

Simple fabrication of highly conductive and passivated PEDOT:PSS film via cryo-controlled quasi-congealing spin- coating for flexible perovskite solar cells

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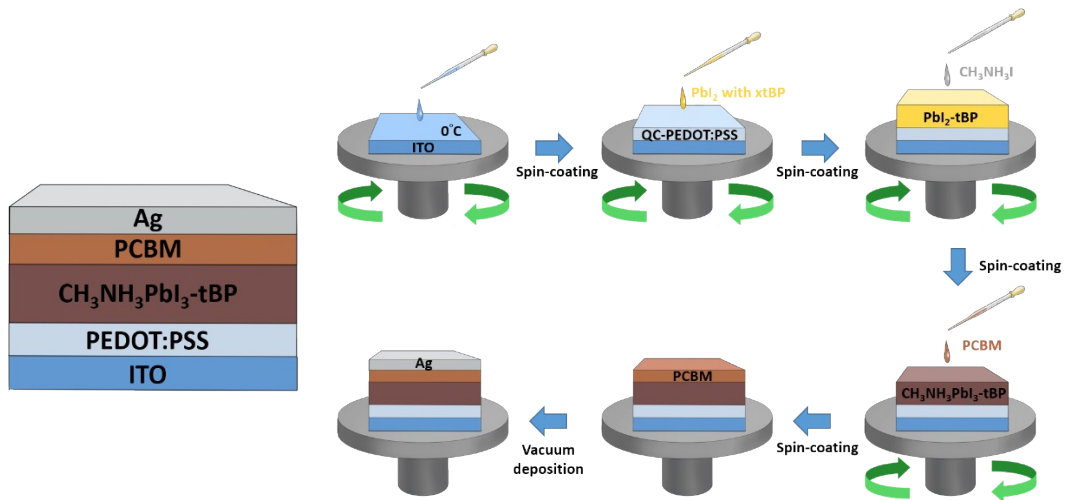


Figure S1. The model of inverted-planar PSC and the experimental process for fabricating.

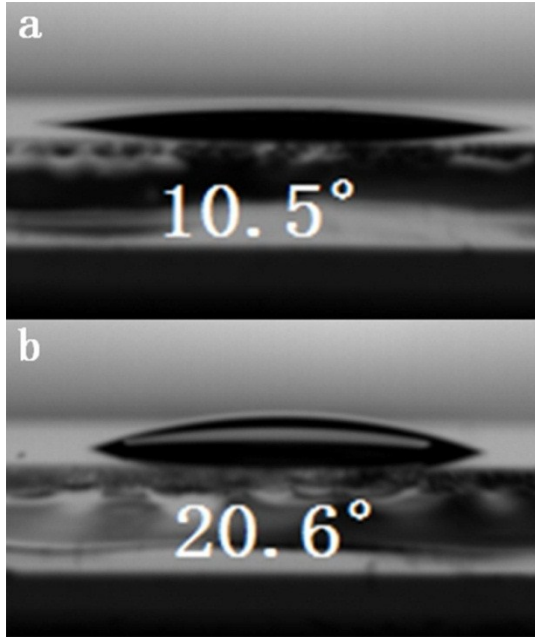


Figure S2. Water-contact-angle measurements were taken of water droplets on the films of (a) C-PEDOT:PSS and (b) QC-PEDOT:PSS.

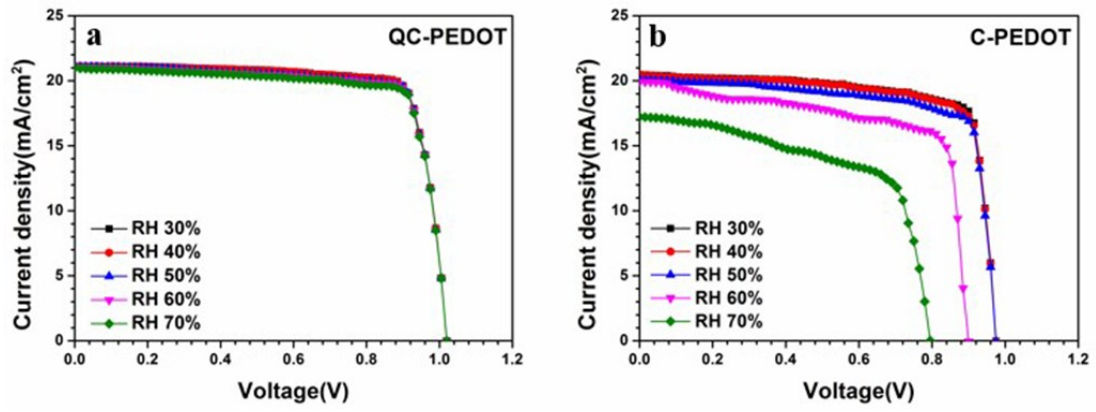


Figure S3. J - V curves of PSCs with (a) QC-PEDOT:PSS, (b) C-PEDOT:PSS fabricated at different moisture condition.

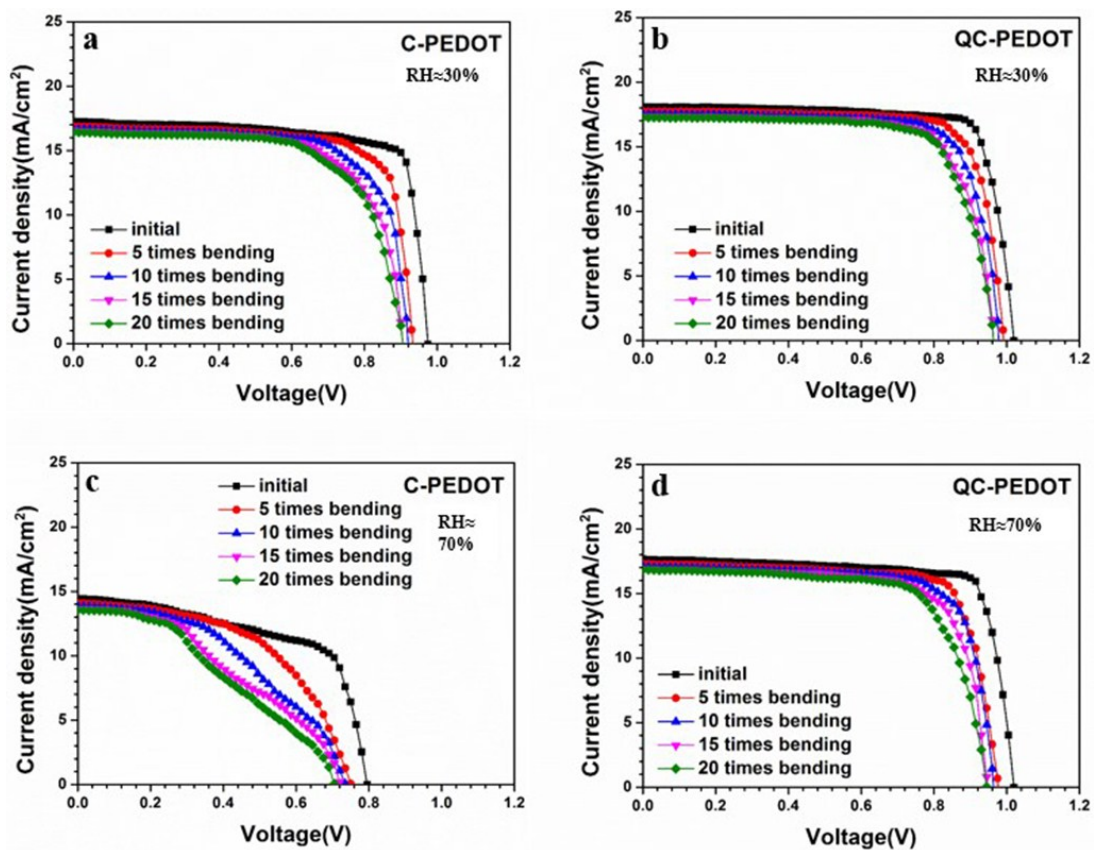


Figure S4. J - V curves of different fabricated flexible PSCs (a) C-PEDOT:PSS-RH30, (b) QC-PEDOT:PSS-RH30, (c) C-PEDOT:PSS-RH70, (d) QC-PEDOT:PSS-RH70 with different times of bending.

Table S1. Detailed photovoltaic parameters for QC-PEDOT:PSS-based PSCs fabricated at different moisture condition.

QC-PEDOT	J (mA/cm ²)	V (V)	FF (%)	PCE (%)
RH \approx 30%	21.13	1.02	82	17.67
RH \approx 40%	21.11	1.02	82	17.65
RH \approx 50%	21.09	1.02	82	17.61
RH \approx 60%	21.05	1.02	82	17.51
RH \approx 70%	20.99	1.01	82	17.34

Table S2. Detailed photovoltaic parameters for C-PEDOT:PSS-based PSCs fabricated at different moisture condition.

C-PEDOT	J (mA/cm ²)	V (V)	FF (%)	PCE (%)
RH \approx 30%	20.47	0.97	80	15.90
RH \approx 40%	20.44	0.97	79	15.60
RH \approx 50%	20.10	0.97	78	15.24
RH \approx 60%	19.93	0.90	72	12.89
RH \approx 70%	17.23	0.79	62	8.44

Table S3. Detailed photovoltaic parameters for flexible C-PEDOT:PSS-RH30-based PSCs with different times of bending.

C-PEDOT-RH30	J (mA/cm ²)	V (V)	FF (%)	PCE (%)
Initial	17.27	0.98	79	13.37
5 times bending	16.90	0.94	74	11.77
10 times bending	16.68	0.92	71	10.83
15 times bending	16.54	0.91	68	10.16
20 times bending	16.42	0.90	66	9.76

Table S4. Detailed photovoltaic parameters for flexible QC-PEDOT:PSS-RH30-based

PSCs with different times of bending.

QC-PEDOT-RH30	J (mA/cm ²)	V (V)	FF (%)	PCE (%)
Initial	18.09	1.02	82	15.13
5 times bending	17.75	0.99	79	13.92
10 times bending	17.52	0.98	77	13.16
15 times bending	17.35	0.97	76	12.71
20 times bending	17.26	0.97	74	12.41

Table S5. Detailed photovoltaic parameters for flexible C-PEDOT:PSS-RH70-based

PSCs with different times of bending.

C-PEDOT-RH70	J (mA/cm ²)	V (V)	FF (%)	PCE (%)
Initial	14.44	0.80	61	7.08
5 times bending	14.08	0.75	53	5.59
10 times bending	13.84	0.74	41	4.46
15 times bending	13.66	0.72	37	3.61
20 times bending	13.55	0.71	35	3.33

Table S6. Detailed photovoltaic parameters for flexible QC-PEDOT:PSS-RH70-based

PSCs with different times of bending.

QC-PEDOT-RH70	J (mA/cm ²)	V (V)	FF (%)	PCE (%)
Initial	17.66	1.02	81	14.59
5 times bending	17.32	0.98	77	13.13
10 times bending	17.09	0.97	74	12.26
15 times bending	16.91	0.95	72	11.67
20 times bending	16.85	0.95	71	11.38