Supplementary Information for
Self-Powered Broadband Photodetector Based on Vertically Stacked
\(\text{WSe}_2/\text{Bi}_2\text{Te}_3\) \(p-n\) Heterojunction

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Figure S1. Atomic structure models of rhombohedral \(\text{Bi}_2\text{Te}_3\).
Figure S2. Schematic growth procedure of the WSe$_2$/Bi$_2$Te$_3$ heterostructures. (c, d)

Optical image of the as-grown large-scale monolayer WSe$_2$ triangular flakes and the vertically stacked WSe$_2$/Bi$_2$Te$_3$ heterostructures after step I and II (scale bar: 20 μm).
Figure S3. Band diagram of the charge transfer process at the junction interface under laser illumination (532 nm).
Figure S4. (a) Optical image of the Bi$_2$Te$_3$-based FET device (scale bar: 10 μm). (b) $I_{ds}-V_g$ curves of Bi$_2$Te$_3$-based FET device and (c) shows the $I_{ds}-V_{ds}$ output characteristics. (d) Optical image of the WSe$_2$-based FET device (scale bar: 10 μm). (d) $I_{ds}-V_g$ curves of WSe$_2$-based FET device and (e) shows the $I_{ds}-V_{ds}$ output characteristics.
Figure S5. Stability test of photoswitch behavior at $V_{ds} = 0$, $P = 26.4$ mW/cm$^2$. 
Figure S6. $I_{ds}-V_{ds}$ curves of the WSe$_2$/Bi$_2$Te$_3$ heterostructures based photodetector under different light: (a-d) 375, 520, 980 and 1550 nm, respectively.