Supplementary Information for

Reasonably designed 2D WS_2 and CdS microwire heterojunction for high performance photoresponse

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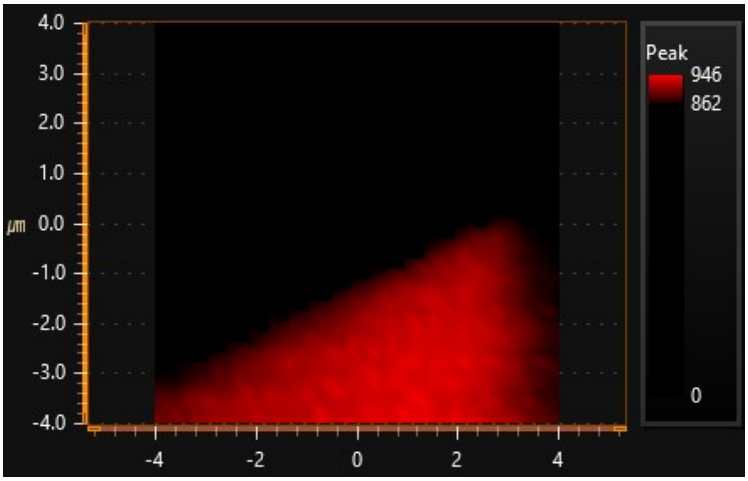

Figure S1. The PL mapping of F-WS_2 under 532 nm light excitation.

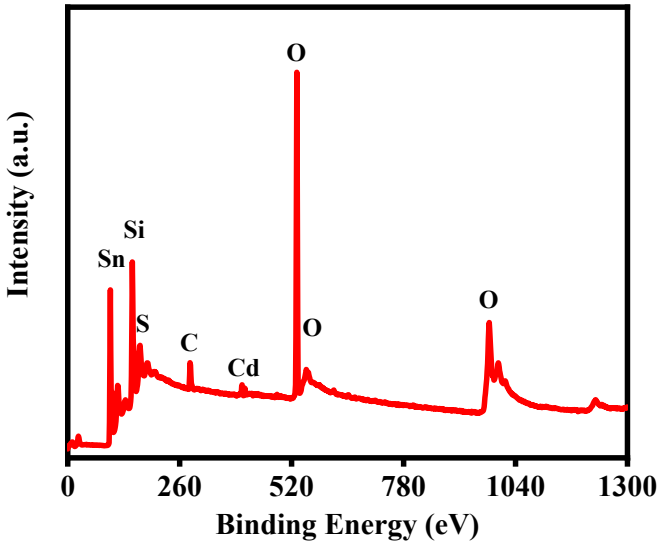

Figure S2. Full XPS spectrum of the CdS microwires.

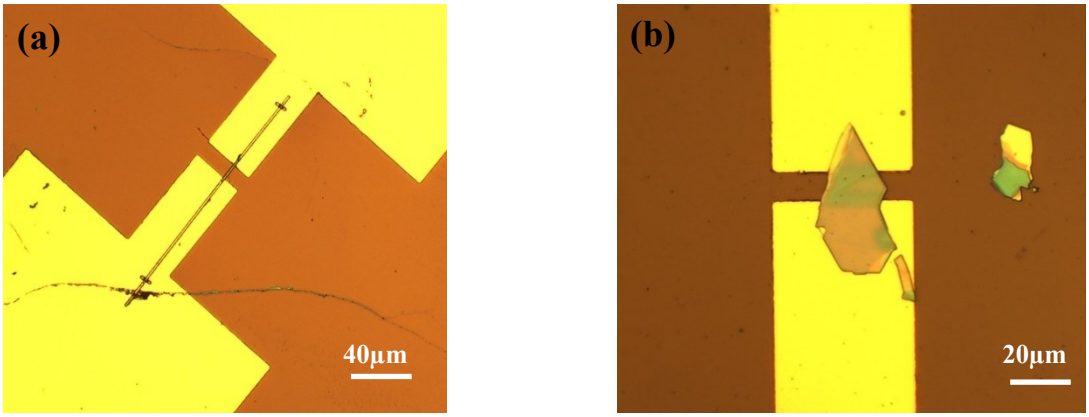

Figure S3. (a) Optical image of the device prepared by a single CdS microwire. (b) Optical image of the M-WS_2 device. The electrode parameters are consistent with the heterojunction device.

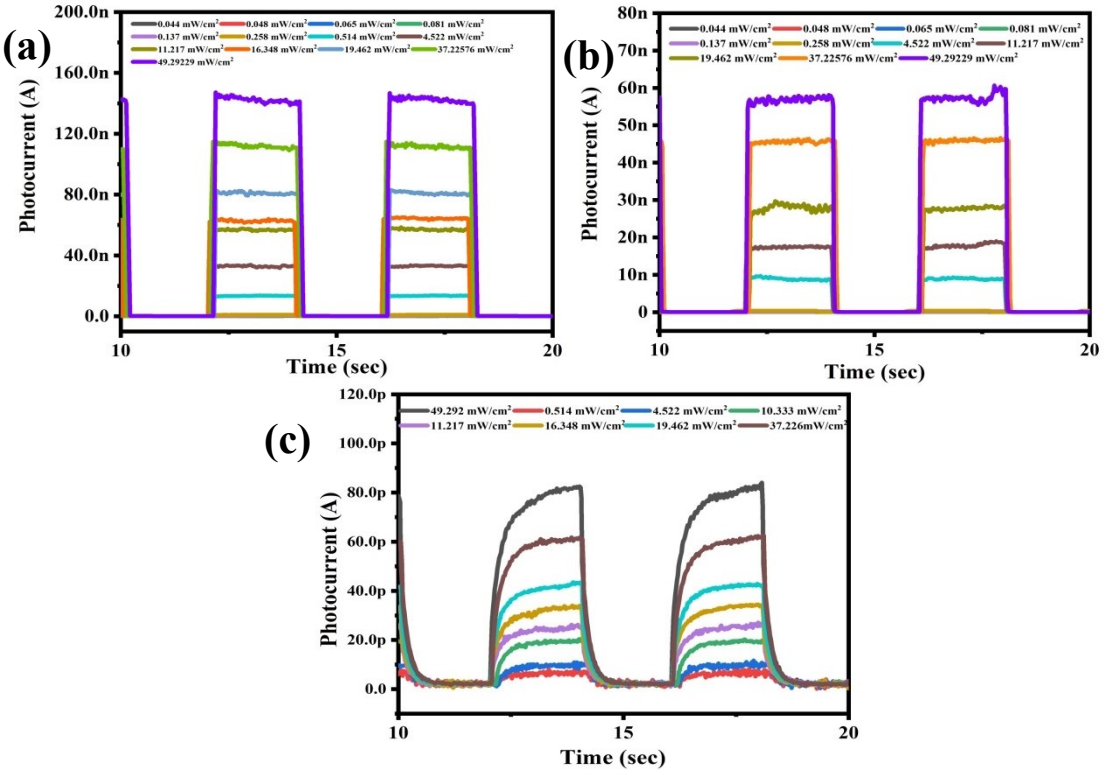

Figure S4. (a) Response curves of the heterojunction device under various light intensities. (b) Response curves of M-WS_2 device under various light intensities. (c) Response curves of CdS/F-WS_2 device under various light intensities. In particular, because CdS/F-WS_2 has a very weak response under low-light, the selected light power densities are higher. The three light sources are all 405 nm laser.

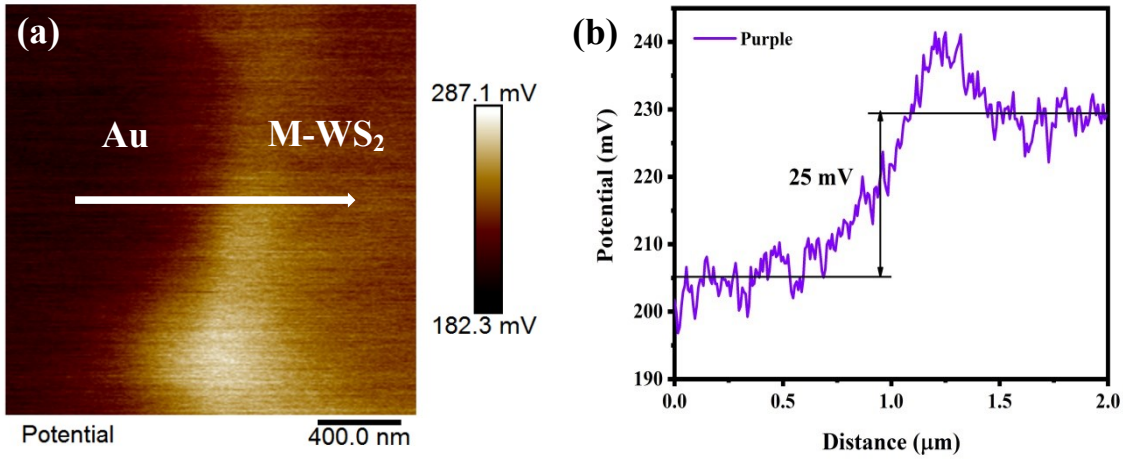

Figure S5. (a) SPD map captured from the interface of the M-WS_2 and an Au electrode. The white arrow points in the direction of the staircase in panel (b). (b) Plot of the measured SPD along white line. The ΔE_f of M-WS_2 and Au is 25 mV, indicating that the work function of Au is 25 meV higher than M-WS_2. As M-WS_2 is a n-type semiconductor, the higher work function of Au indicates Schottky connect.

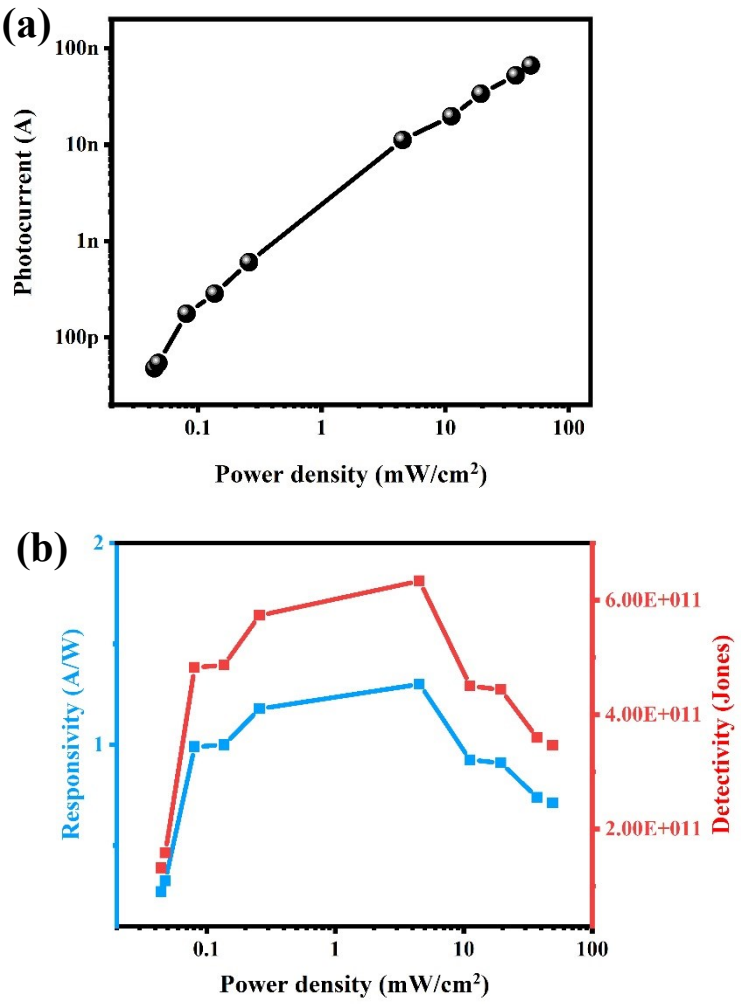

Figure S6. (a) The light power dependence of photocurrent of the M-WS_2 device. (b) The light power dependence of R_λ and D* of the M-WS_2 device.

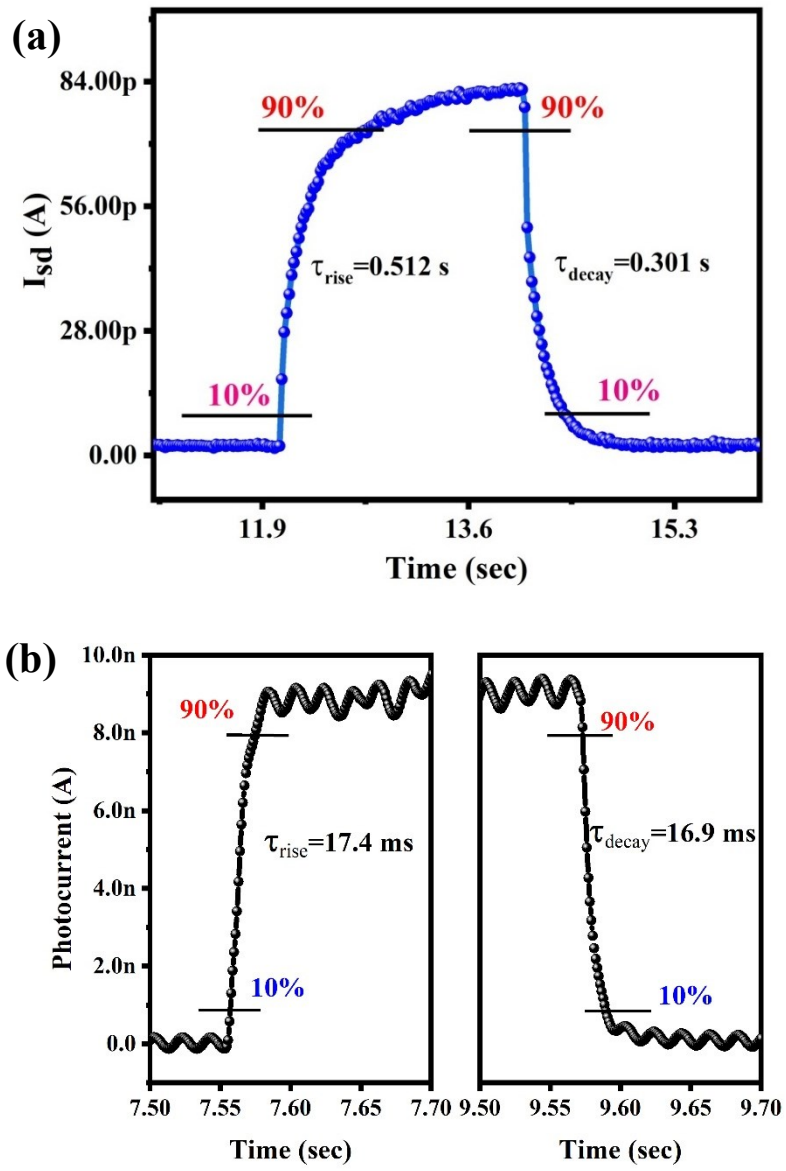

Figure S7. (a) The dynamic response of the CdS/F-WS_2 device for the rise and recovery. The rise and recovery times are 0.512 s and 0.301 s, respectively. (b) The dynamic response of the M-WS_2 device for the rise and recovery. The rise and recovery times are 17.4 ms and 16.9 ms, respectively.