

Supplementary material for

**Stable, high-responsive and broadband photodetection based on large-area
multilayer WS₂ films grown by pulsed-laser deposition**

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S1. Wire-masking technique for the fabrication of a WS₂ photoresistor

The WS₂ photoresistor was fabricated with a wire-masking technique, which is schematically depicted in Fig. S1. Firstly, a multilayer WS₂ film (1.5 mm × 1.5 mm) was deposited onto the SiO₂/Si substrate. Then, a copper wire with a diameter of 100 μm was placed onto the WS₂ film, followed by the deposition of Pt electrodes. Finally, the wire was removed and a photoresistor of 1.5 mm in width and 100 μm in length was achieved.

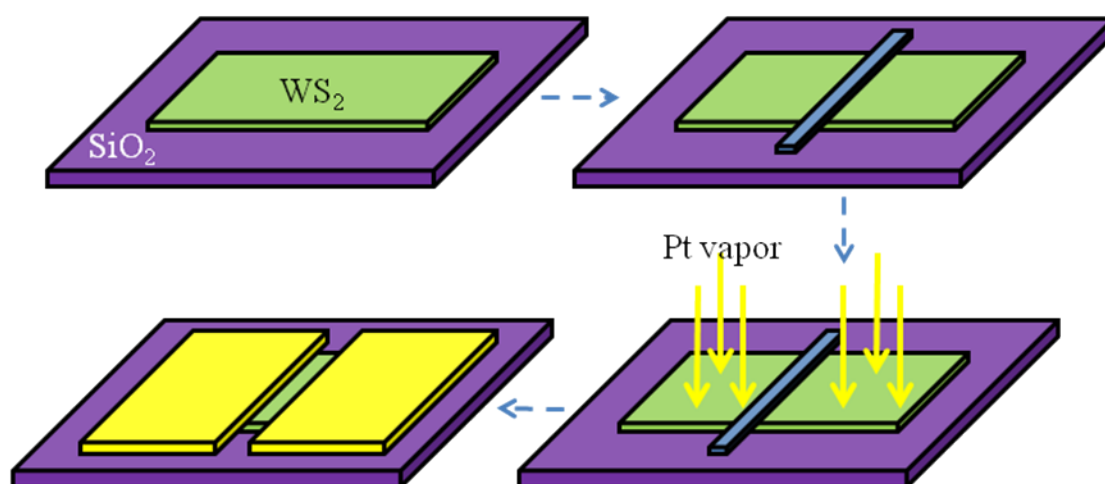


Figure S1. Schematic diagram of the wire-masking technique for the fabrication of a WS₂ photoresistor.

S2. EDS component analysis and AFM thickness profile of the PLD-grown WS₂ film

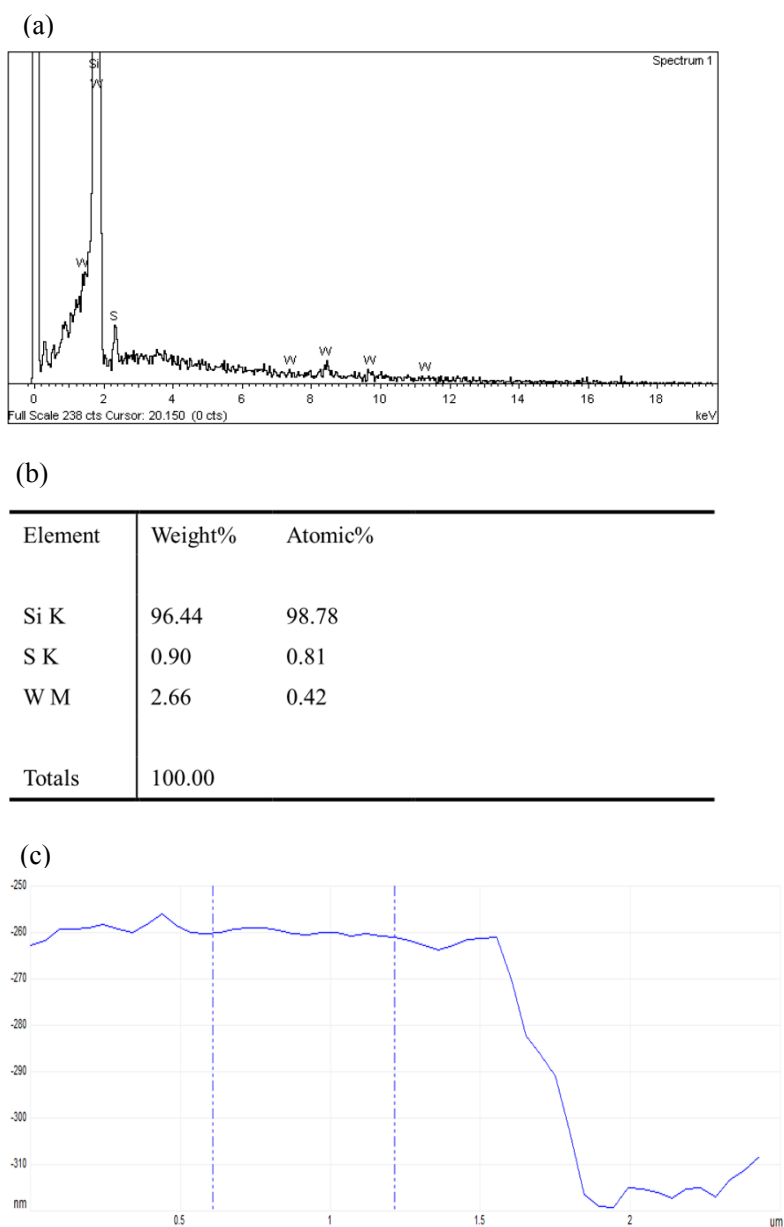


Figure S2. (a) EDS spectrum of the PLD-grown WS₂ film. (b) The weight and atomic ratio of the WS₂ film, conforming the stoichiometric ratio of W:S ~ 1:2. (c) AFM thickness profile of the film, whose thickness is deduced to be 60 nm.

S3. Performance of the devices fabricated from WS₂ with different thickness and growth method

Table 1. Comparison of performances of devices fabricated from WS₂ with different thickness and growth method.

	Methods	Measured condition	Responsivity	Spectral range	Ref
Multilayer WS ₂	PLD	V _{SD} = 0.09 mV/nm V _G = 0 V	0.51 A/W	370 nm ~ 1064 nm	ours
Multilayer WS ₂	Exfoliated	V _{SD} = 0.02 mV/nm V _G = - 2V	0.27 A/W	450 nm ~ 700 nm	1
Multilayer WS ₂	Exfoliated	V _{SD} = 0 mV/nm V _G = - 40 V	1 A/W	488 nm ~ 633 nm	2
Multilayer WS ₂	Exfoliated	V _{SD} = 0.06 mV/nm V _G = 0 V	5.7 A/W	633 nm	3
Monolayer WS ₂	CVD	V _{SD} = 0.7 mV/nm V _G = 0 V	0.2 uA/W	532 nm	4
Few-layer WS ₂	CVD	V _{SD} = 0.6 mV/nm	92 uA/W	458 nm ~ 647 nm	5

References

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