Electronic supplementary information (ESI)

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

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Table S1 Composition analysis of the SnTe film

Element	Weight %	Atomic %
Sn	1.36	0.15
Te	1.50	0.16

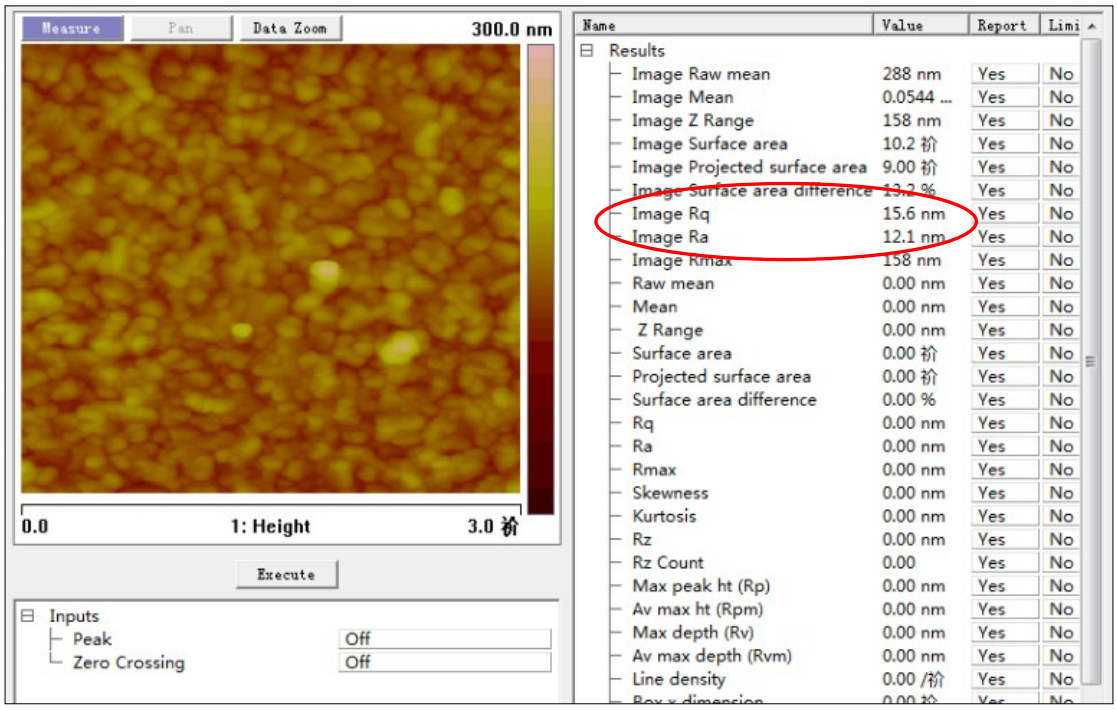

Fig. S1 AFM 2D image.

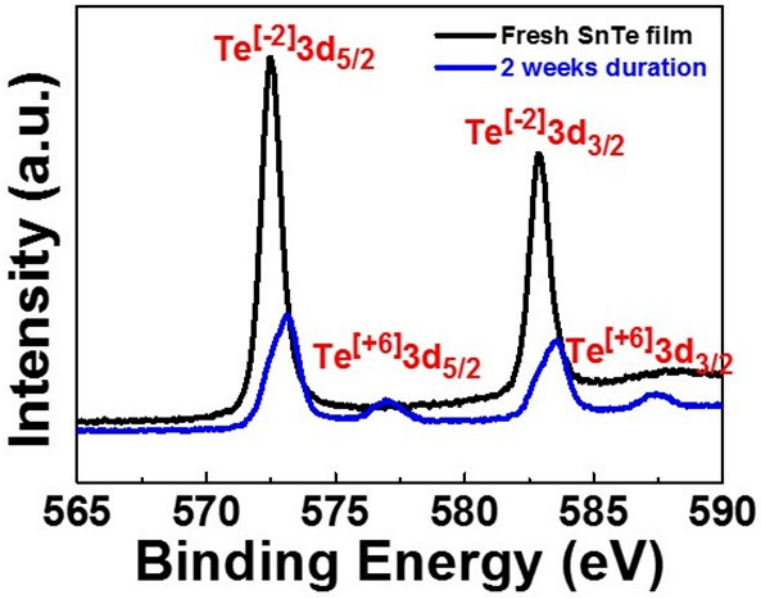

Fig. S2 XPS spectra of Te for fresh and 2 weeks duration respectively.

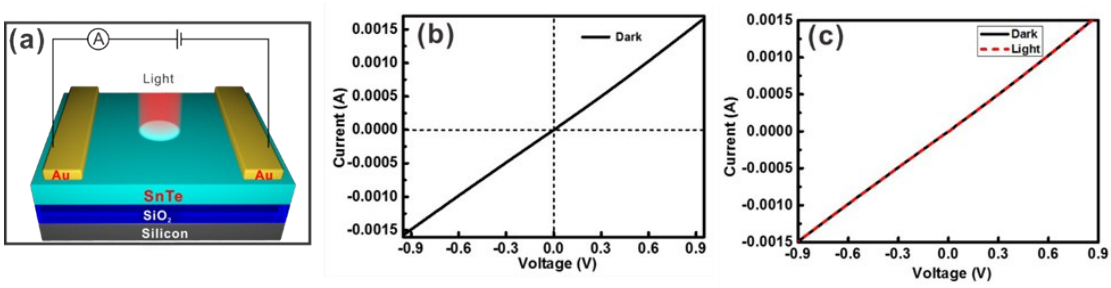

Fig. S3 (a) Schematic illustration of the Au/SnTe/Au device. (b) *I-V* curve of the device measured in dark, indicating good ohmic contacts of Au electrodes with SnTe film. (c) Comparison of the light and dark current. No photoresponse was observed under the 808 nm light illumination.

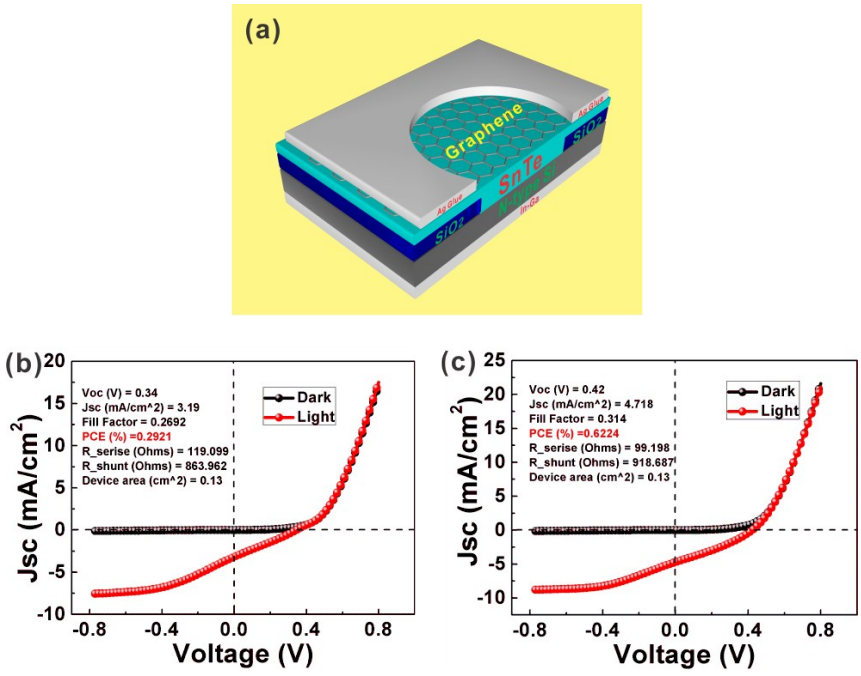

Fig. S4 Photovoltaic performance of the SnTe/Si heterstructure device with graphene transparent electrode measured before and after doping the graphene with HNO_3.

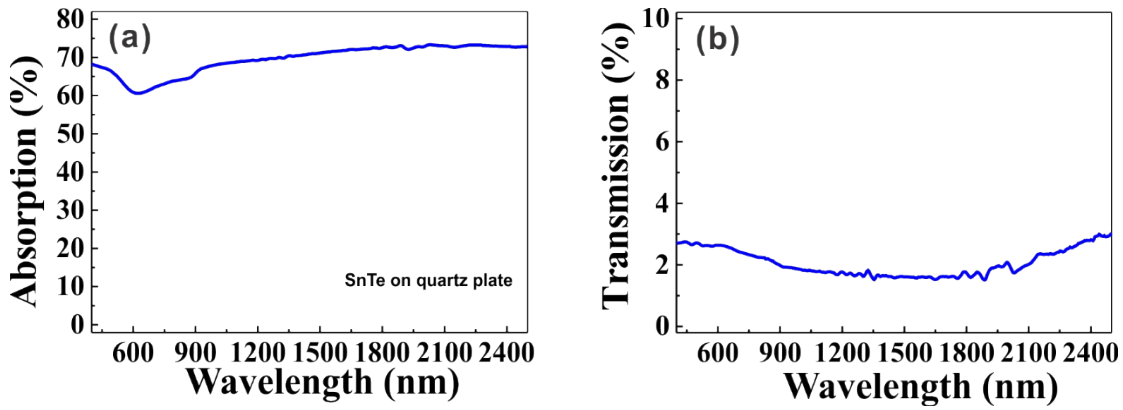

Fig. S5 (a) Absorption spectrum (b) transmission spectrum of 150 nm SnTe film on quartz substrate.

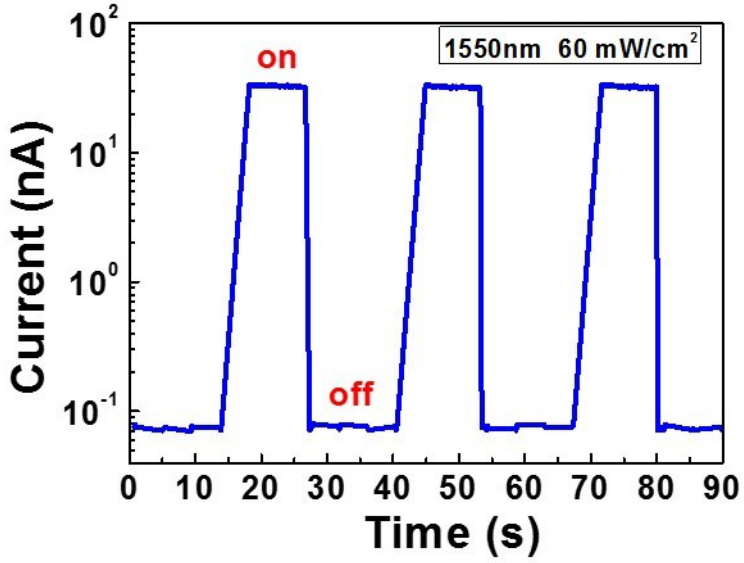

Fig. S6 Temporal responses of the device in semi-logarithmic scale under the illumination of 1550 nm light (60 mW/cm^2).

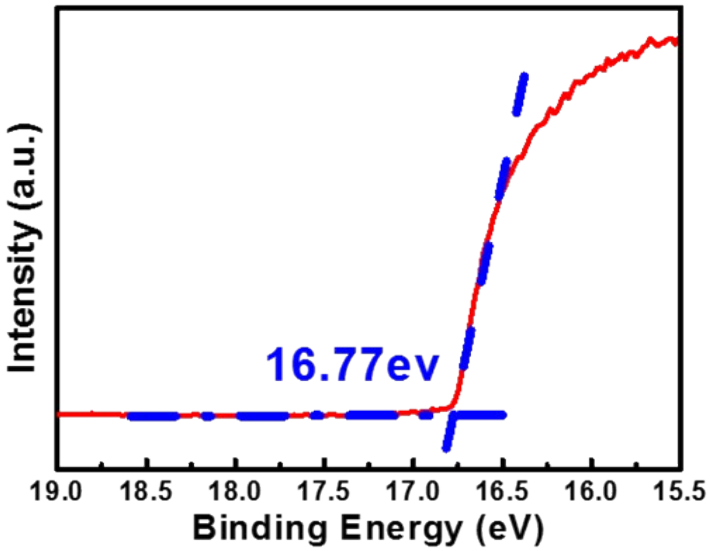

Fig. S7 UPS analysis of the SnTe film. Fermi level of the SnTe film can be determined to be at 4.45 eV.

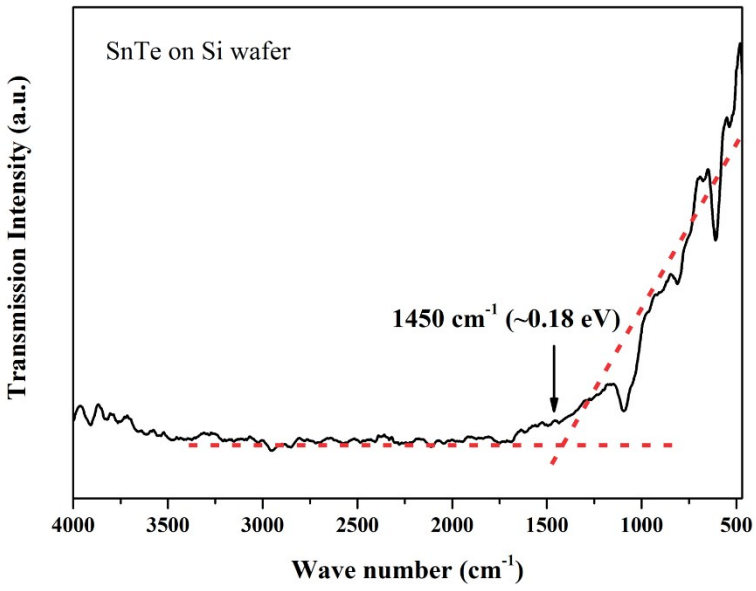

Fig. S8 FTIR spectrum of the SnTe film.