

## **Electronic supplementary information**

### **Self-Powered Broadband, High-Detectivity and Ultrafast Photodetectors Based on Pd-MoS<sub>2</sub>/Si Heterojunctions**

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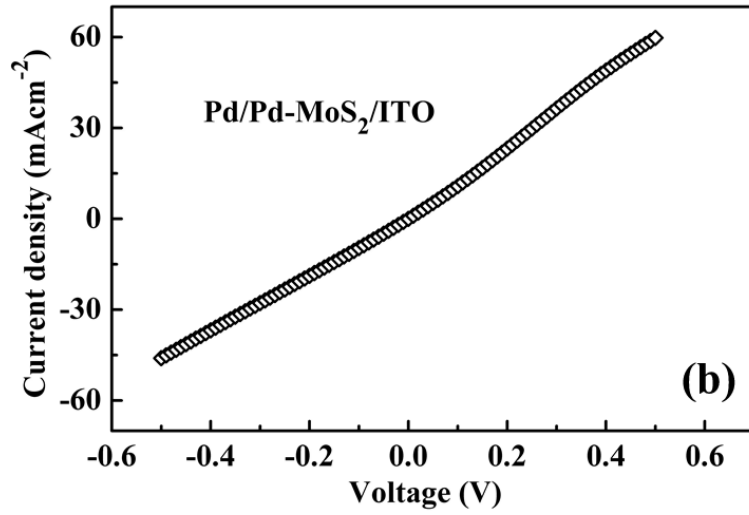
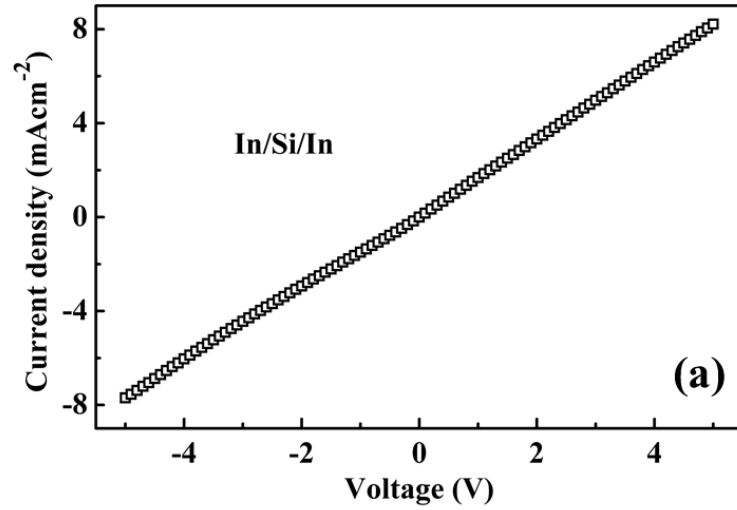
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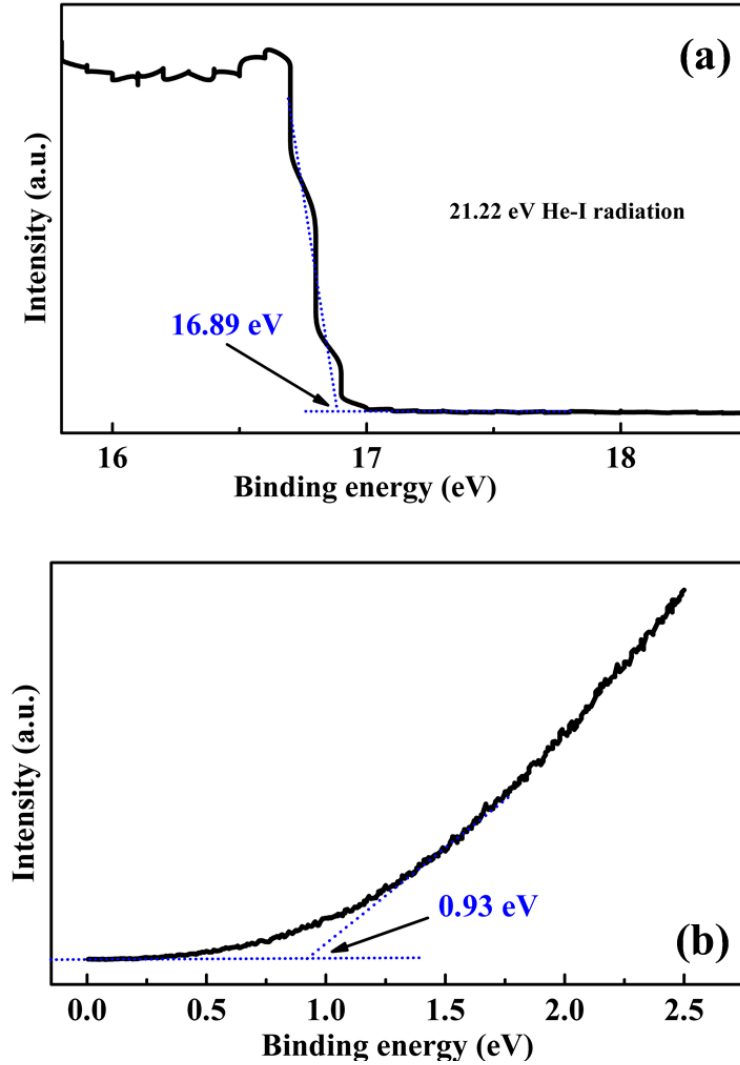


**Fig. S1.**  $I$ - $V$  curves of (a) the In/n-Si/In and (b) the Pd/Pd-MoS<sub>2</sub> film/ITO.

Fig. S1 shows the  $J$ - $V$  curves of the In/n-Si/In and Pd/Pd-MoS<sub>2</sub> film/ITO structure, respectively.

From the figure, the linear characteristics of the  $J$ - $V$  curves for both the devices are observed. This

demonstrates that the contacts of In/Si and Pd/Pd-MoS<sub>2</sub> film are ohmic.



**Fig. S2.** UPS spectra of the MoS<sub>2</sub> film on Si, showing its Fermi level (a) and the distance between the Fermi level and the conduction band (b), respectively.

Figure S2 shows the UPS spectrum of the MoS<sub>2</sub> film without Pd doping. The work function ( $W$ ) of the film can be calculated from the difference between the cutoff of the highest binding energy and the photon energy of the exciting radiation. As shown in Figure S2(a),  $W=4.33$  eV. The distance ( $\Delta E$ ) between the valence band and Fermi level of MoS<sub>2</sub> film can be extracted from the onset energy, as shown in Figure 2S(b). The  $\Delta E$  is determined to be 0.93 eV. This further demonstrates the n-type behavior of the MoS<sub>2</sub> film without Pd doping.