Electronic Supplementary Material (ESI) for Journal of Materials Chemistry C.

Supporting information

Fabrication of γ-In_2Se_3/Si heterostructure phototransistor for heart rate detection

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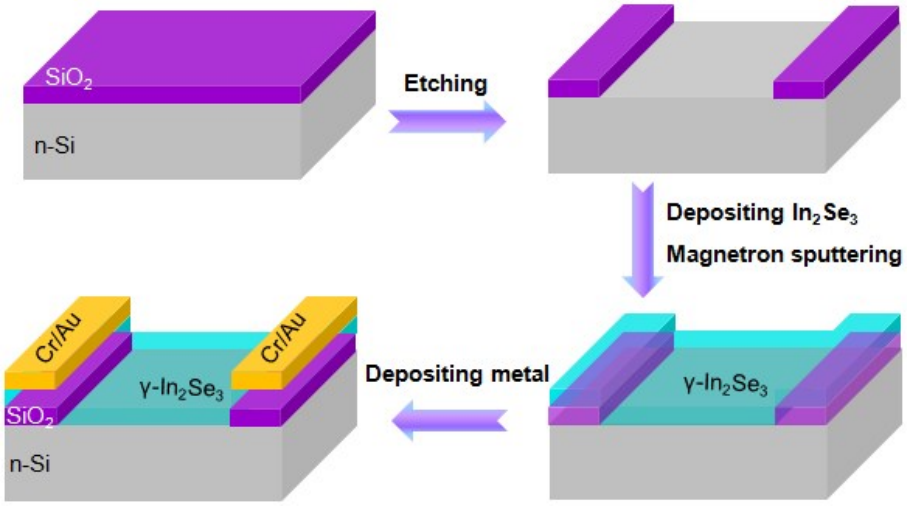

Figure S1 Schematic illustration for the fabrication of the device.

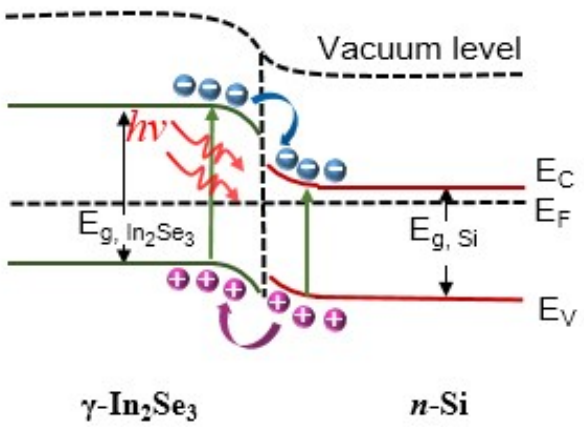

Figure S2 Energy band diagram of the γ-In_2Se_3/n-Si heterojunction.

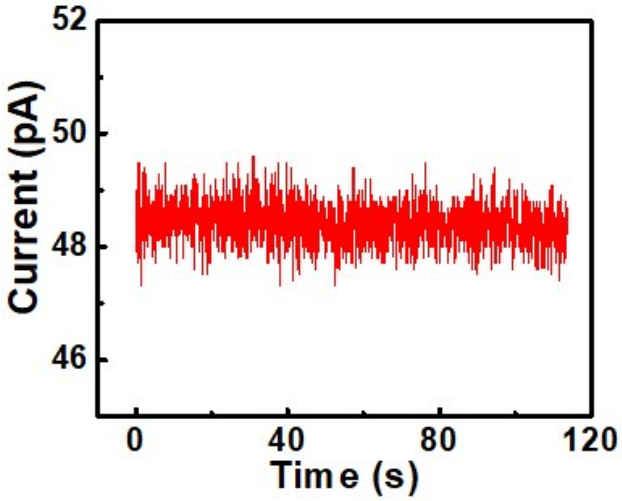

Figure S3 Dark current of the γ-In_2Se_3/Si heterojunction phototransistor at 3V bias.

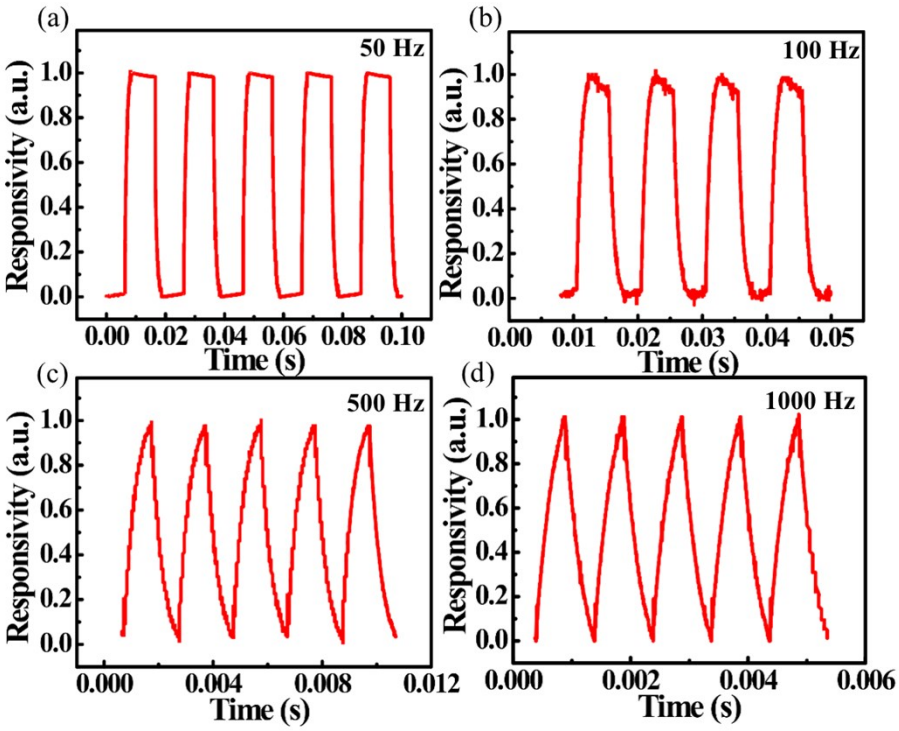

Figure S4 (a-d) Response of the device to pulsed light irradiation at frequencies of 50 Hz, 100 Hz, 500 Hz and 1000 Hz, respectively.

Table S1 Comparison of key parameters between this work and other In_2Se_3 film-based photodetectors.

Materials	Measurement conditions		*R* (AW^{-1})	*D*(Jones)*	τ_r/τ_f	Ref
γ-In_2Se_3 film/Si	V_{bias} = 3 V	λ=450 nm	10.24	8.63×10^{12}	0.76/0.8 ms	Our work
α-In_2Se_3 film	V_{bias} = 1.5 V	λ=600 nm	0.37	--	243 μs	S1
β-In_2Se_3 film	V_{bias} = 5 V	λ=532 nm	20.5	6.02×10^{11}	24.6/57.4 ms	S2
α-In_2Se_3 nanosheets	V_{bias} = 5 V	λ=300 nm	395	2.26×10^{12}	18/73 ms	S3
α-In_2Se_3 layers	V_{bias} = 2 V	λ=532 nm	340	--	6/12 μs	S4

Table S2 Comparision of the measured results of our device and the commercial wristband.

No.	Heat rate (min^{-1})		
	Our device	Commercial band	Difference value
1	72.3	72	0.3
2	70.4	69	0.4
3	73.8	74	-0.2
4	75.7	76	-0.3
5	72.1	71	0.1
6	81.3	81	0.3
7	81.6	82	0.1
8	72.5	73	0.5
Avg.	74.9	74.7	0.2

References

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[S4] J. Zhou, Q. Zeng, D. Lv, L. Sun, L. Niu, W. Fu, F. Liu, Z. Shen, C. Jin and Z. Liu, *Nano Lett.*, 2015, **15**, 6400-6405.