Supporting Information

Polarized near-infrared organic phototransistor based on narrow-band SnPc single crystal

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S1. Surface morphology

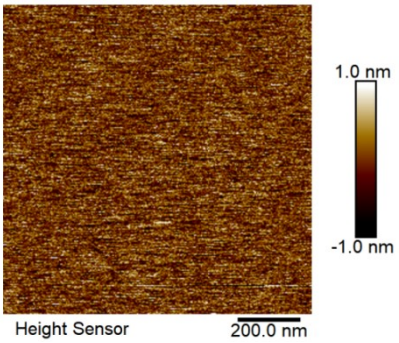

Fig. S1. Surface morphology of a typical SnPc single crystal.

S2. Cross-polarized microscopy images

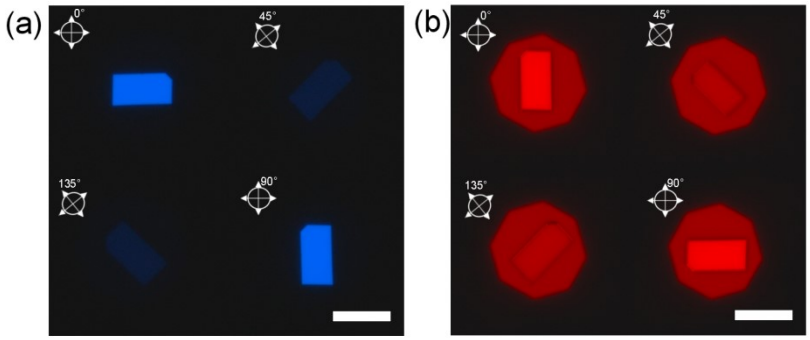

Fig. S2. Cross-polarized optical microscopy images of a SnPc single crystal under different polarization directions for 470 nm and 625 nm LED light illumination. Scale bar: 20 μm.

S3. The relationship between absorption and bandgap

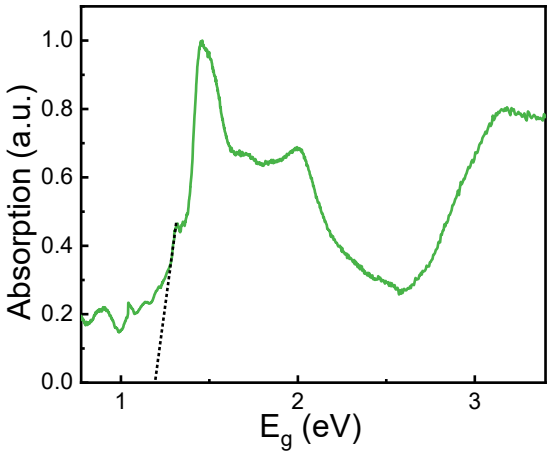

Fig. S3. The relationship between absorption and Eg.

S4. Selected area electron diffraction (SAED)

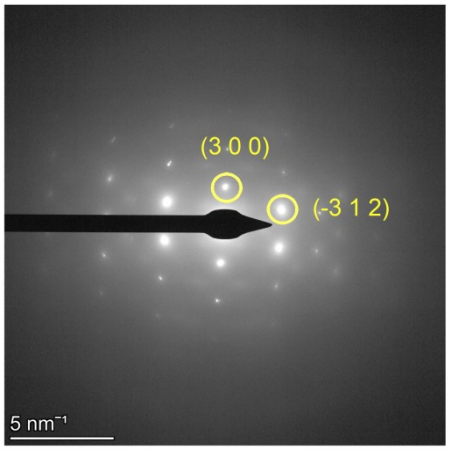

Fig. S4. Selected area electron diffraction and calibration of crystal face.

S5. Thickness of the SnPc single crystal.

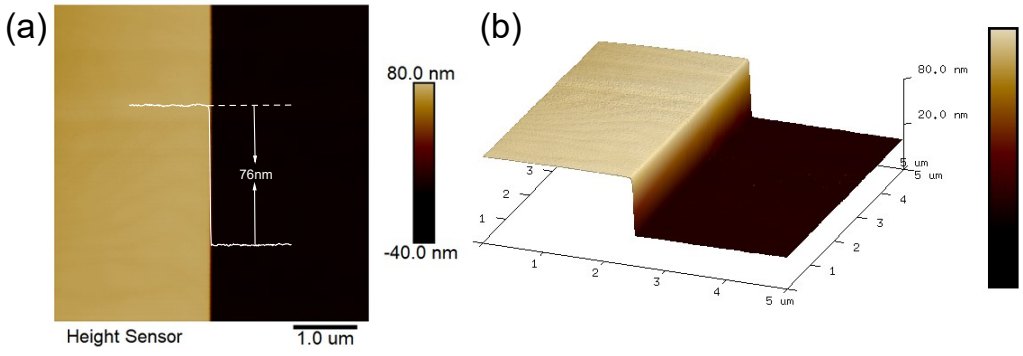

Fig. S5. (a) AFM of the SnPc single crystal and the corresponding thickness. (b) The 3D

nature of the SnPc single crystal.

S6. The output curve

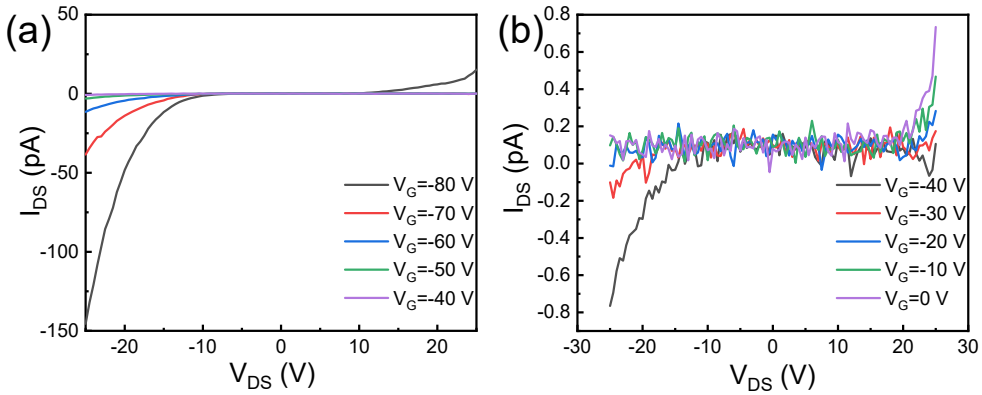

Fig. S6. (a,b) Output curves of the device under different gate voltages under dark.

S7. Log-scale photocurrent as the function of incident light power

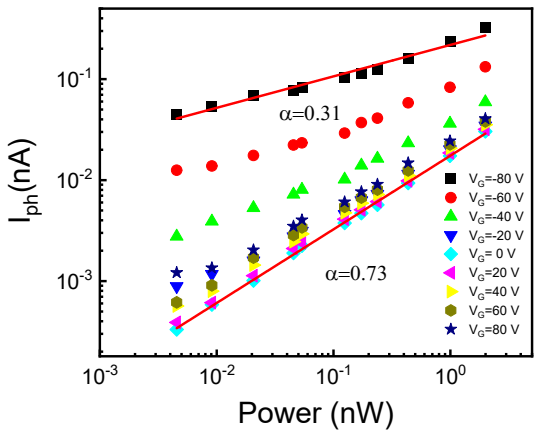

Fig. S7. Log-scale photocurrent as the function of incident light power under different gate voltages.

S8. Transfer curves and temporal photoresponse at different temperatures

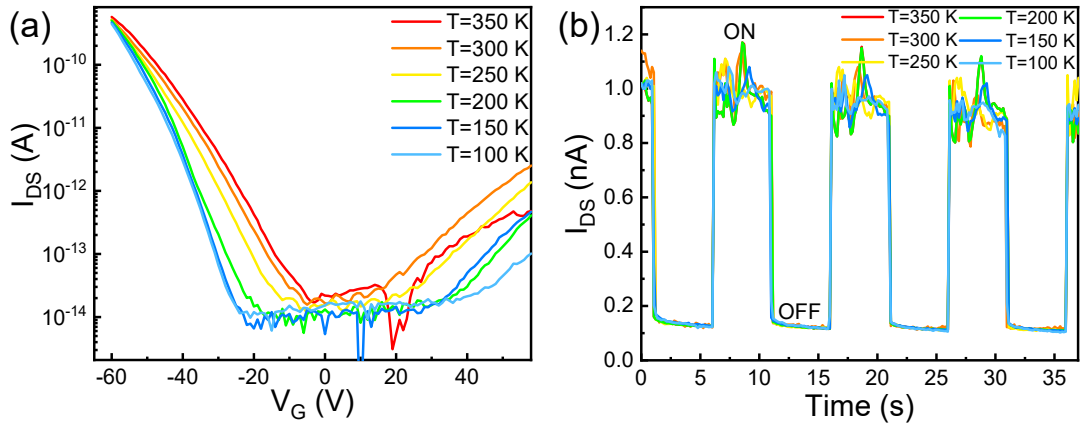

Fig. S8. (a) Transfer curves of the device in dark at different temperatures, at V_{DS} = 25 V. (b) Temporal photoresponse for 850 nm at different temperatures, at V_{DS} = 25 V.

S9. A home-constructed single pixel scanning imaging system with linear polarized regulation.

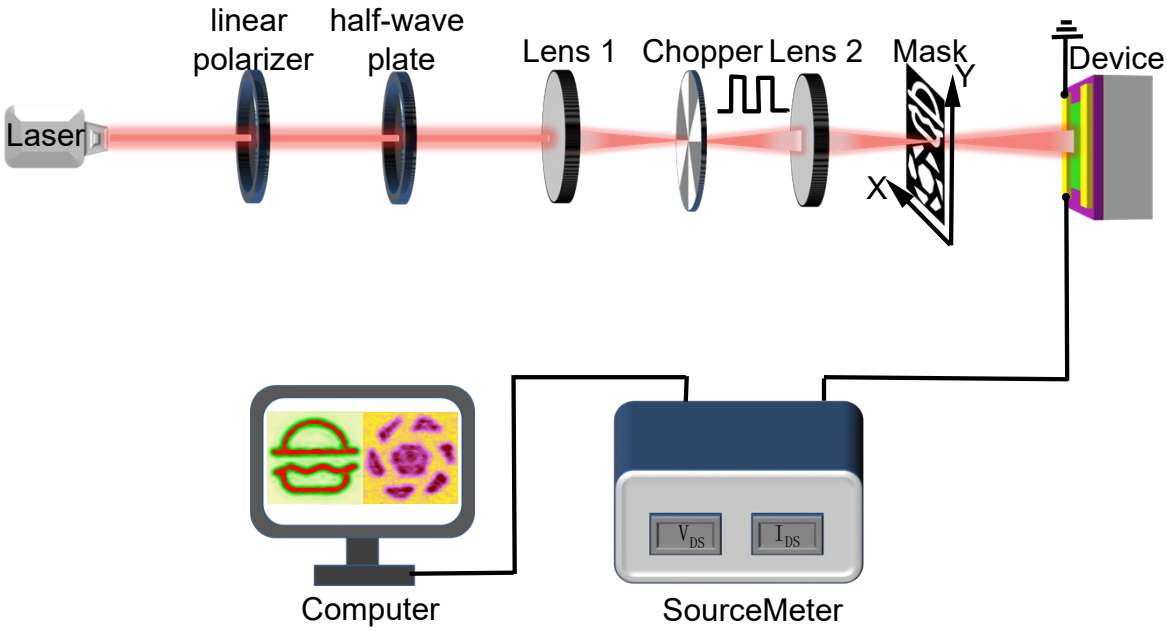

Fig. S9. The home-constructed single pixel scanning imaging system.

S10. Other single-pixel imaging

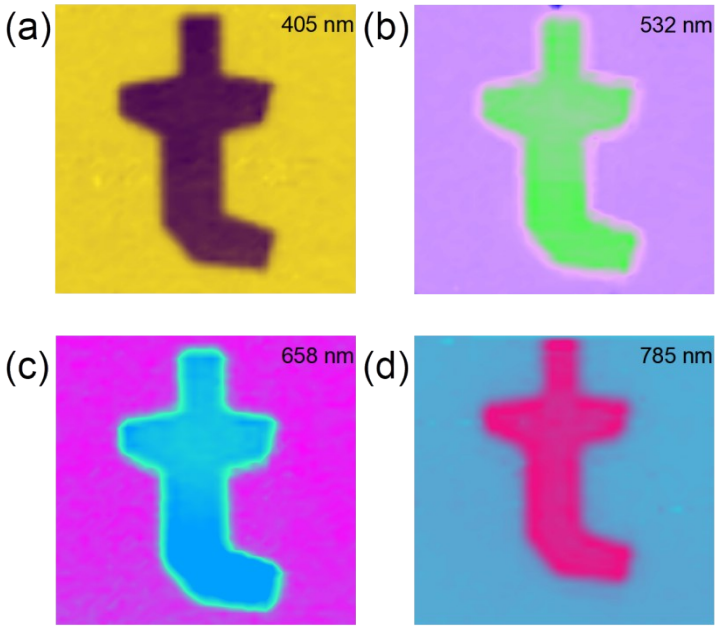

Fig. S10. Acquired 100×100 scanned pixels high-speed photocurrent imaging results for the objects, using 1.5 k Hz-modulated light signal (405, 532, 658 and 785 nm).

S11. The interfacial dipole barrier.

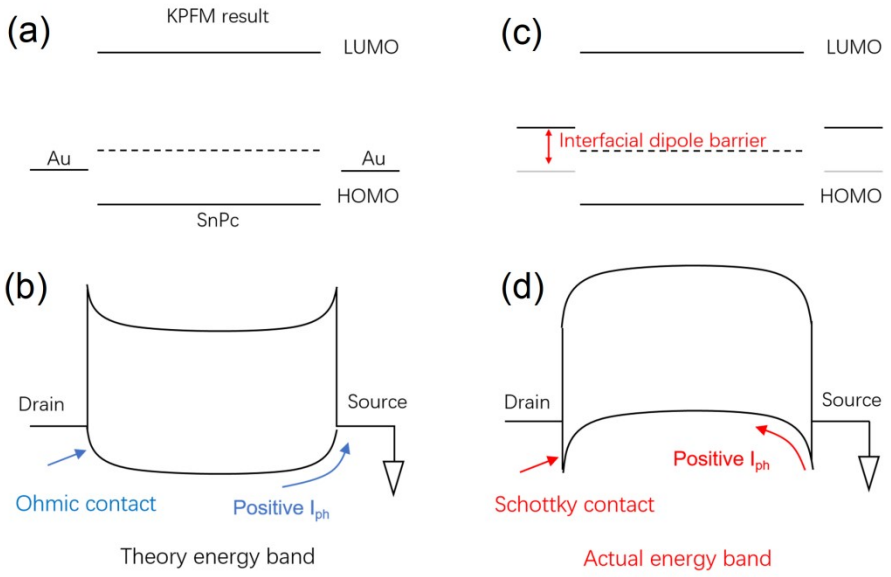

Fig. S11. (a) Energy profles of Au and SnPc before contacting. (b) Theory schematic band diagram based on KPFM result. (c) Interfacial dipole that reduces the work function of Au. (d) Actual schematic band diagram corresponding to photocurrent mapping results.

Table 1. Comparison of our photodetector with other similar photodetectors.

operating wavelengths (nm)	Device structures	Responsivity (A/W)	response time (s)/ EQE	D^* (Jones)
850	This Work (SnPc single crystal)	38.5	5.9×10^{-4}/57%	1.12×10^{10}
800	ZnTPP-C_{60} cocrystals (ZCCs)[1]	2.424	0.6	3.77×10^{11}
850	dimeric porphyrin small molecule[2]	0.33	48%	5.73×10^{13}
770	P3HT/PC70BM[3]	>10	1643%	~ 10^{13}
740	8H2Pc:PC61BM(1:1)[4]	0.2	29%	1.3×10^{12}
850	SnPc film[5]	1.06×10^{-4}	1.5%	2.88×10^{-11}
850	pentacene/SnPc/C60[5]	2.68	4×10^{-4}	1.41×10^{12}
850	pentacene/SnPc:C60/C60[5]	0.27	38.8%	1.52×10^{11}
980	This Work (SnPc single crystal)	2.65	2.1×10^{-3}/1.3%	7.75×10^{8}
960	CO1-4Cl[6]	0.5	50%	~10^{12}
1000	DTPC/NFAs[7]	0.27	6×10^{-7}	9.24×10^{13}
960	PbPc/C_{60}[8]	0.0358	4.4%	>10^{12}
907	PBTTT:PC71BM[9]	0.05	7.5%	NA

References

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