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Electronic Supplementary Information for

Ultra-wideband self-powered photodetector based on suspended reduced graphene oxide with asymmetric metal contacts

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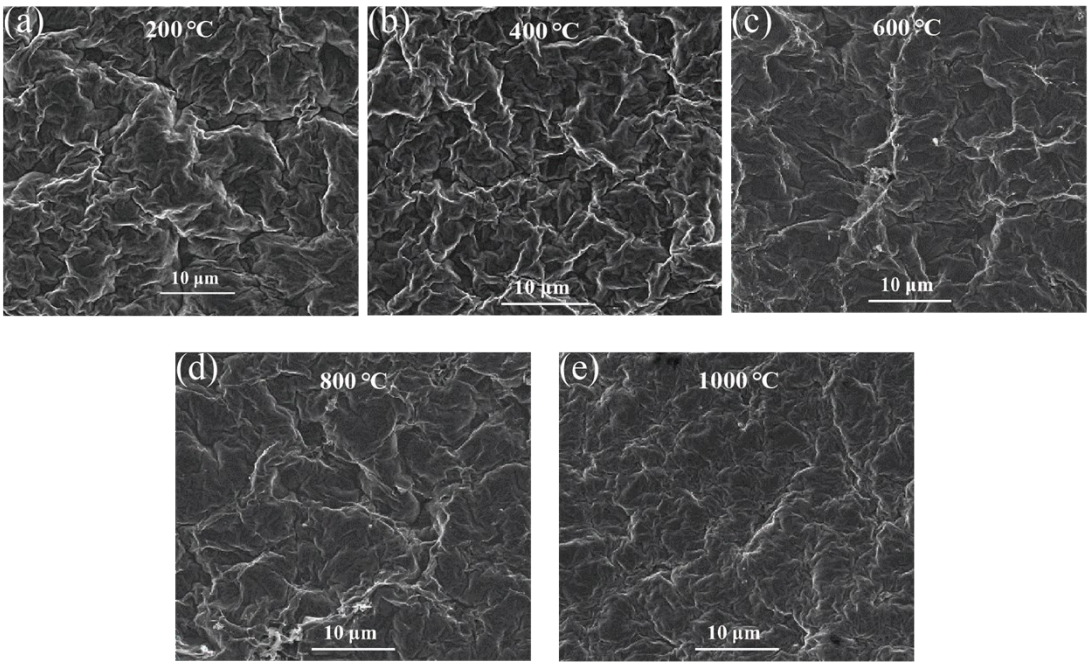

Fig. S1. SEM images of rGO films annealed at (a) 200, (b) 400, (c) 600, (d) 800 and (e) 1000 ℃.

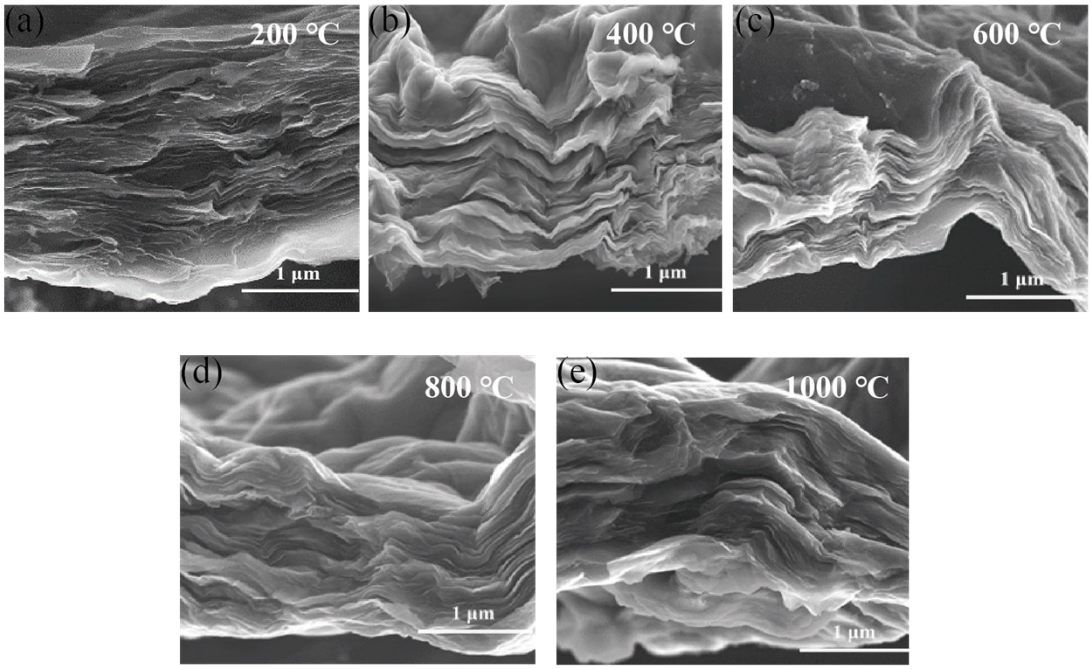

Fig. S2. The cross-sectional SEM images of rGO films annealed at (a) 200, (b) 400, (c) 600, (d) 800, and (e) 1000 ℃.

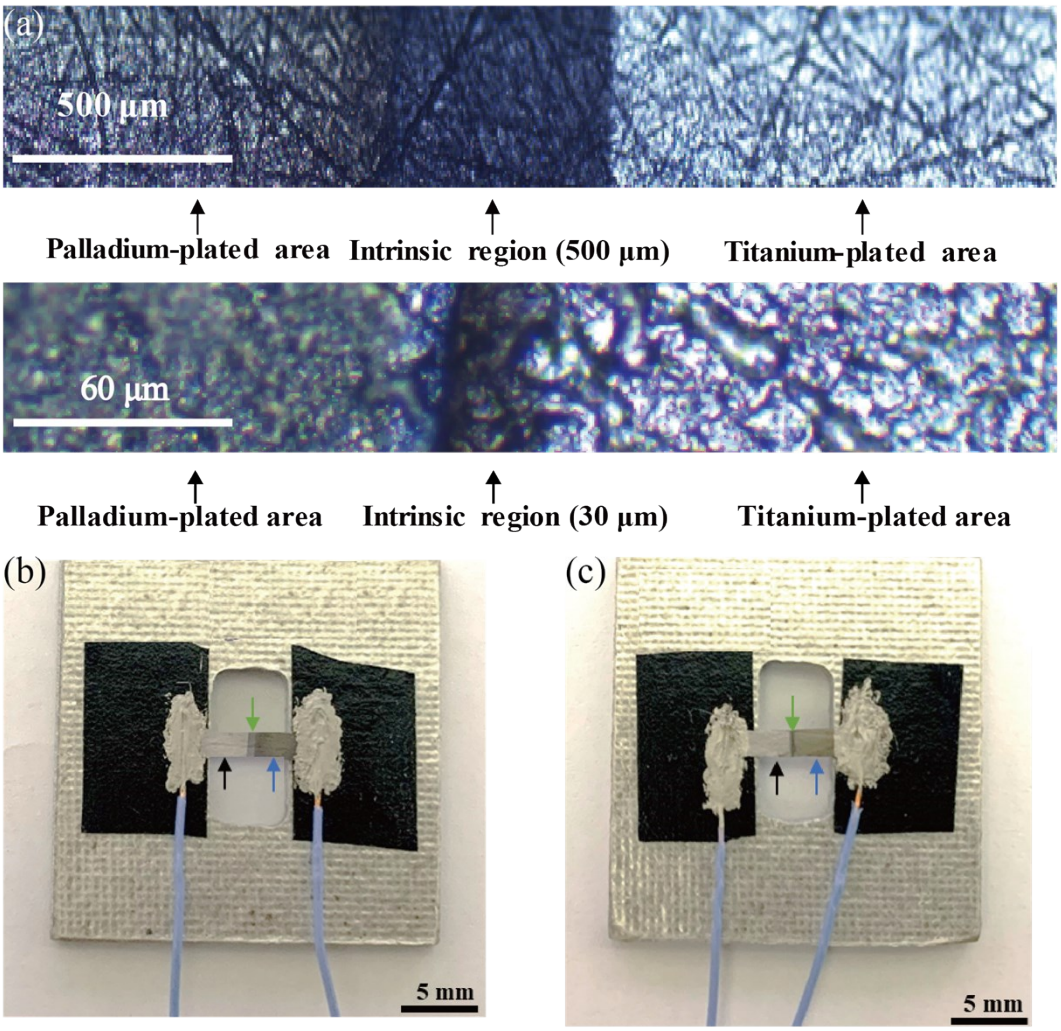

Fig. S3. (a) Photomicrograph of the Pd-rGO-Ti nanostructure with two different channel widths: (top) 500 µm and (bottom) 30 µm. The photographs of the photodetectors with two different channel widths: (b) 500 µm and (c) 30 µm. The black arrow, green arrow and blue arrow indicate the palladium-plated area, intrinsic region and titanium-plated area, respectively.

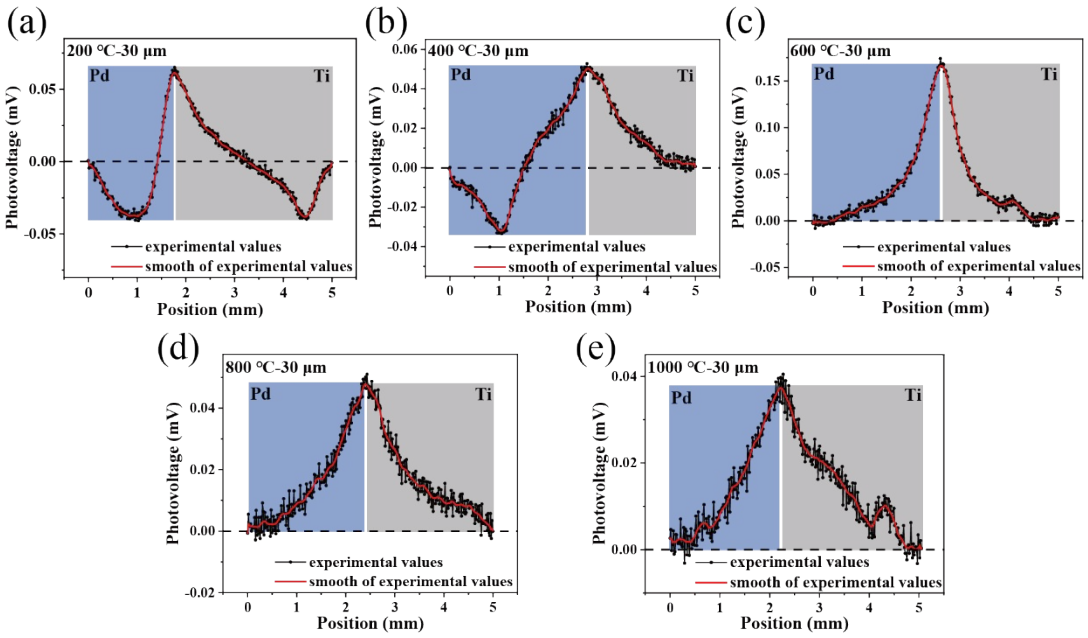

Fig. S4. Scanning photovoltage measurement results from the palladium-plated area to the titanium-plated area of photodetectors with 30 μm channel annealed at (a) 200, (b) 400, (c) 600, (d) 800 and (e) 1000 ˚C under illumination at 532 nm.

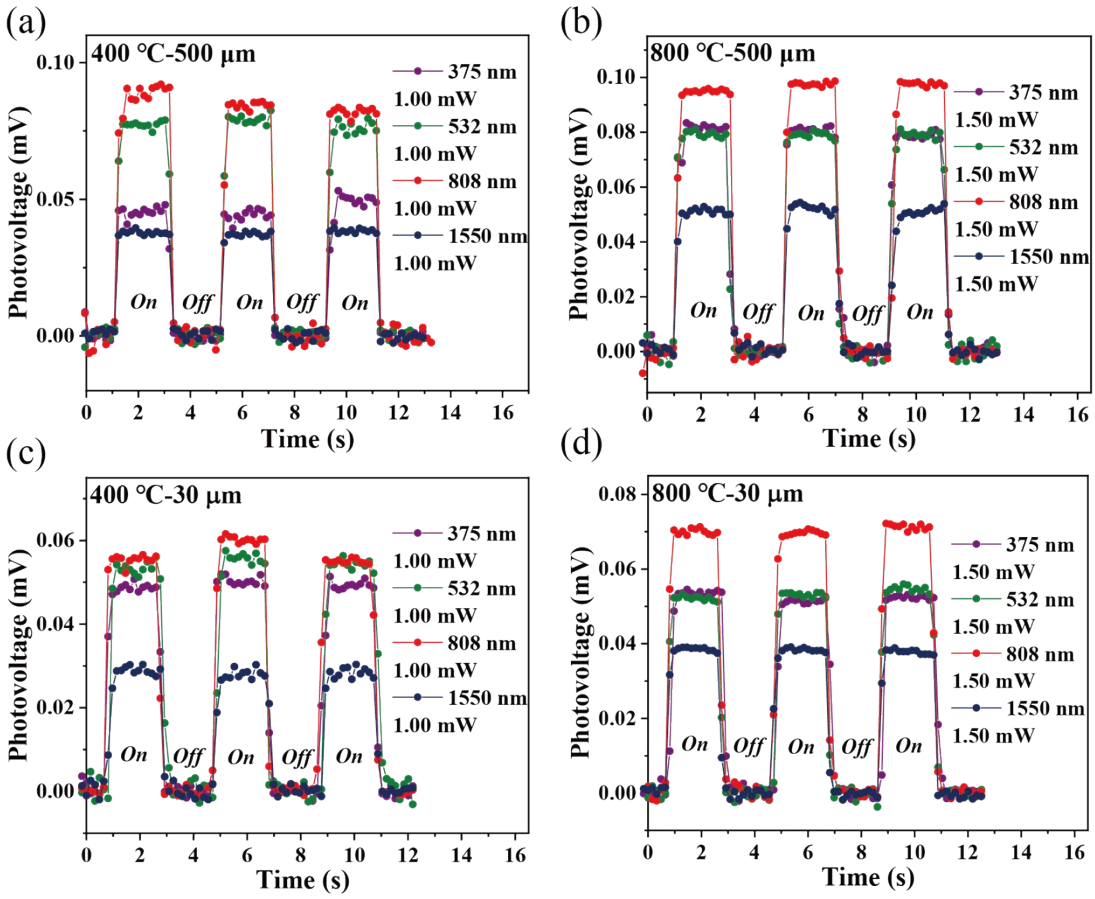

Fig. S5. On-off curves of the photovoltages of photodetectors annealed at (a) 400 and (b) 800 ℃ with the 500 μm channel and annealed at (c) 400 and (d) 800 ℃ with the 30 μm channel when illuminated at different light wavelengths.

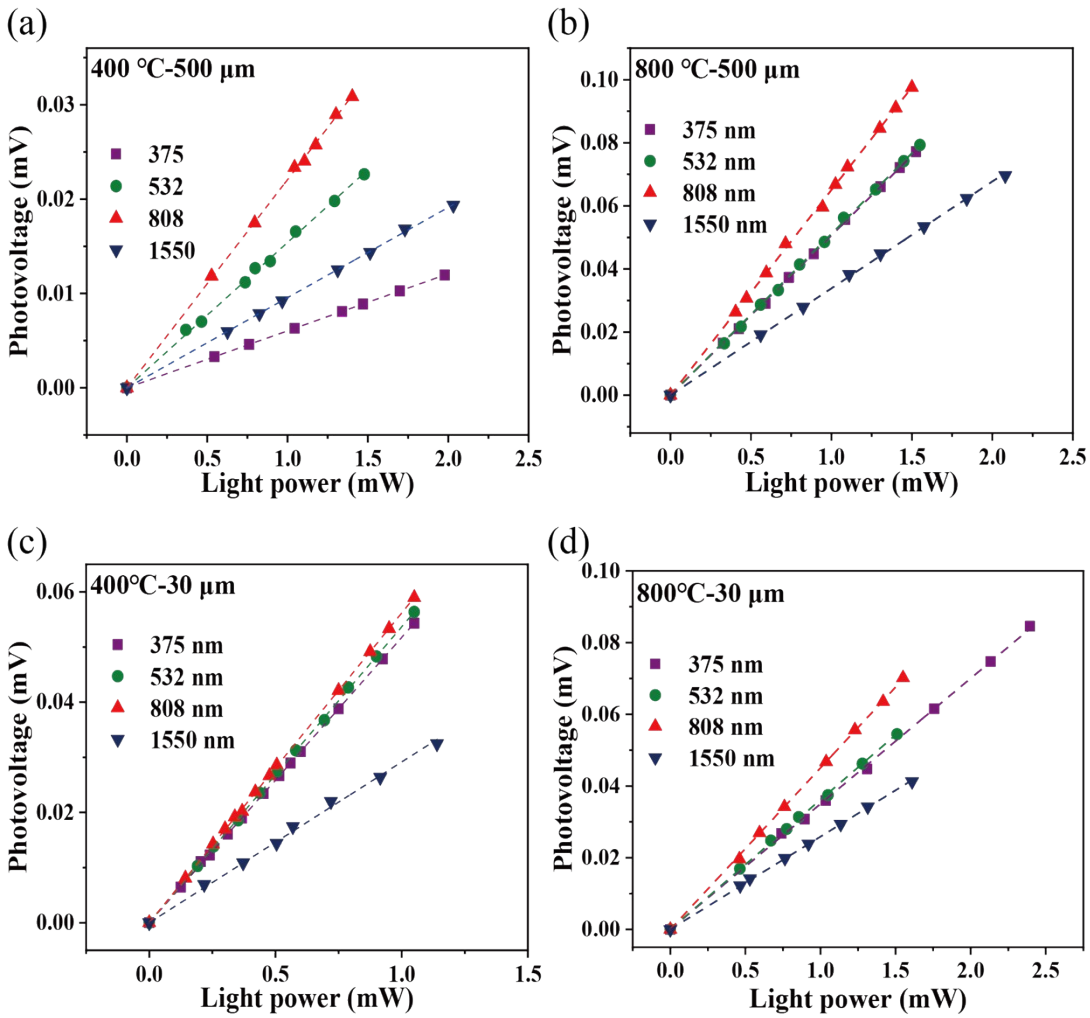

Fig. S6. Dependence of photovoltage on light power under UV to NIR illumination of detectors with 500-µm-wide channels annealed at (a) 400 and (b) 800 ℃ and detectors with 30-µm-wide channels annealed at (c) 400 and (d) 800 ℃.

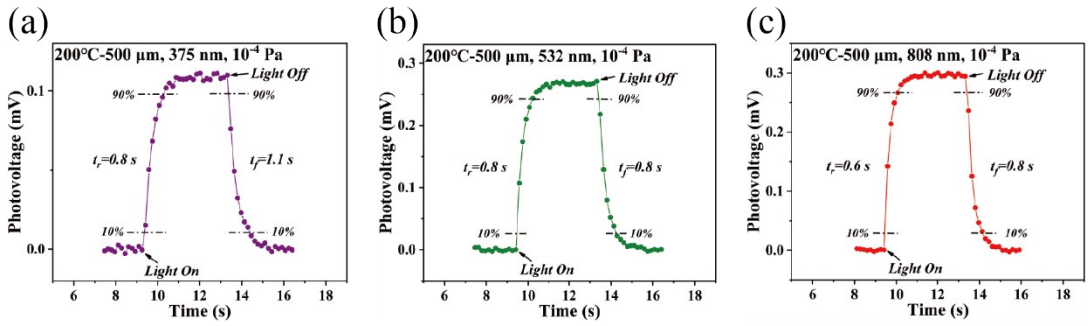

Fig. S7. Rise time tr and fall time tf characteristics of the photodetector with the 500-um-wide channel annealed at 200 ℃ in the vacuum (10-4 Pa) under (a) 375 nm, (b) 532 nm and (c) 808 nm.

Table S1. Comparison of the t_r and t_f values of the Pd-rGO-Ti photodetectors with the different channel widths and annealing temperatures under 2.52 THz illumination.

Annealing temperature (℃)		**200**	**400**	**600**	**800**	**1000**
t_r/t_f (ms)	**Pd-rGO-Ti (500 μm)**	213.2/245.1	175.6/169.9	165.4/159.6	201.9/193.4	154.6/154.6
	Pd-rGO-Ti (30 μm)	133.5/125.4	110.4/96.5	145.5/145.5	188.1/125.4	131.7/117.9

Table S2. *D** values of Pd-rGO-Ti photodetectors annealed at various temperatures under illumination in the UV to THz range.

Annealing temperature (℃)			200	400	600	800	1000
D* **(10^6 cm $Hz^{1/2}$ W^{-1})**	**375 nm**	**Pd-rGO-Ti (500 μm)**	4.43	4.48	7.90	13.70	5.48
		Pd-rGO-Ti (30 μm)	2.29	4.85	12.29	11.65	4.96
	532 nm	**Pd-rGO-Ti (500 μm)**	7.08	7.47	15.80	13.70	5.48
		Pd-rGO-Ti (30 μm)	3.79	5.03	12.12	12.03	4.33
	808 nm	**Pd-rGO-Ti (500 μm)**	7.08	7.47	15.80	13.70	6.85
		Pd-rGO-Ti (30 μm)	4.53	5.26	14.34	14.99	7.64
	1550 nm	**Pd-rGO-Ti (500 μm)**	4.43	3.20	6.32	9.13	4.57
		Pd-rGO-Ti (30 μm)	1.64	2.73	7.05	8.61	2.90
	10.6 μm	**Pd-rGO-Ti (500 μm)**	4.89	2.37	4.64	2.91	5.29
		Pd-rGO-Ti (30 μm)	1.37	2.04	6.27	4.15	3.79
	118.8 μm	**Pd-rGO-Ti (500 μm)**	1.86	1.24	3.95	2.74	9.13
		Pd-rGO-Ti (30 μm)	1.06	1.84	2.55	2.00	5.17