Supporting Information

Recombination Resistance Identification through Current-Voltage Curve Reconstruction in Perovskite Solar Cells

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Table S1. Parameters used for the *j-V* curve reconstruction under different light intensities. β parameter was calculated either the slope of R_{rec+tr} vs V_{app} (Figure S4a) or from the correlation between j_{sc} with R_{rec} at open circuit conditions (equation 2 main manuscript).

Device	Ligth intensity ($mWcm^{-2}$)	β from R_{rec}	β from Eq2	*m* from R_{rec}	*m* from Eq2
PEDOT:PSS/C_{60}	10	0.86	0.96	2.08	2.43
PEDOT:PSS/C_{60}	50	0.81	0.81	2.70	2.5
PEDOT:PSS/C_{60}	100	0.71	0.79	3.12	3.12
MeO-2PACz/C_{60}	10	0.48	0.41	1.16	1.04
MeO-2PACz/C_{60}	50	0.37	0.40	1.23	1.23
MeO-2PACz/C_{60}	100	0.32	0.32	1.41	1.26

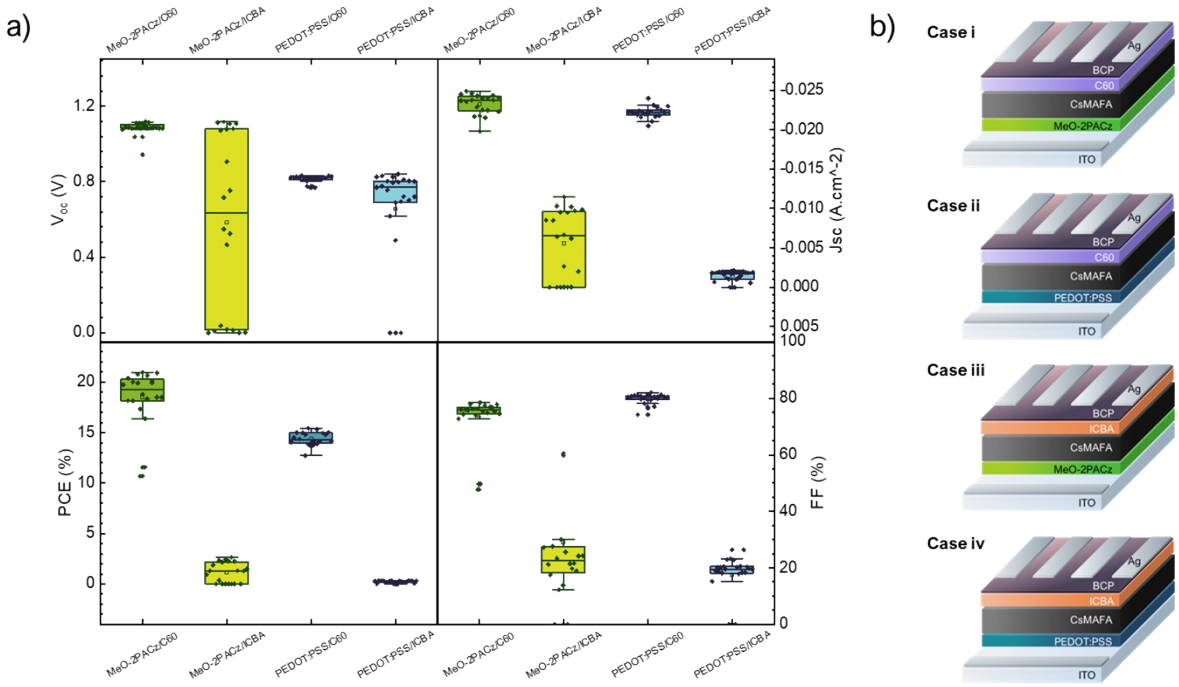

Figure S1. a) Statistics of the devices under study with different selective contacts (HTM/ETM) at 1 sun illumination. b) Schematic of the devices.

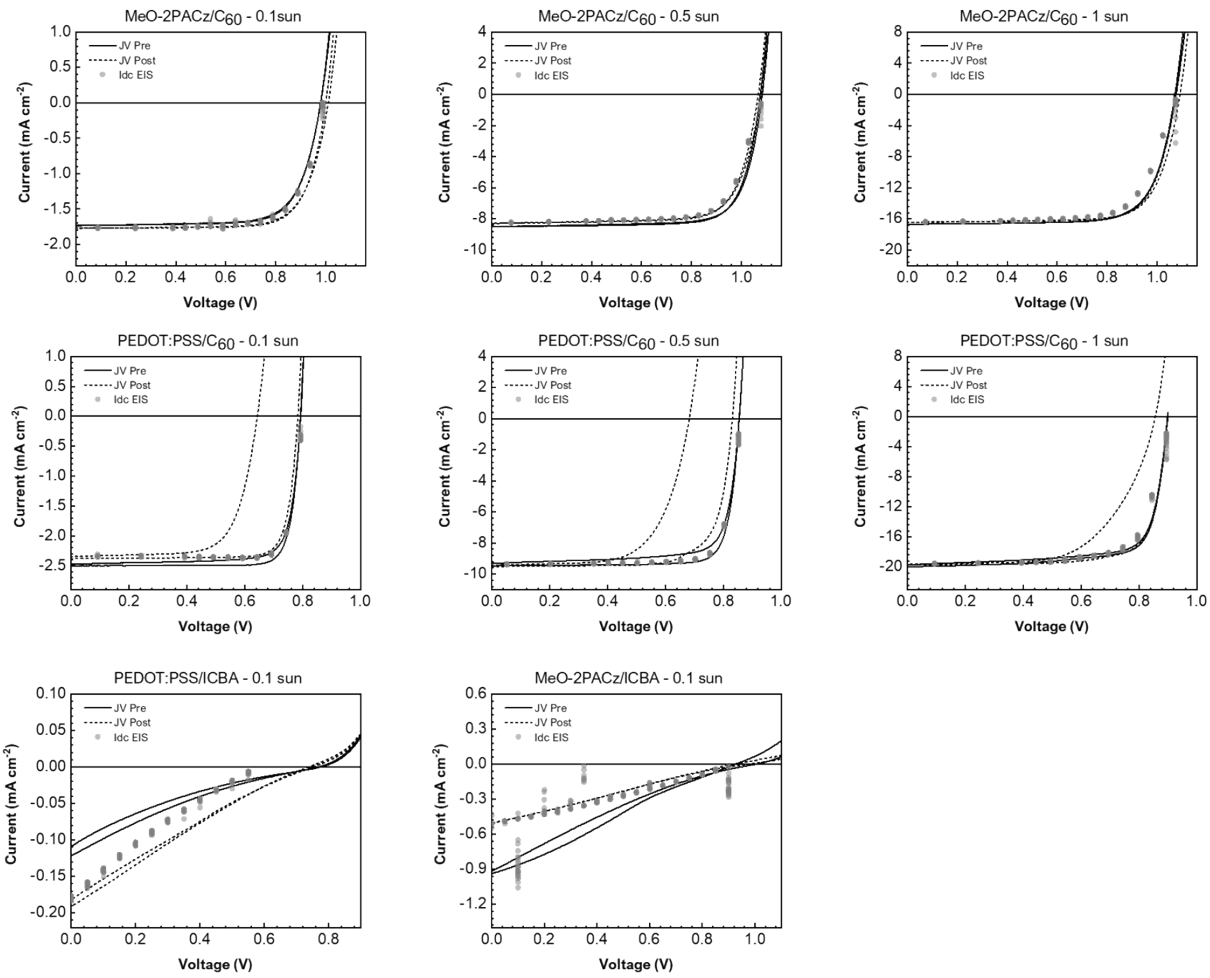

Figure S2. Device stability during IS measurements. Solid line represents *J-V* pre-IS, segmented line *J-V* pos-IS, and dots the DC current values measured during the IS at each specific voltage bias.

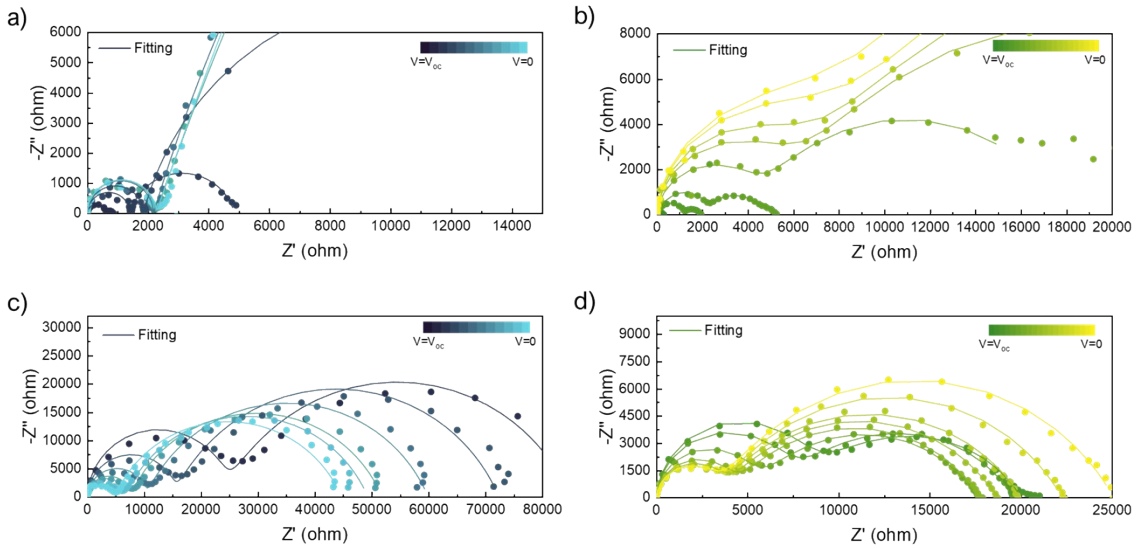

Figure S3. Nyquist plots of the devices with different selective contacts: PEDOT:PSS (a, c) and MeO-2PACz (b, d) were used as HTMs, and C_{60} (a, b) and ICBA (c, d) were used as ETMs. The measurements were performed at different bias from $V_{app}=V_{oc}$ to $V_{app}=0$ V.

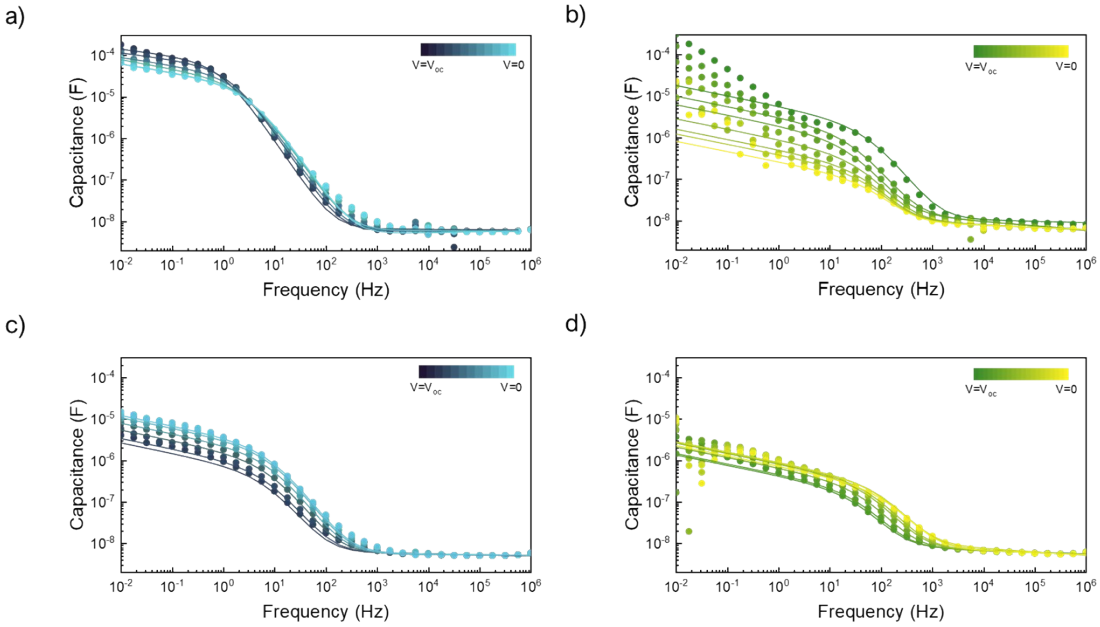

Figure S43. Bode plots of the devices with different selective contacts: PEDOT:PSS (a, c) and MeO-2PACz (b, d) were used as HTMs, and C_{60} (a, b) and ICBA (c, d) were used as ETMs. The measurements were performed at different bias from $V_{app}=V_{oc}$ to $V_{app}=0$ V.

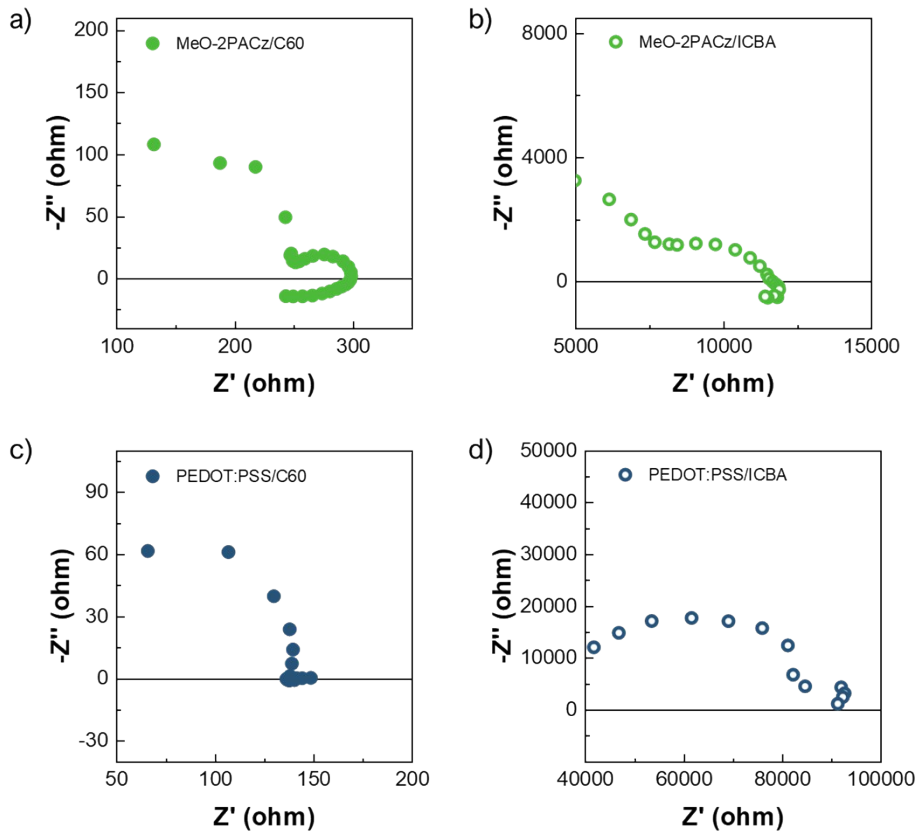

Figure S5. Nyquist plots at low frequency regime for the devices under open-circuit conditions.

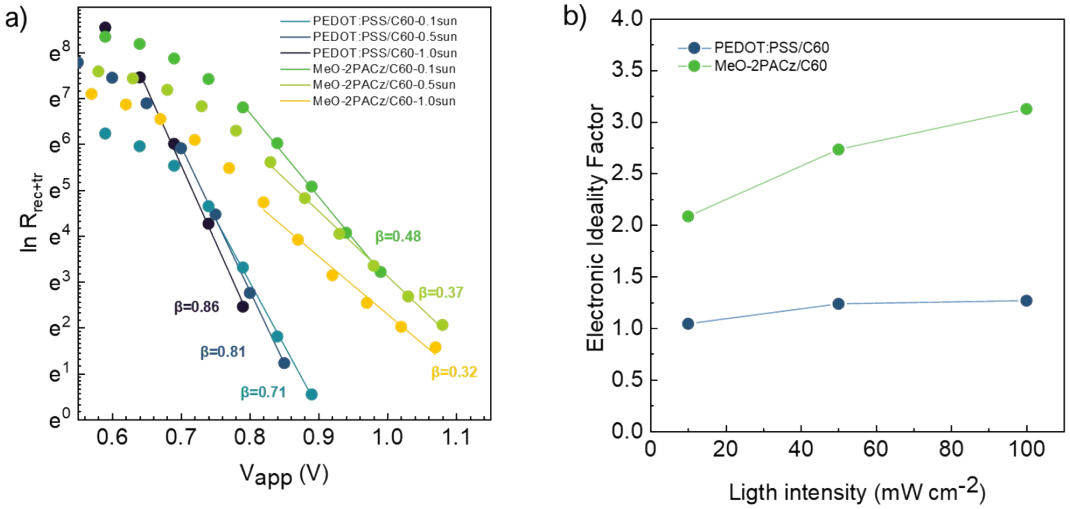

Figure S6. (a) β parameter calculated from the slope of R_{rec+tr} vs V_{app} for devices with C_{60} as ETM under different illumination intensities. (b) Light intensity dependence of the electronic ideality factor (m=1/β).

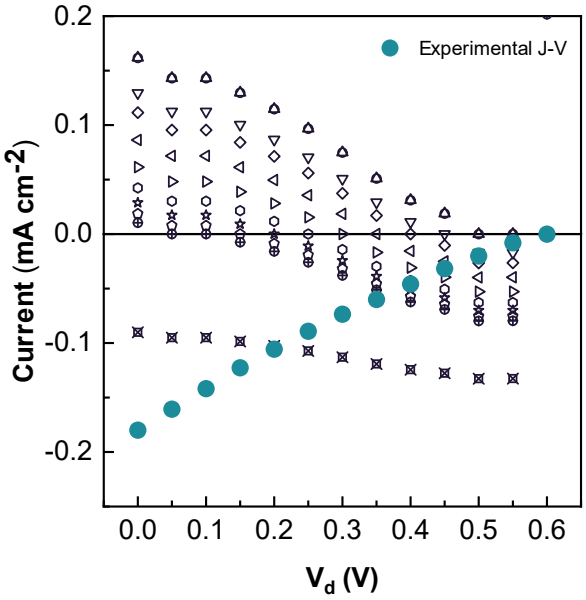

Figure S7. Comparison between experimental *j–V* curves at 10 mW/cm^2 (dots) and its reconstruction using equation 4 (main manuscript, empty shapes). The reconstruction was carry calculating the *m* value associate to each V_{app} (equation 2, with $R_{rec}(V_F)$).

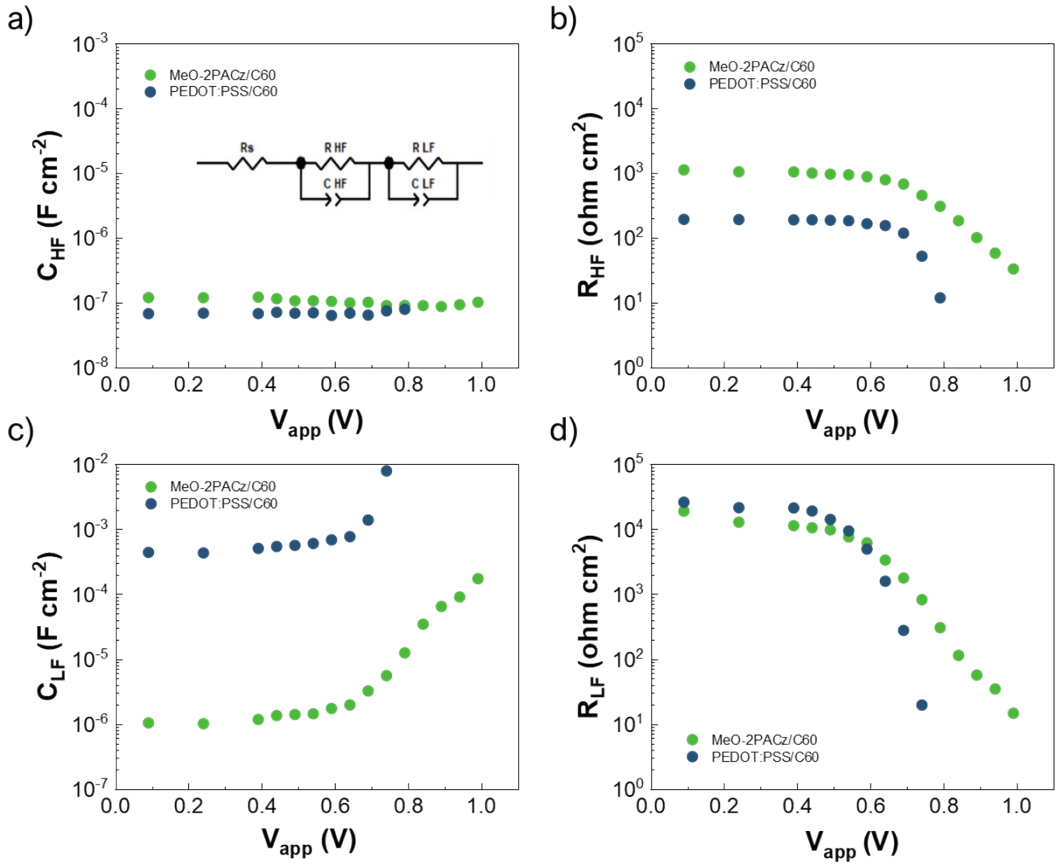

Figure S8. (a, c) Capacitive and (b, d) resistive elements as extracted from the fittings of the impedance spectra under 0.1 sun. The inset in (a) shows the ECM implemented.

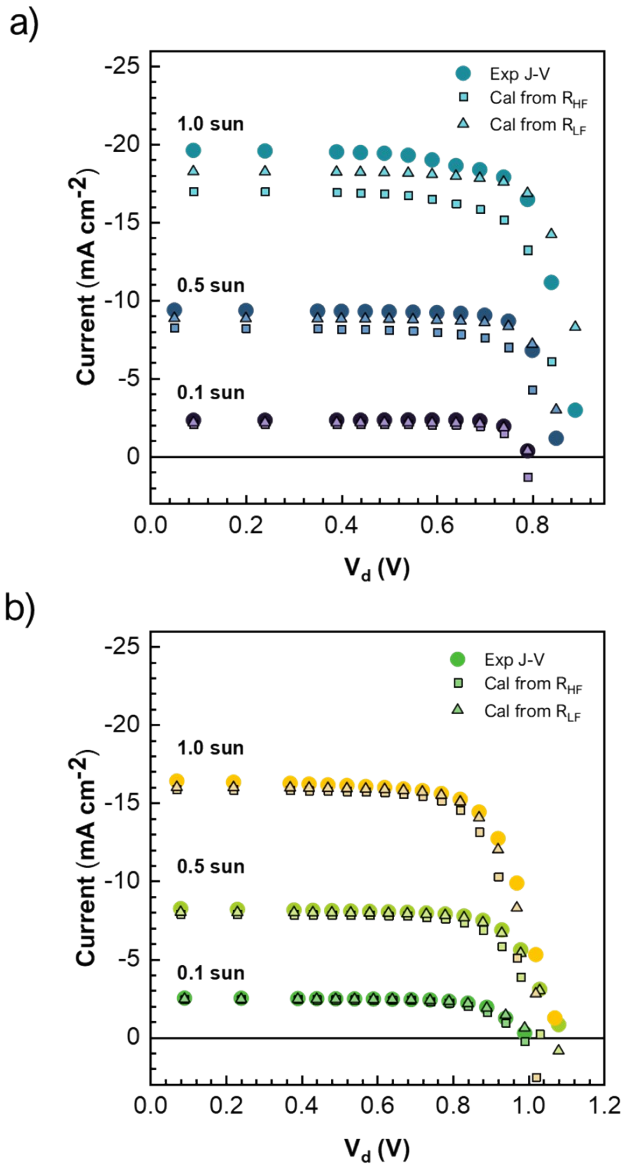

Figure S9. Experimental *j*–*V* curve (dots) and its reconstruction (equation 4) by using *m* value obtained either the slope of R_{HF} *vs* V_{app} (squares) or R_{LF} *vs* V_{app} (triangles) at different illumination intensities for (a) PEDOT:PSS/C_{60} and (b) MeO-2PACz/C_{60} devices. The resistances are extracted using the ECM in series (Figure S8a). The voltage applied is optimized by the series resistance contribution as $V_d = V_{app} - j_{Rs}$.