Electronic Supplementary Material (ESI) for CrystEngComm.

Supporting Information

SbSI Whisker/PbI_2 Flake Mixed-Dimensional van der Waals Heterostructure for Photodetection

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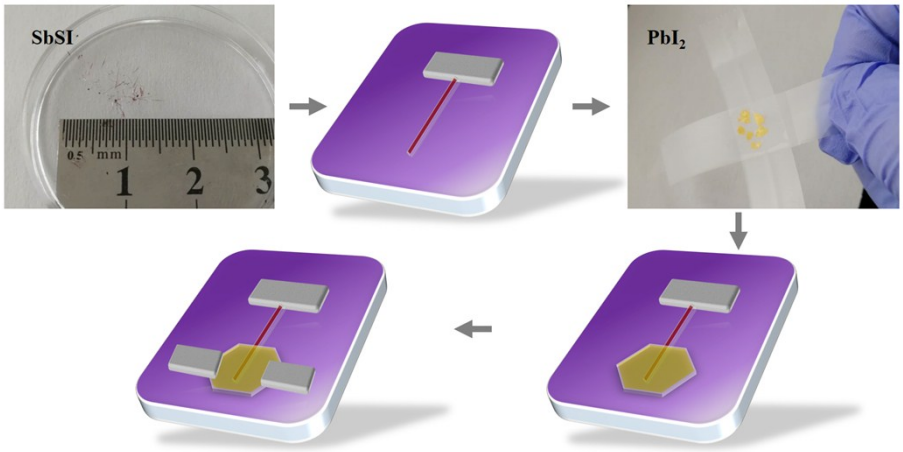

Fig. S1 Preparation process of the device formed from $SbSI/PbI_2$ vdW heterostructure.

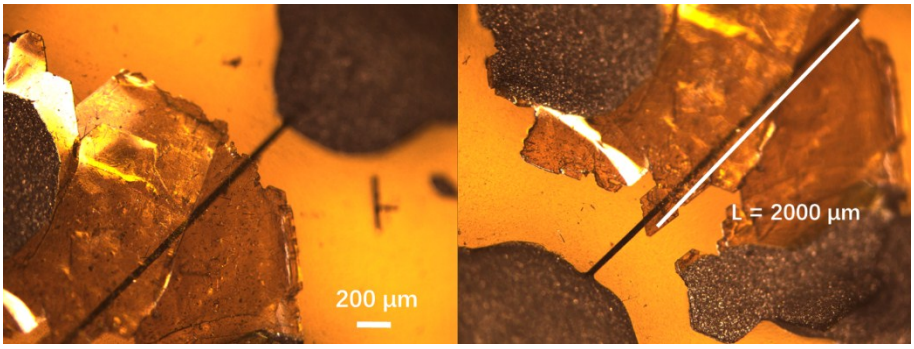

Figure S2. Optical image of $SbSI/PbI_2$ van der Waals heterostructure.

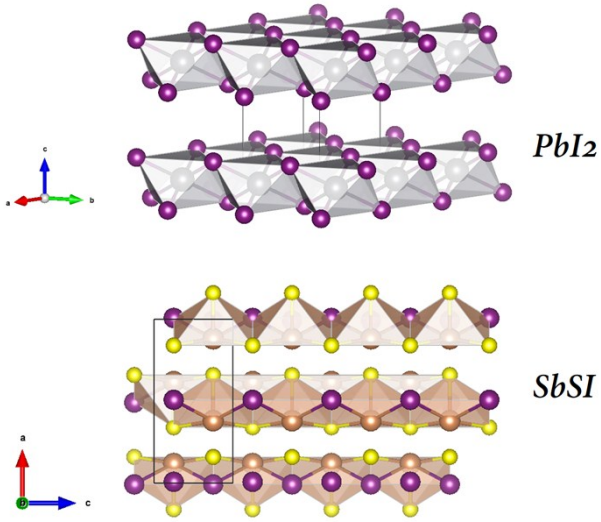

Fig. S3 Crystallographic structural models for PbI_2 and SbSI, respectively.

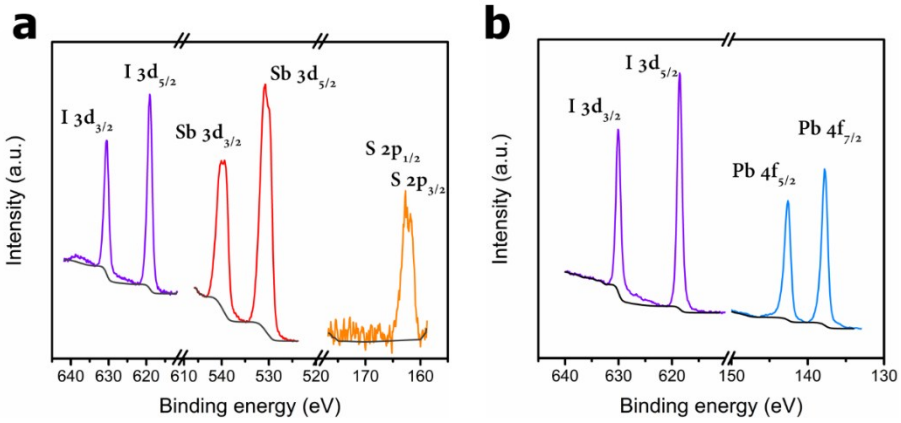

Fig. S4 (a) XPS spectrum of SbSI, and corresponding regional peaks of Sb 3d, S 2p and I 3d. (b) XPS spectrum of PbI_2, and corresponding regional peaks of Pb 4f and I 3d.

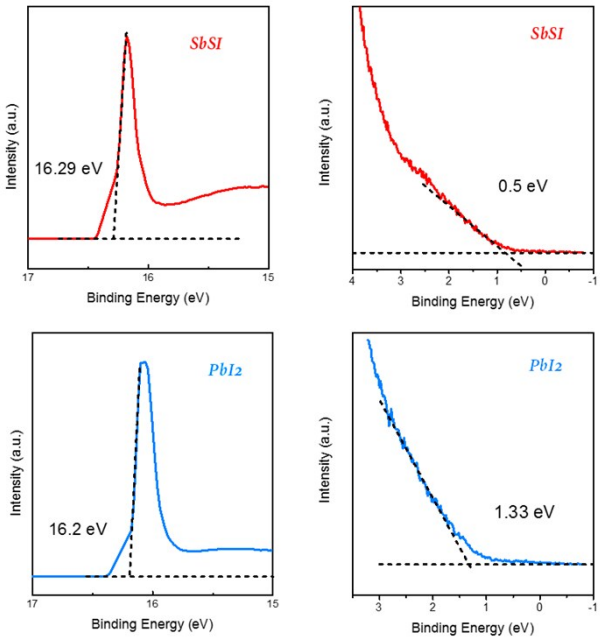

Fig. S5 Ultraviolet photoelectron spectroscopy (UPS) results of (a) SbSI and (b) PbI_2.

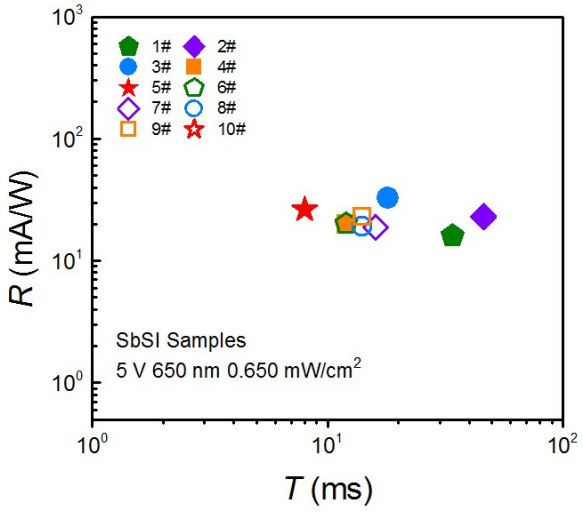

Fig. S6 Statistics of responsivity and response time of other SbSI devices under 650 nm light illumination.

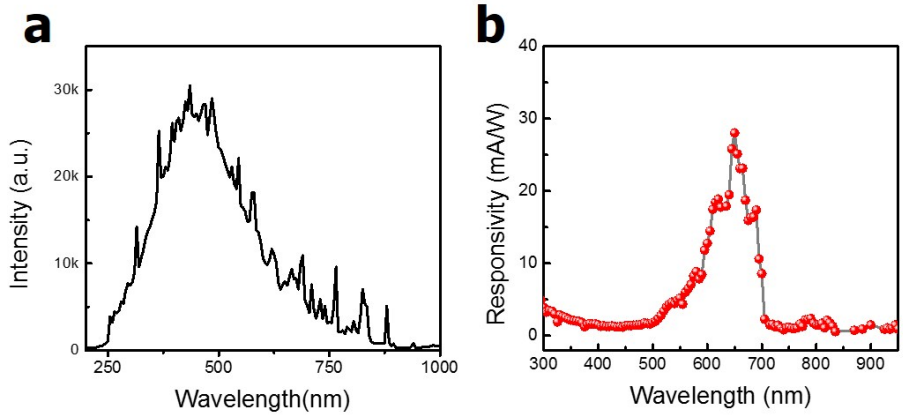

Fig. S7 (a) Spectral output intensity distribution of Xenon lamp. (b) Photoresponsivity of the vdW heterojunction device.

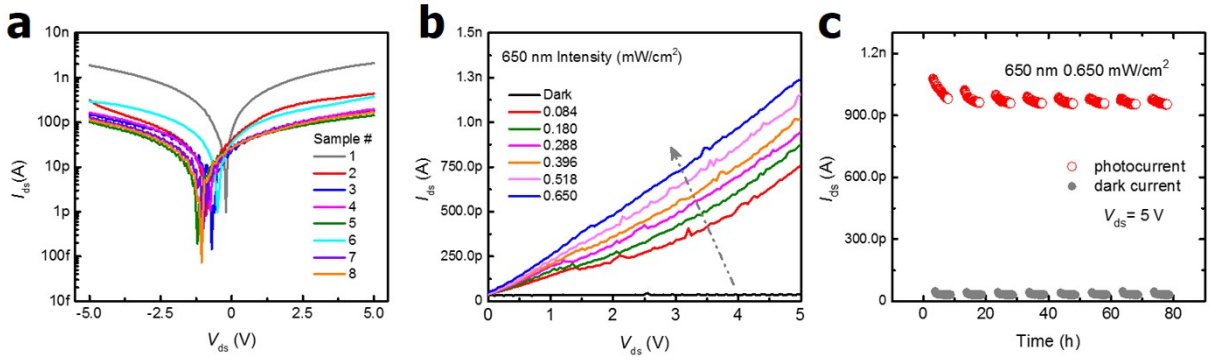

Fig. S8 (a) *I-V* curves of other fabricated SbSI/PbI_2 vdW heterojunctions under illumination in logarithm scales. (b) I_{ds}-V_{ds} curves of other SbSI/PbI_2 vdW heterojunction device under 650 nm light illumination at different incident power. (c) Variation of dark current/photocurrent with time of vdW heterojunction device in air at room temperature.