

Supplementary Materials for

Chlorine Management of Carbon Counter Electrode for High Performance Printable Perovskite Solar Cells

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Table.1S The weight percentage for C and Cl in C-Cl_x (x=0, 0.2, 0.4, 0.6) samples by EDX.

Sample	C	C-Cl _{0.2}	C-Cl _{0.4}	C-Cl _{0.6}
C /weight%	86.66	85.33	74.91	77.97
Cl /weight%	0.06	0.09	0.08	0.1
Ratio (m _{Cl} :m _C)	0.07%	0.105%	0.11%	0.13%

Table 2S The statistical average values of the V_{oc} , J_{sc} , FF , PCE based on 80 PSCs for a reverse scan of voltage.

	V_{oc} (V)	J_{sc} (mA/cm ²)	FF	PCE (%)
C-r	0.7653	17.7064	0.5873	8.0948
C-Cl0.2-r	0.8055	20.5272	0.6173	10.0514
C-Cl0.4-r	0.8521	20.8032	0.6630	11.7477
C-Cl0.6-r	0.8246	21.4088	0.6105	10.5706

Table 3S The statistical average values of the V_{oc} , J_{sc} , FF , PCE based on 80 PSCs for a forward scan of voltage.

	V_{oc} (V)	J_{sc} (mA/cm ²)	FF	PCE (%)
C-f	0.6949	19.8089	0.3903	5.1963
C-Cl_{0.2}-f	0.7172	21.6372	0.5041	7.8333
C-Cl_{0.4}-f	0.7884	21.9205	0.5939	10.3268
C-Cl_{0.6}-f	0.7394	22.3737	0.5408	8.8818

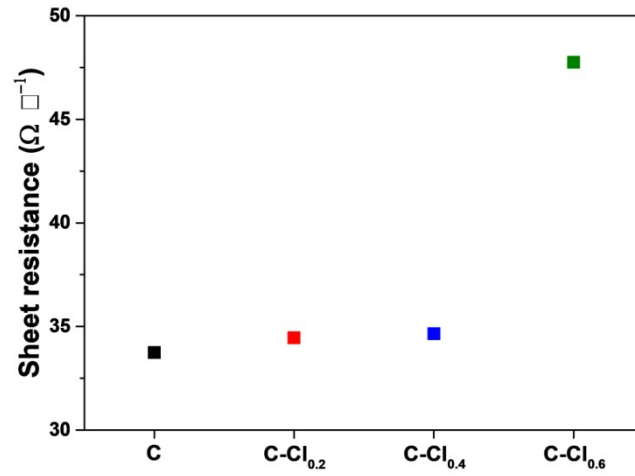


Figure S1. The sheet resistance of C-Cl_x (x=0, 0.2, 0.4, 0.6) samples.

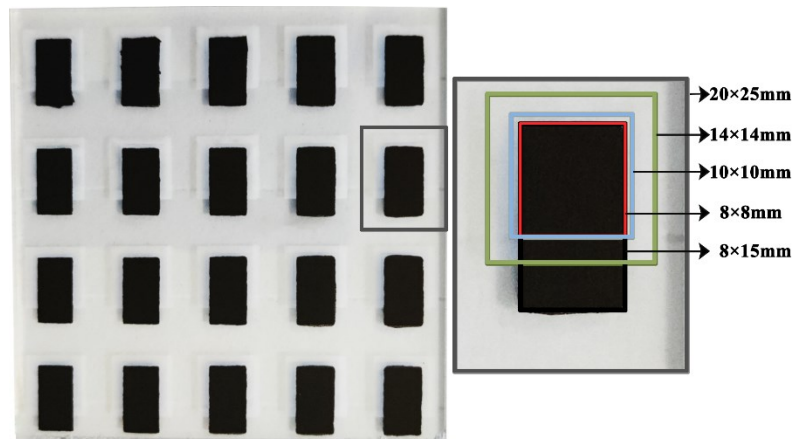


Fig.2S The integrated module of 20 C-PSCs and the characters of one cell.

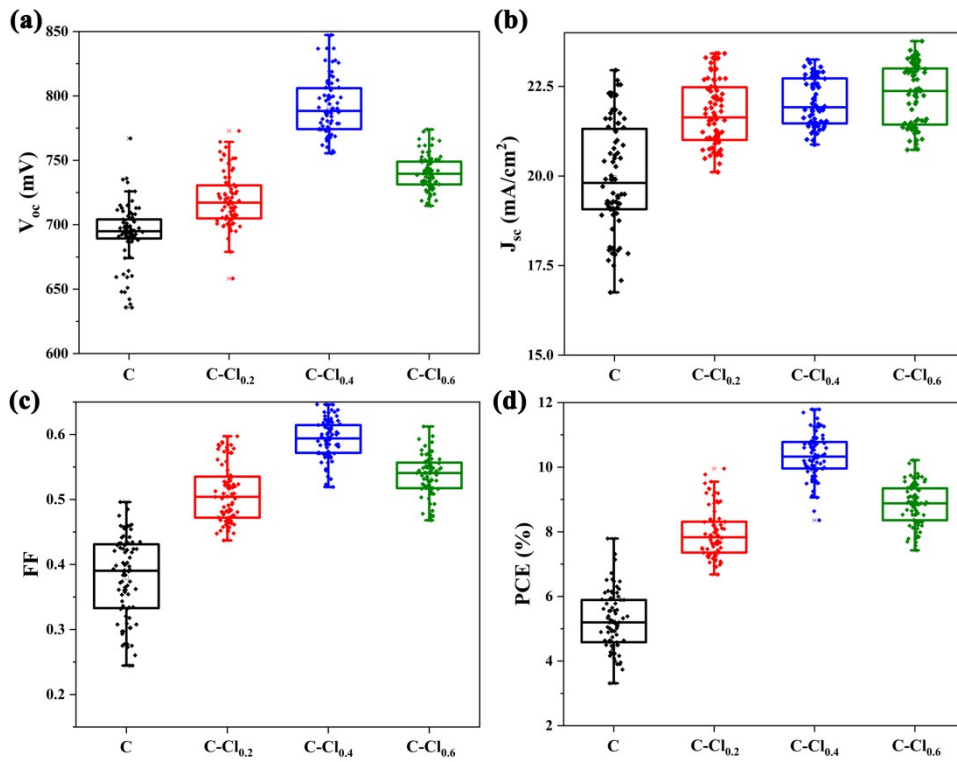


Fig.3S The statistical data of the V_{oc} , J_{sc} , FF and PCE of a forward scan for 80 cells.

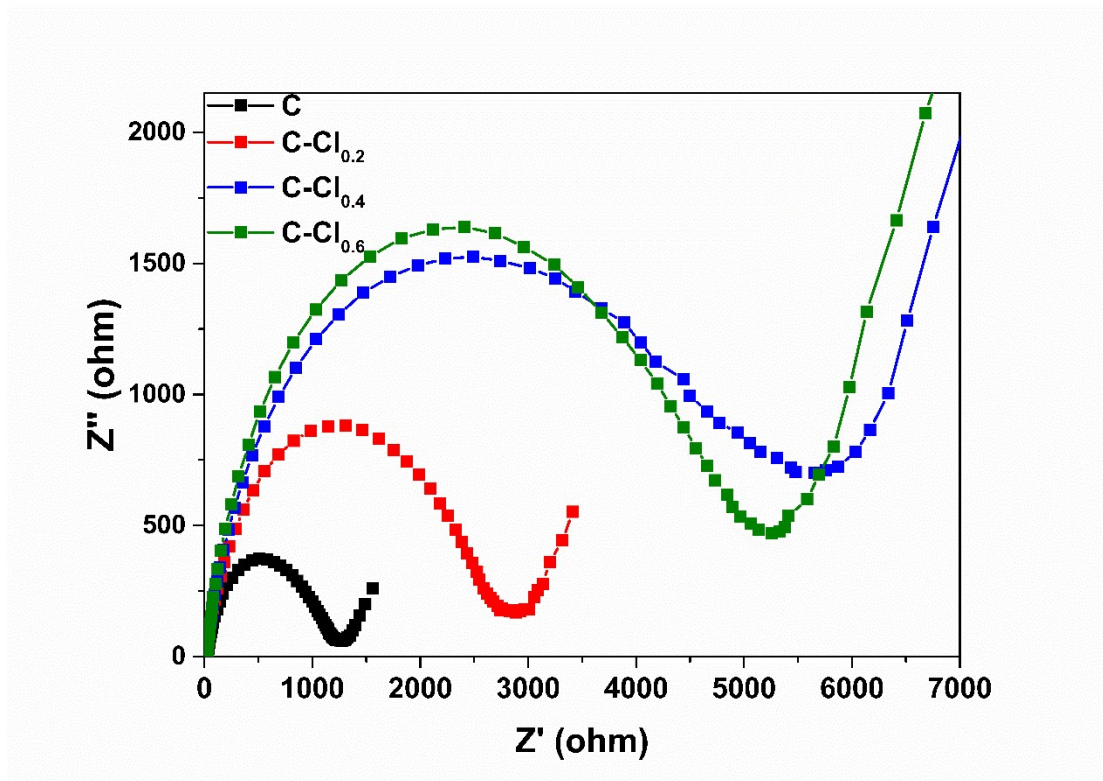


Fig.4S The EIS curves of C-PSCs based on C, C-Cl_{0.2}, C-Cl_{0.4} and C-Cl_{0.6} counter

electrodes respectively.

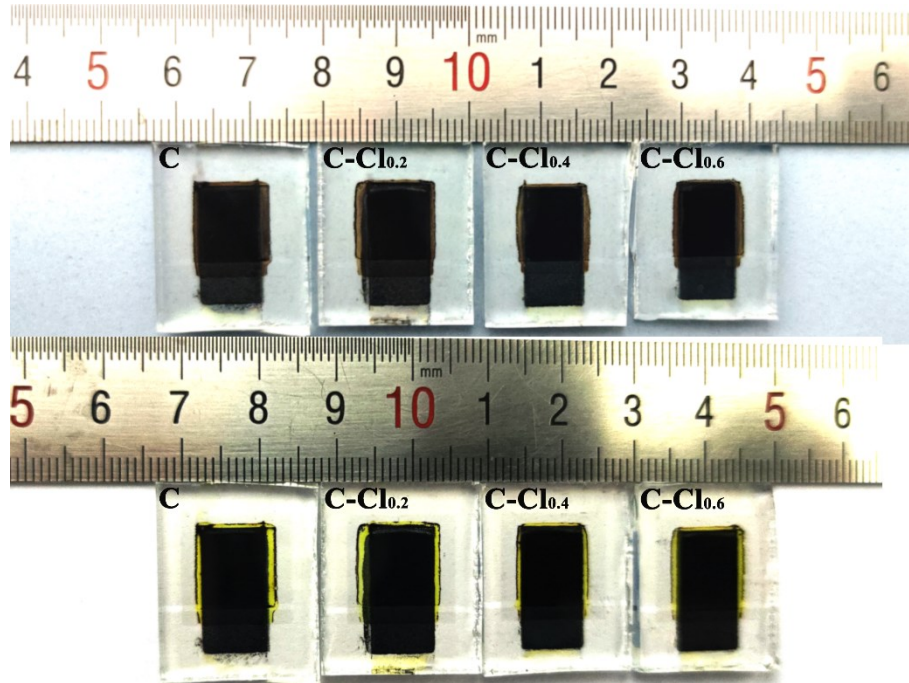


Fig.5S The photograph of the PSCs based on C, C-Cl_{0.2}, C-Cl_{0.4} and C-Cl_{0.6} CEs stored at ambient air condition without protection for 0 day and 30 days.