

Supporting Information

Controlled Growth of an Mo₂C–Graphene hybrid film as an Electrode in Self-Powered Two-Sided Mo₂C–Graphene/Sb₂S_{0.42}Se_{2.58}/TiO₂ Photodetectors

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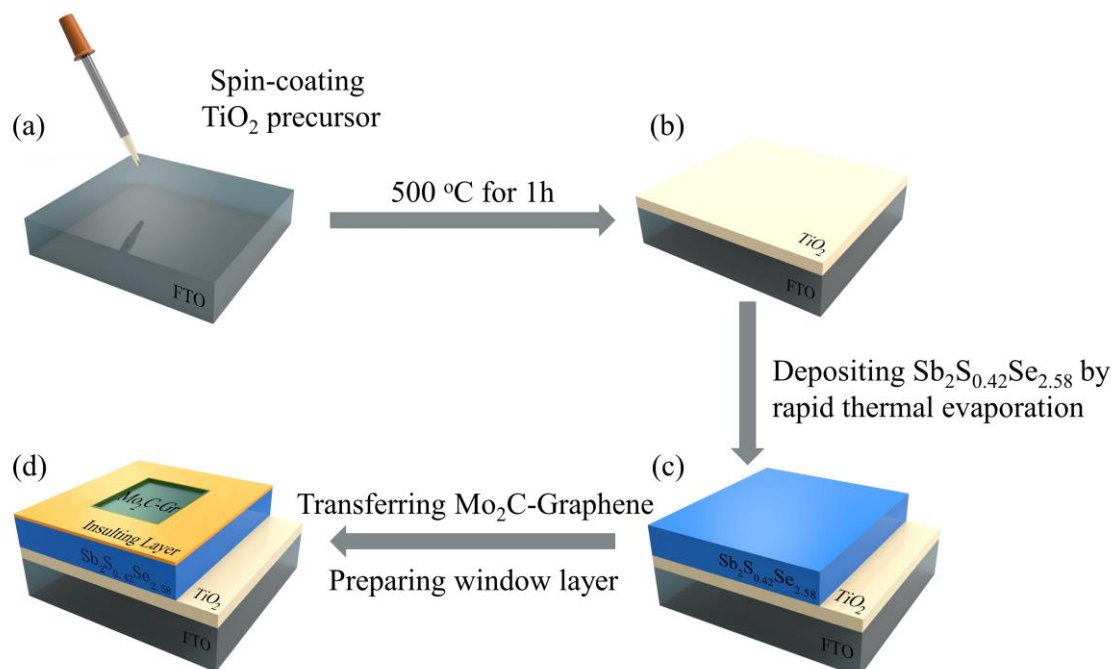


Figure S1. The preparation process of the Mo₂CGr/Sb₂S_{0.42}Se_{2.58}/TiO₂/FTO photodetector.

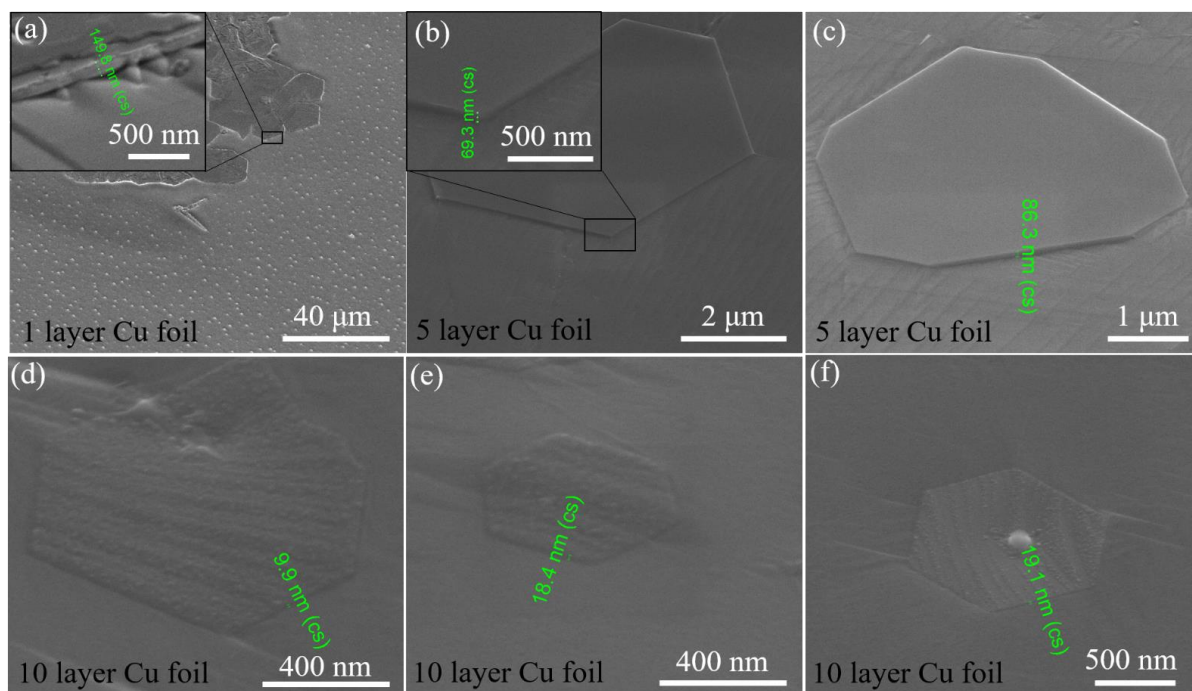


Figure S2. The thickness of Mo₂C crystals grown on various amounts of thickness of the Cu layer: (a) 25 μm, (b) and (c) 125 μm, (d) to (f) 250 μm.

kV : 200.00 Azimuth: 0.00 Elevation:35.00 AmpT : 102.4
 Detector Type:SUTW, Sapphire Resolution:138.23 Lsec:8

Element	Weight %	Atomic %
C K	5.7	32.7
MoK	94.3	67.3
Total	100.0	100.0

Element	Net Inte.	Bkgd Inte.	Inte. Error	P/B
C K	21.36	16.14	11.81	1.32
MoK	236.74	13.65	2.36	17.35

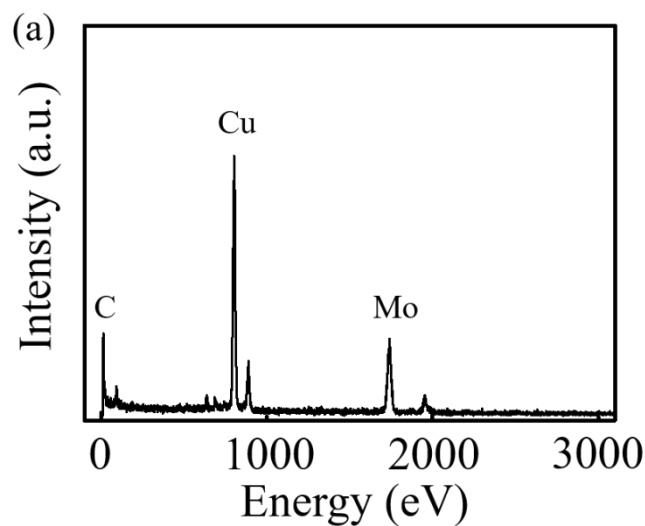


Figure S3. The energy dispersive spectrometer (EDS) spectra and atomic ratio of Mo₂C.

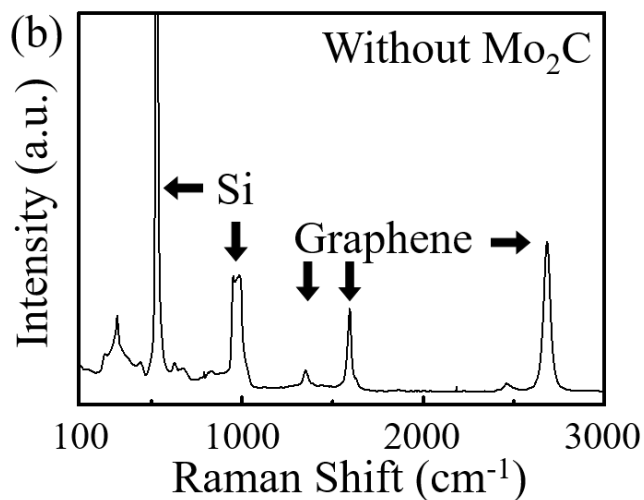
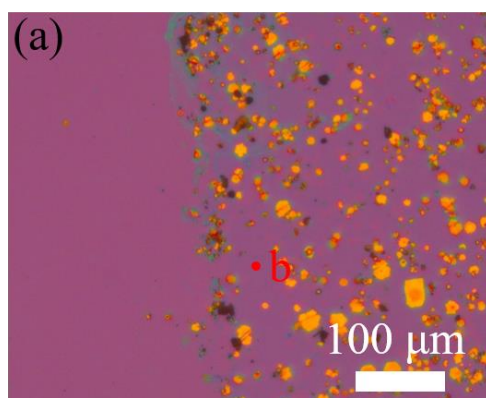


Figure S4. Characterization and analysis of graphene in the Mo₂C–graphene

Structure: (a) The optical image of Mo₂C–Gr. (b) The Raman spectra of graphene.

EDAX ZAF Quantification (Standardless)						
Element Normalized						
SEC Table : Default						
Element	Wt %	At %	K-Ratio	Z	A	F
SeL	44.24	51.73	0.3576	1.0333	0.7816	1.0008
S K	2.82	8.13	0.0300	1.3031	0.8103	1.0052
SbL	52.94	40.14	0.4928	0.9490	0.9810	1.0000
Total	100.00	100.00				
Element	Net Inte.	Bkgd Inte.	Inte. Error	P/B		
SeL	116.82	6.81	1.15	17.15		
S K	10.49	5.26	5.12	1.99		
SbL	40.34	4.64	2.05	8.69		

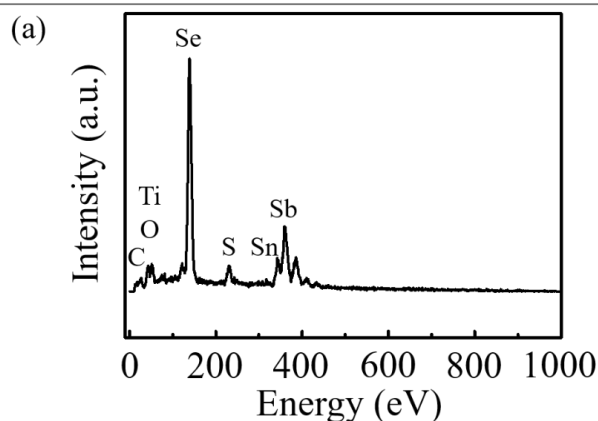


Figure S5. The energy dispersive spectrometer (EDS) spectra and atomic ratio of Sb₂S_{0.42}Se_{2.58}/TiO₂/FTO.

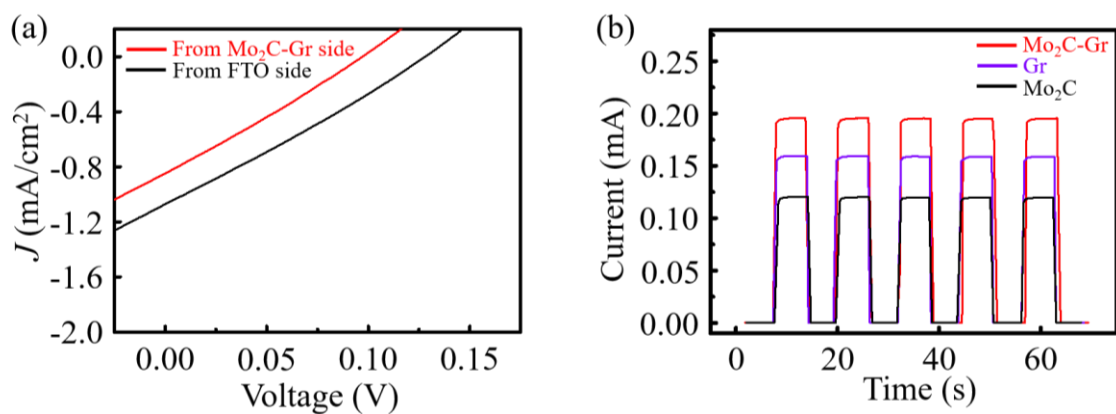


Figure S6. (a) Current-voltage curves of the Mo₂C-Gr/Sb₂S_{0.42}Se_{2.58}/TiO₂ photodetector under 1.5 G illumination (100 mW cm⁻²) from the Mo₂C–Gr (red) side and FTO side

(black). **(b)** Current response of $\text{Mo}_2\text{C}/\text{Sb}_2\text{S}_{0.42}\text{Se}_{2.58}/\text{TiO}_2$, $\text{Mo}_2\text{C}-\text{Gr}/\text{Sb}_2\text{S}_{0.42}\text{Se}_{2.58}/\text{TiO}_2$ and $\text{Gr}/\text{Sb}_2\text{S}_{0.42}\text{Se}_{2.58}/\text{TiO}_2$ photodetectors, respectively, under 1.5 G illumination.

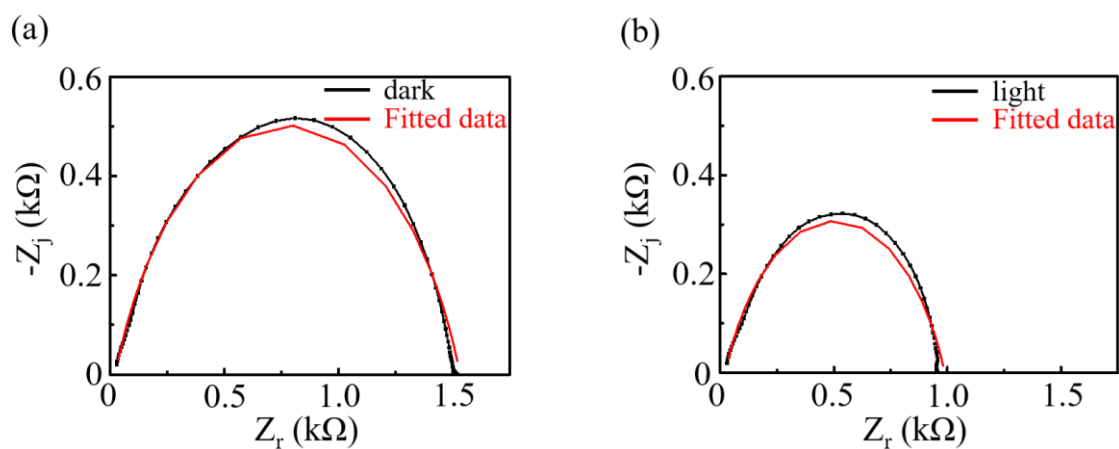


Figure S7. Impedance analysis of the photodetector. **(a)** Nyquist diagram (black) and fitted curve (red) of the $\text{Mo}_2\text{C}-\text{Gr}/\text{Sb}_2\text{S}_{0.42}\text{Se}_{2.58}/\text{TiO}_2/\text{FTO}$ photodetector under the dark condition. **(b)** Nyquist diagram (black) and fitted curve (red) of the $\text{Mo}_2\text{C}-\text{Gr}/\text{Sb}_2\text{S}_{0.42}\text{Se}_{2.58}/\text{TiO}_2/\text{FTO}$ photodetector under the illumination condition.