Supporting Information

Polarity Flipping in Iso-Type Heterojunction (p-SnS/p-Si) to Enable a Broadband Wavelength Selective Energy-Efficient Photodetector

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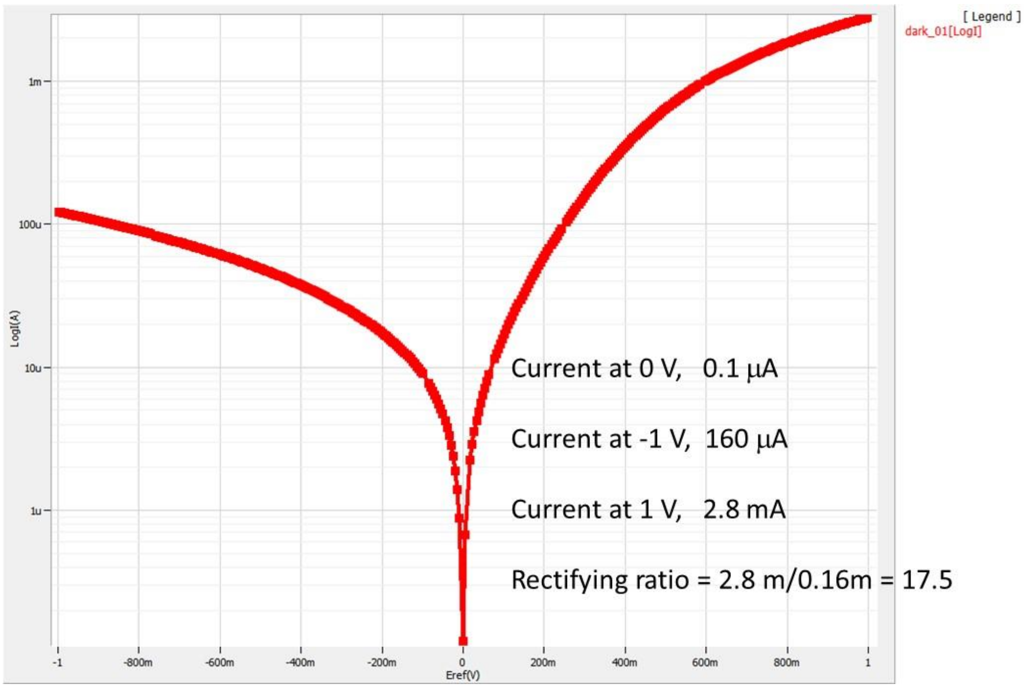

Fig. S1 Dark I-V characteristics of p-p isotype heterojunction (p-Si/p-SnS) device.

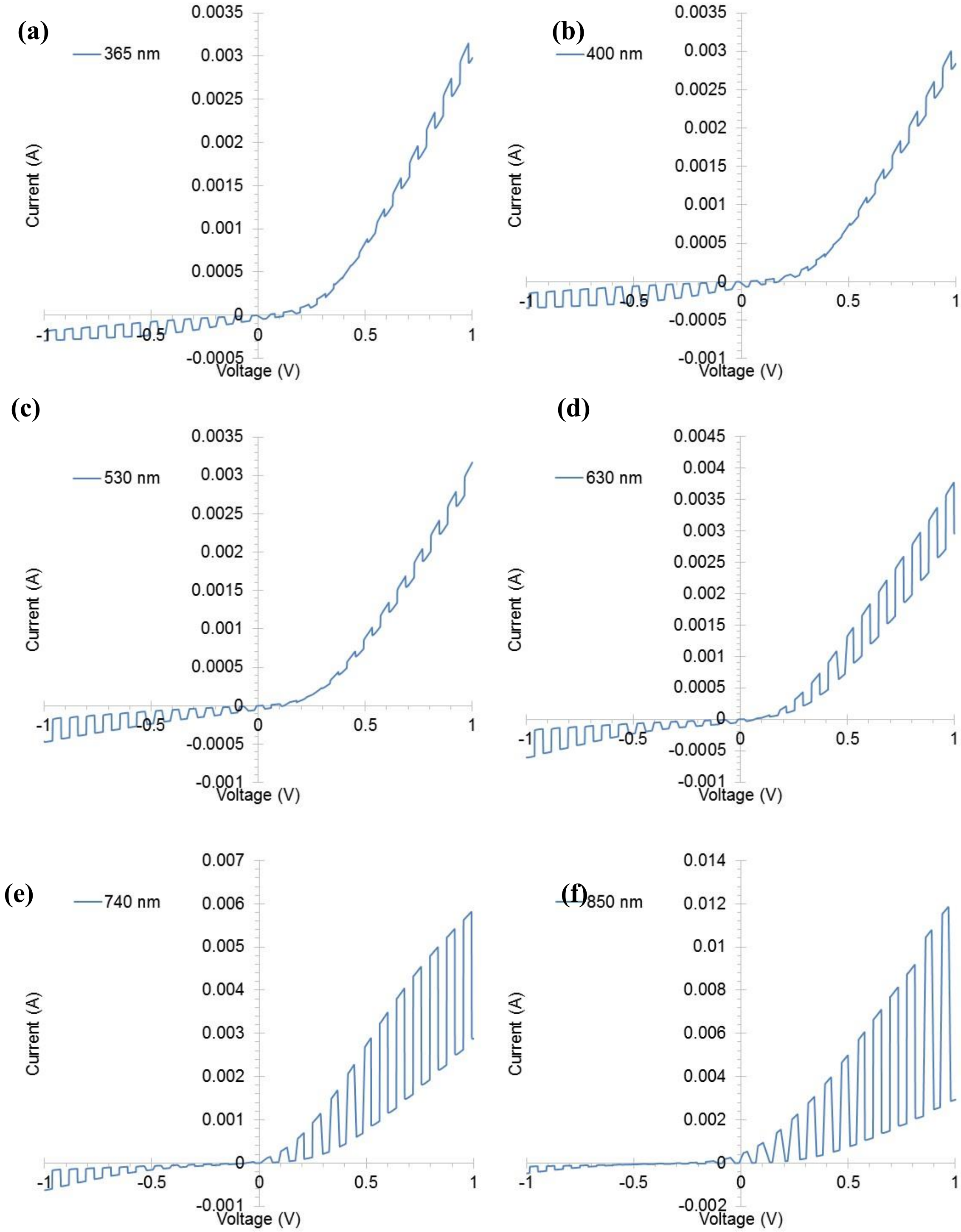

Fig. S2 Current-voltage characteristics of the device under the pulsed light illumination, (a) λ = 365 nm, (b) λ = 400 nm, (c) λ = 530 nm, (d) λ = 630 nm, (e) λ = 740 nm, and (f) λ = 850 nm. Scan direction is -1 V to 1 V, scan rate is 100 mV s^{-1}, scan interval is 1 mV, and light pulse frequency 1.3 Hz.

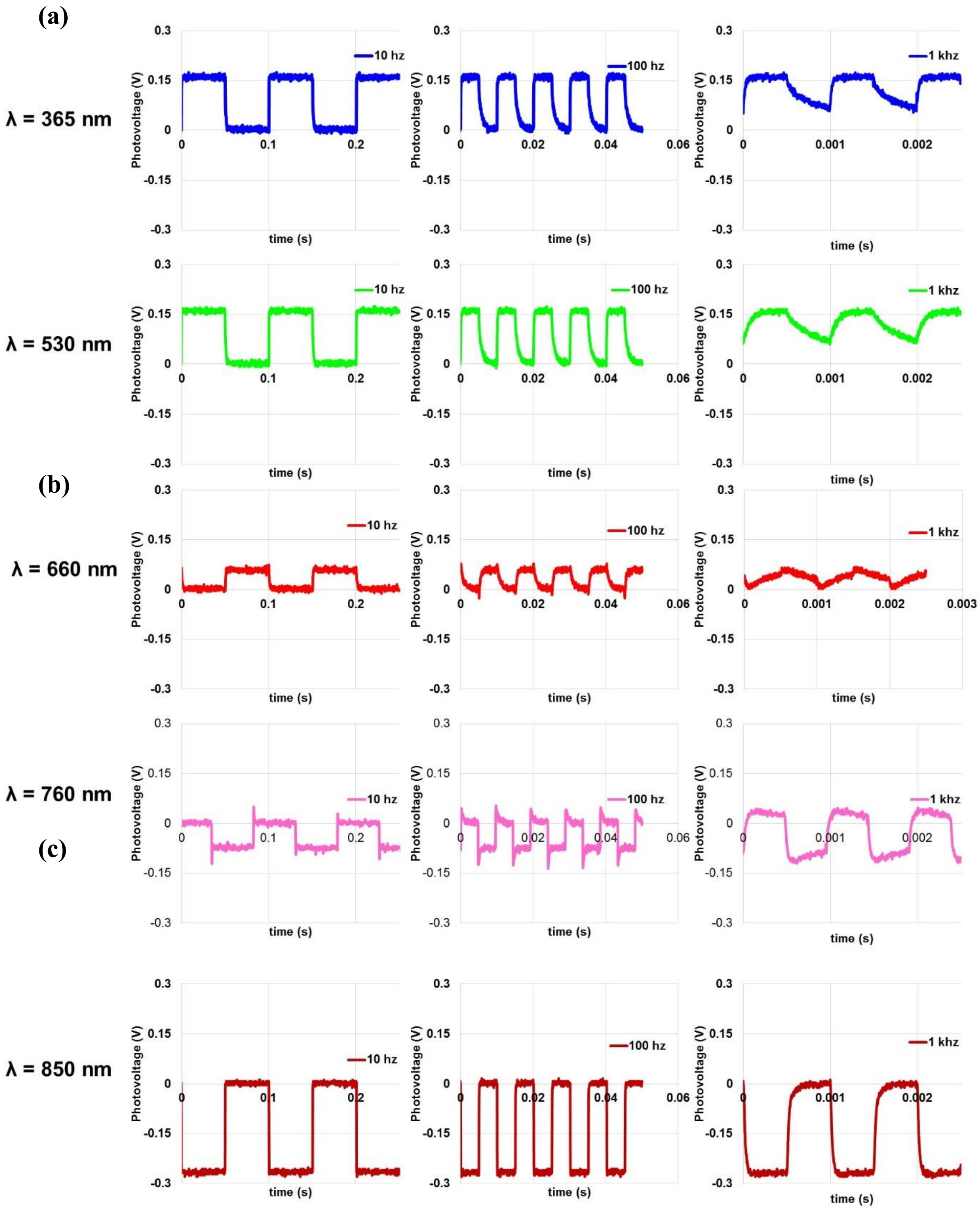

Fig. S3 Transient photovoltage plots of the device under various pulsed frequency (10 Hz, 100 Hz and 1 kHz) of light illumination, (a) λ = 365 nm, (b) λ = 530 nm, (c) λ = 660 nm, and (d) λ = 760 nm, and (e) λ = 850 nm.

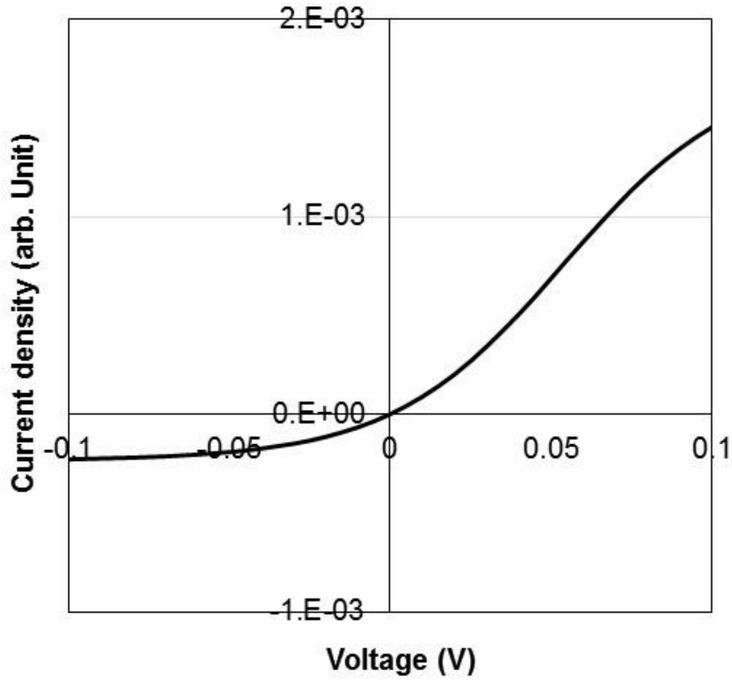

Fig. S4 Simulated J-V characteristic of the device under dark condition.

Table S1. Hall measurement of the 100 nm-thick SnS film.

# of scan	Bulk Con. (cm^{-3})	Resistivity (Ω cm)	Mobility ($cm^2 V^{-1} s^{-1}$)
1	1.84×10^{17}	65.08	5.19
2	1.40×10^{17}	65.21	6.83
3	1.57×10^{17}	65.24	6.07
Average	1.60×10^{17}	65.18	6.03

Table S2. Responsivity (R*) and detectivity (D*) for wavelength of 400 nm and 800 nm. The photo-induced R^*_{ph} and D^*_{ph} values calculated using the relation $R^*_{ph} = |J_{ph} - J_{dark}|/P_{in}$ and $D^*_{ph} = R^*_{ph}/\sqrt{2qJ_{dark}}$, respectively, where J_{ph} is the photo current density, J_{dark} is the dark current density, P_{in} is the incident light intensity, and q is electron charge. Considering the pyroelectric effect, R^*_{ph+py} and D^*_{ph+py} can be formed by $R^*_{ph+py} = |J_{ph+py} - J_{dark}|/P_{in}$ and$D^*_{ph+py} = R^*_{ph+py}/\sqrt{2qJ_{dark}}$.

Wavelength (nm)	Light intensity ($mW cm^{-2}$)	Photo-induced		Photo+Pyro-induced	
		R^*_{ph} ($mA W^{-1}$)	D^*_{ph} (Jones)	R^*_{ph+py} ($mA W^{-1}$)	D^*_{ph+py} (Jones)
400 nm	10	34.45	1.97×10^{13}	66.25	3.79×10^{13}
800 nm	150	11.44	5.93×10^{12}	14.80	7.68×10^{12}