

Supporting Information for

# Efficient All-Inorganic Perovskite Light Emitting Diodes with Improved Operation Stability

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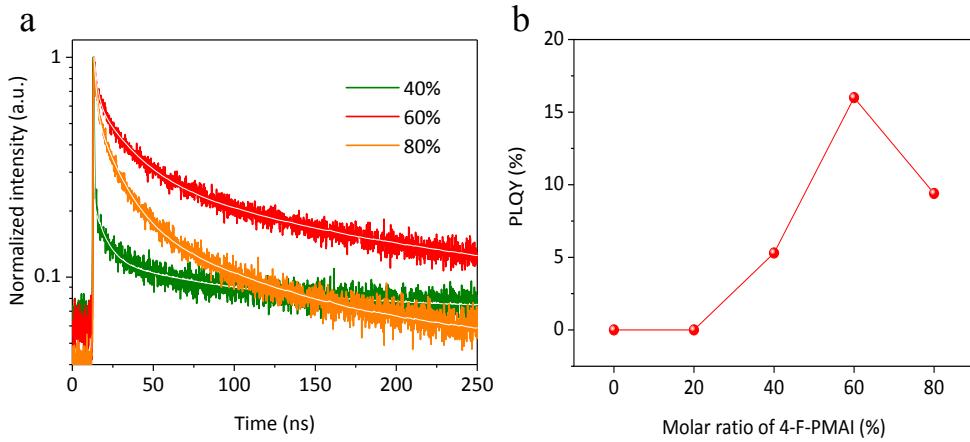
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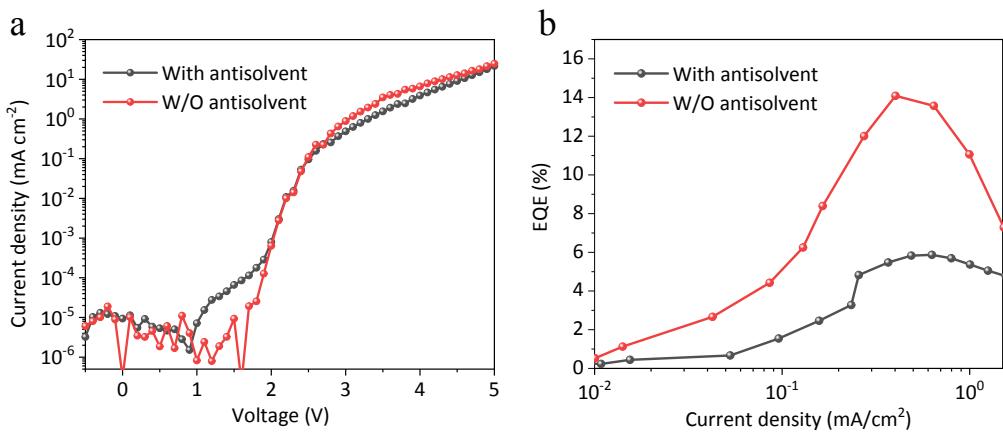
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## Supplementary Figures

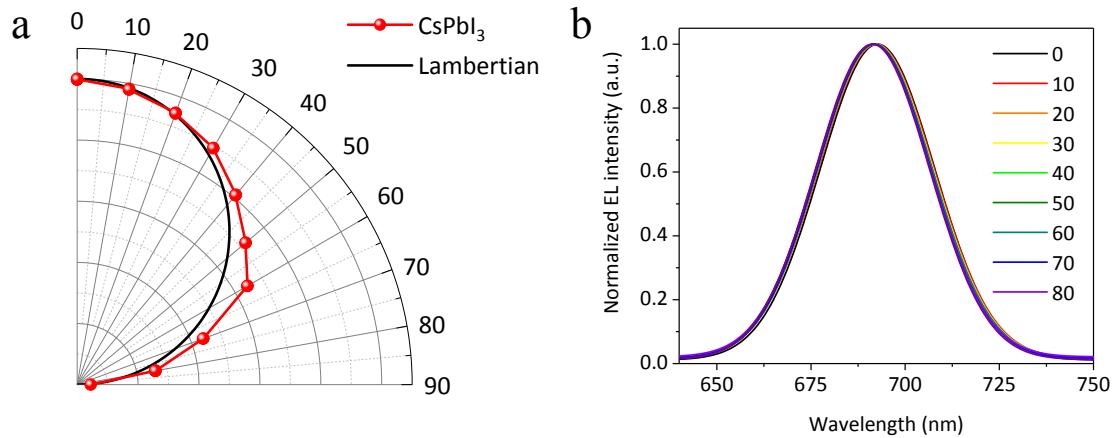


**Figure S1.** (a) TRPL spectra and (b) PLQY of  $\text{CsPbI}_3$  perovskite films with different molar ratios of 4-F-PMAI. The excitation intensity and wavelength for TRPL (PLQY) measurement is  $0.6 \text{ mW/cm}^2$  ( $0.7 \text{ mW/cm}^2$ ) and a wavelength of  $369 \text{ nm}$  ( $400 \text{ nm}$ ), respectively.

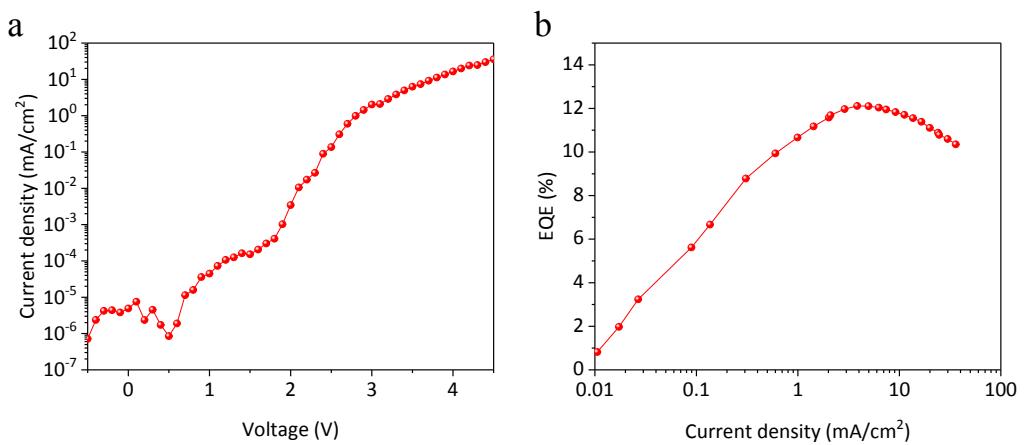


**Figure S2.** (a)  $J$ - $V$  and (b) EQE curves of  $\text{CsPbI}_3$  PeLEDs with 60% 4-F-PMAI

fabricated with/without anti-solvent.



**Figure S3.** (a) Angular intensity profile and (b) angular spectra of  $\text{CsPbI}_3$  PeLEDs with 60% molar ratio of 4-F-PMAI.



**Figure S4.** (a)  $J$ - $V$  and (b) EQE curves of  $\text{MAPbI}_3$  PeLEDs with 30% molar ratio of 4-F-PMAI.

**Table S1.** TRPL decay profiles of  $\text{CsPbI}_3$  films with different molar ratios of 4-F-PMAI.

Molar ratio [%]	$\tau_1$ [ns]	$\tau_2$ [ns]	$\tau_3$ [ns]	B <sub>1</sub> [%]	B <sub>2</sub> [%]	B <sub>3</sub> [%]	$\tau_{\text{average}}$ [ns]
40	0.18	7.38	90.52	14.52	11.97	73.52	89.39
60	2.01	21.43	157.28	2.31	17.91	79.78	153.19
80	1.48	14.58	90.57	4.89	28.43	66.68	85.59

**Table S2.** Transient and steady-state optical properties of CsPbI<sub>3</sub> with different molar ratios of 4-F-PMAI.

Molar ratio [%]	$T_{average}$ [ns]	Quantum yield [%]	$k_{rad}$ [s <sup>-1</sup> ]	$k_{nonrad}$ [s <sup>-1</sup> ]
40	89.39	5.3	$0.59 \times 10^6$	$10.59 \times 10^6$
60	153.19	16.0	$1.04 \times 10^6$	$5.49 \times 10^6$
80	85.59	9.4	$1.10 \times 10^6$	$10.58 \times 10^6$