Supporting Information

Interface compatibility: how to outperform classical Spiro-OMeTAD in Perovskite Solar Cells with carbazole derivatives.

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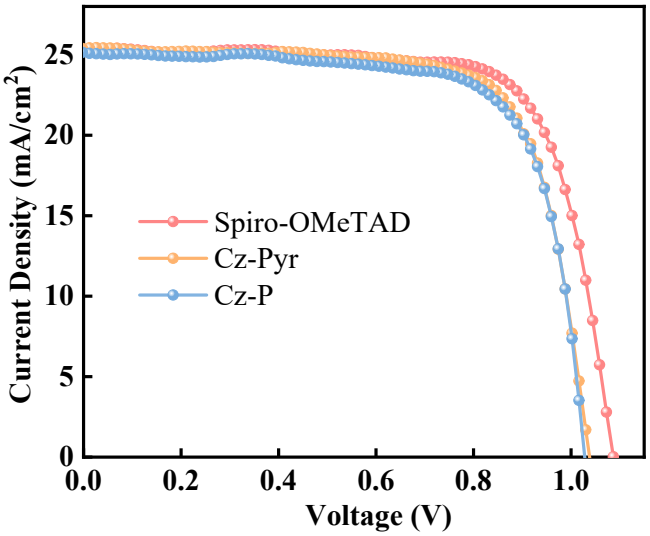

Figure S1 *J-V* tests of devices without IL.

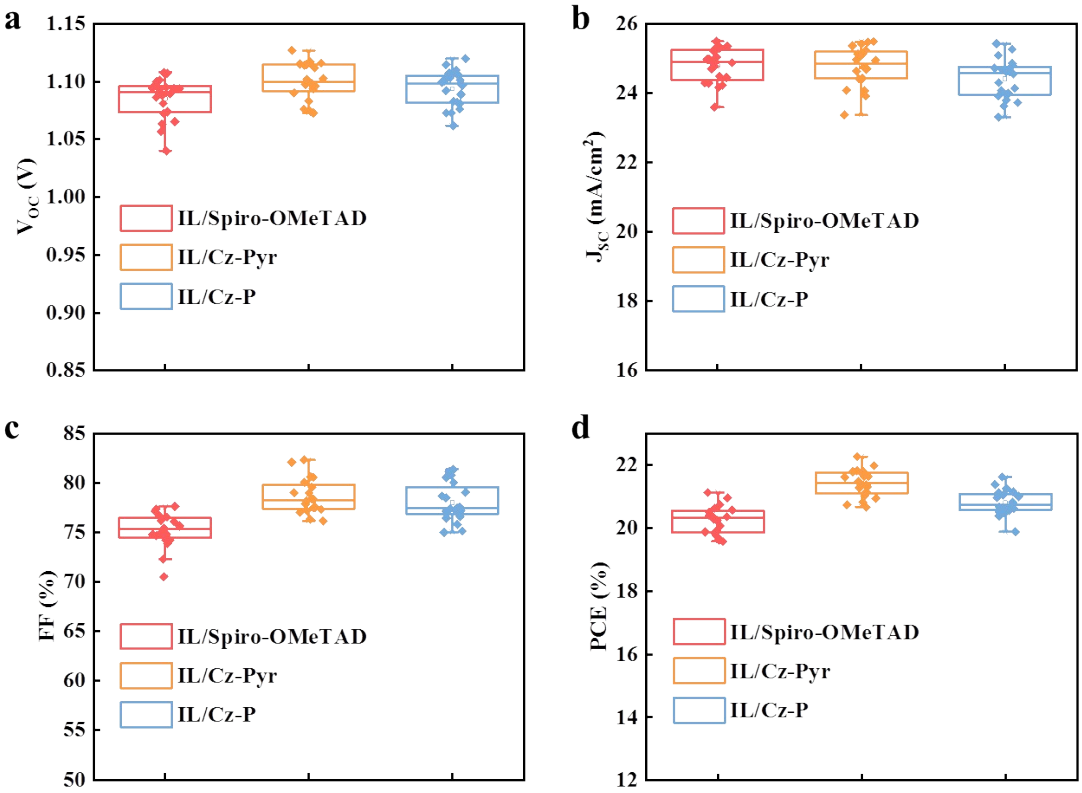

Figure S2 Distributions of a) V_{OC}、b) J_{SC}、c) *FF* and d) *PCE* for different devices.

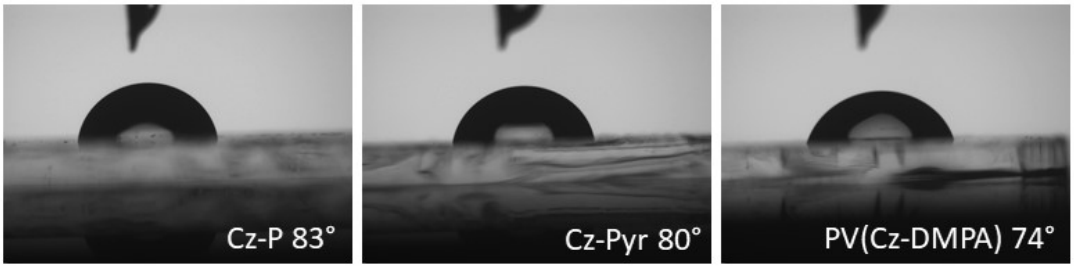

Figure S3. Water contact angle of **Cz-P**, **Cz-Pyr**, **PV(Cz-DMPA)** films on a glass substrate.

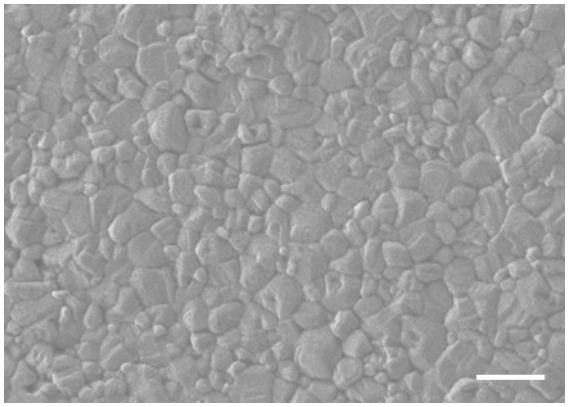

Figure S4 SEM image of perovskite. Scale bar: 500 nm

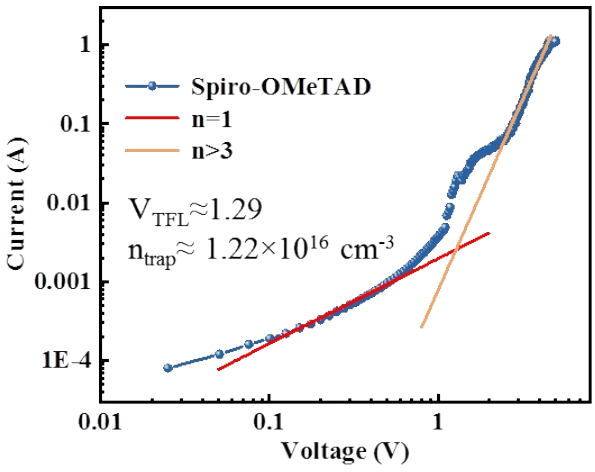

Figure S5 SCLC measurement of device based on spiro-OMeTAD.

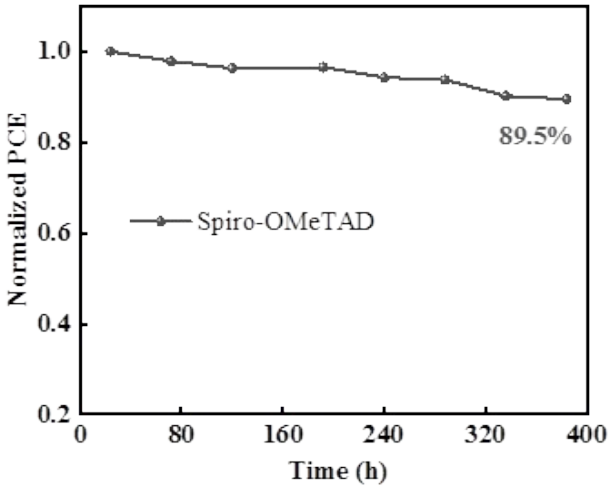

Figure S6 Stability of device based on spiro-OMeTAD ($FTO/SnO_2/Cs_{0.05}FA_{0.85}MA_{0.10}Pb(I_{0.97}Br_{0.03})_3$/spiro-OMeTAD/Ag).

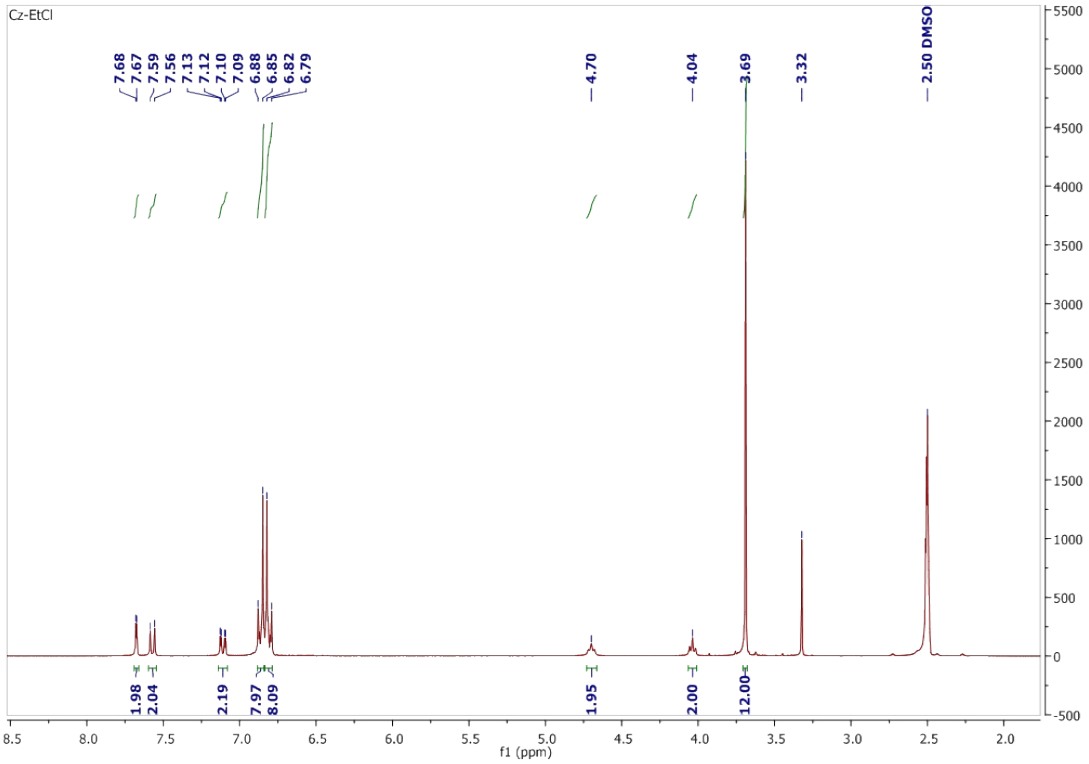

Figure S7 ^{1}H NMR spectrum of *3,6-Bis[N,N'-di(4-methoxyphenyl)amino]-9-(2-chloroethyl)-carbazole* **(2)** in DMSO-d6

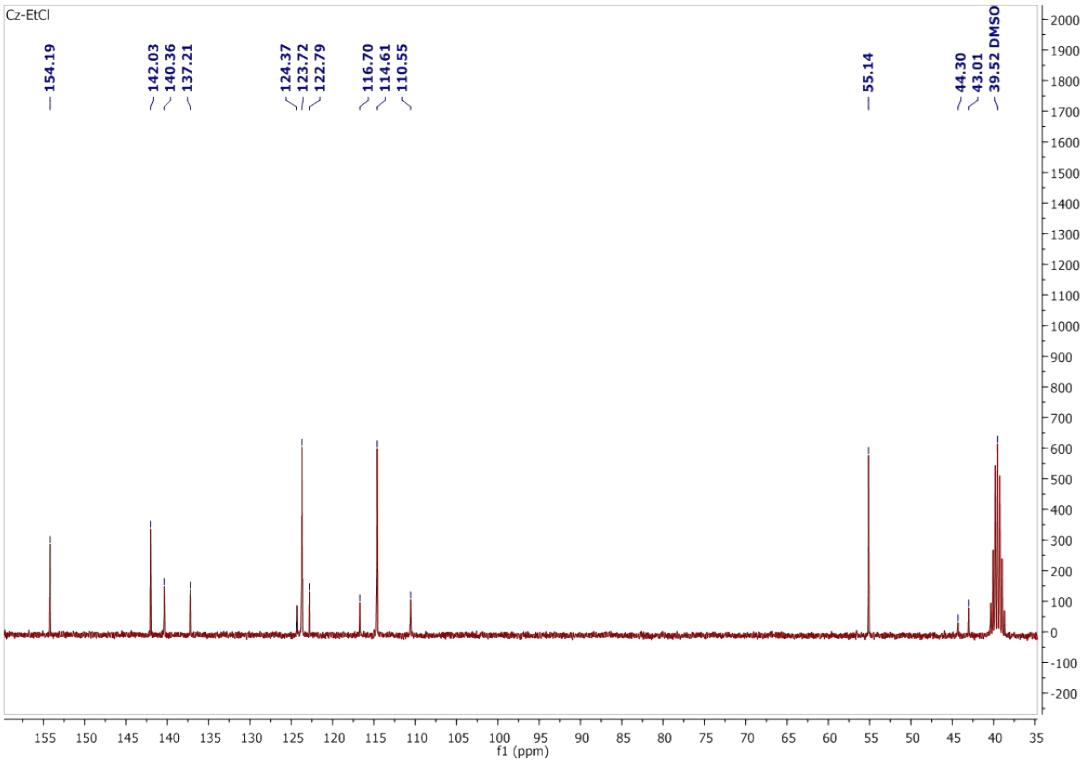

Figure S8 ^{13}C NMR spectrum of *3,6-Bis[N,N'-di(4-methoxyphenyl)amino]-9-(2-chloroethyl)-carbazole* **(2)** in DMSO-d6

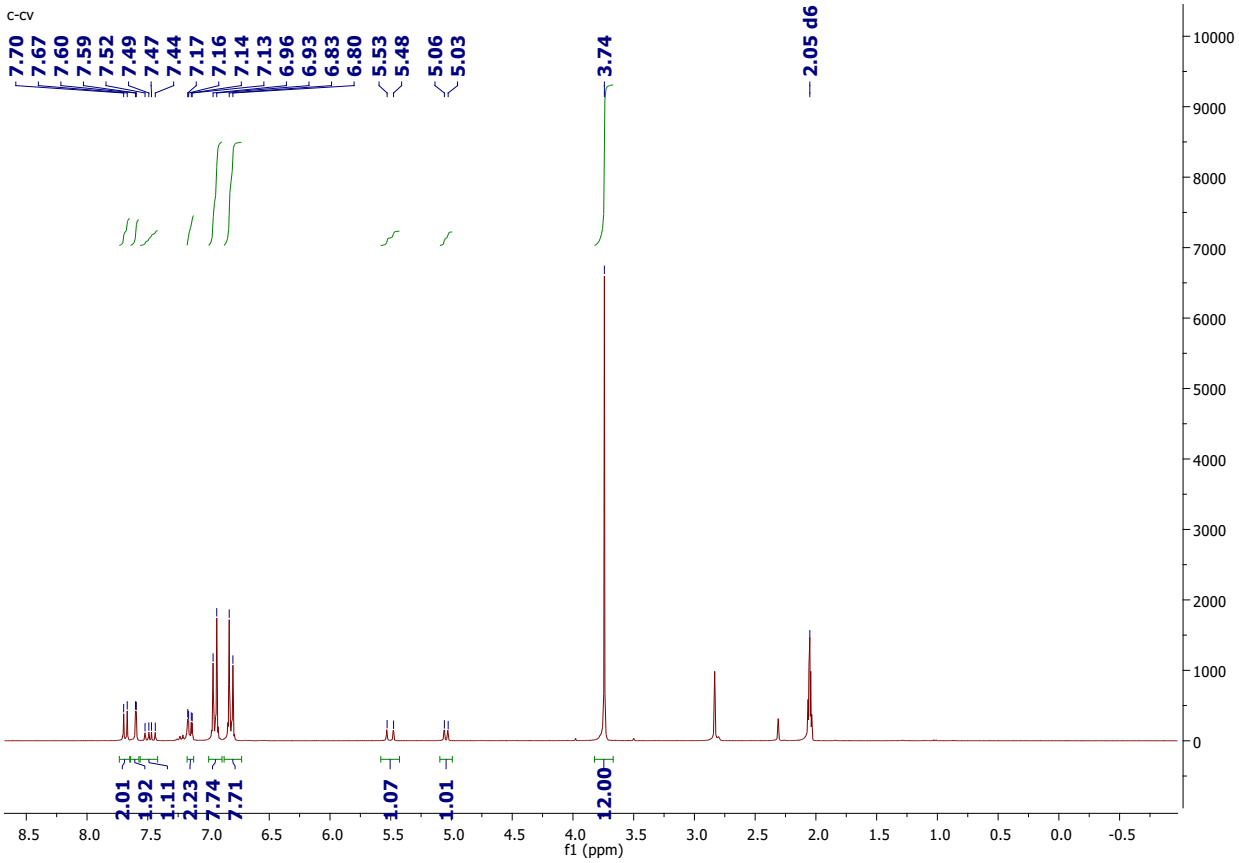

Figure S9 ^{1}H NMR spectrum of *3,6-Bis[N,N'-di(4-methoxyphenyl)amino]-9-vinyl-carbazole* **(3)** in acetone-d6.

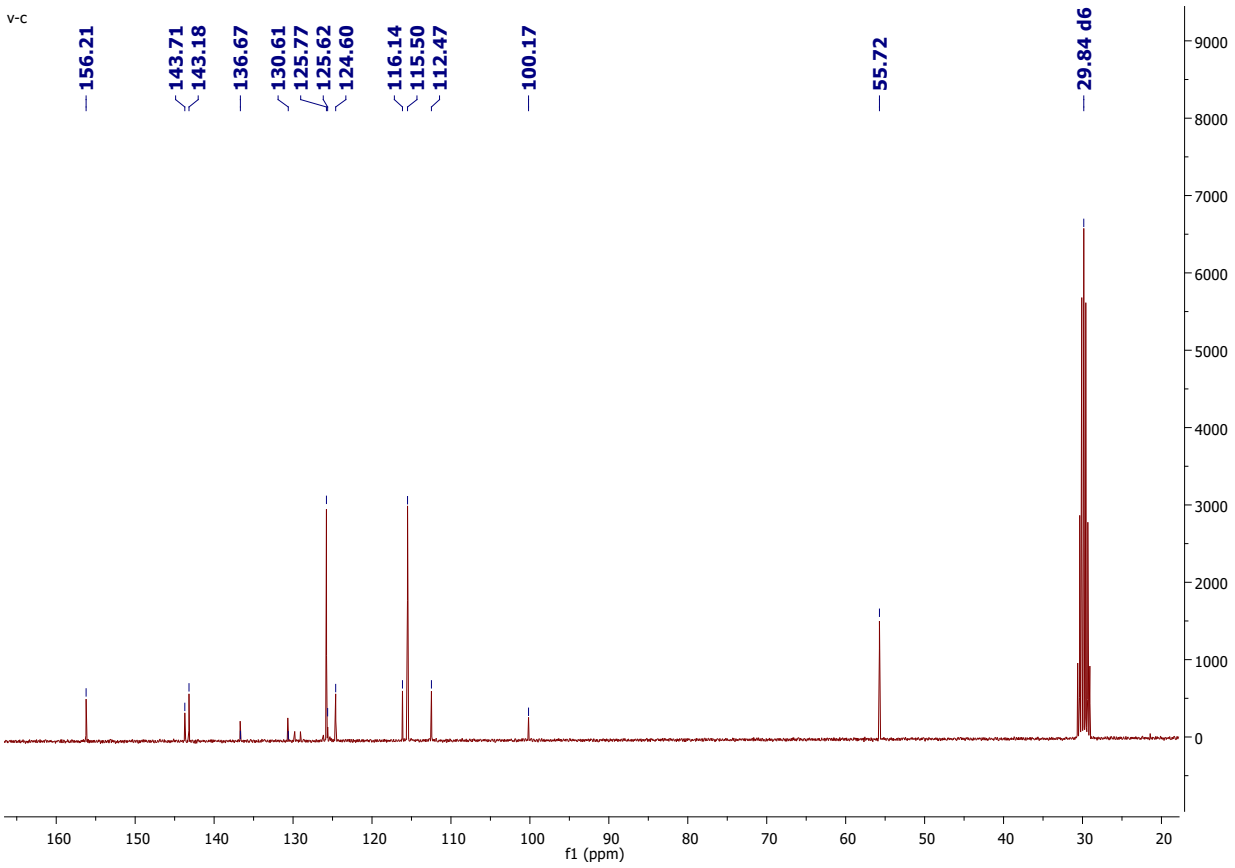

Figure S10 ^{13}C NMR spectrum of *3,6-Bis[N,N'-di(4-methoxyphenyl)amino]-9-vinyl-carbazole* **(3)** in acetone-d6.

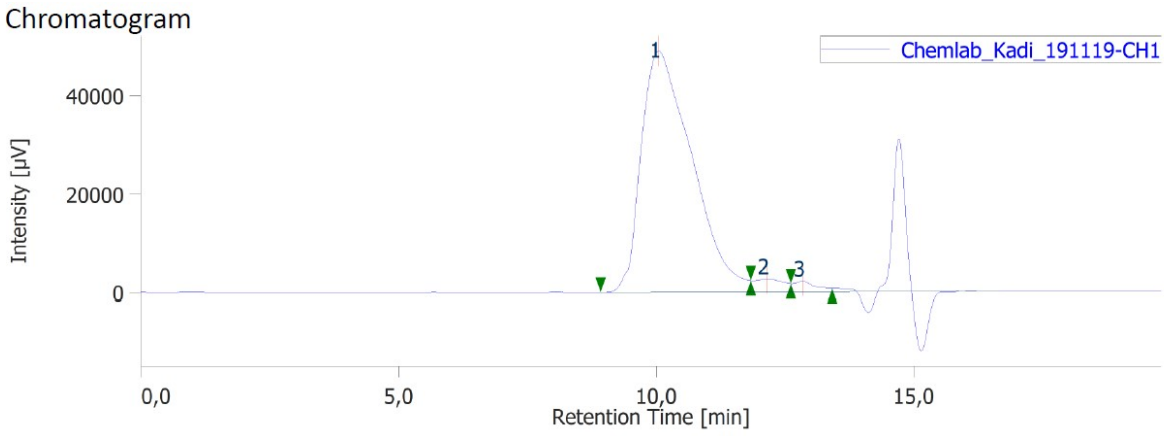

Figure S11 SEC chromatogramm of polymer **PV(Cz-DMPA)**.

Table S1 Photovoltaic parameters for devices without IL.

	V_{OC} (V)	J_{SC} (mA/cm^2)	*FF* (%)	*PCE* (%)
Spiro-OMeTAD	1.09	25.24	73.81	20.25
Cz-Pyr	1.04	25.27	73.48	19.27
Cz-P	1.03	25.10	72.75	18.75

Table S2 The time constant and amplitude extracted from fitting the TRPL data with biexponential decay equation [$f(t) = A_1\exp(-t/\tau_1) + A_2\exp(-t/\tau_2)$] for devices.

	A_1	τ_1 (ns)	A_2	τ_2 (ns)	$\tau_{average}$ (ns)
Perovskite	75.38	21.44	414.33	205.17	201.74
w IL/Spiro-OMeTAD	253.97	16.23	215.85	92.90	79.83
w IL/Cz-Pyr	265.31	9.87	244.72	52.91	45.67
w IL/Cz-P	266.57	13.73	217.77	80.14	68.63