

Electronic Supplementary Information (ESI)

Oxygen-incorporated and layer-by-layer stacked WS₂
nanosheets for broadband, self-driven and fast-response
photodetection

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Table S1 Recent advance of WS₂-based photodetectors.

Device	Synthetic method	Responsivity	Detectivity (Jones)	Response time (τ_r/τ_f)	Incident light (nm)	Ref.
WS ₂ film / SiO ₂ / p-Si	CVD	5.7 A W ⁻¹ (365.5 μ W cm ⁻²)	—	670/998 μ s	660	ACS Appl. Mater. Interfaces, 2016, 8, 18375–18382.
WS ₂ film /CH ₃ NH ₃ PbI ₃ / Sapphire	CVD	17 A W ⁻¹ (0.2 μ W cm ⁻²)	$\sim 10^{12}$	2.7/7.5 ms	505	Adv. Mater., 2016, 28, 3683–3689.
Few-layered WS ₂ nanosheets	CVD	92 μ A W ⁻¹	NA	5.3/5.3 ms	568	Adv. Funct. Mater., 2013, 23, 5511–5517.
Bi/WS ₂ film/ Si	PLD	0.42 A W ⁻¹ (6 mW cm ⁻²)	1.36×10^{13}	>100 ms	635	ACS Appl. Mater. Interfaces, 2015, 7, 26701–26708.
WS ₂ nanofilms	Magnetron Sputtering	53.3 A W ⁻¹	$\sim 10^{11}$	NA	365	Sci. Rep. 2016, 6, 20343.
WS ₂ films	PLD	0.70 A W ⁻¹ (18 mW cm ⁻²)	2.7×10^9	4.1/4.4 s	635	Nanoscale, 2015, 7, 14974–14981.
WS ₂ film/ SiO ₂ / n-Si	CVD	18.8 mA W ⁻¹	NA	< 4.5 ms	532	Nanoscale, 2015, 7, 5974–5980.
WS ₂ nanosheets aligned on Si wafer	Solvothermal reaction	1.54 A W ⁻¹ (1.55 μ W cm ⁻²)	2.0×10^{12}	2.0/7.2 μ s	650	This work

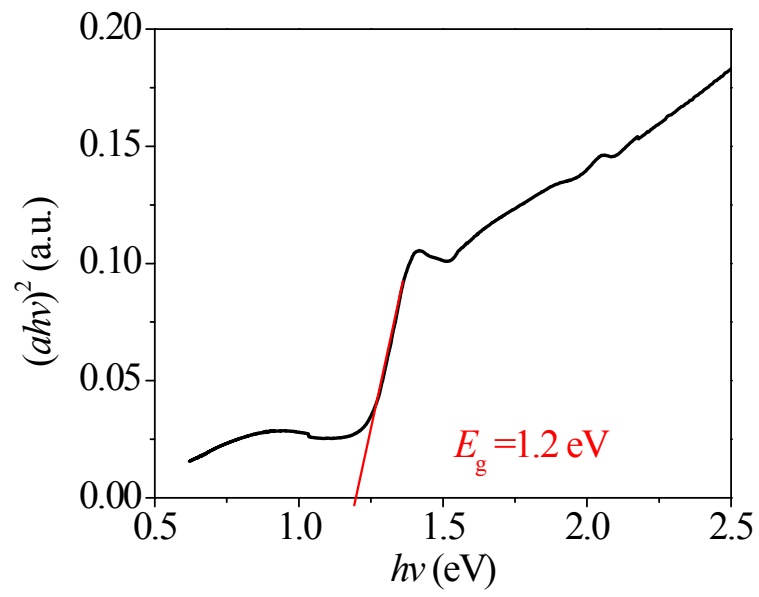


Fig. S1 The $(\alpha h\nu)^2$ vs. $h\nu$ curve of the oxygen-incorporated WS_2 nanosheets to determine the bandgap.

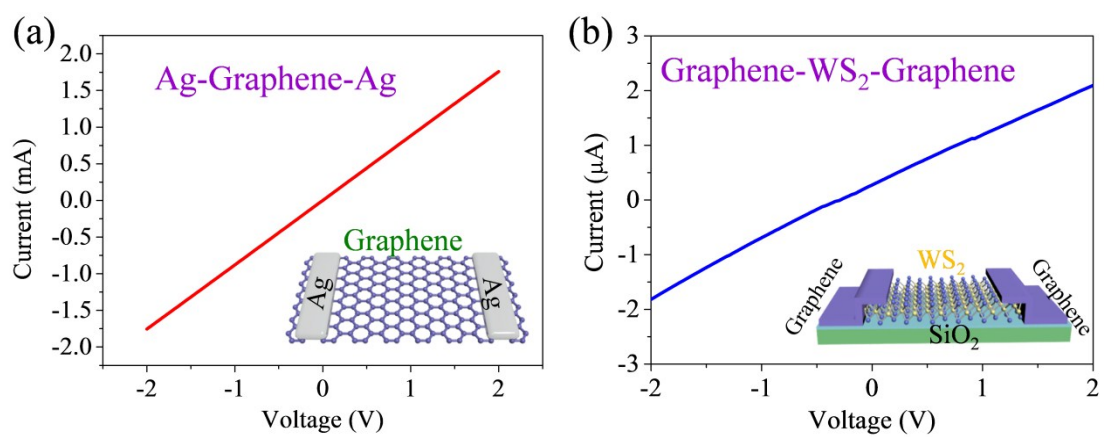


Fig. S2 I-V curves of (a) the Ag-Graphene-Ag and (b) the Graphene-WS₂-Graphene devices on SiO₂ substrates, showing good Ohmic contacts in both devices.