

Electronic Supplementary Information (ESI)

**Integration of Fiber Dye-Sensitized Solar Cells with Luminescent
Solar Concentrators for High Power Output**

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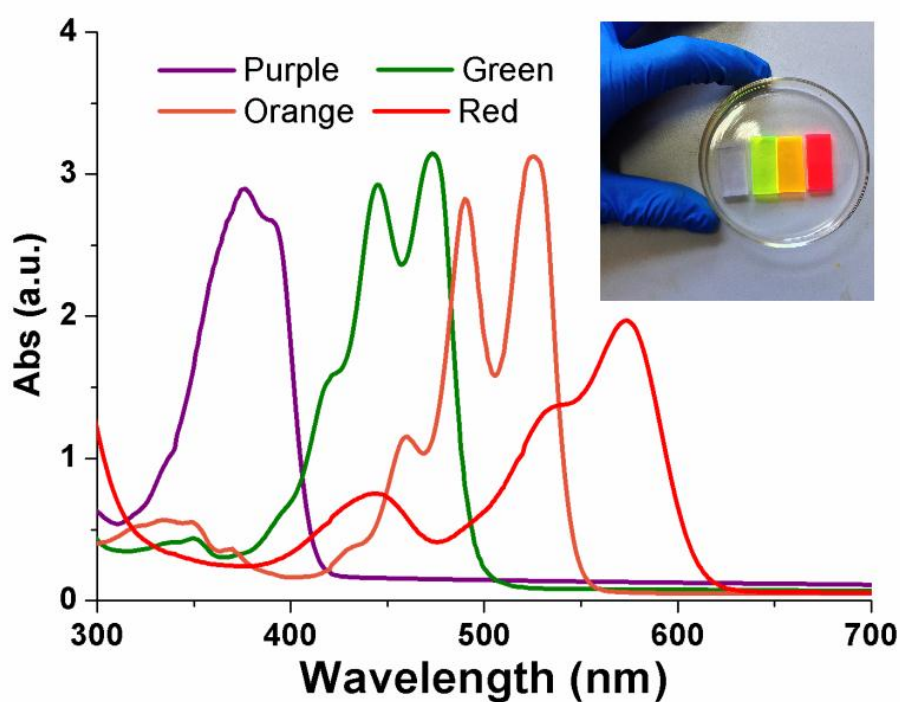
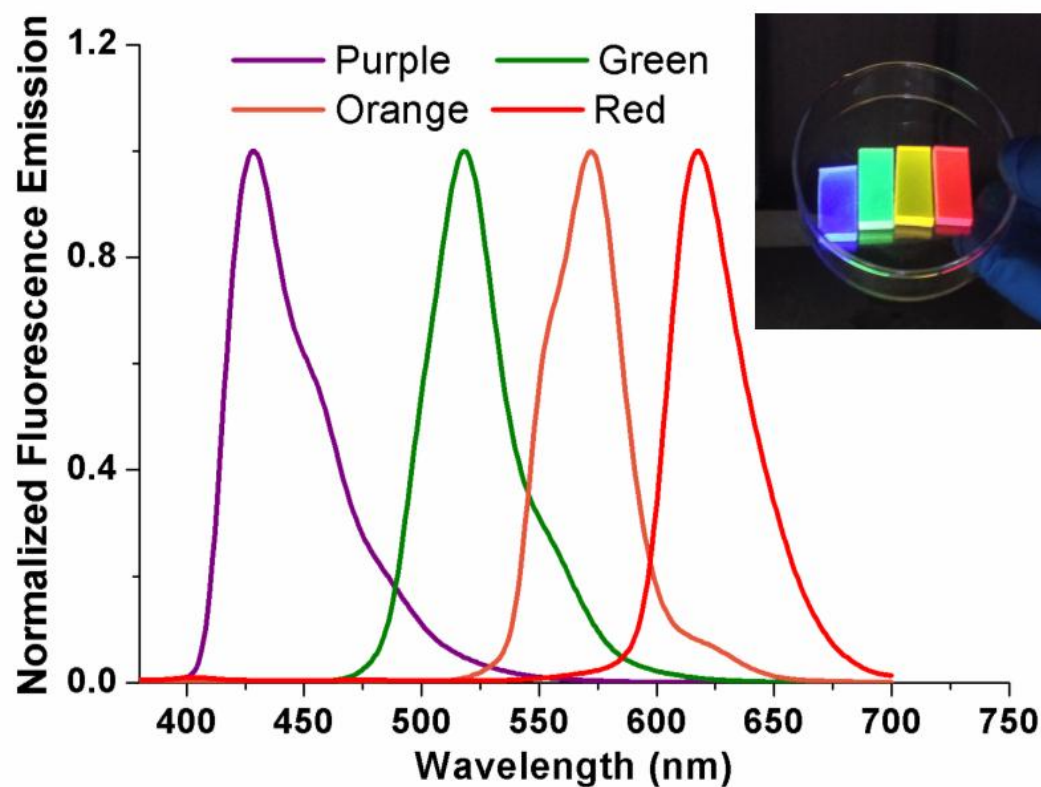


Figure S1 Absorption spectrum of the LSCs. The inset picture is a common optical

14 photograph of the LSCs pieces ($1.3 \times 2.6 \times 0.3 \text{ cm}^3$).

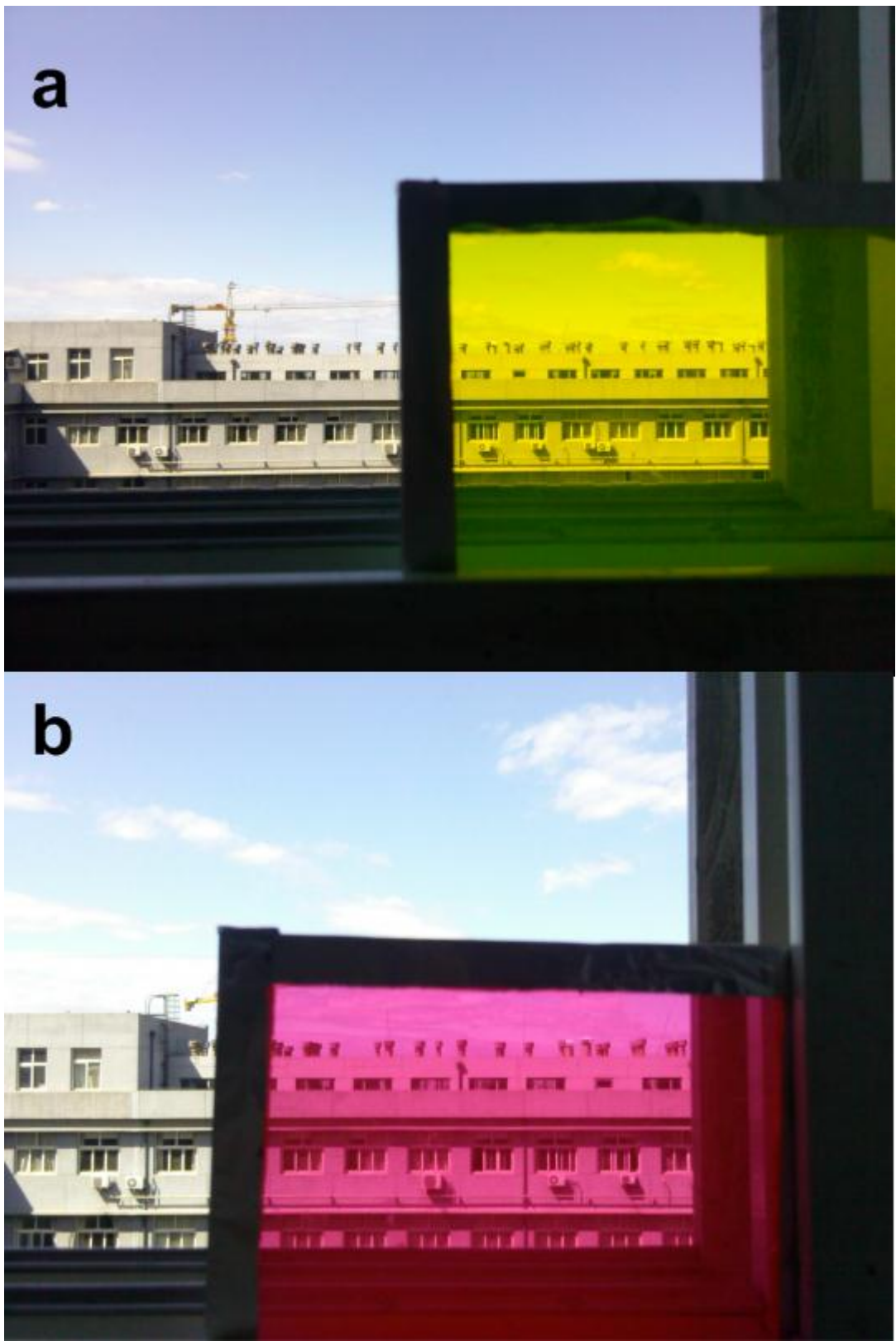


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16 **Figure S2** Fluorescence emission spectrum of the LSCs. The inset picture is the

17 emitting scene of the LSCs pieces ($1.3 \times 2.6 \times 0.3 \text{ cm}^3$) at 365 nm UV light

18 irradiation.

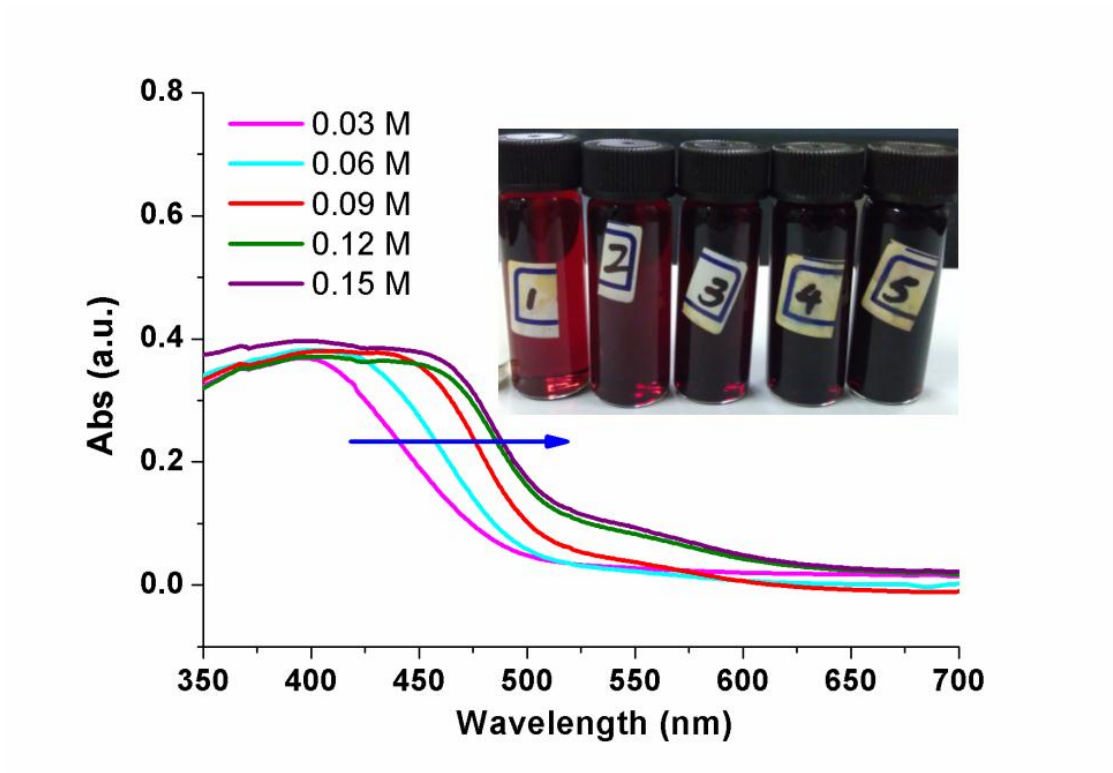


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20 **Figure S3** Embedding well-packaged semi-transparent green (a) and red (b)

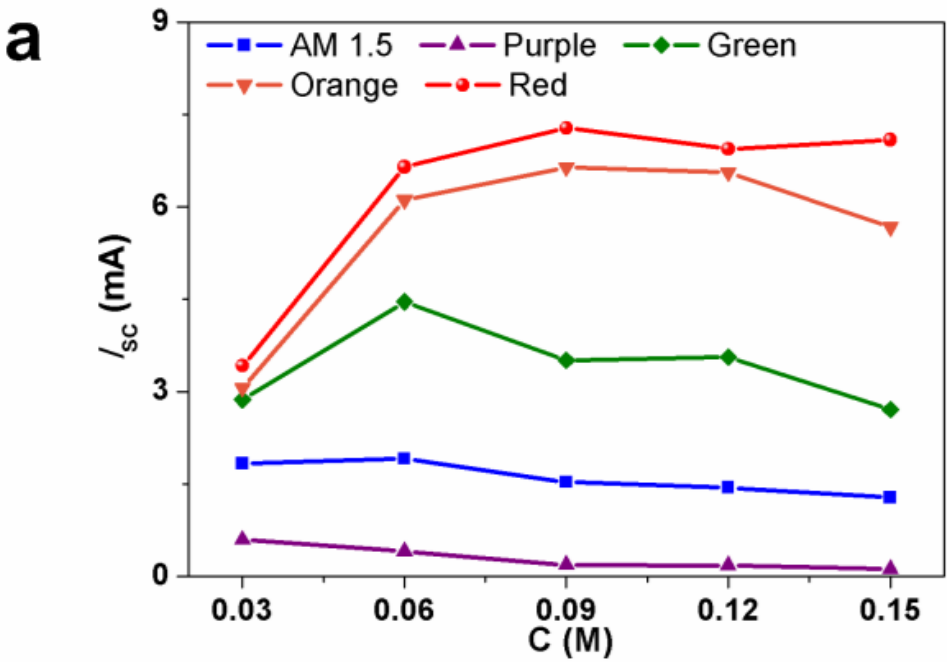
21 FSDC-LSC solar device into the window. The illumination area of each LSC is 70.56

22 cm². The FDSC is “hidden” in the frame structure.

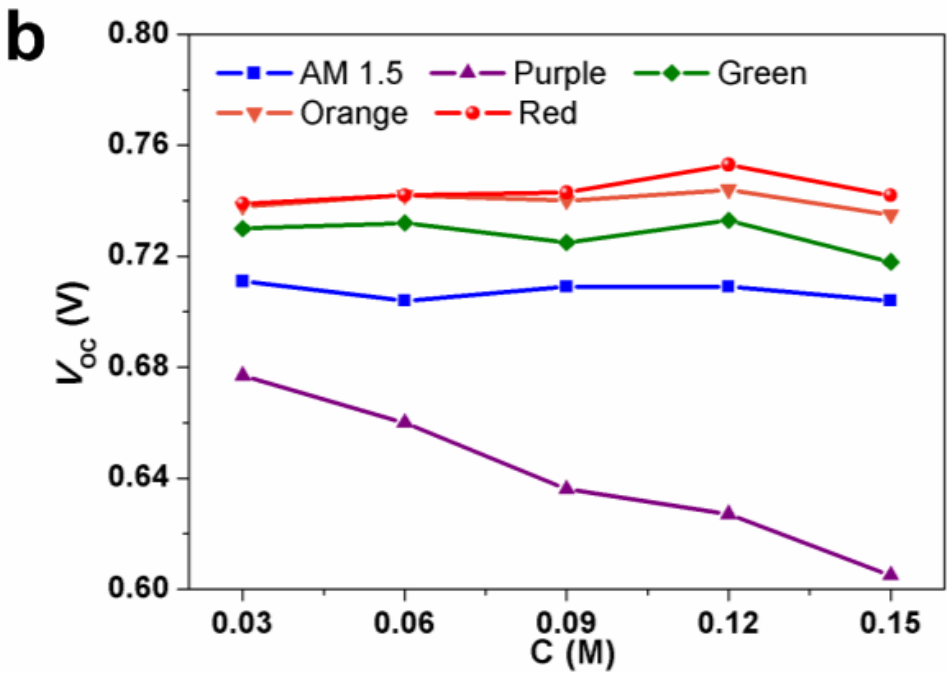


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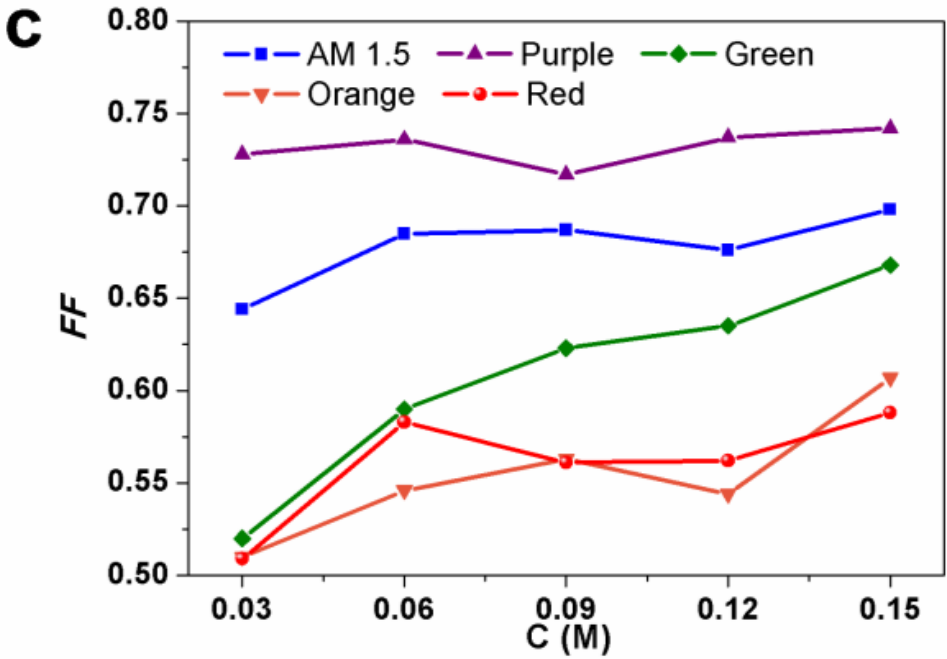
24 **Figure S4** The absorption spectrum of the electrolyte thin film (approximately 60 μm)
25 with different I_2 concentrations. The inset shows the optical photograph of the
26 electrolyte from 0.03 M to 0.15 M corresponding to **No. 1** to 5.



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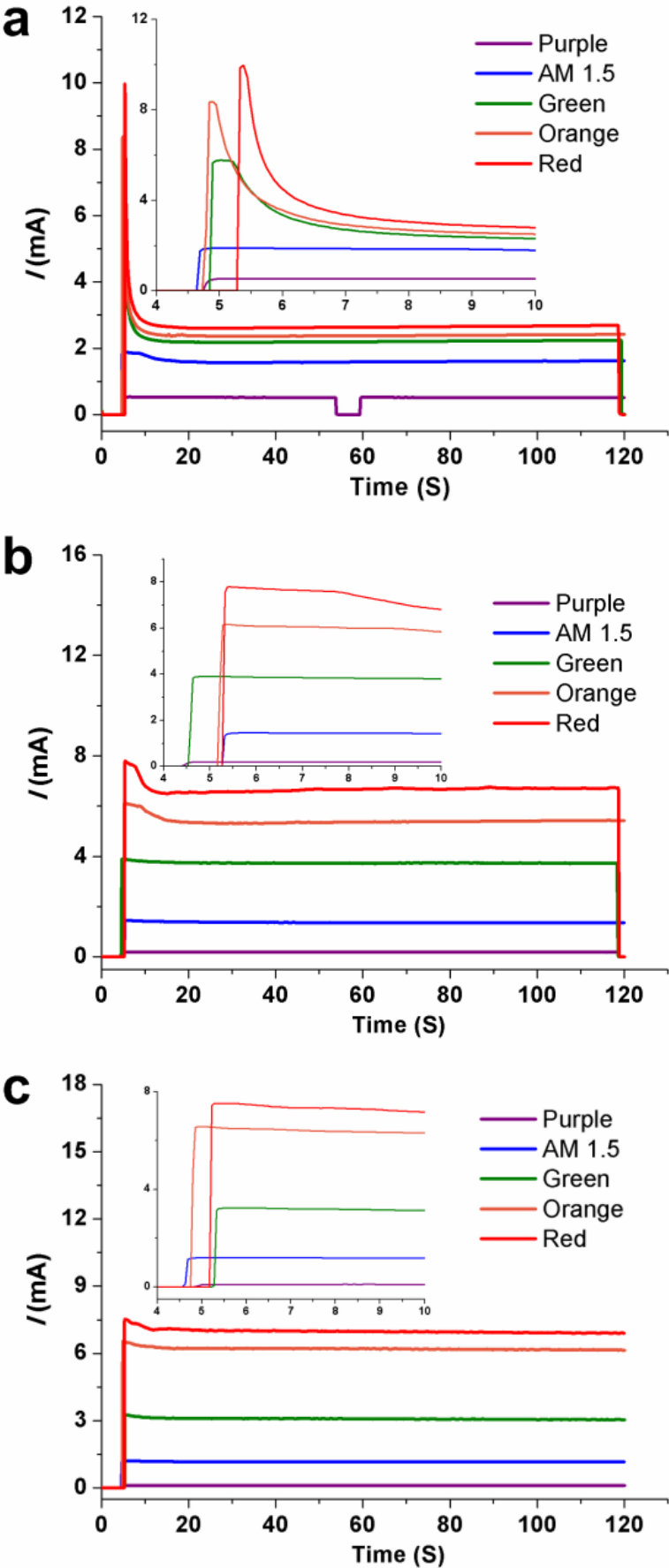


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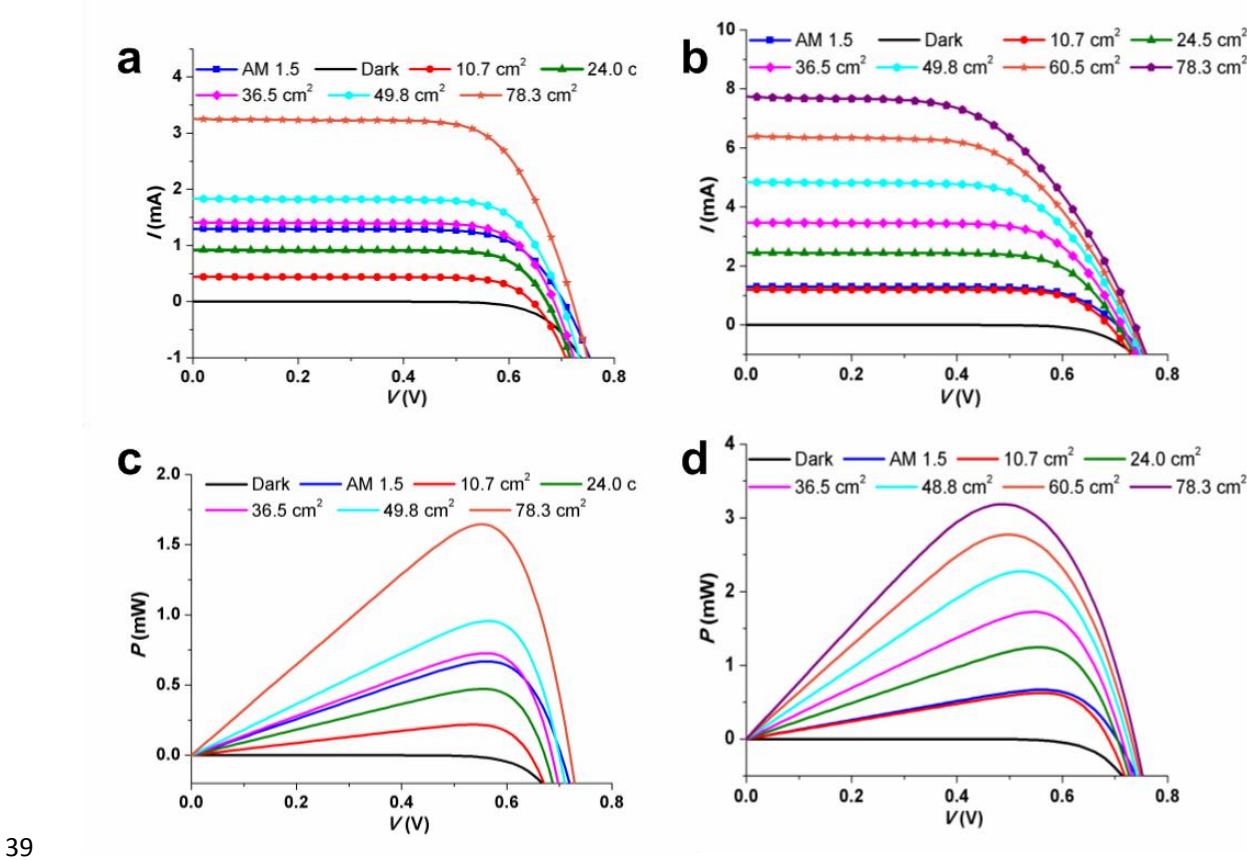


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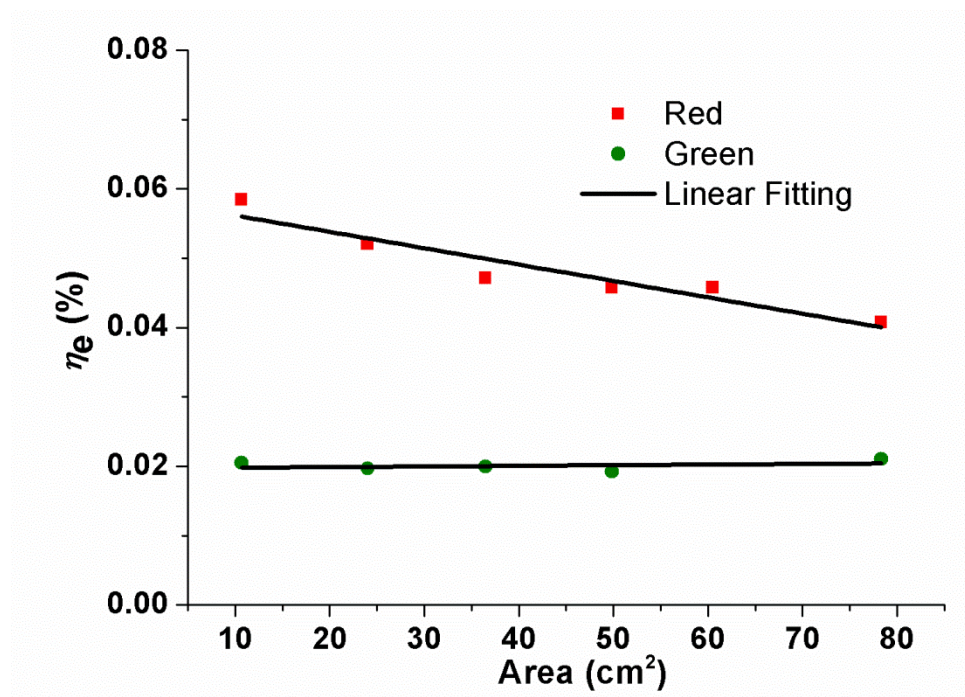
Figure S5 *I*_{sc} (a), *V*_{oc} (b) and *FF* (c) of typical FDSC-LSC solar devices with different *I*₂ concentrations. The illumination area of each LSC is 70.56 cm². The FDSC is 5.50 cm in length.



34 **Figure S6** Persistent current at 0 V of typical FDSC–LSC solar devices in 120
35 seconds with I₂ concentrations of 0.03 (a), 0.09 (b), and 0.15 M (c). The inset shows
36 the enlargement during the first 10 s. The illumination area is 78.32 cm². The FDSC is
37 10.30 cm in length.
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39
40 **Figure S7** Current–voltage (a and b) and power–voltage (c and d) curves of typical
41 FDSC–LSC solar devices with different light-collecting areas. In the experiment, LSC
42 was green (a and c) and red (b and d), respectively. The maximum illumination area of
43 each LSC is 78.32 cm². The FDSC is 5.50 cm in length. “AM 1.5” represents the case
44 that the FDSC is tested without any LSC. The I₂ concentration is 0.12 M.



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47 **Figure S8** Electrical efficiencies of typical FDSC–LSC solar devices with different
 48 illumination areas. In the experiment, LSC was green and red. The maximum
 49 illumination area of each LSC is 78.32 cm². Each FDSC is 5.50 cm in length. The I₂
 50 concentration is 0.12 M.

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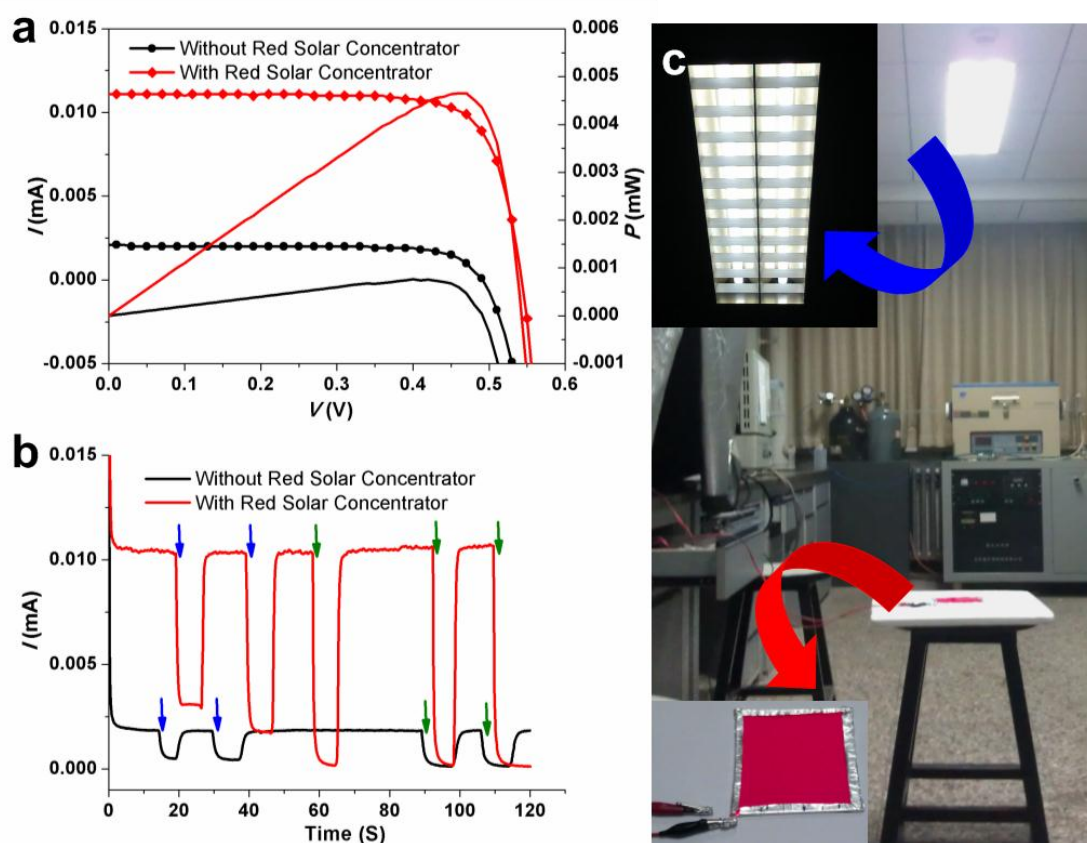


Figure S9 Current–voltage curves (a) and photocurrent response (b) of typical FDSC-LSC solar device with and without red LSC. (Blue arrow: LSC covered with a sheet of aluminum foil; green arrow: light off.) Test scene under weak light intensity in the room (c). The inset shows the daylight lamp (enlarged in the upper left corner) and the FDSC–LSC solar device (enlarged in the lower left corner). A piece of A4 paper is used as substrate. Light intensity was evaluated by *V*_{oc} of a standard silicon solar cell (*V*_{oc} = 0.118 V). The illumination area of each LSC is 78.32 cm². The FDSC is 5.50 cm in length.

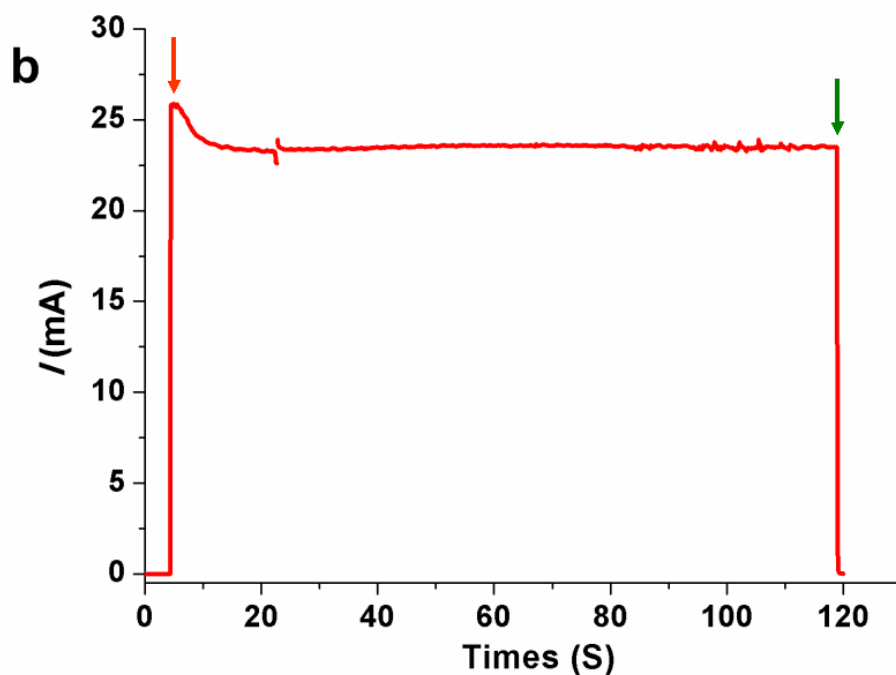
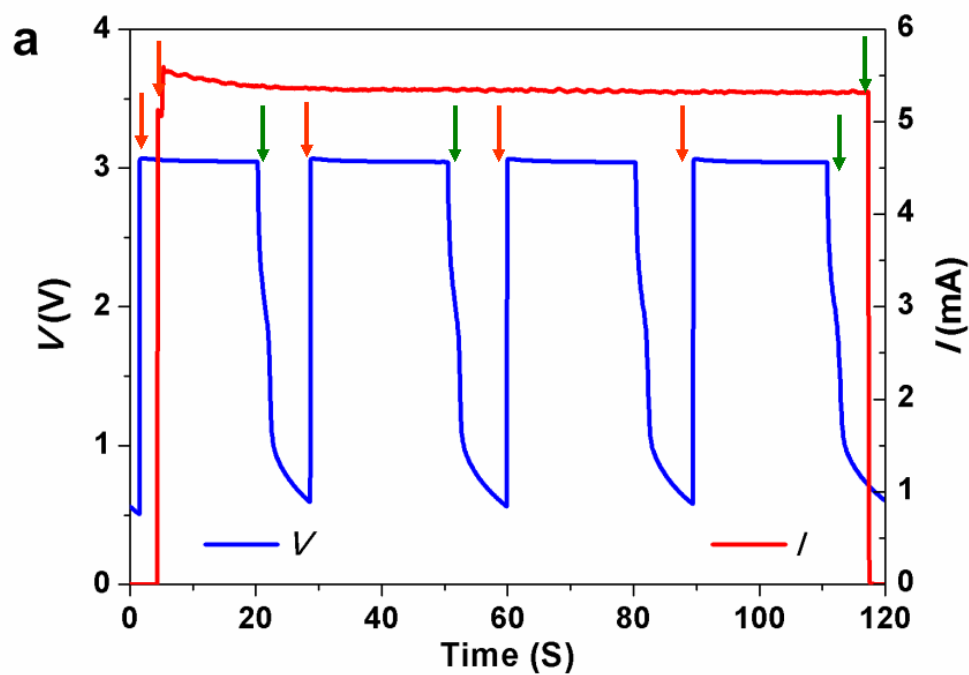


Figure S10 Sustained short circuit current (red line) and open circuit voltage (blue line) in 120 seconds of the FDSC-LSC solar (red) module with four FDSCs in series (a) and parallel (b) (Red arrow: light on; Green arrow: light off.) . The illumination area of each LSC is 70.56 cm². All the four FDSCs are 5.50 cm in length.

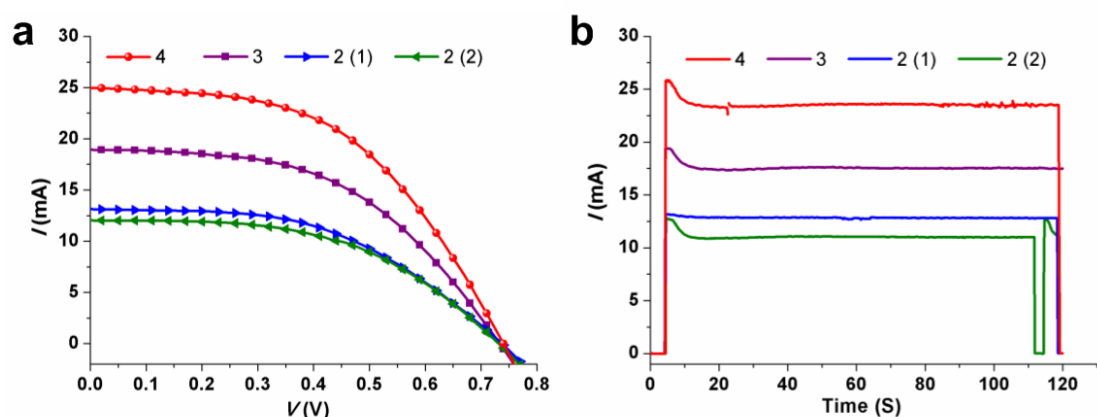


Figure S11 Current–voltage curves (a) and short current response (b) of the FDSC–LSC (red) solar module with two to four FDSCs in parallel, which is labeled as 2, 3 and 4, respectively.. The FDSC–LSC (red) solar module with two FDSCs in parallel is fabricated twice and labeled as 2 (1) and 2 (2), respectively. The illumination area of each LSC is 70.56 cm². All the FDSCs are 5.50 cm in length.

Table S1 PV parameters of the FDSC–LSC (red) solar module with two to four FDSCs in parallel

Case	<i>I</i> _{sc} (mA)	<i>V</i> _{oc} (V)	<i>FF</i>	<i>P</i> _{max} (mW)
2 (1)	13.12	0.738	0.489	4.73 (0.450 V, 10.52 mA)
2 (2)	12.03	0.732	0.514	4.52 (0.470 V, 9.62 mA)
3	18.93	0.733	0.502	6.96 (0.470 V, 14.82 mA)
4	24.97	0.740	0.504	9.31 (0.470 V, 19.82 mA)

The FDSC–LSC (red) solar module with two to four FDSCs in parallel is labeled as 2, 3 and 4, respectively. The FDSC–LSC (red) solar module with two FDSCs in parallel is fabricated twice and labeled as 2 (1) and 2 (2), respectively. The voltage and current corresponding to *P*_{max} is provided in the parentheses. The illumination area of each LSC is 70.56 cm². All the FDSCs are 5.50 cm in length.

Video: The FDSC-LSC (red) solar device with four FDSCs in parallel can easily drive

78 a motor. The illumination area of each LSC is 70.56 cm^2 . All the four FDSCs are 5.5
79 cm in length.