 6 and S7.

CsBr:PbBr$_2$	**V_{on} [V]**	**L_{max} [cd/m^2]**	**CE_{max} [cd/A]**	**EQE_{max} [%]**	**λ_{max} [nm]**
1:1	4.0	8421	6.55	1.94	517
1.3:1	3.4	10675	35.04	10.51	517
1.6:1	3.4	12605	41.22	11.84	518
1.9:1	3.4	10905	34.02	10.33	517
2.2:1	3.6	10380	28.29	8.53	517

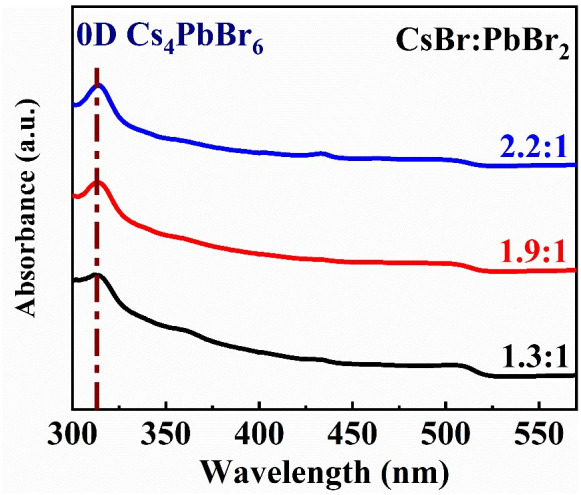

Fig. S1 Absorption spectra of the perovskite films with the $CsBr:PbBr_2$ of 1.3:1, 1.9:1 and 2.2:1.

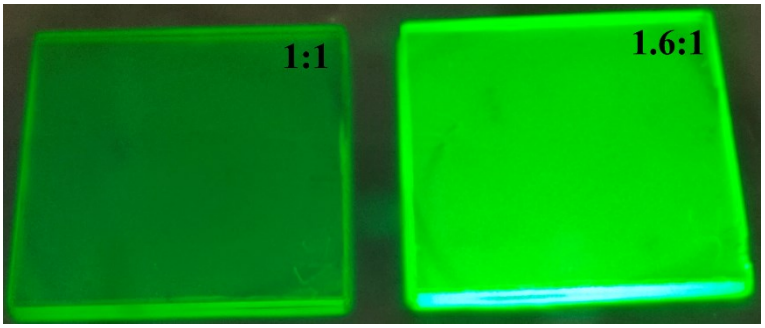

Fig. S2 Photoluminescence image of the (1:1) and (1.6:1) perovskite films under 365 nm ultraviolet lamp excitation.

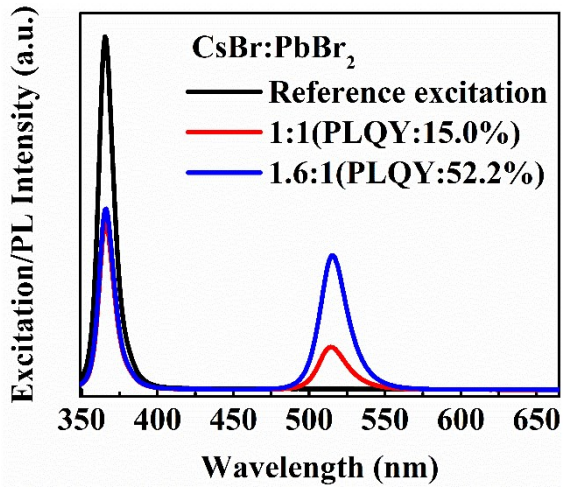

Fig. S3 Photoluminescence quantum yield (PLQY) of the (1:1) and (1.6:1) perovskite films.

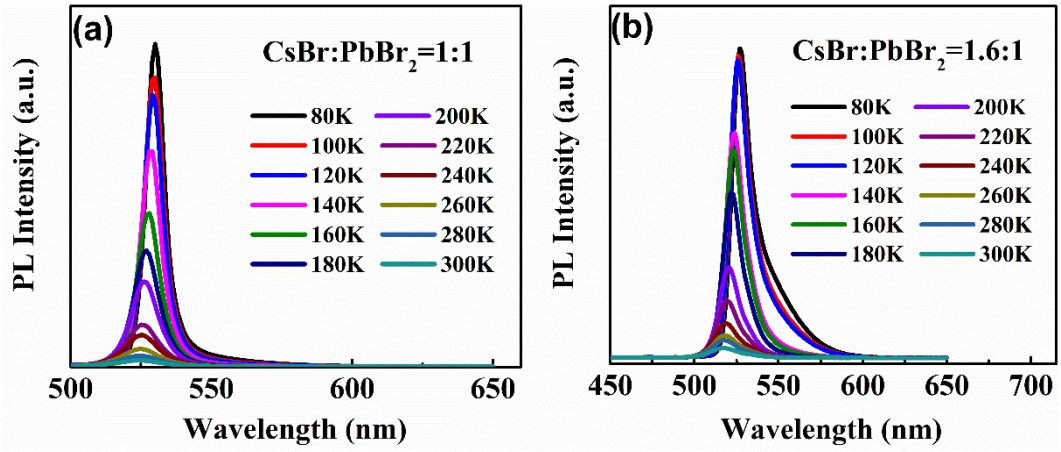

Fig. S4 Temperature-dependent PL spectra of the perovskite films with different CsBr: $PbBr_2$ ratios of 1:1 (a) and 1.6:1 (b).

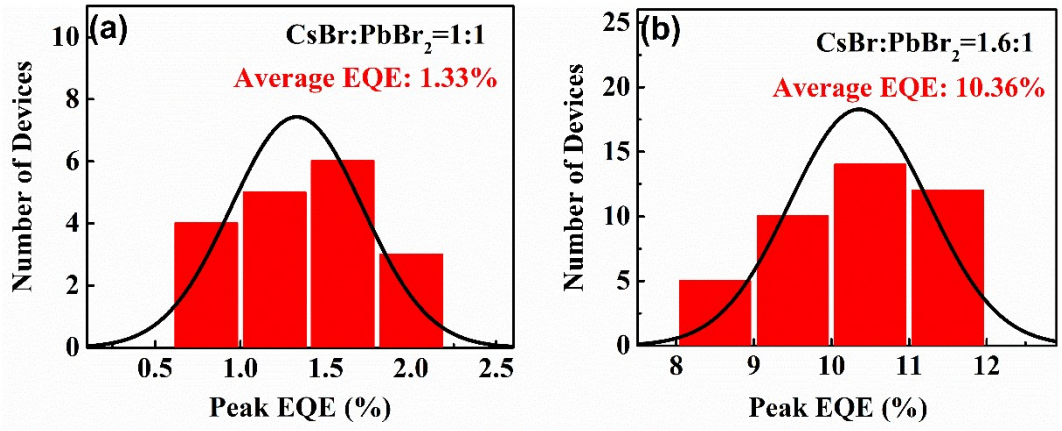

Fig. S5 Histogram of peak EQEs of the PeLEDs using the (1:1) and (1.6:1) perovskite films as the EMLs.

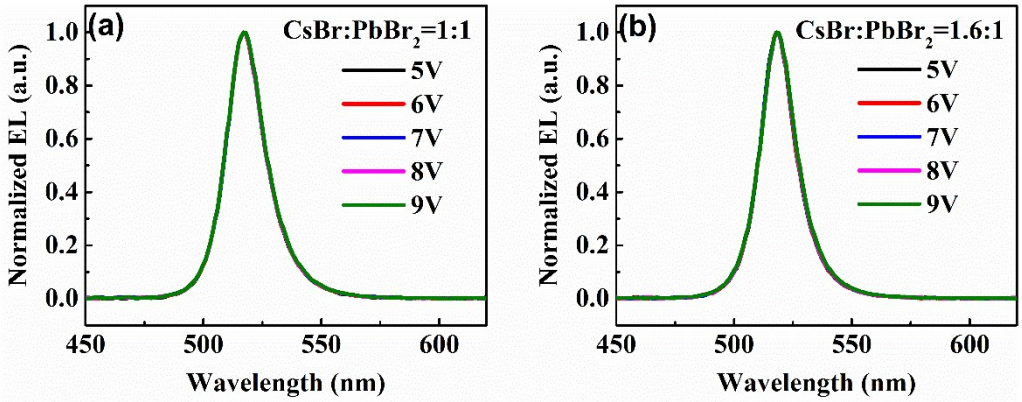

Fig. S6 EL spectra of the PeLEDs at the driven voltages ranging from 5 to 9V.

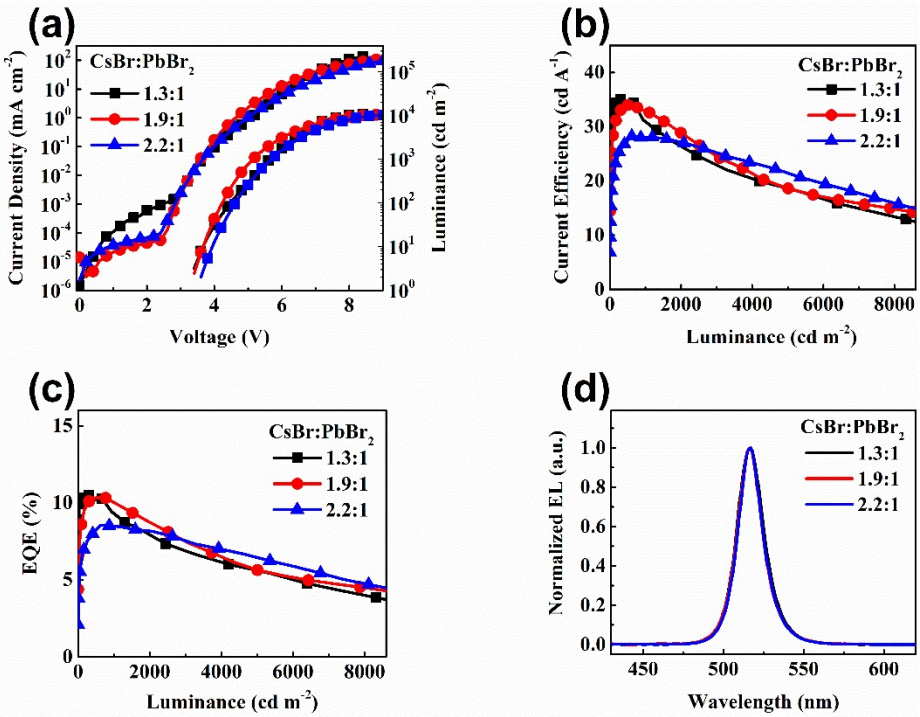

Fig. S7 (a) current density-voltage-luminance (J-V-L), (b) current efficiency-luminance (CE-L), and (c) external quantum efficiency-luminance (EQE-L) characteristics of the PeLEDs base on the CsBr:$PbBr_2$ ratios of 1.3:1, 1.9:1 and 2.2:1. (e) EL spectra of the devices.

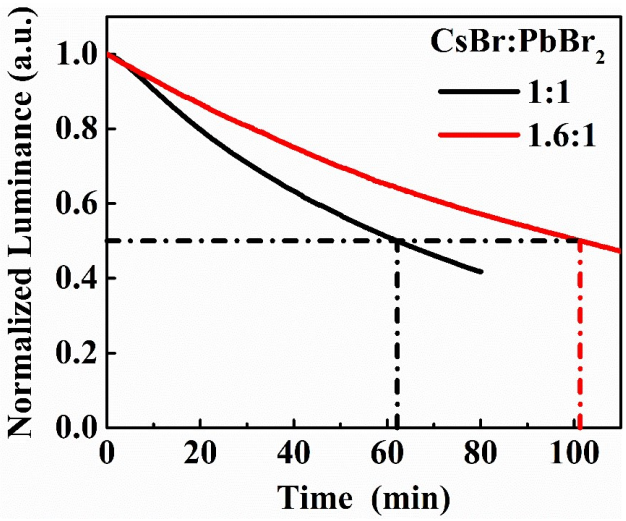

Fig. S8 Operational lifetimes of the PeLEDs with the (1:1) and (1.6:1) perovskite films as the EMLs. The initial luminance is 100 cd m^{-2}.