Electronic Supplementary Material (ESI) for Journal of Materials Chemistry A.


## Supplementary tables

**Table S1** Electrochemical parameters for all-weather solar cells. $R_s$ is series resistance; $R_{ct1}$ refers to charge-transfer resistance at Pt counter electrode/electrolyte interface; $R_{ct2}$ corresponds to charge-transfer resistance at photoanode/electrolyte interface. The tail in the low frequency region indicates Warburg diffusion process of redox couples ($W$). CPE1 and CPE2 are constant phase elements; $\tau$ is electron lifetime at photoanode.

| Photoanodes with CQDs at various heating times (h) | $R_s$ (ohm cm$^2$) | $R_{ct1}$ (ohm cm$^2$) | $R_{ct2}$ (ohm cm$^2$) | $W$ (ohm cm$^2$) | $\tau$ (ms) |
|---|---|---|---|---|---|
| 3 | 4.63 | 172 | 1743 | 223 | 16 |
| 4 | 2.30 | 102 | 948 | 120 | 41 |
| 6 | 3.43 | 44.6 | 416 | 30.5 | 90 |
| 9 | 2.54 | 6.7 | 126 | 10.4 | 94 |
| 12 | 2.84 | 11.5 | 524 | 29.5 | 88 |
| 15 | 8.65 | 12.9 | 651 | 33.1 | 74 |
| 20 | 3.48 | 16.5 | 987 | 37.4 | 27 |

## Supplementary figures

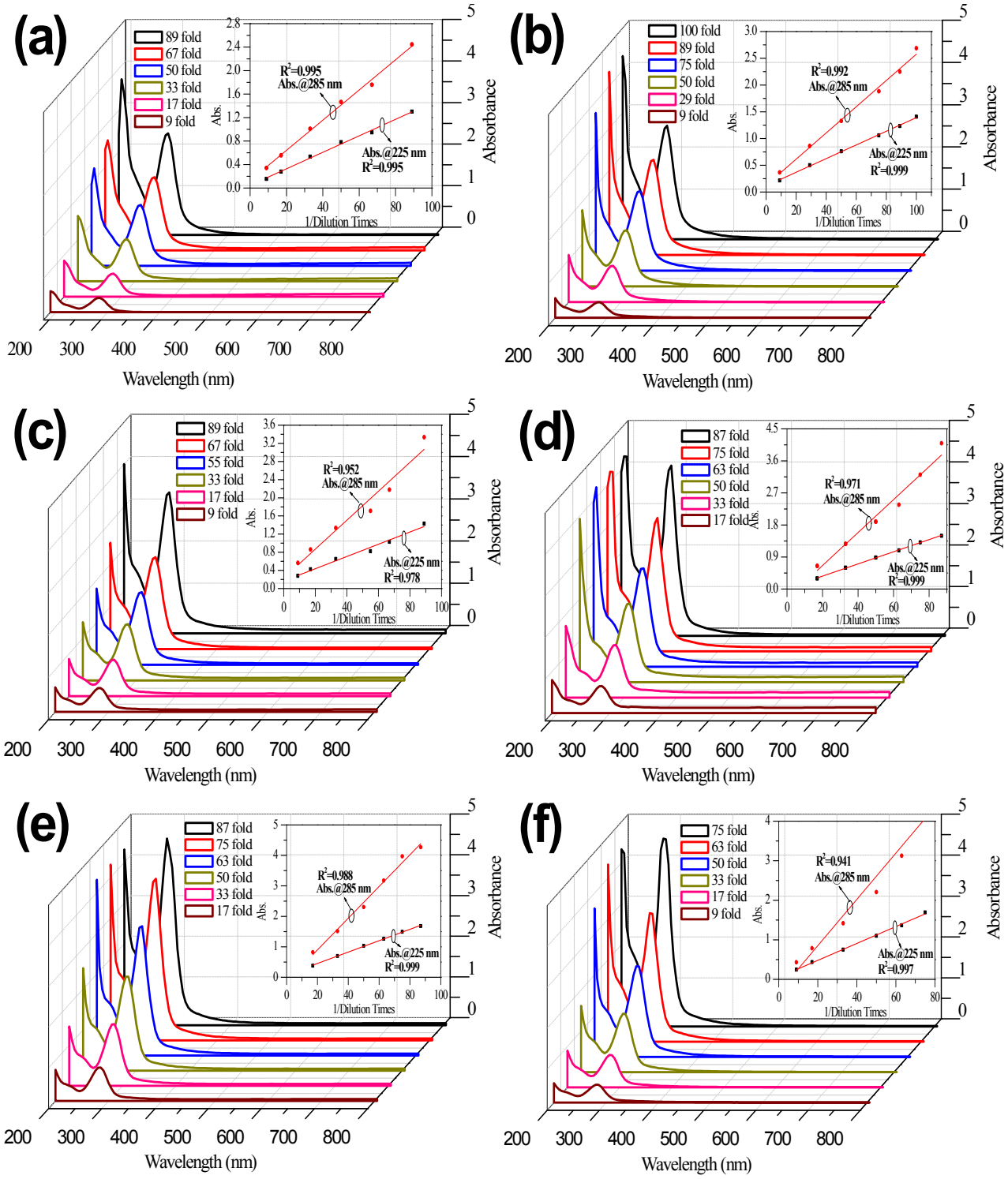


**Fig. S1** UV-vis absorption spectra of the diluted CQDs solutions at a heating time of (a) 3 h, (b) 4 h, (c) 6 h, (d) 12 h, (e) 15 h, and (f) 20 h.

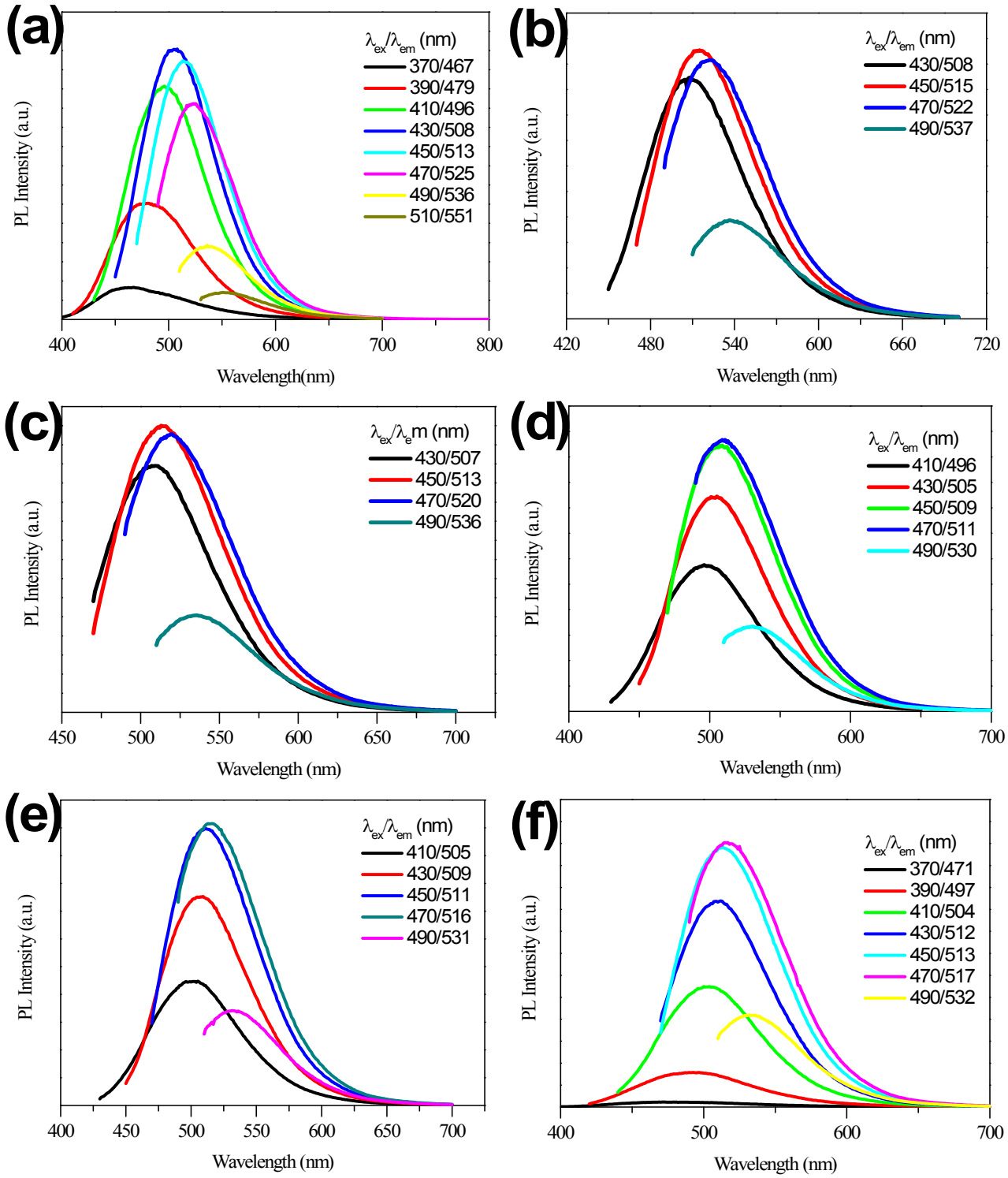


**Fig. S2** PL emission spectra of the CQDs at a heating time of (a) 3 h, (b) 4 h, (c) 6 h, (d) 12 h, (e) 15 h, and (f) 20 h.

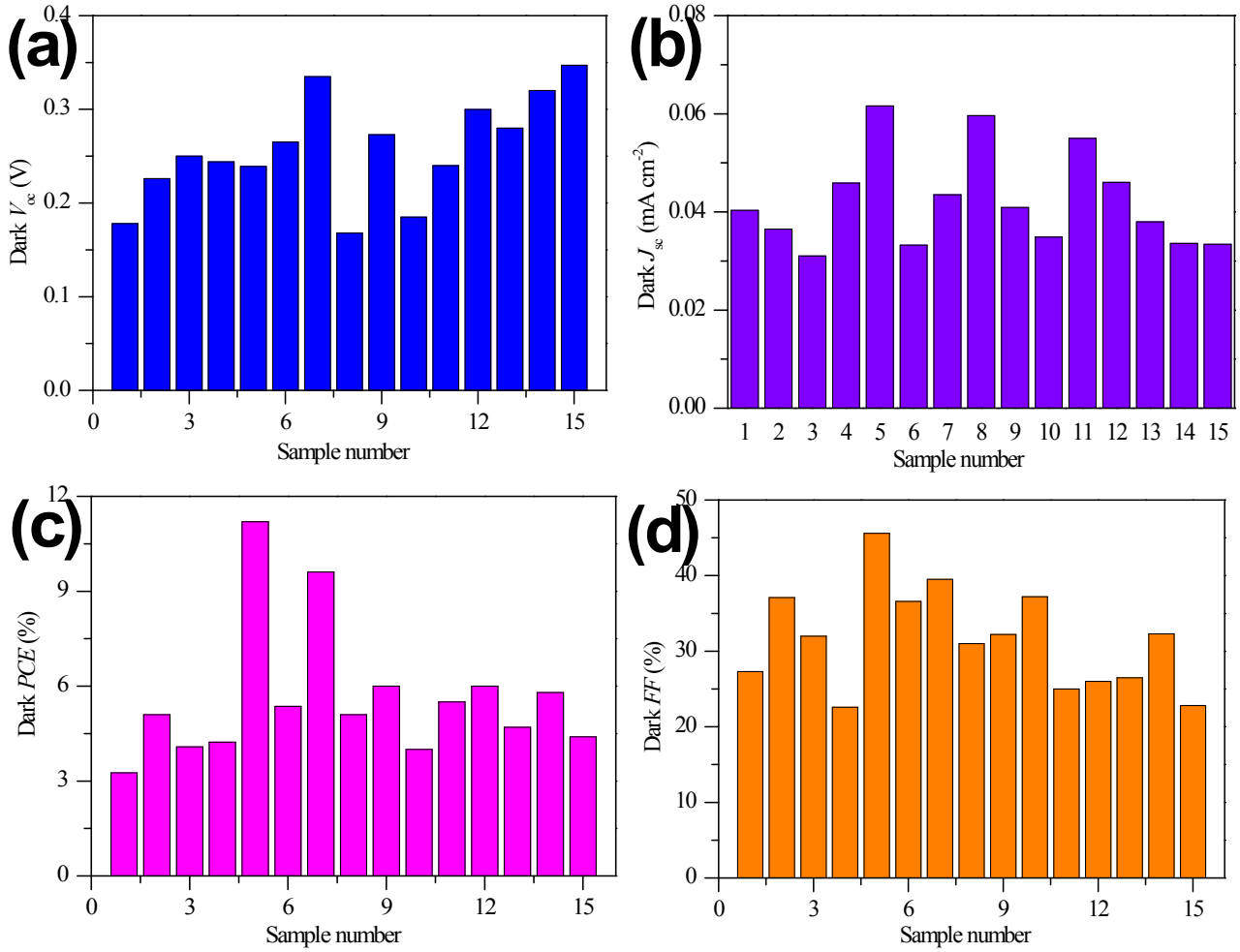


**Fig. S3** The random photovoltaic parameters for all-weather solar cells sensitized with CQDs at a heating time of 3 h.

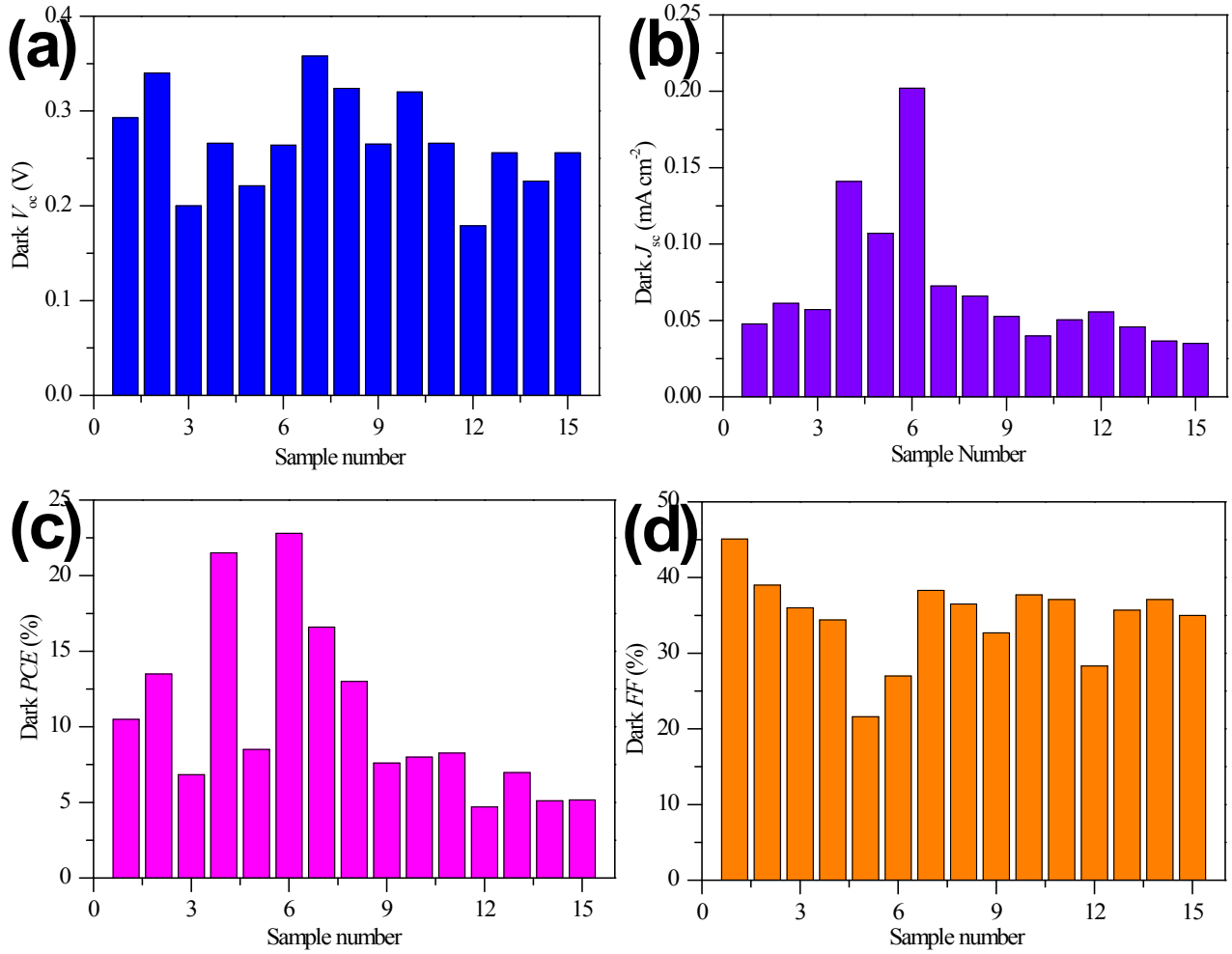


**Fig. S4** The random photovoltaic parameters for all-weather solar cells sensitized with CQDs at a heating time of 4 h.

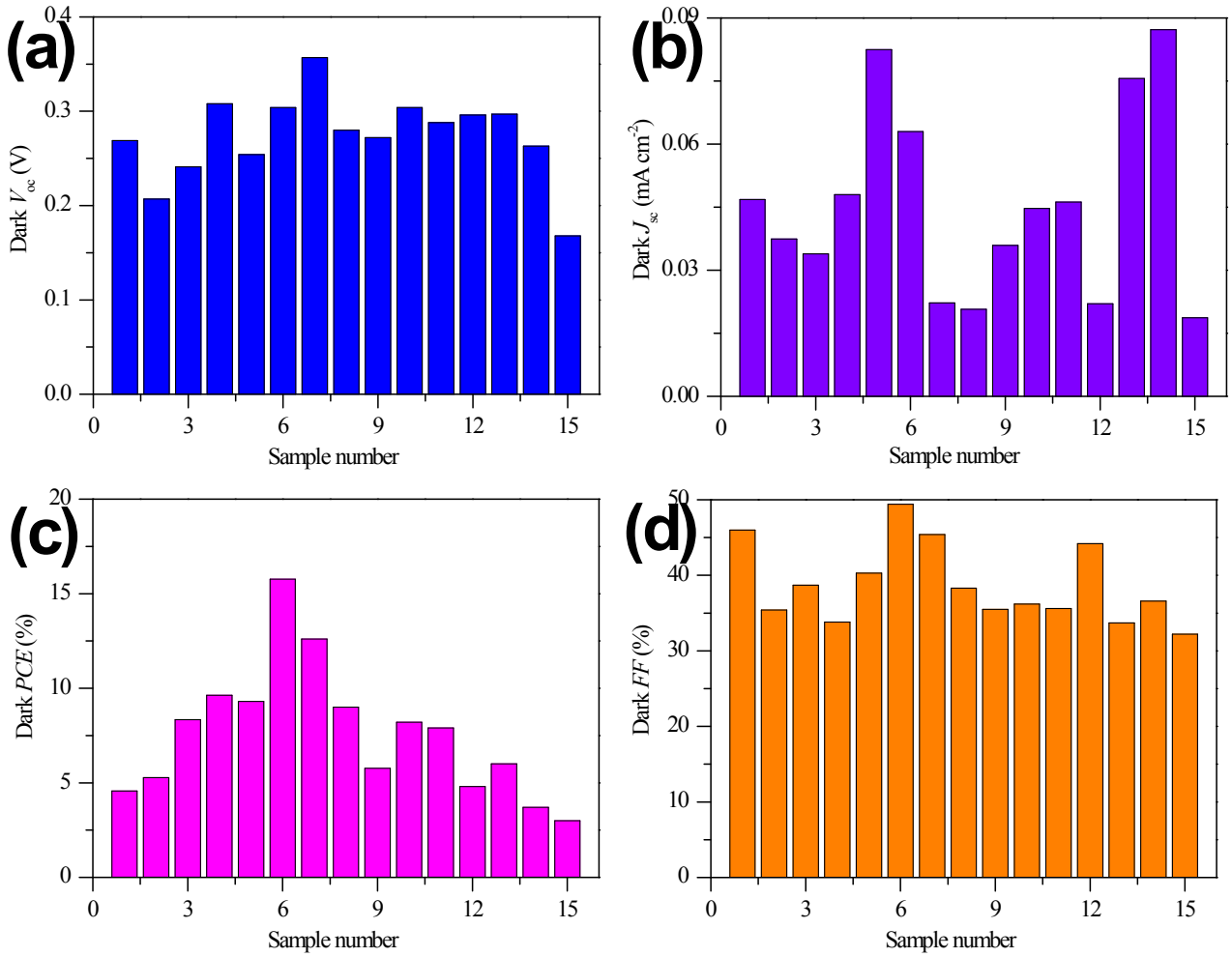


**Fig. S5** The random photovoltaic parameters for all-weather solar cells sensitized with CQDs at a heating time of 6 h.

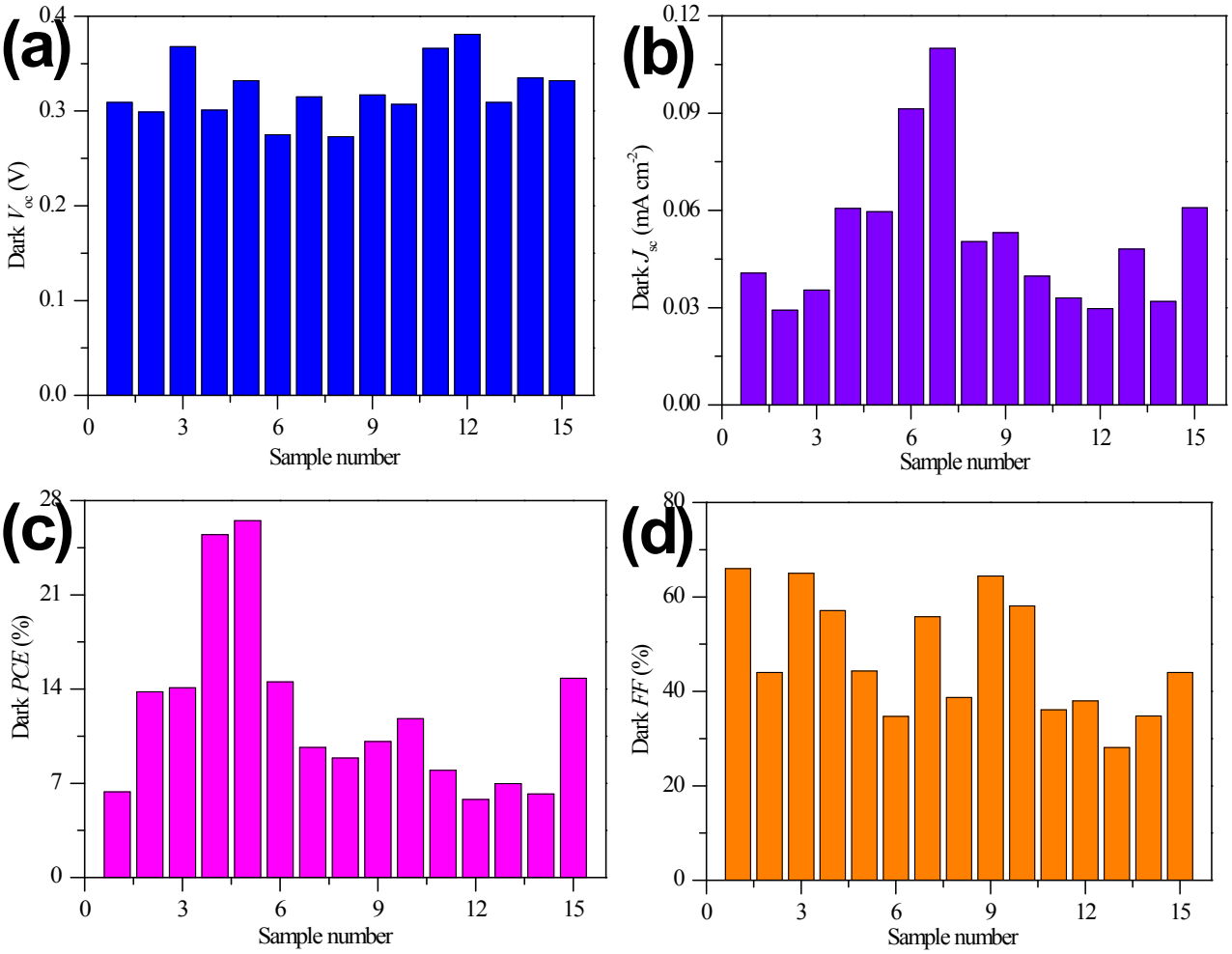


**Fig. S6** The random photovoltaic parameters for all-weather solar cells sensitized with CQDs at a heating time of 9 h.

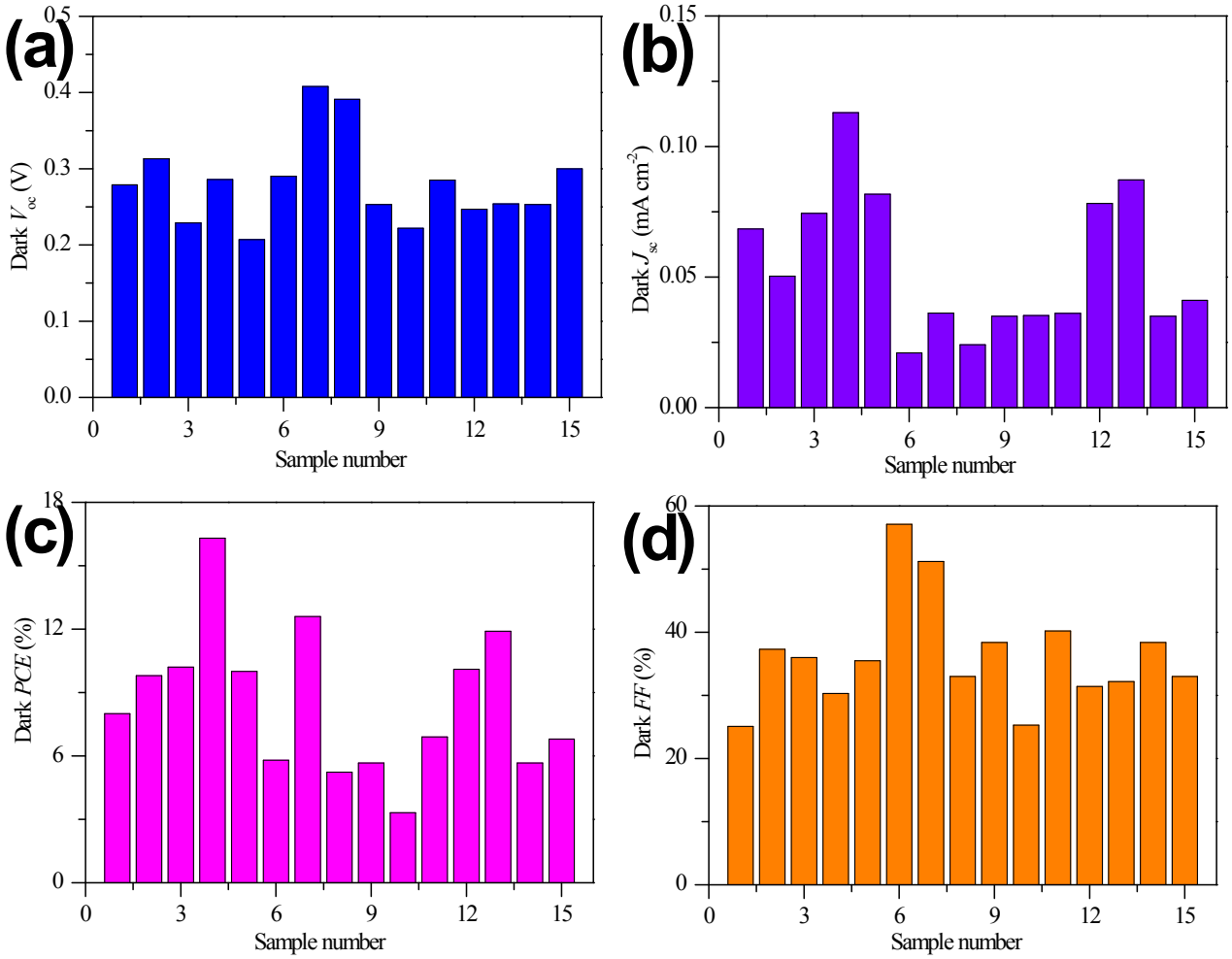


**Fig. S7** The random photovoltaic parameters for all-weather solar cells sensitized with CQDs at a heating time of 12 h.

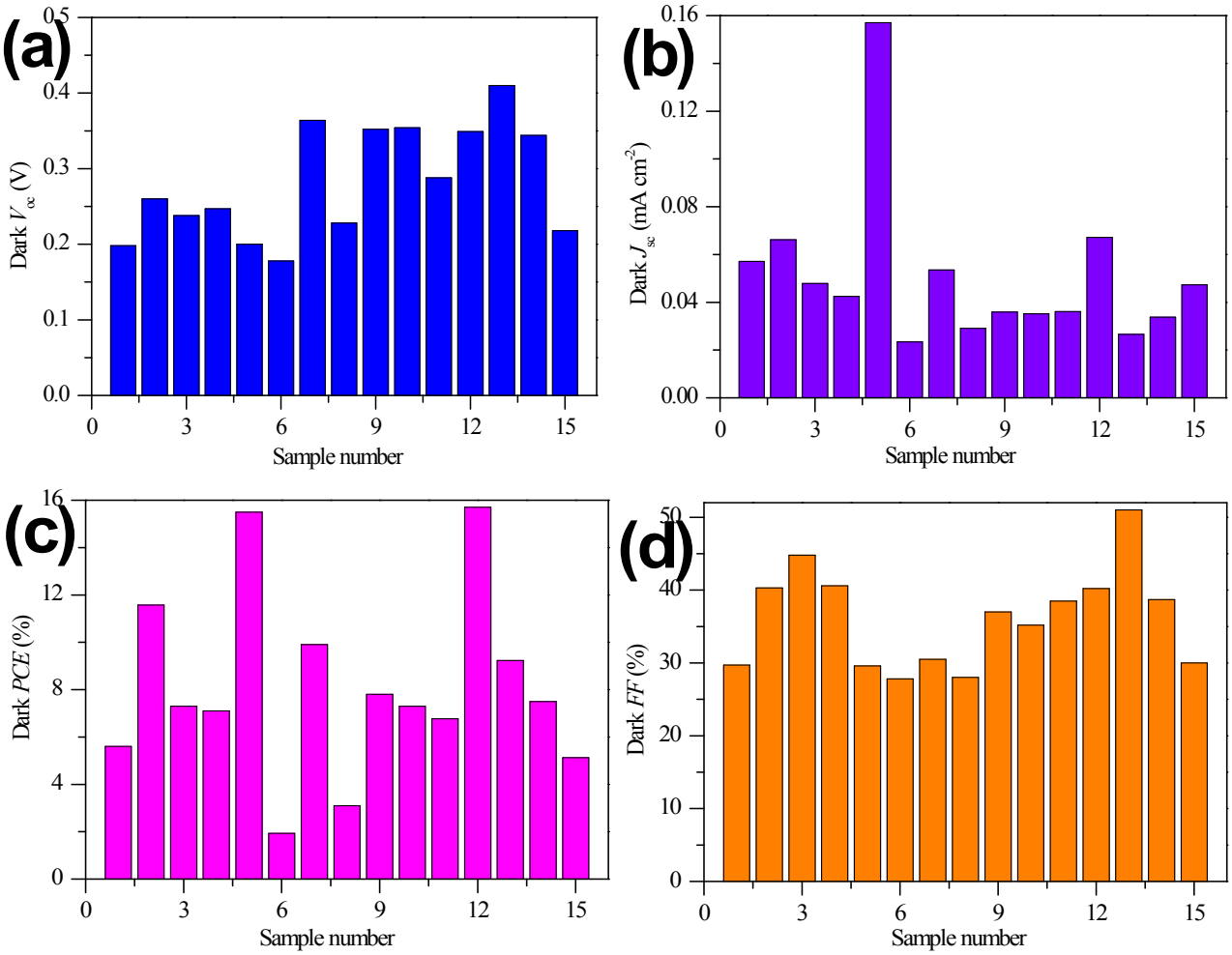


**Fig. S8** The random photovoltaic parameters for all-weather solar cells sensitized with CQDs at a heating time of 15 h.

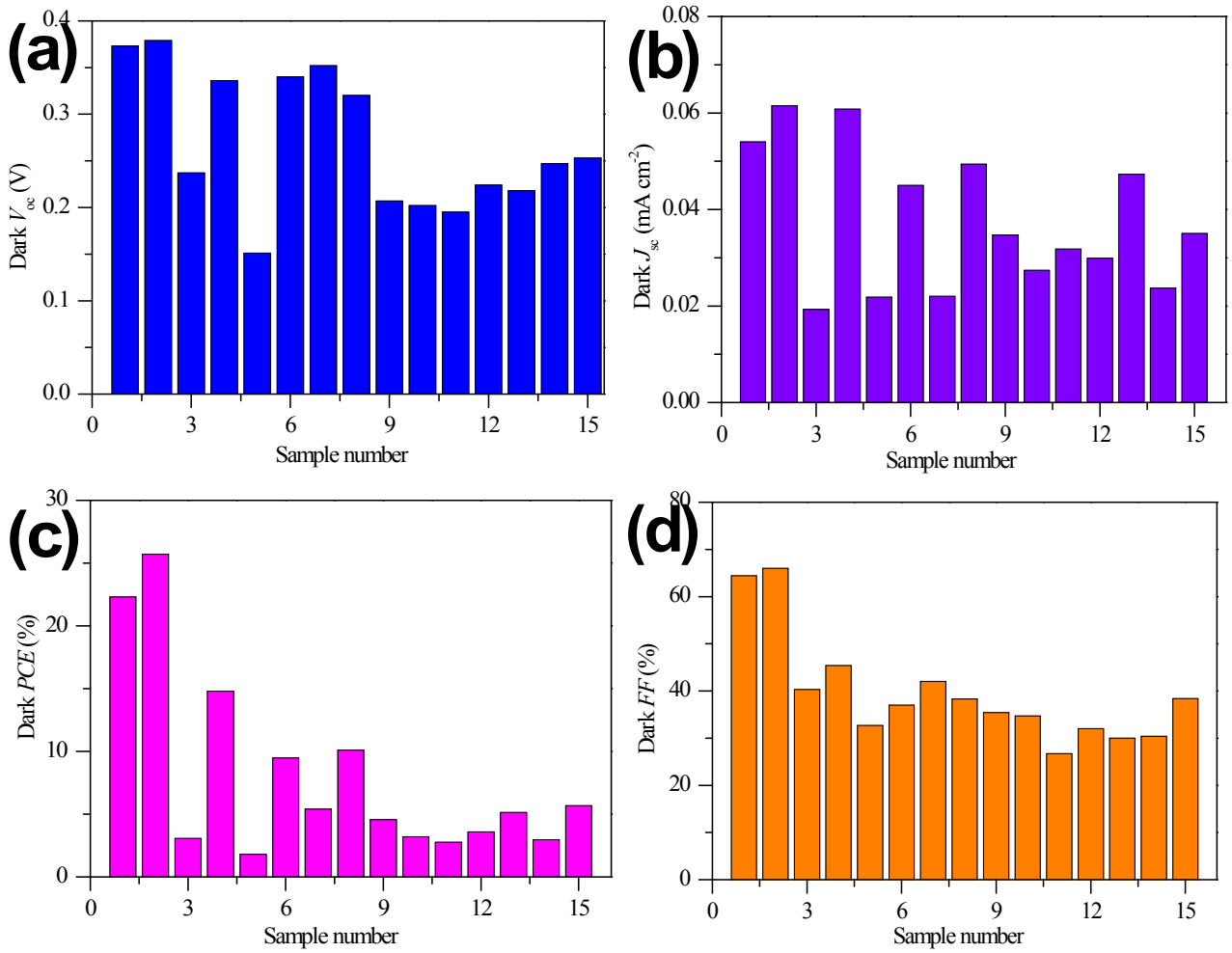


**Fig. S9** The random photovoltaic parameters for all-weather solar cells sensitized with CQDs at a heating time of 20 h.

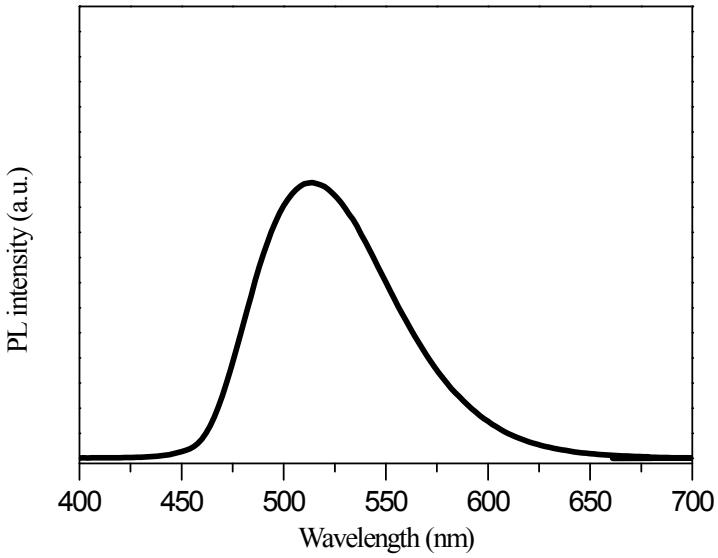


**Fig. S10** The PL emission spectrum of green-emitting LPP phosphors under 330 nm light excitation.

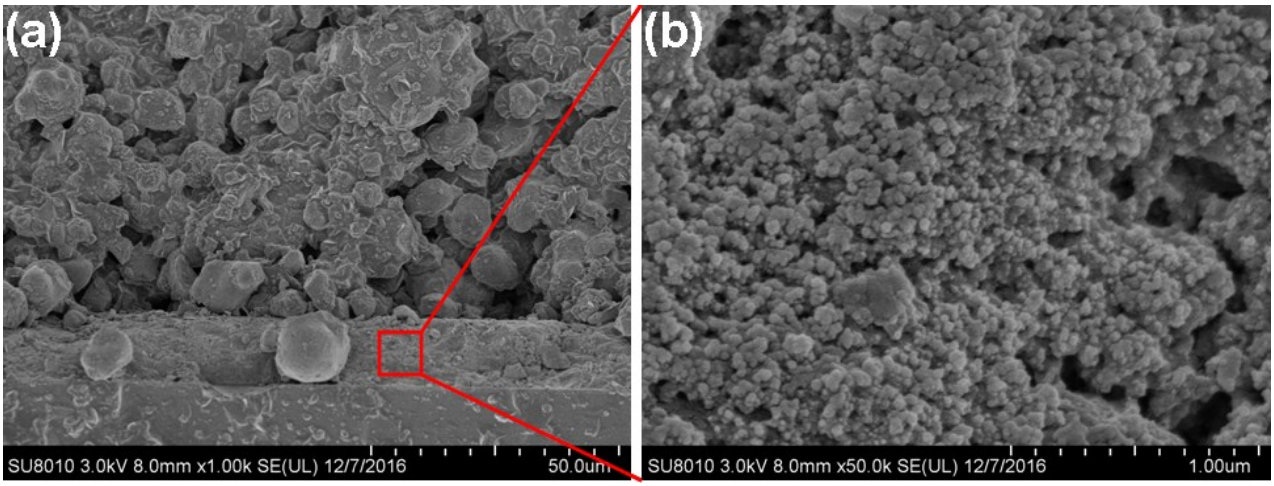


**Fig. S11** The PL emission spectrum of green-emitting LPP phosphors under 330 nm light excitation.

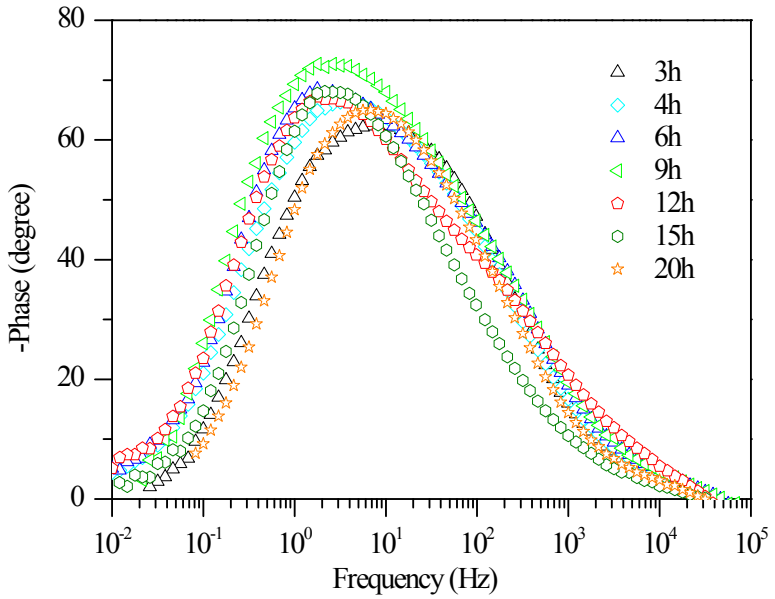


**Fig. S12** The Bode EIS plots for all-weather solar cells with CQD sensitized *m*-$TiO_2$/LPP photoanodes.

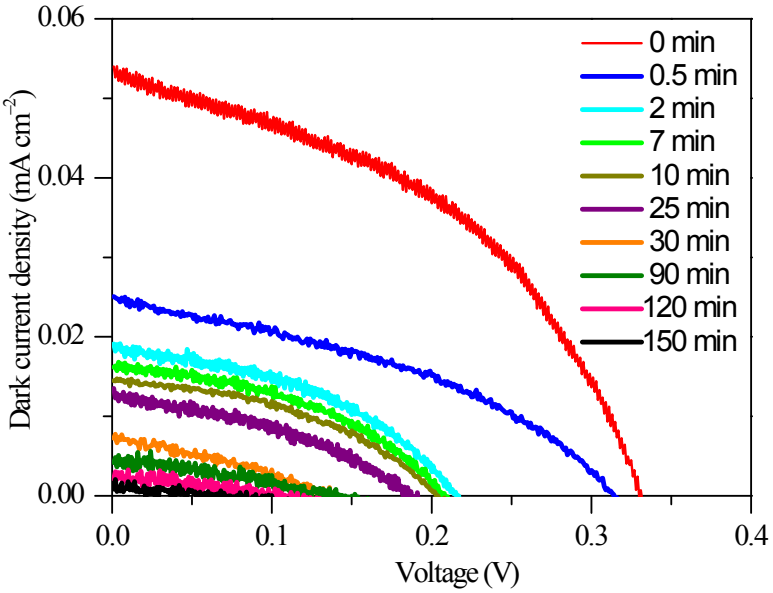


**Fig. S13** The dark *J*–*V* curves for all-weather solar cells with CQD sensitized *m*-$TiO_2$/LPP photoanode at various decay times. The heating time for CQDs is 9 h.