

Supporting Information

**Switching Photodiodes Based on (2D/3D) PdSe<sub>2</sub>/Si Heterojunctions  
with a Broadband Spectral Response**

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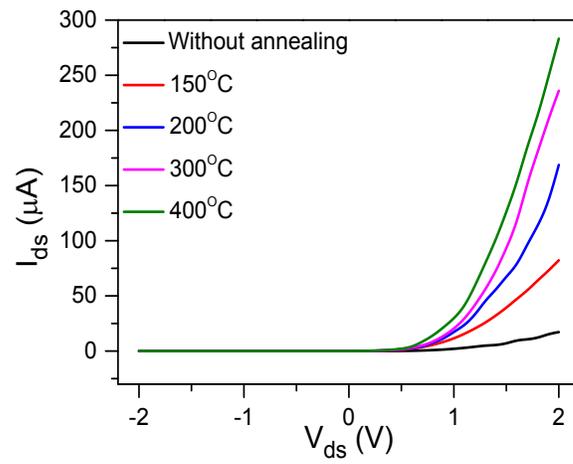
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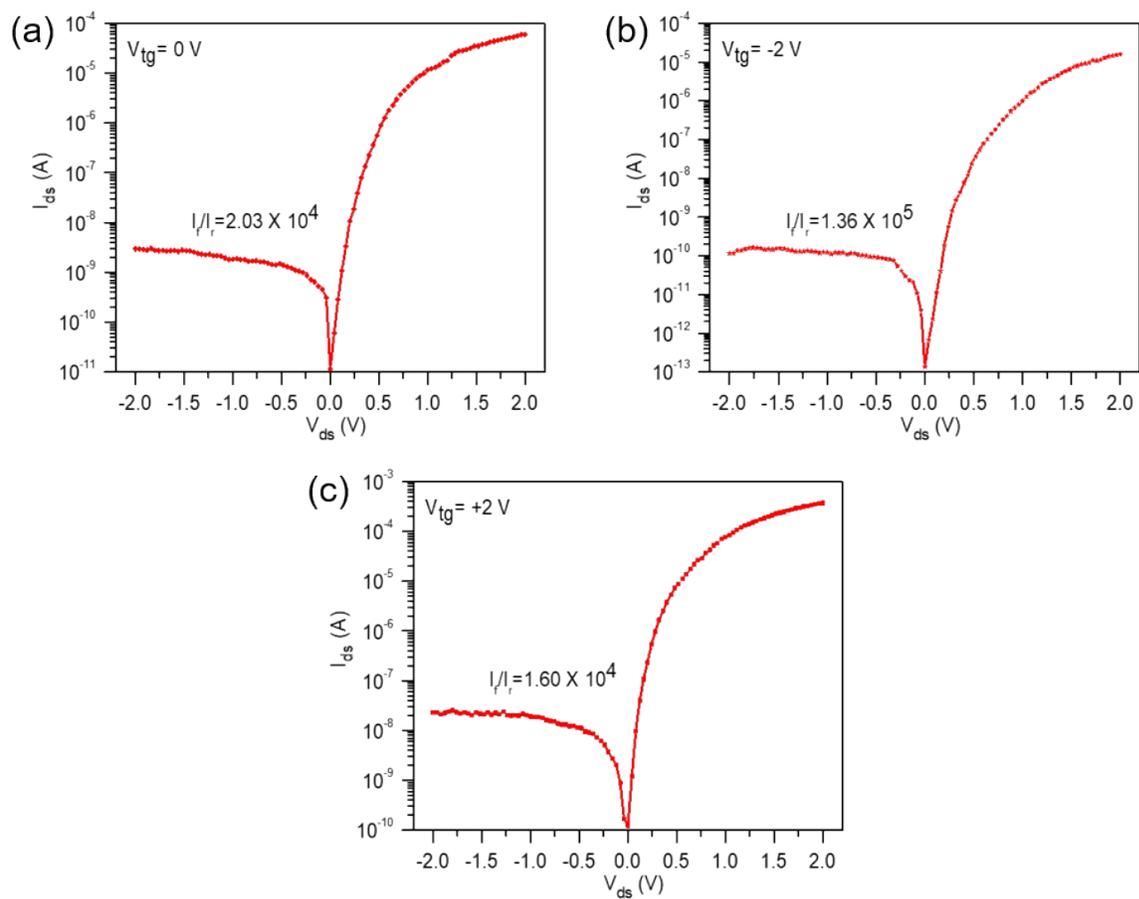
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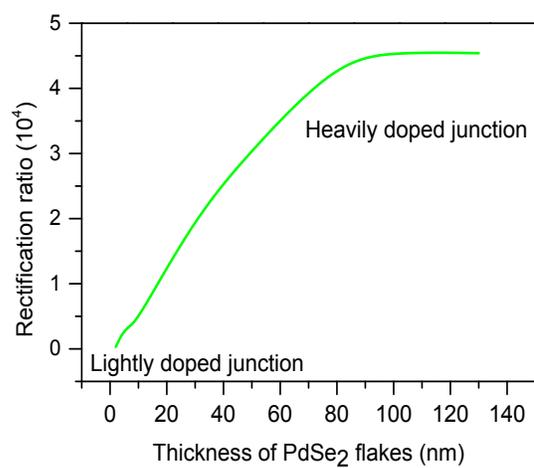
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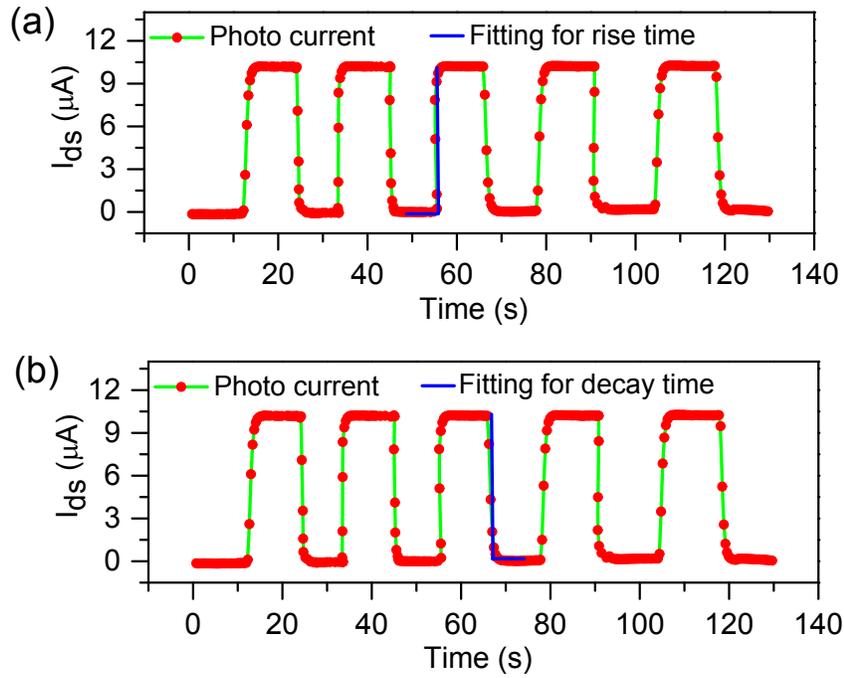
**Figure S1.** ( $I_{ds}-V_{ds}$ ) characteristics of the n- $PdSe_2$ /p-Si diode of the same device before and after vacuum annealing at various annealing temperatures.



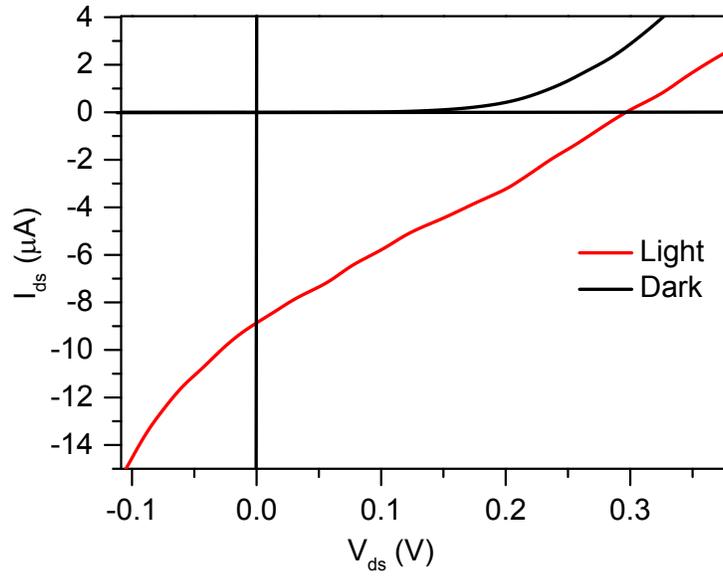
**Figure S2.** Gate-dependent rectifying effect of the  $PdSe_2/Si$  mix-dimensional heterojunction  $p-n$  diode in the log scale show change in the rectification ratio with respect to ionic liquid top gate voltage.



**Figure S3.** Rectifying effect at zero top gate voltage of the  $PdSe_2/Si$  mix-dimensional heterojunction  $p-n$  diode at different thickness of  $PdSe_2$  flakes.



**Figure S4.** Photoreponse of n- $\text{PdSe}_2$ /p-Si diode with  $\lambda = 600$  nm for  $62.3$   $\text{mW}/\text{cm}^2$  (a) showing fitting for rise time and (b) for decay time.



**Figure S5.** The  $I_{ds}$ - $V_{ds}$  curves of the PdSe<sub>2</sub>/Si heterojunction diode under dark and illumination of light  $\lambda = 600$  nm which shows the photovoltaic behaviors at a power intensity of 35.1 mW/cm<sup>2</sup>.