Supporting information

Mesoscopic fully printable perovskite Light Emitting Diodes in the Near Infra-Red

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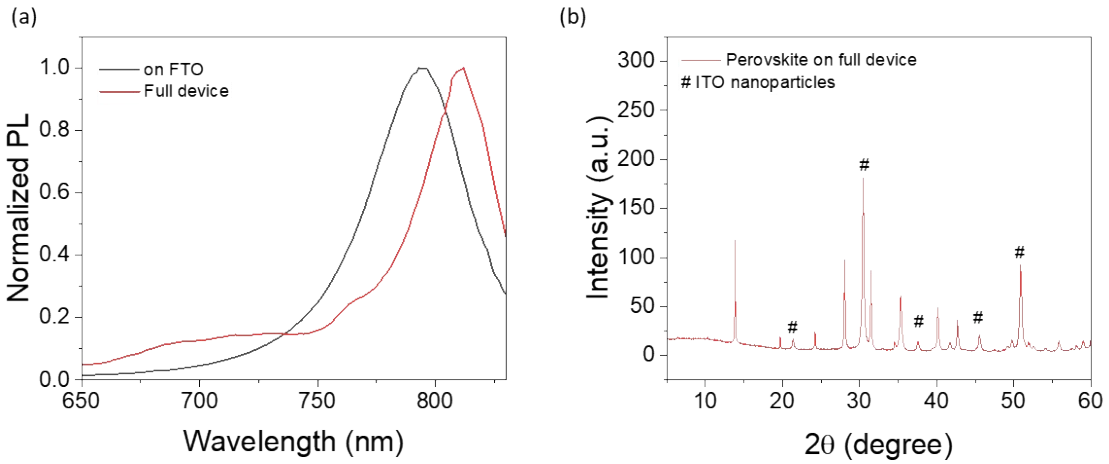

Figure S1. PL measurements of $FA_{0.85}MA_{0.15}Pb(I_{0.85}Br_{0.15})_3$ deposited via two-step deposition method, on top of an FTO-coated glass and into a full ITO-PeLED. (b) XRD results of the perovskite deposited into a full device.

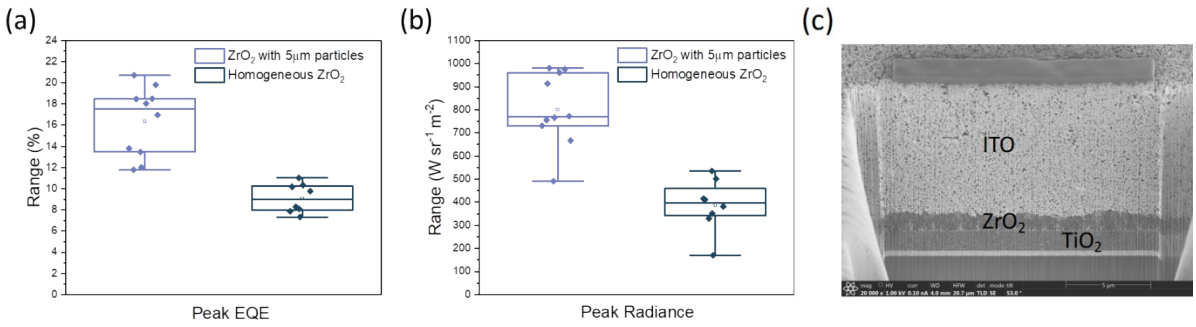

Figure S2. The statistical distribution of the ITO-PeLEDs. (a) Peak EQE. (b) Peak radiance. (c) A cross-sectional image of the ITO-PeLED with homogenous ZrO_2.

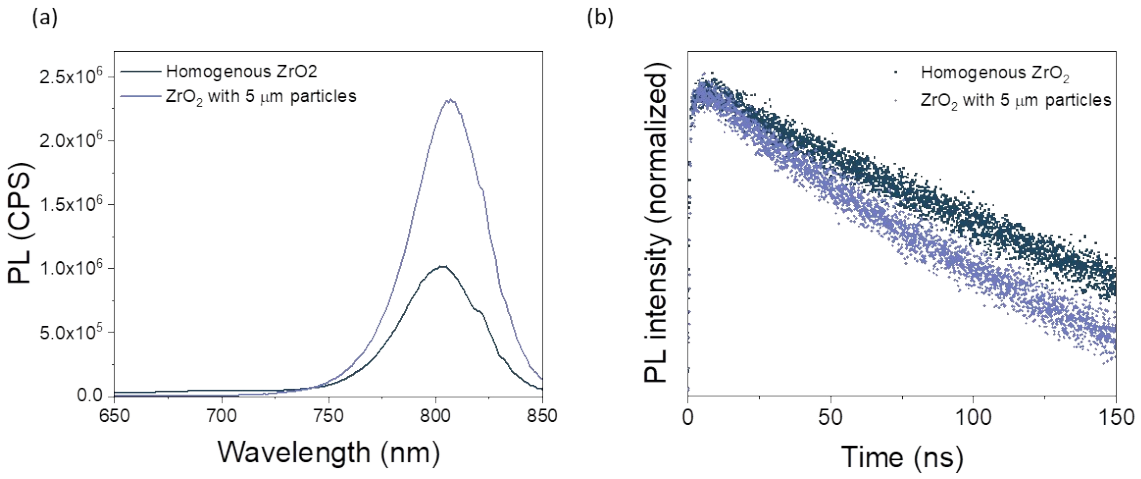

Figure S3. PL (a) and PL lifetime (b) of perovskite deposited on homogenous ZrO_2 and ZrO_2 with the large particles.

Table S1. Time constants and parameters calculated by two-exponential fitting ($y=A_1\exp(-x/\tau_1)+A_2\exp(-x/\tau_2)$) to PL lifetime measurements.

	$\frac{A_1}{A_1+A_2}$	$\tau_1\ (ns)$	$\frac{A_1}{A_1+A_2}$	$\tau_2\ (ns)$	$\tau_{ave}\ (ns)$
Homogenous ZrO_2	0.07	20.0	0.93	148.5	147.2
ZrO_2 with 5 μm particles	0.15	21.9	0.85	111.8	108.8

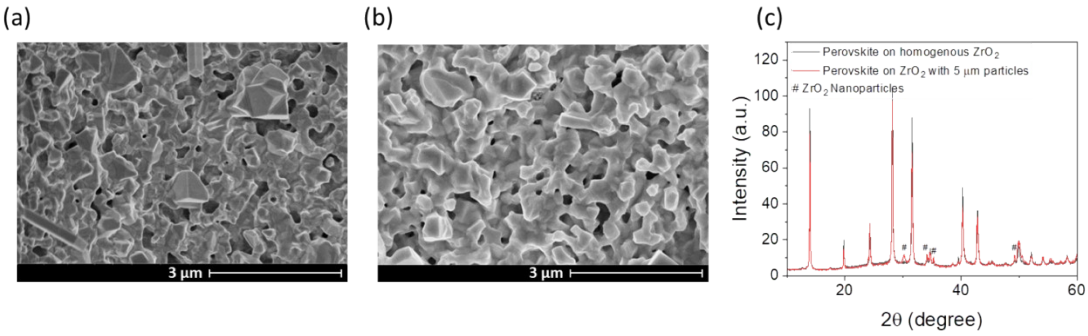

Figure S4. SEM images of perovskite deposited on (a) homogenous ZrO_2 (b) inhomogenous ZrO_2. (c) XRD measurements of perovskite deposited on the homogenous ZrO_2 and the ZrO_2 with bigger particles.

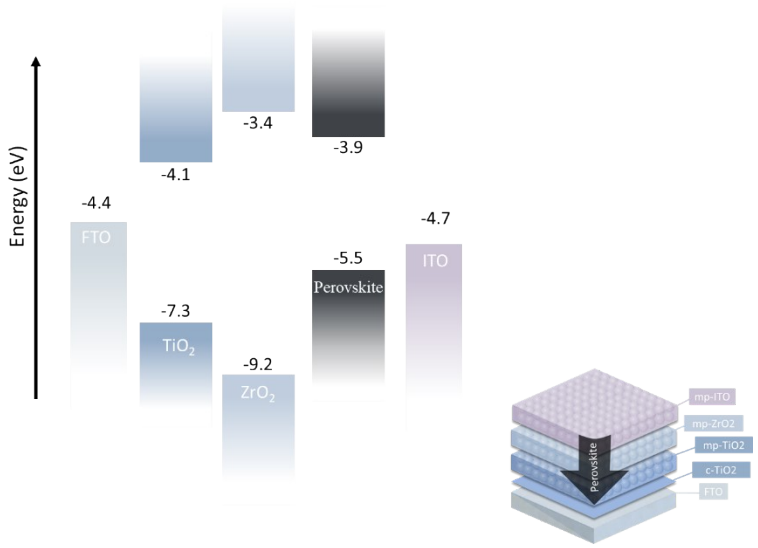

Figure S5. Energy level diagram of ITO-PeLED structure. The energy level values were taken from reference 1.

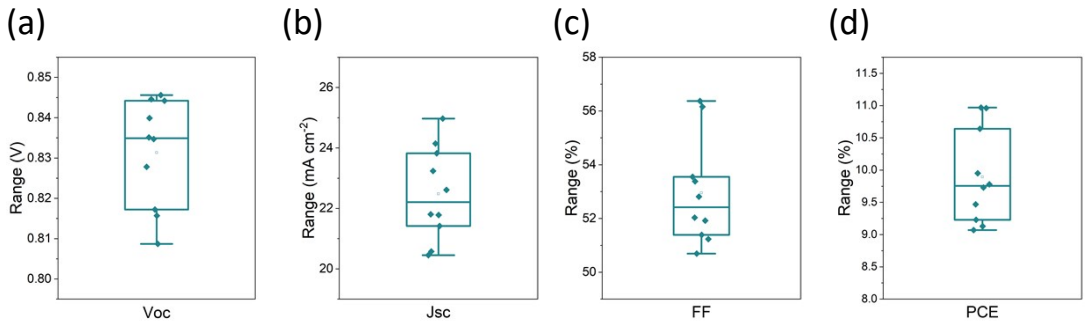

Figure S6. The statistical distribution of the PV parameters of the ITO-PeLEDs function as solar cells. (a) Voc. (b) Jsc. (c) Fill factor. (d) PCE.

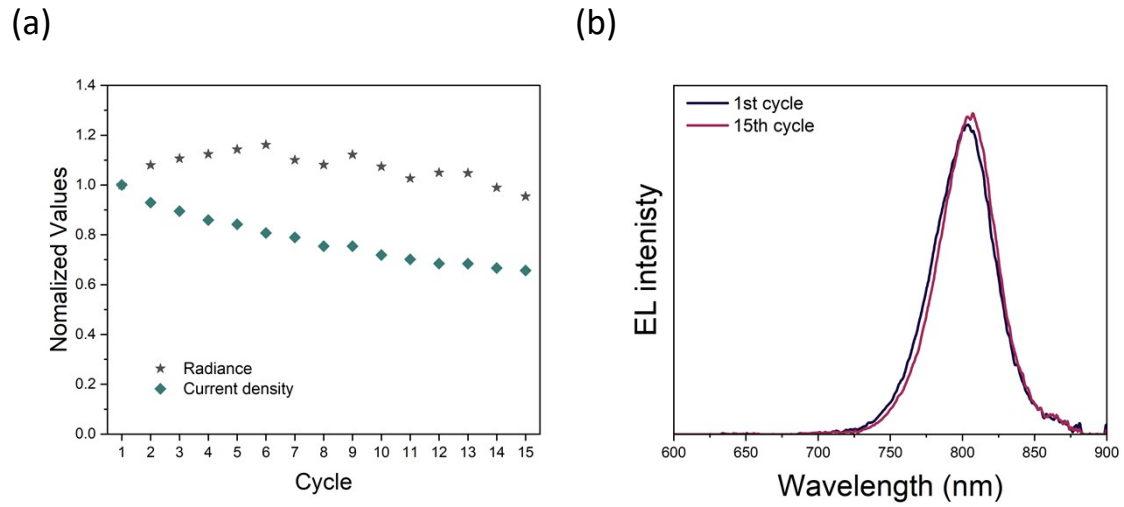

Figure S7. (a) Normalized radiance and Current density of ITO-PeLED through 15 sequential measurements. (b) EL peaks in the first and 15th cycles of use.

References

(1) Schneider, A.; Efrati, A.; Alon, S.; Sohmer, M.; Etgar, L. Green Energy by Recoverable Triple-Oxide Mesostructured Perovskite Photovoltaics. https://doi.org/10.1073/pnas.2013242117/-/DCSupplemental.