

# One-step fabrication of large-area ultrathin MoS<sub>2</sub> nanofilms with high catalytic activity for photovoltaic devices

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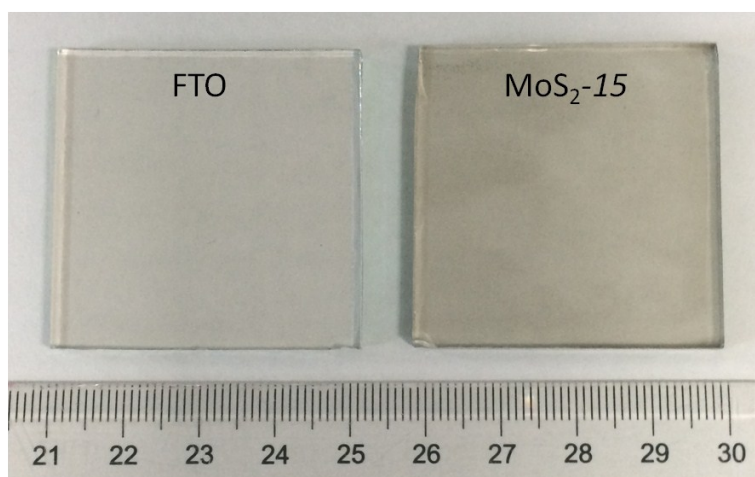
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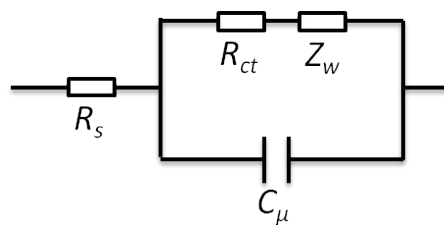
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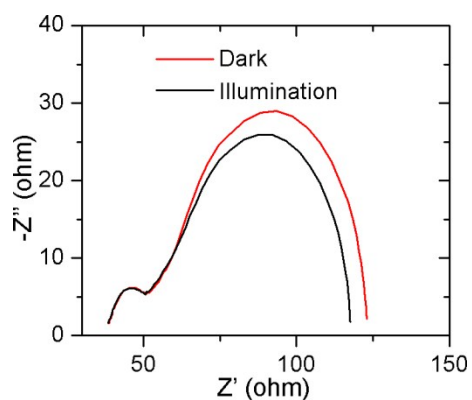
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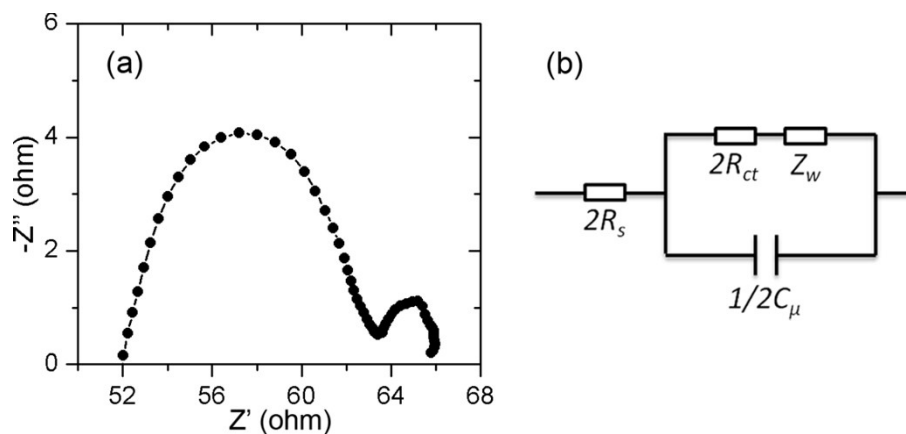
**Figure S1.** Optical photographs of pristine FTO substrate (left) and MoS<sub>2</sub>-15 sample (right) with a large area of 4 cm × 4 cm.



**Figure S2.** Equivalent circuit model of EIS analysis for the DSSCs.



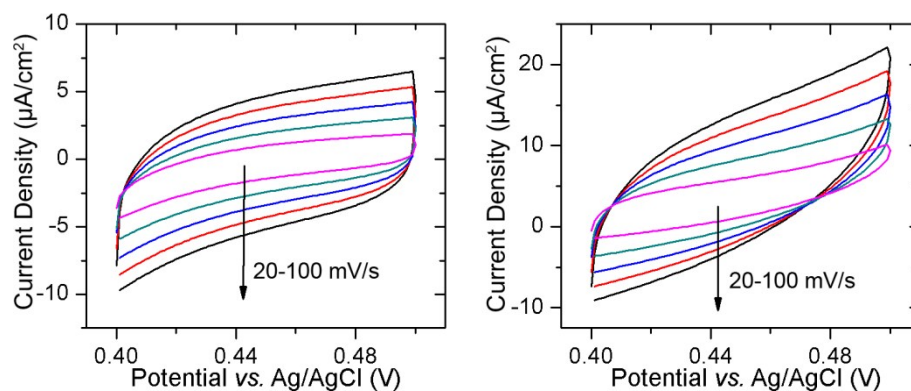
**Figure S3.** Nyquist plots of MoS<sub>2</sub>-15 based DSSC under illumination (black line) and dark condition (red line).



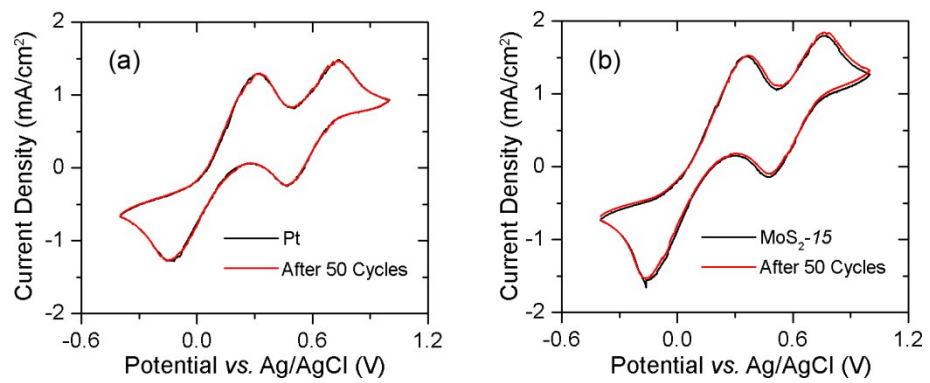
**Figure S4.** (a) Nyquist plot of symmetrical electrochemical cell with the structure of MoS<sub>2</sub>-15/electrolyte/MoS<sub>2</sub>-15. (b) Equivalent circuit model of the symmetrical electrochemical cell.

**Table S1.** EIS parameters of the symmetrical electrochemical cell with a structure of MoS<sub>2</sub>-15/electrolyte/MoS<sub>2</sub>-15.

Electrodes	$2R_s/\Omega$	$2R_{ct}/\Omega$	$1/2C_\mu/\mu\text{F}$
MoS <sub>2</sub> -15	52.5	10.1	16.1



**Figure S5.** CV curves of (a) Pt and (b) MoS<sub>2</sub>-15 based counter electrodes taken in a selected potential range without Faradaic current under different scanning rates (20, 40, 60, 80, and 100 mV/s), respectively.



**Figure S6.** CV curves of (a) Pt and (b) MoS<sub>2</sub>-15 based counter electrodes before and after 50 cycles with a scanning rate of 100 mV/s, respectively.