Supplementary Information for:

In-situ fabrication of chalcogenide nanoflake arrays for Hybrid solar cells: the case of In_2S_3/poly (3-hexylthiophene)

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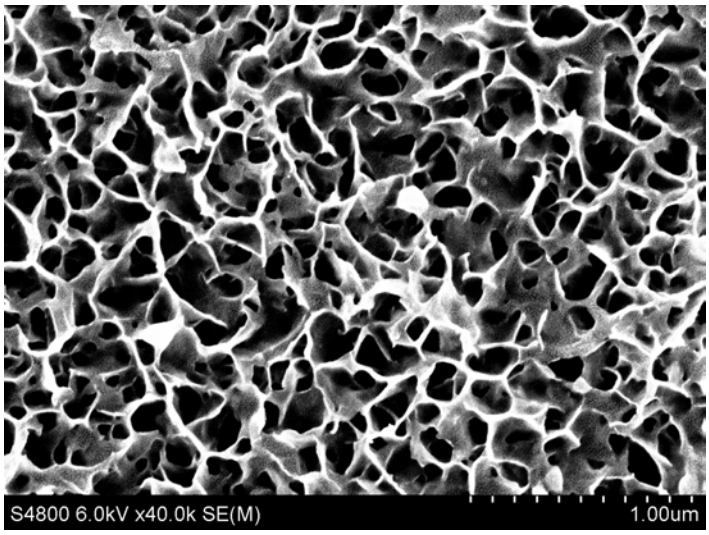

Fig. S1 SEM image of the as-prepared In2S3 film directly fabricated on the ITO substrate without pre-coated a PEDOT:PSS layer.

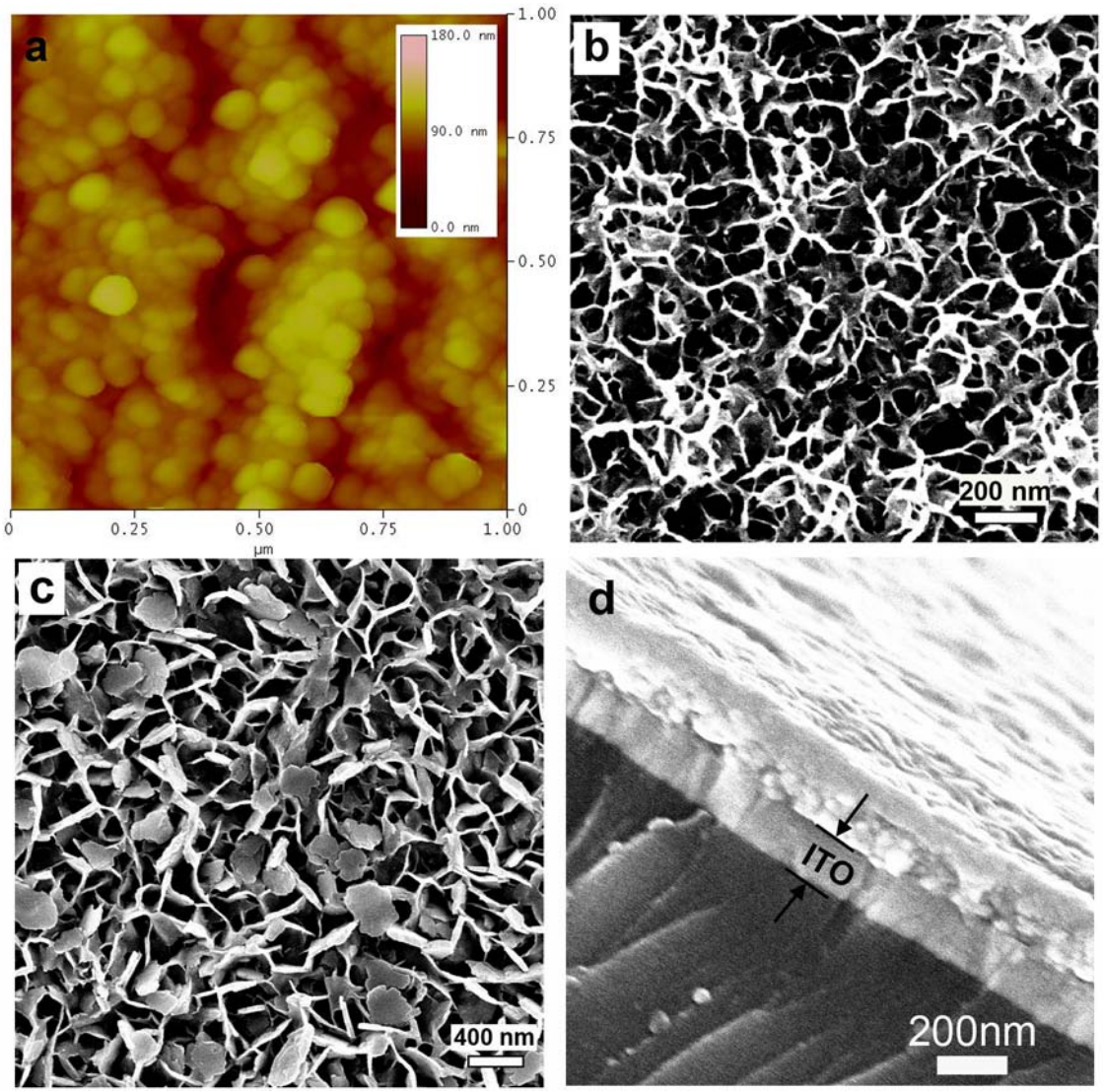

Fig. S2 AFM image (a) of 90 nm thick indium film. SEM images of In_2S_3 film obtained by solvothermal treatment of a 90 nm thick indium film and S powders (b), In_2S_3 film obtained by the solvothermal treatment of a 60 nm thick indium film and 1.0 mmol S powders at 180℃ for 24 h and cross-sectional SEM images (d) of P3HT/ In_2S_3 composite film(d), respectively.

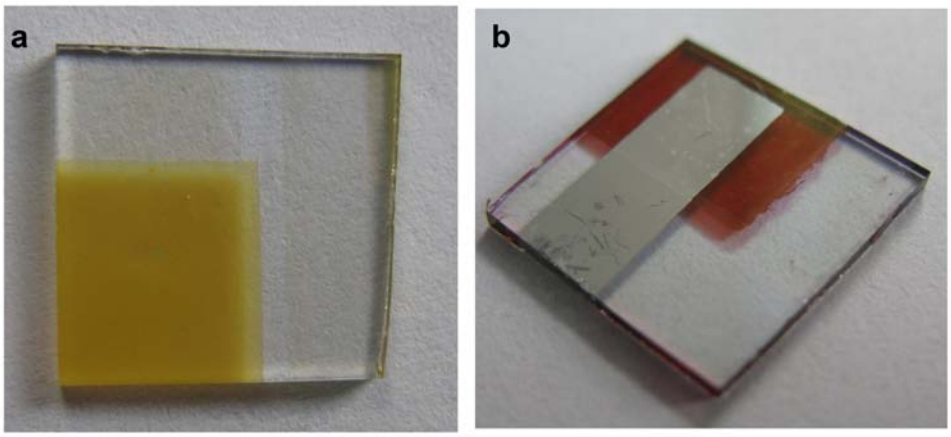

Fig. S3 Photographs of the as-prepared In_2S_3 nanosheet film (yellow region) by solvothermal treatment of a 60 nm thick indium film and 0.25 mmol S powders on the ITO substrate (a) and the as-fabricated solar cell device (ITO/PEDOT:PSS/In_2S_3:P3HT/Al) (b, after tested).

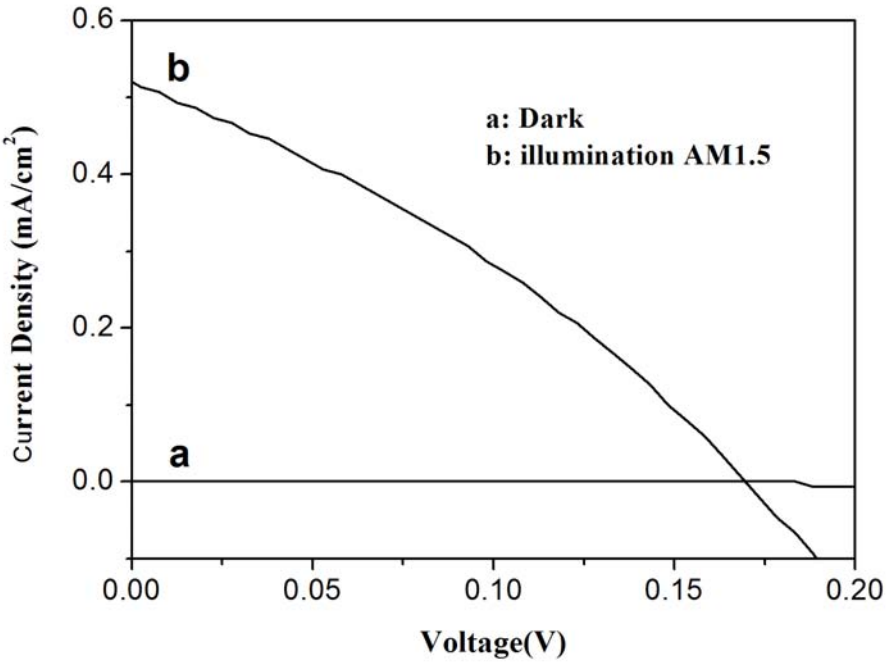

Fig. S4 The current-voltage characteristics of the P3HT/In_2S_3 hybrid device (ITO/In_2S_3:P3HT/Au) in the dark and under simulated AM1.5 illumination (100 $mWcm^{-2}$).

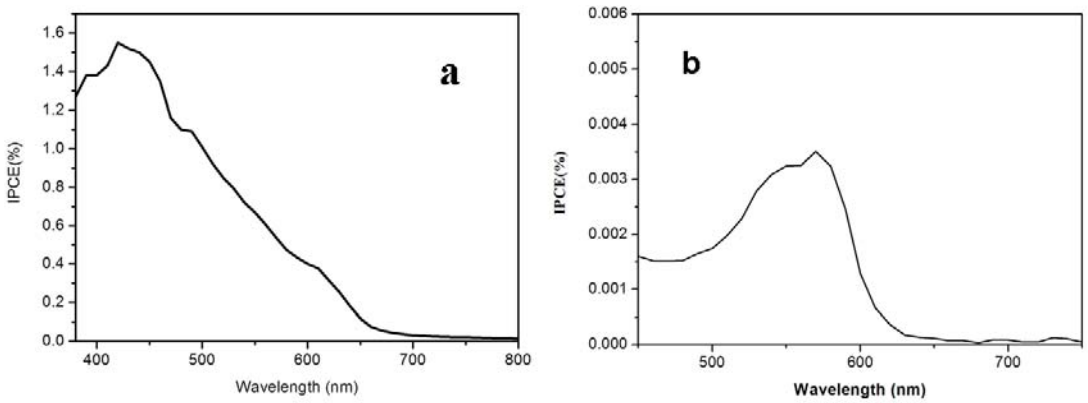

Fig. S5 IPCE curves of the P3HT/ In2S3 hybrid solar cell (a) and the pristine P3HT polymer solar cell (b).

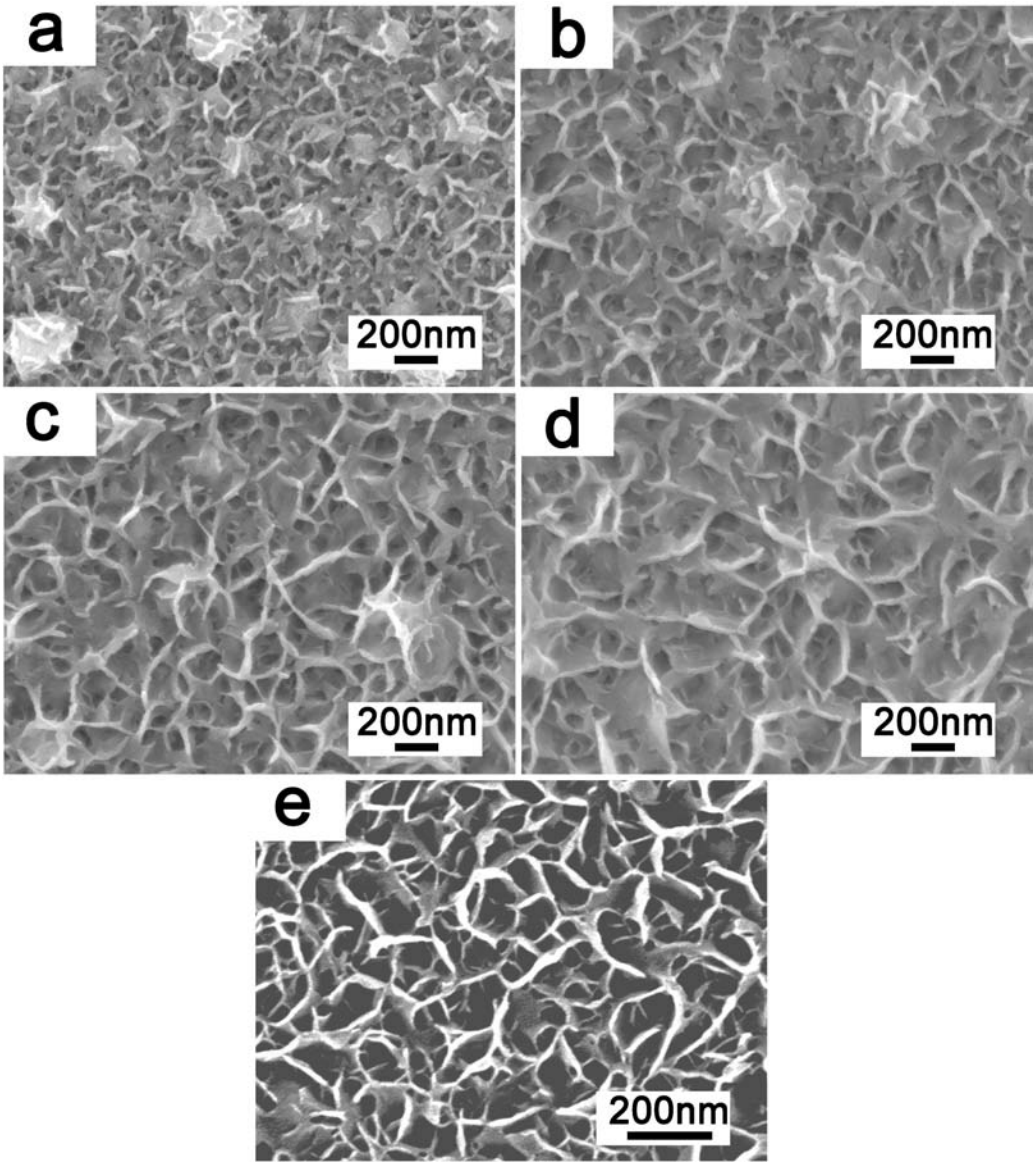

Fig. S6 SEM images of the as-prepared In_2S_3 film obtained by solvothermal treatment of the 60 nm indium film with 0.25mmol S powders at 180 ºC for different reaction time: (a) 0.5 h, (b) 1.5 h, (c) 3 h, (d) 6 h and (e) 12 h.

Table S1 Photovotaic performances of the pristine In_2S_3 solar cell and the pristine P3HT polymer solar cell.

Samples	J_{sc} (mA cm^{-2})	V_{oc} (V)	FF (%)	η (%)
ITO/PEDOT: PSS/In_2S_3/Al	0.0005	0.03	24	4×10^{-6}
ITO/PEDOT: PSS/P3HT/Al	0.009	0.16	30	5×10^{-3}