Electronic Supplementary Material (ESI) for Nanoscale.

Supporting Information

Bifacial Passivation towards Efficient $FAPbBr_3$-based Inverted Perovskite Light-emitting Diodes

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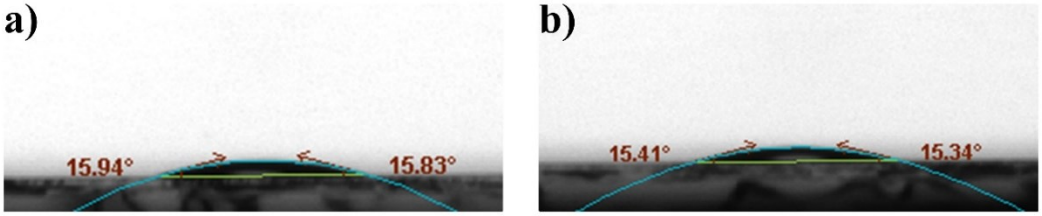

Figure S1. Contact angles of a) ZnO film and b) ZPM film.

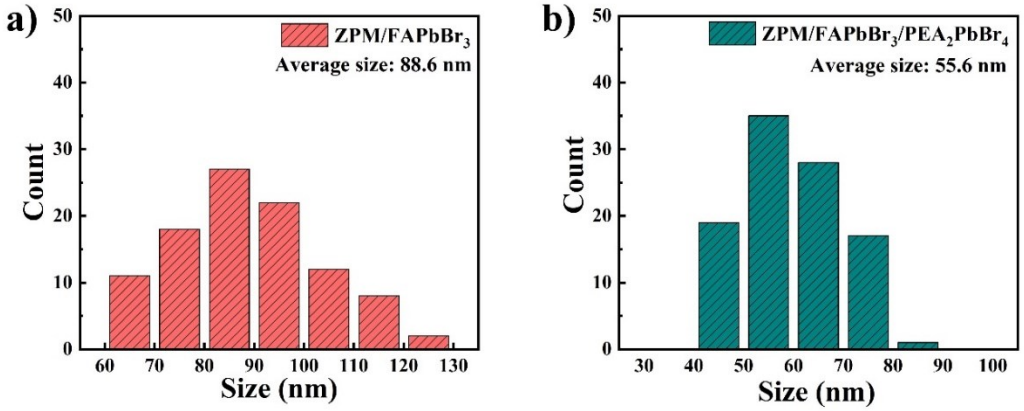

Figure S2. Grain size distribution of $FAPbBr_3$ films deposited on a) ZPM, and b) PEABr-modified $FAPbBr_3$ film on ZPM.

Table S1. Tri-exponential fitting parameters of the photoluminescence decay profiles shown in Figure 5c.

Device	A_1 (%)	τ_1 (ns)	A_2 (%)	τ_2 (ns)	A_3 (%)	τ_3 (ns)	τ_{avg} (ns)
ZnO/$FAPbBr_3$	15	3.13	49	15.58	36	53.92	27.51
ZPM/$FAPbBr_3$	10	5.12	48	23.89	42	80.91	45.87
ZPM/$FAPbBr_3$/PEA_2PbBr	7	6.30	40	39.55	53	135.4	88.08

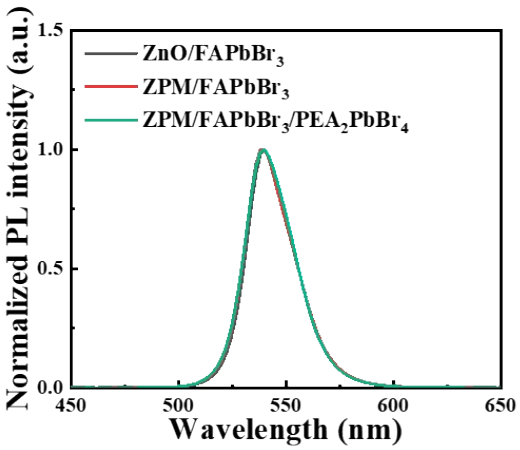

Figure S3. Normalized PL intensity different kinds of perovskite films.

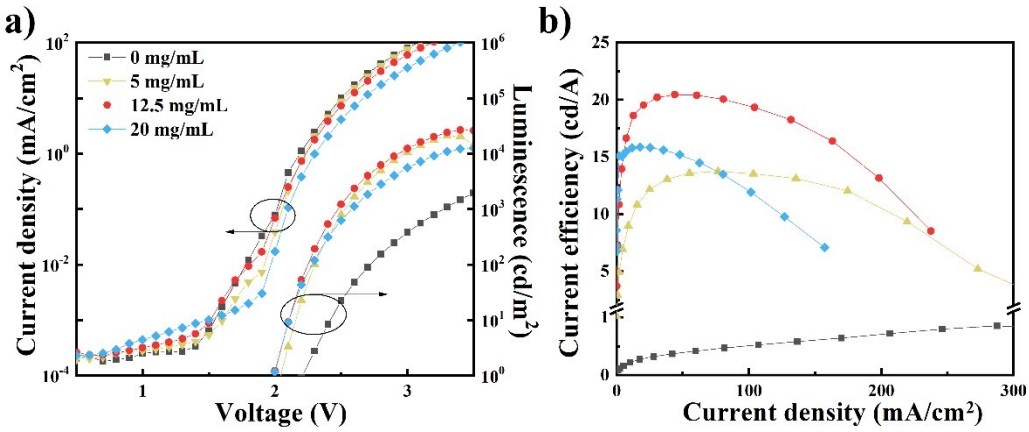

Figure S4. Device performance of ZPM/$FAPbBr_3$ devices with different concentrations of PVP in the PVP solution. a) *J-V-L* characteristics, b) CE–*J* characteristics.

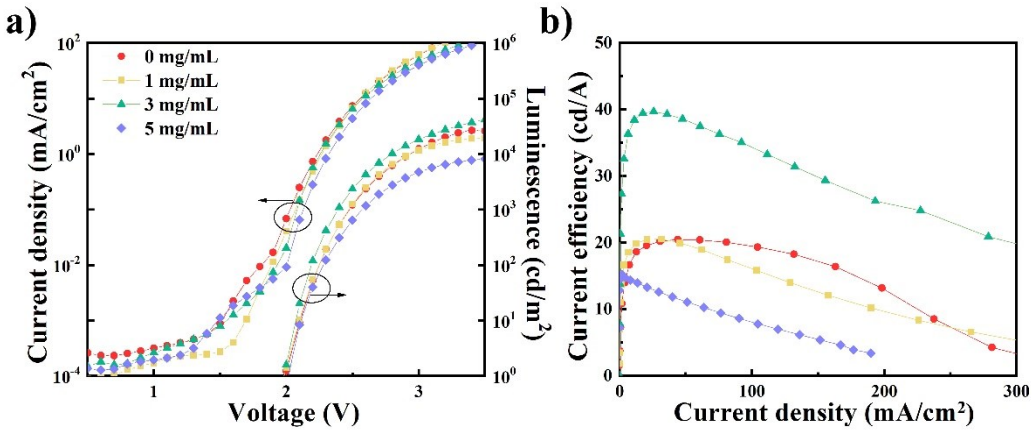

Figure S5. Device performance of ZPM/$FAPbBr_3$/PEA_2PbBr_4 devices with different concentrations of PEABr in the PEABr solution (the PVP concentration in the PVP solution is fixed at 12.5 mg/mL). a) *J*-*V*-*L* characteristics, b) CE–*J* characteristics.

Table S2. Device performance of the inverted green PeLEDs.

Device Structure	V_{on} [V]	L_{max} [cd/m^2]	EQE_{max} [%]	PE_{max} [lm/W]	Ref.
ITO/AZO:Cs/$Cs_{10}(MA_{0.17}FA_{0.83})PbBr_{2.97}I_{0.003}$ /CuSGaSnO/ WO_3/Au	2.5	553370	12.98	89.7	1
ITO/ZnO/PVP/$Cs_{0.87}MA_{0.13}PbBr_3$ /CBP/ MoO_x/Al	2.9	91000	10.4	/	2
ITO/LZO/MIZO/$CsPbBr_3$ QDs/TCTA/NPD/HAT-CN/Al	2.7	22825	5.7	9.7	3
ITO/a-ZSO/$CsPbBr_3$/NPD/MoO_x/Al	/	496320	9.3	33.0	4
ITO/ZnO/PEI/$MAPbBr_3$/TFB/MoO_x/Al	2.2	20000	0.8	4	5
ITO/ZnO/PMMA/$MAPbBr_3$/PVK/NPD/Al	5.0	3450	2.8	4.4	6
ITO/ZnO/$FAPbBr_3$/Poly-TPD/MoO_x/Al	1.9	13062	1.2	3.1	7
ITO/ZnO/PEIE/$FAPbBr_3$/TFB/MoO_x/Al	2.0	7348	3.5	19.1	8
ITO/ZnO/$FAPbBr_3$ QDs/PVK/Poly-TPD/Pt	4.1	12998	6.0	/	9
ITO/ZPM/$FAPbBr_3$/PEA_2PbBr_4/PVK/MoO_x /Al	**2.0**	**60290**	**9.0**	**46.4**	**This work**

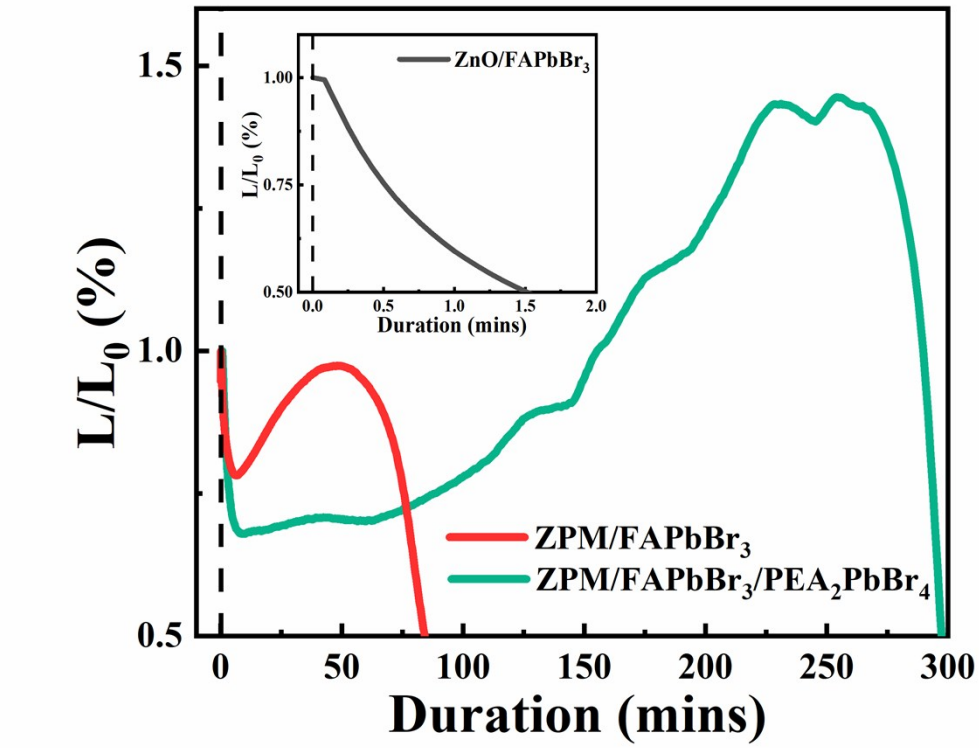

Figure S6. The operational lifetime at initial brightness of ~100 cd/m^2.

Supplementary References

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