Electronic supplementary information (ESI)

Self-Driven, Broadband and Ultrafast Photovoltaic Detectors Based on Topological Crystalline Insulator SnTe/Si Heterostructures

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Element	Weight %	Atomic %
Sn	1.36	0.15
Te	1.50	0.16

Table S1 Composition analysis of the SnTe film

Measure	Pan Data Zoom	300.0 nm	Name	Value	Report	Limi
The state of the s	and the second second		Results			
	and the second of	100 Barris -	Image Raw mean	288 nm	Yes	No
A COM	A DE THE REAL	Contraction of the local division of the loc	 Image Mean 	0.0544	Yes	No
A REAL PROPERTY OF	and the second s	States and States of States	 Image Z Range 	158 nm	Yes	No
	A TANK MAN	ALC: 1077104	 Image Surface area 	10.2 初	Yes	No
1000		ACC TALK	- Image Projected surface area	9.00 祄	Yes	No
and the second	A CONTRACTOR OF		- Image Surface area difference		Yes	No
	A PR & COM	COM BOARD	- Image Rq	15.6 nm	Yes	No
	and the second	and the second s	Image Ra	12.1 nm	Yes	No
ALC: 1			- Image Rmax	158 nm	Yes	No
1000	A 10 10 10 10 10 10 10 10 10 10 10 10 10	Contraction of the	 Raw mean 	0.00 nm	Yes	No
and and		100 C	- Mean	0.00 nm	Yes	No
	And the second second	1 5 F	- Z Range	0.00 nm	Yes	No
and the second s	and the set	Contraction of the	 Surface area 	0.00 祄	Yes	No
	Sector and the	100 CT 1000	 Projected surface area 	0.00 祄	Yes	No
Surger and the second		Sector Sector Sector	 Surface area difference 	0.00 %	Yes	No
State States	A DESCRIPTION OF THE OWNER OF THE	SAME AND THE OWNER.	- Rg	0.00 nm	Yes	No
	A COLUMN TWO IS NOT	100 Color 10 Color	- Ra	0.00 nm	Yes	No
and the second	A MARINE F	NAME OF TAXABLE PARTY.	- Rmax	0.00 nm	Yes	No
1000		And a second second second	- Skewness	0.00 nm	Yes	No
0		0.0.26	 Kurtosis 	0.00 nm	Yes	No
0	1: Height	3.0 衸	- Rz	0.00 nm	Yes	No
	1		- Rz Count	0.00	Yes	No
	Execute		 Max peak ht (Rp) 	0.00 nm	Yes	No
Inputs			- Av max ht (Rpm)	0.00 nm	Yes	No
Inputs Peak	Off		- Max depth (Rv)	0.00 nm	Yes	No
Zero Cros			 Av max depth (Rvm) 	0.00 nm	Yes	No
- Zero Cros	und Sang		- Line density	0.00 / 祄	Yes	No
			- Box x dimension	0.00 20	Ver	No

Fig. S1 AFM 2D image.

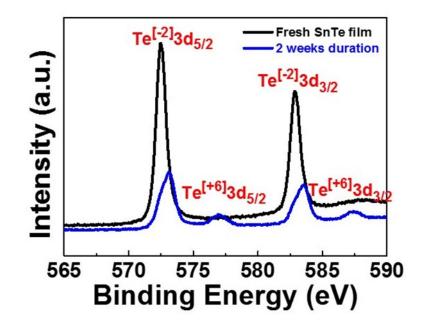


Fig. S2 XPS spectra of Te for fresh and 2 weeks duration respectively.

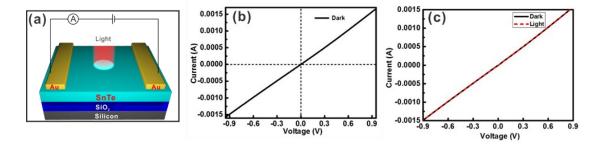


Fig. S3 (a) Schematic illustration of the Au/SnTe/Au device. (b) *I-V* curve of the device measured in dark, indicating good ohmic contacts of Au electrodes with SnTe film. (c) Comparison of the light and dark current. No photoresponse was observed under the 808 nm light illumination.

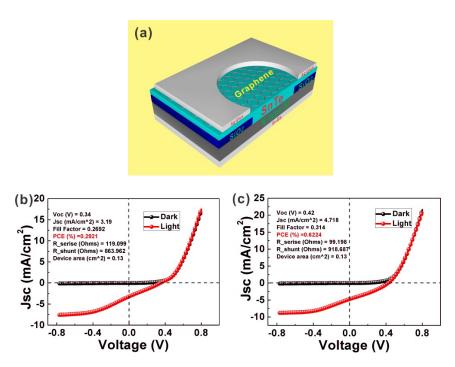


Fig. S4 Photovoltaic performance of the SnTe/Si heterstructure device with graphene transparent electrode measured before and after doping the graphene with HNO₃.

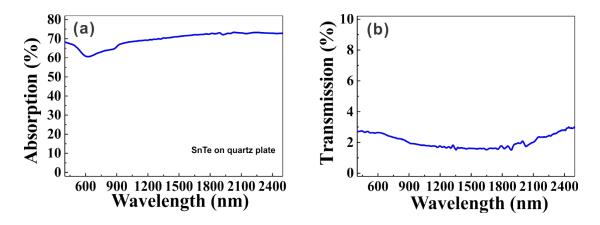


Fig. S5 (a) Absorption spectrum (b) transmission spectrum of 150 nm SnTe film on quartz substrate.

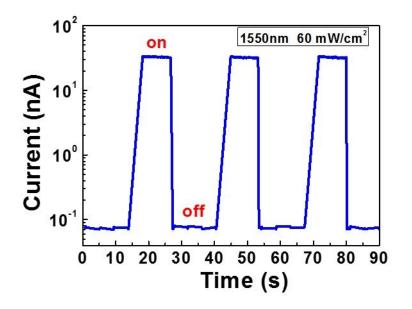


Fig. S6 Temporal responses of the device in semi-logarithmic scale under the illumination of 1550 nm light (60 mW/cm^2).

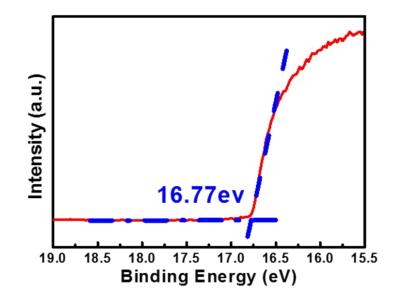


Fig. S7 UPS analysis of the SnTe film. Fermi level of the SnTe film can be determined to be at 4.45 eV.

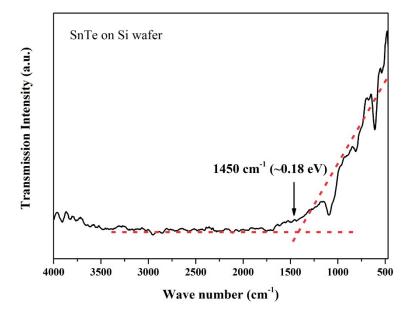


Fig. S8 FTIR spectrum of the SnTe film.