

# Facile fabrication of PtNP/MWCNT nanohybrid films for flexible counter electrode in dye-sensitized solar cells

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## Electronic Supporting Information

Table S1 Photovoltaic parameters of the DSSCs using PtNP/MWCNT/POEM CEs with different weight ratios of 2/1/30 and 2/1/10, measured at  $100 \text{ mW cm}^{-2}$  light intensity.

Table S2 Photovoltaic parameters of the DSSCs using PtNP/MWCNT/POEM CEs with different thicknesses of 380 nm and 1  $\mu\text{m}$ , measured at  $100 \text{ mW cm}^{-2}$  light intensity.

Figure S1 (a) Photograph showing the PtNP/MWCNT dispersed with and without POEM in ethanol (0.1 wt% in ethanol). The photographs were taken 1 week after the preparation of the dispersed carbon materials. (b) The stability of PtNP/MWCNT with and without POEM dispersion was monitored by its absorbance (at 261 nm) in the visible range, which stayed nearly constant over a period of 72 h.

Figure S2 Photocurrent density–voltage curve of the DSSC using a s–Pt CE with a thinner Pt thickness of *ca.* 20 nm CE, measured at  $100 \text{ mW cm}^{-2}$  light intensity.

Figure S3 Photocurrent density–voltage curves of the DSSCs using PtNP/MWCNT/POEM CEs with various ratios of 2/1/30 and 2/1/10, measured at  $100 \text{ mW cm}^{-2}$  light intensity.

Figure S4 Photocurrent density–voltage curves of the DSSCs using PtNP/MWCNT/POEM CEs with different thicknesses of 380 nm and 1  $\mu\text{m}$ , measured at  $100 \text{ mW cm}^{-2}$  light intensity.

Figure S5 SEM cross sectional images of PtNP/MWCNT films with different

thicknesses of (a) 380 nm, (b) 1  $\mu\text{m}$ .

**Table S1**

<b>PtNP/MWCNT/POEM</b> <b>weight ratio</b>	<b><math>V_{OC}</math> (V)</b>	<b><math>J_{SC}</math> (mA cm<sup>-2</sup>)</b>	<b><math>FF</math></b>	<b><math>\eta</math> (%)</b>
1/2/10	0.70	17.49	0.73	8.67
1/2/30	0.68	17.68	0.73	7.95

**Table S2**

<b>PtNP/MWCNT</b> <b>film thickness (nm)</b>	<b><math>V_{OC}</math> (V)</b>	<b><math>J_{SC}</math> (mA cm<sup>-2</sup>)</b>	<b><math>FF</math></b>	<b><math>\eta</math> (%)</b>
380	0.70	15.68	0.74	7.72
1000	0.70	17.27	0.74	8.49

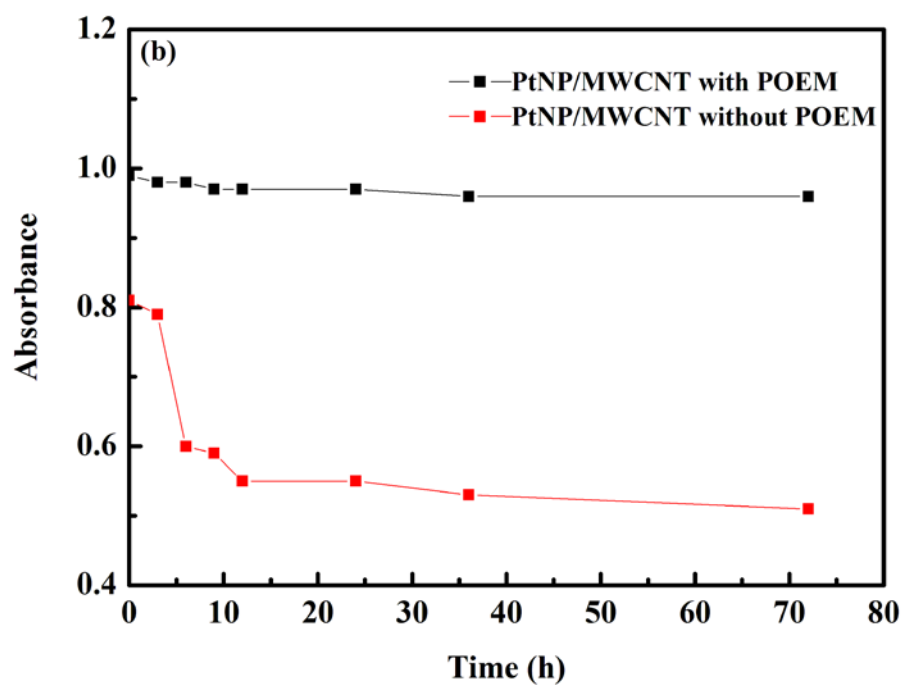
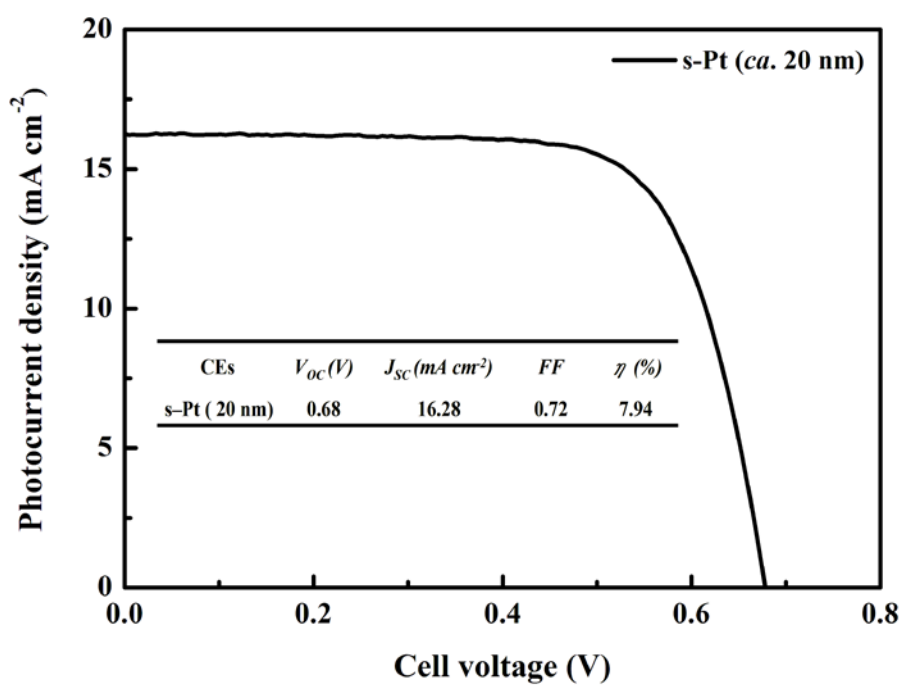
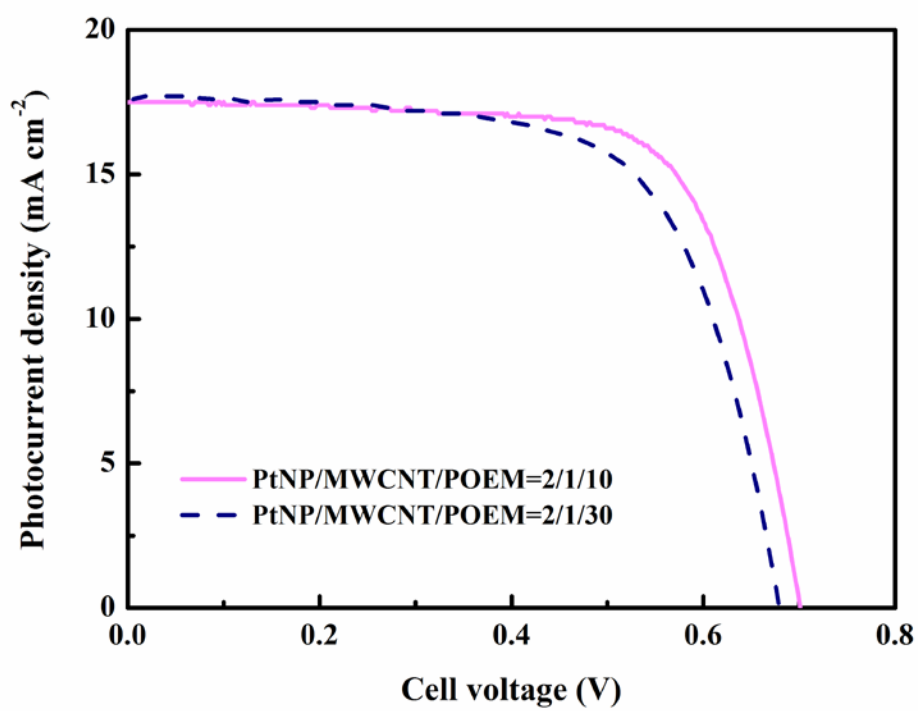


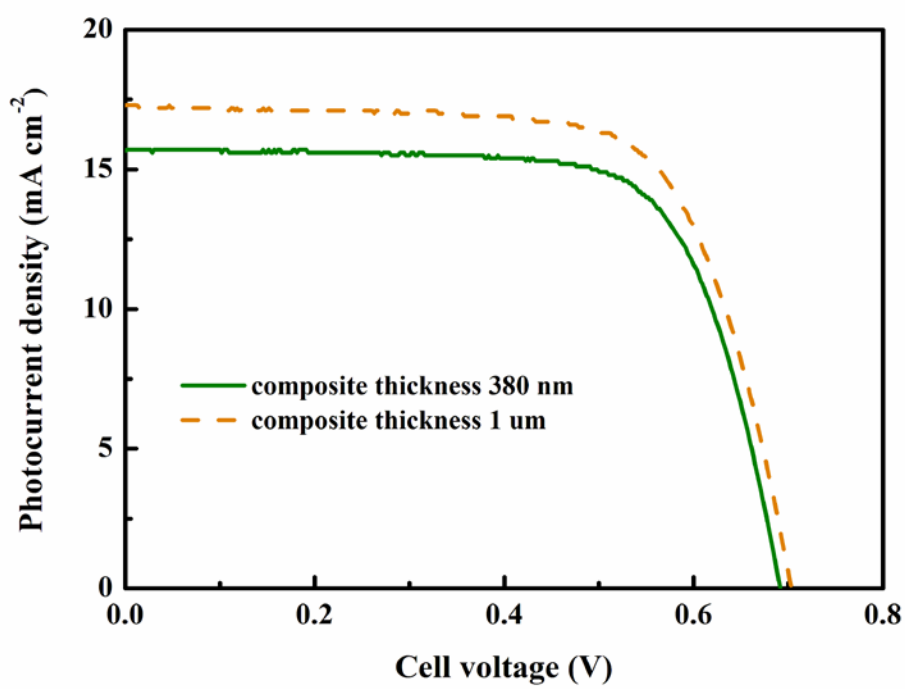
Figure S1



**Figure S2**

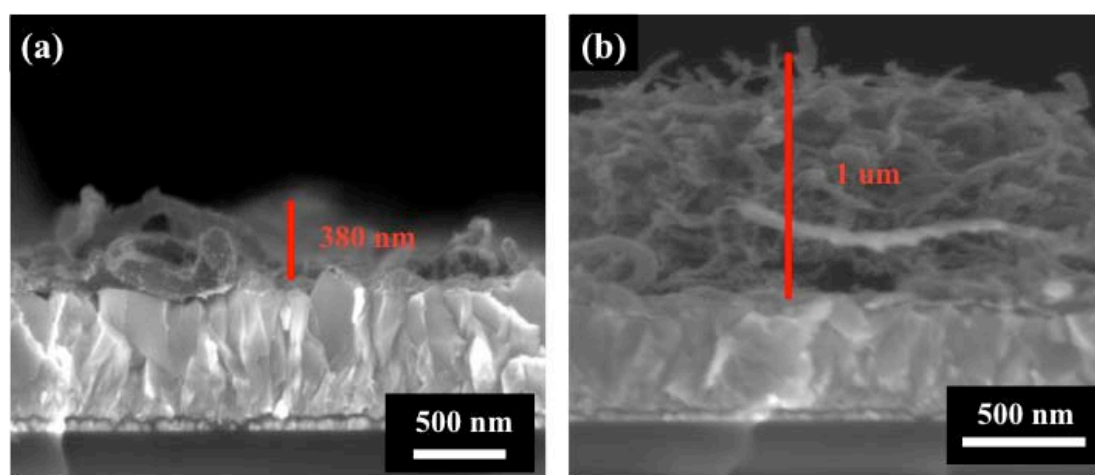


**Figure S3**



**Figure S4**





**Figure S5**