Supporting Information

Stable Perovskite Solar Cells via exfoliated graphite as an ion diffusion-blocking layer

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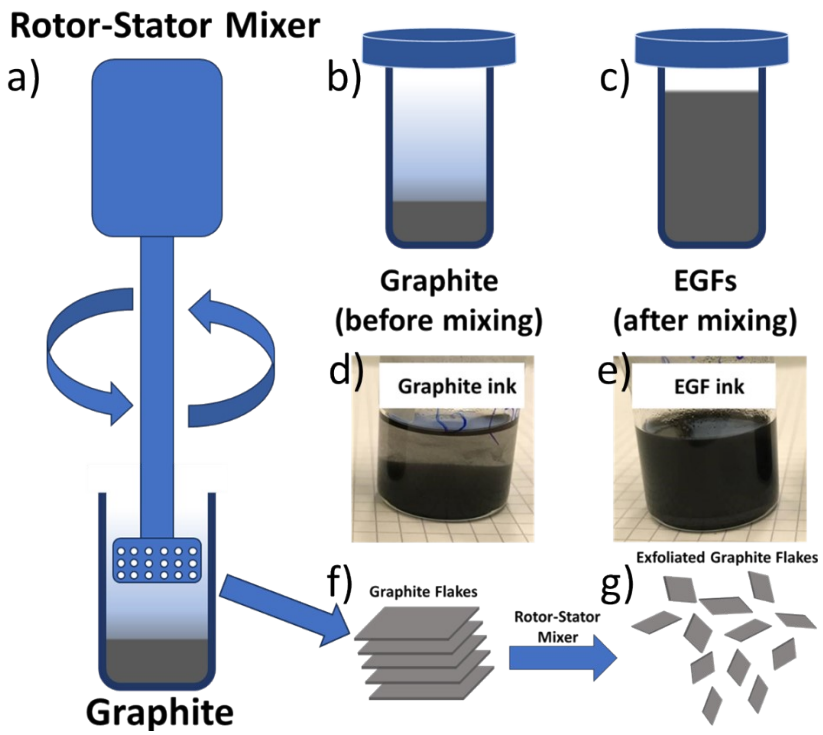

Figure S1. (a) Schematic illustration of RSM exfoliation/fragmentation process. Schematic illustration and images of the graphite flakes and inks (b,d,f) before and (c,e,g) after the RMS process application to the precursor dispersion.

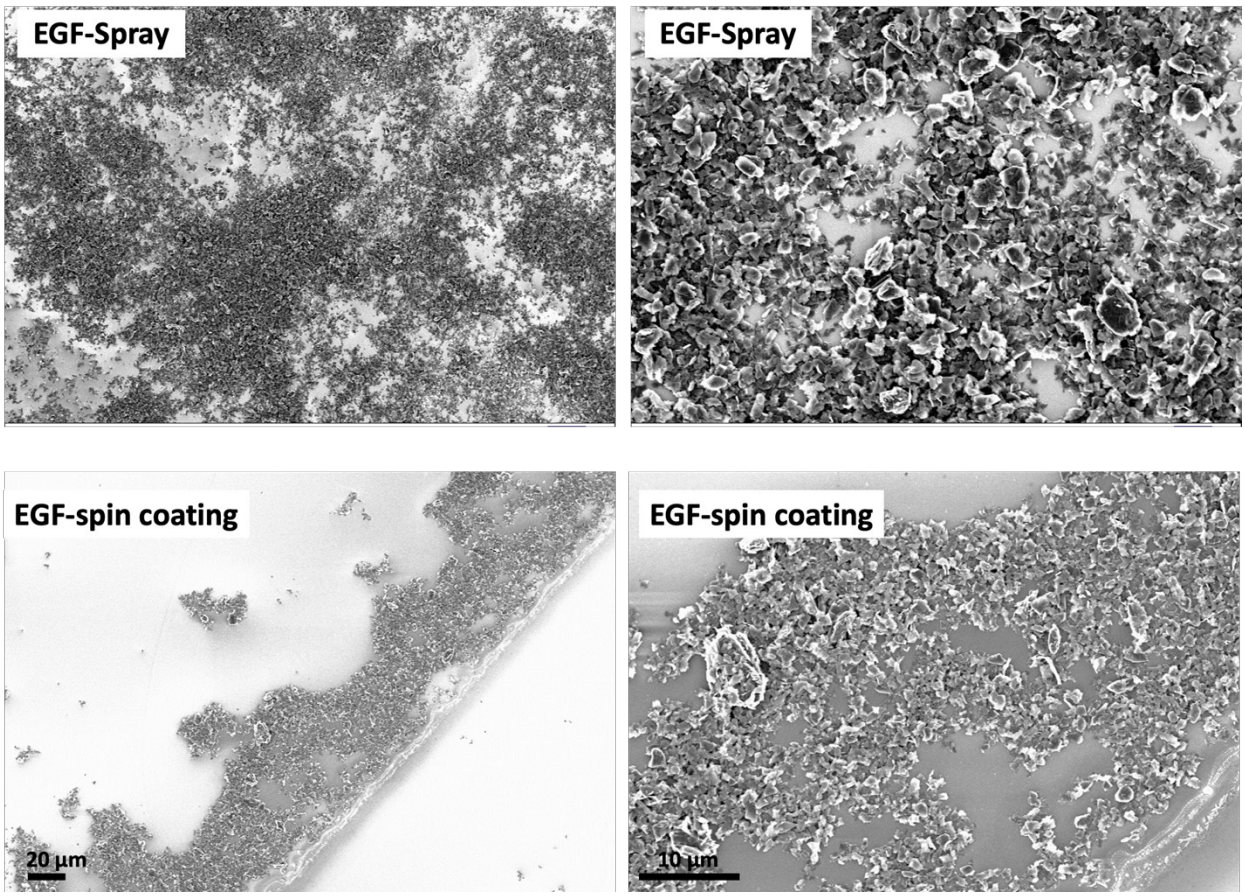

Figure S2. Top-view SEM images comparing the surface coverage of graphene flakes deposited through spray- and spin-coating techniques.

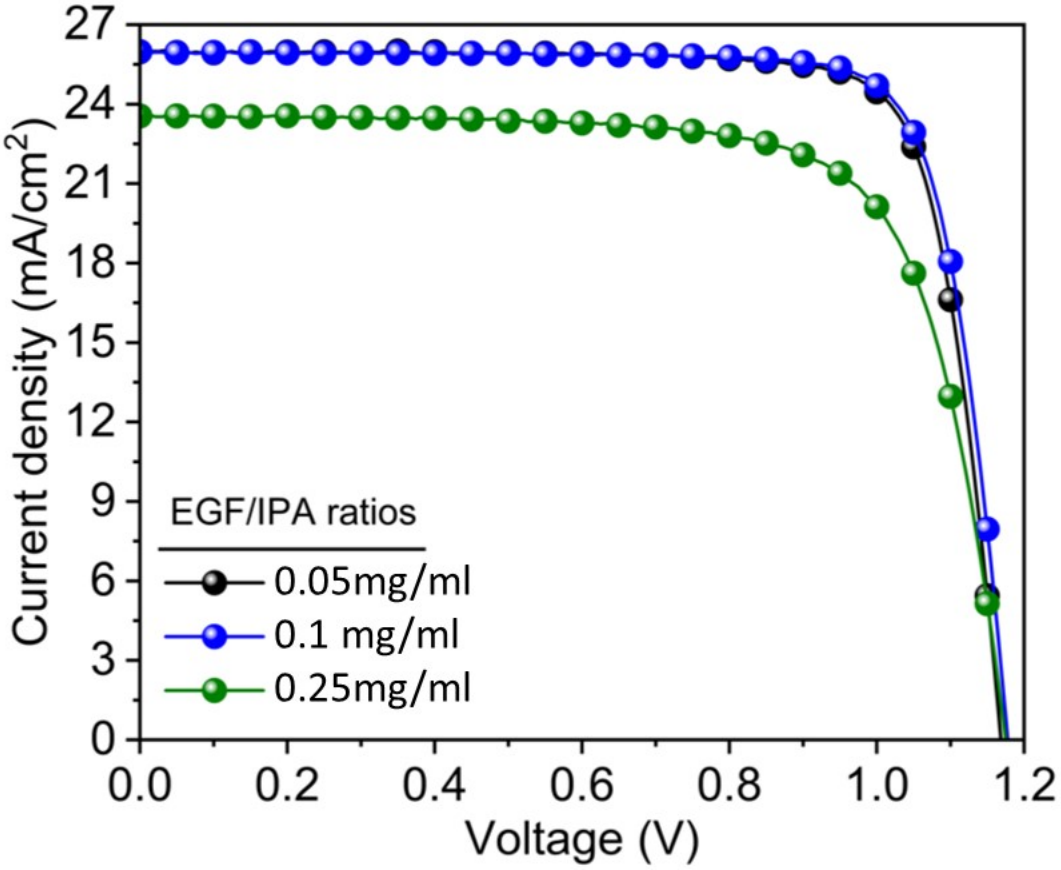

Figure S3. *J-V* characteristics curves using different EGF/ethanol ratio solutions.

Table S1. PV parameters extracted from Figure S6

EGF to IPA ratio	V_{oc}(V)	J_{sc} (mA/cm^2)	FF(%)	PCE(%)	
0.05 mg/ml	1.165	25.97	81.1	24.54	
0.1 mg/ml	1.178	25.98	81.4	25.0	Target
0.25 mg/ml	1.174	24.15	73.5	20.84	

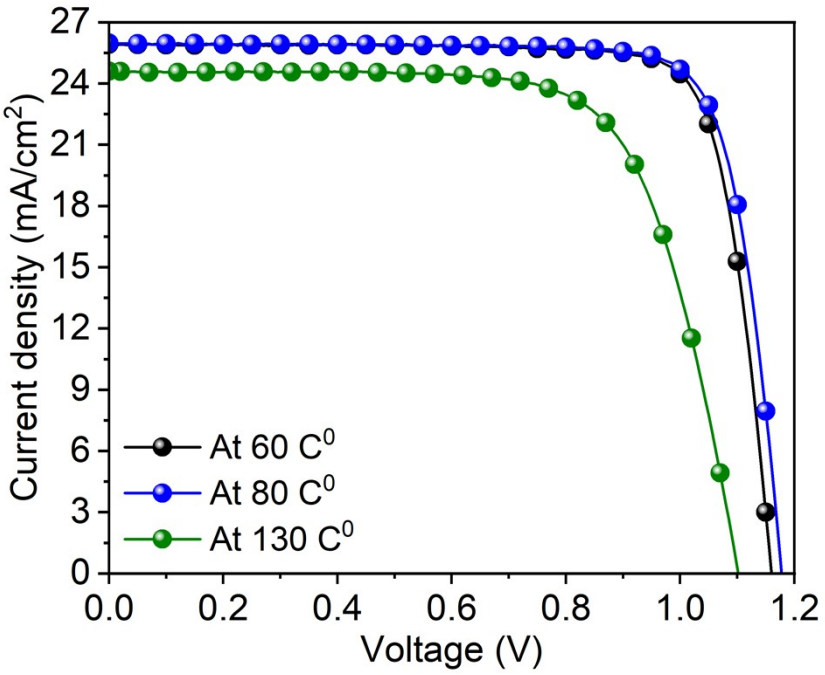

Figure S4. *J-V* characteristics curves at different preparation temperatures.

Table S2. PV parameters extracted from Figure S7

Temperature	V_{oc}(V)	J_{sc} (mA/cm^2)	FF(%)	PCE(%)	
60	1.153	25.92	82.0	24.51	
80	1.178	25.98	81.4	25.0	Target
130	1.090	24.60	71.3	19.12	

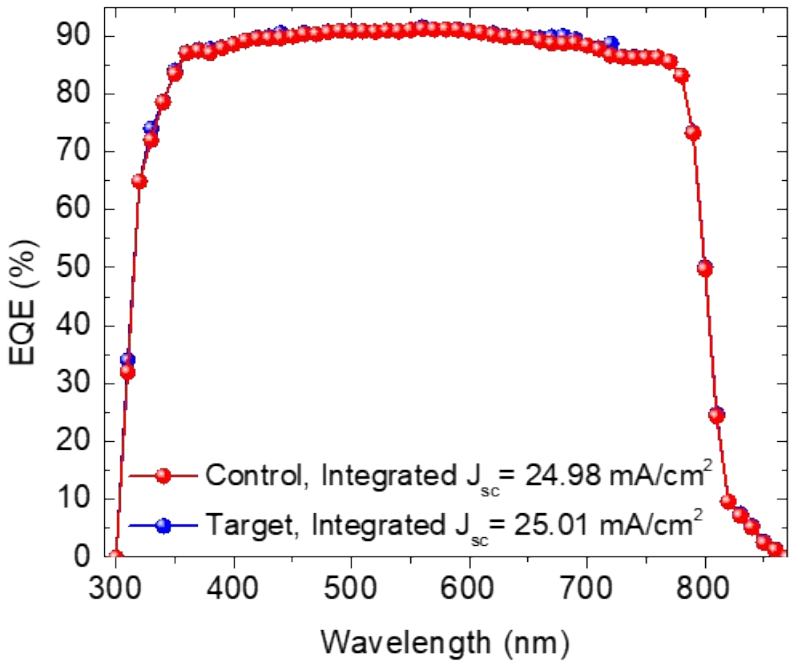

Figure S5. EQE spectra and photocurrent integrated over the standard AM 1.5G solar spectrum

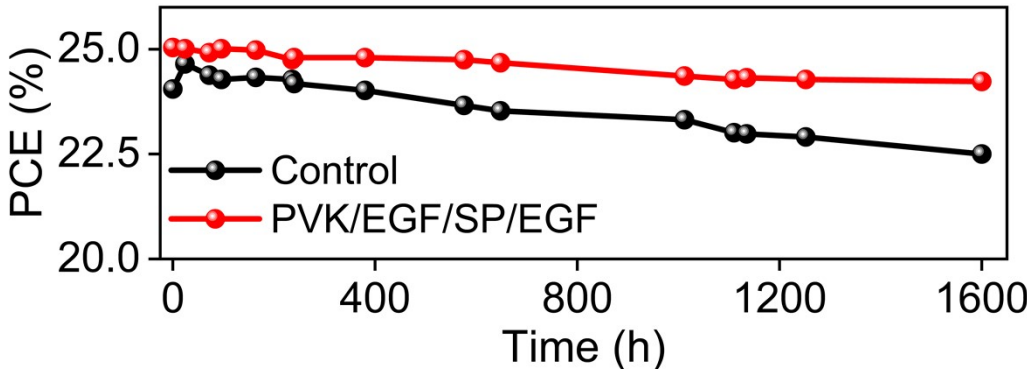

Figure S6. Shelf stability at RT and under ~8% RH of the control and target devices using Spiro-OMeTAD as HTL.

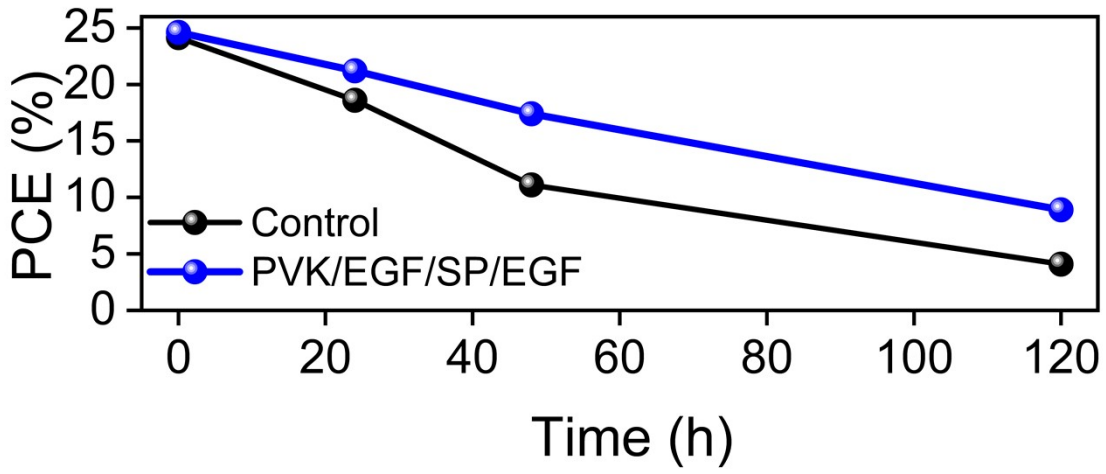

Figure S7. Shelf stability at 80 °C and ~75% RH of the control and target samples using Spiro-OMeTAD as the HTL.

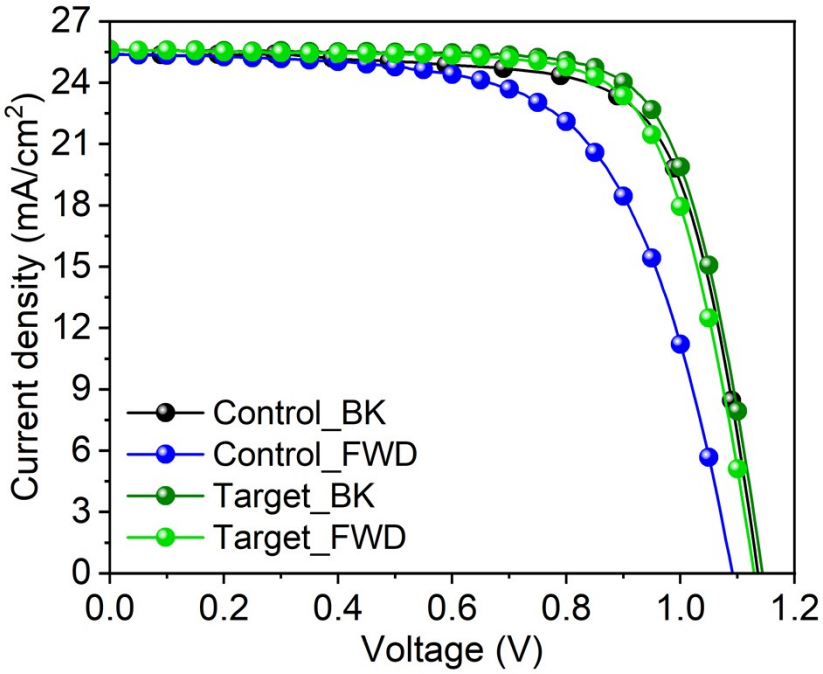

Figure S8. *J–V* results for devices using PTAA as HTL for control and target devices.

Table S3. PV parameters extracted from Figure S10

	V_{oc}(V)	J_{sc} (mA/cm^2)	FF(%)	PCE(%)	
Bk	1.132	25.41	72.50	20.86	control
FWD	1.070	25.39	63.70	17.31	control
Bk	1.142	25.62	74.4	21.77	Target
FWD	1.121	25.61	73.3	21.04	Target

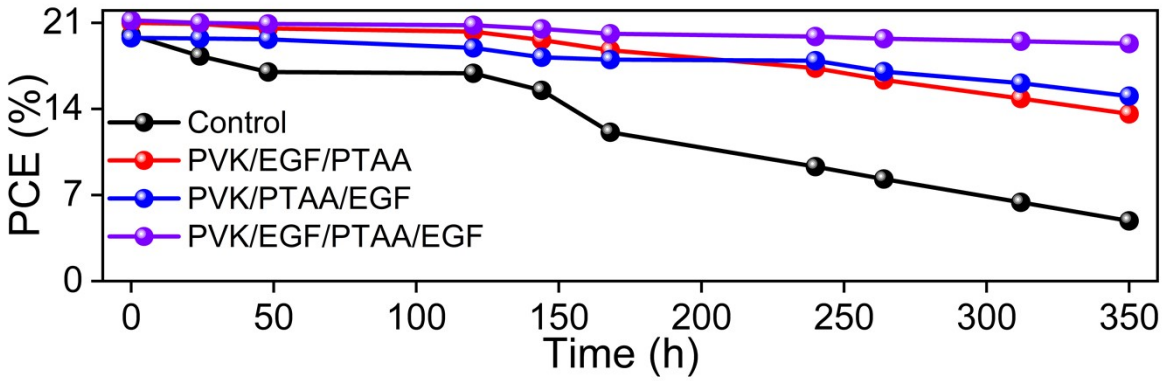

Figure S9. Shelf stability at RT and ~8% RH of control and target devices using PTAA as HTL.