Supplementary Material

Performance enhancement of GeS/MoS_2 van der Waals heterojunction optoelectronic device with photovoltaic-type photodetection

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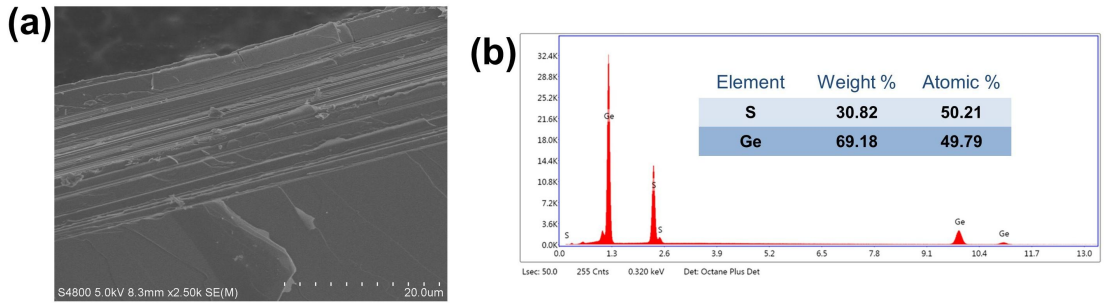


Figure S1. The SEM characterization of the GeS single crystals. (a) The SEM image of GeS single crystals. The obvious layered structure can be seen. (b) The EDS spectra of GeS single crystals. The inset table shows that the ratio of element S and element Ge is nearly 1:1.

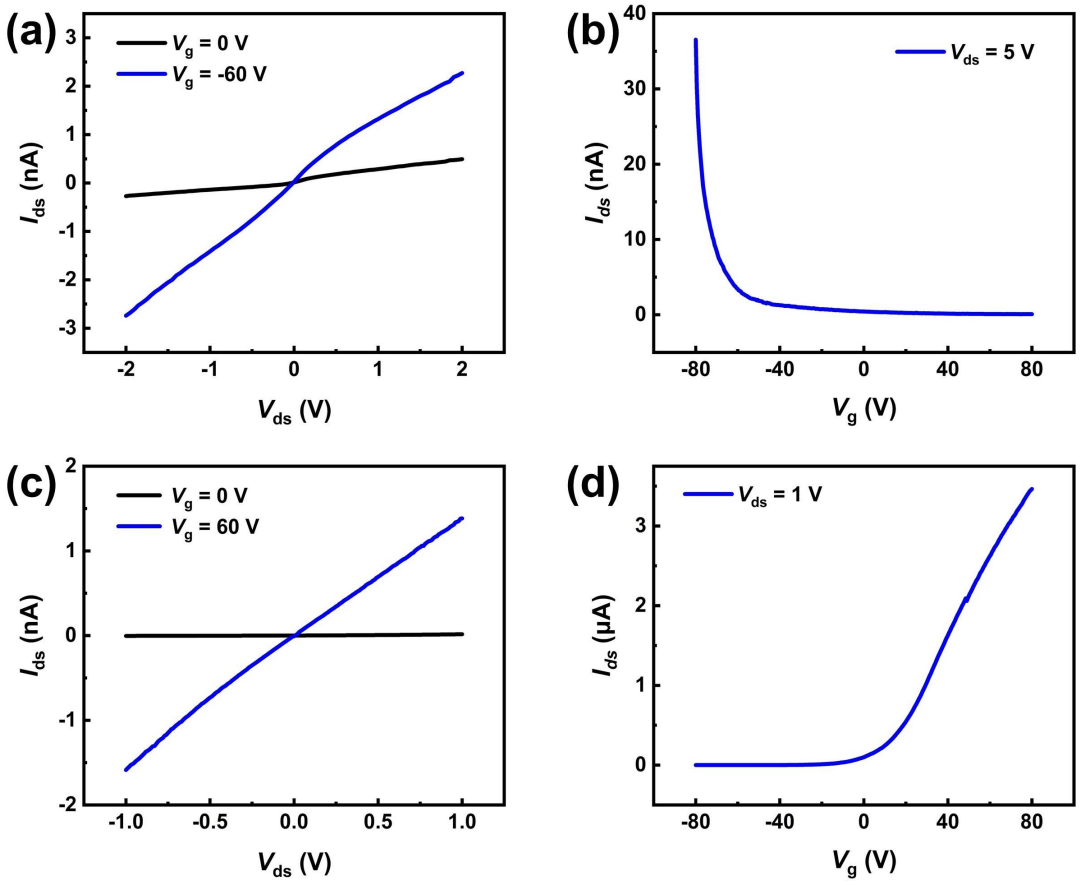


Figure S2. The electrical properties of GeS-FETs and MoS_2-FETs. (a) The output curves and (b) transfer curve of GeS-FETs. (c) The output curves and (d) transfer curve of MoS_2-FETs.

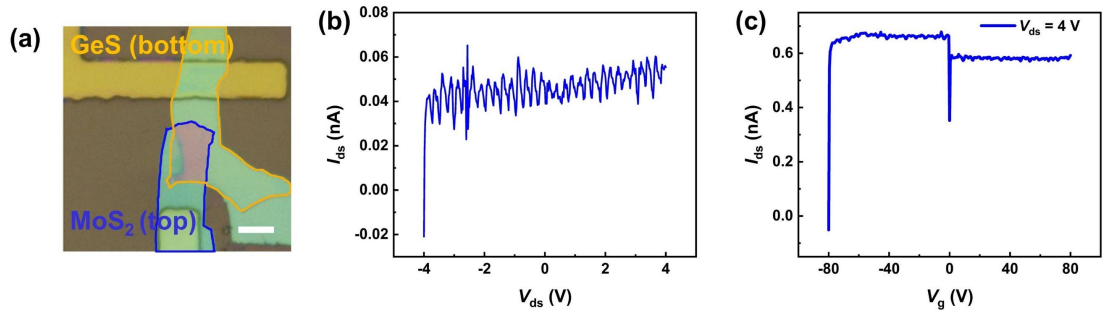


Figure S3. The electrical properties of the GeS/MoS_2 vdW heterojunction. (a) The optical microscope image, (b) the output curve, (c) the transfer curve of the GeS/MoS_2 vdW heterojunction device with structure-1.

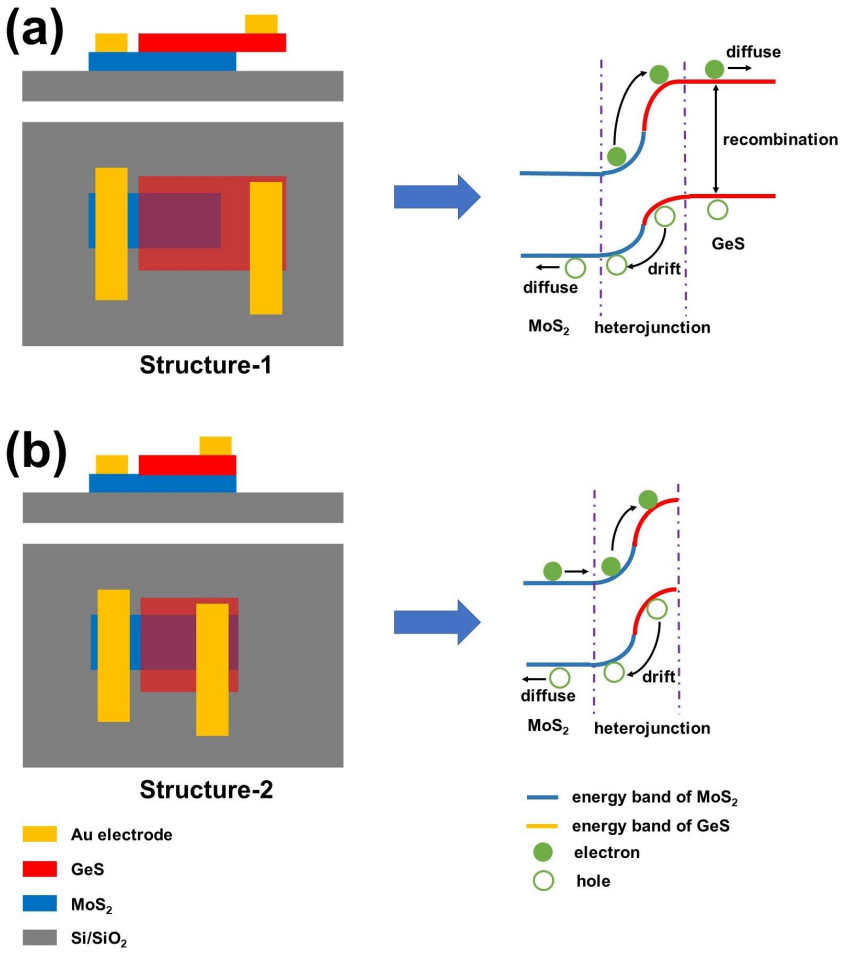


Figure S4. The energy band diagram of GeS/MoS_2 vdW heterojunctions. (a) The device schematic diagram and energy band diagram of structure-1 with non-heterojunction regions on GeS side. (b) The device schematic diagram and energy band diagram of structure-2 without non-heterojunction regions on GeS side.

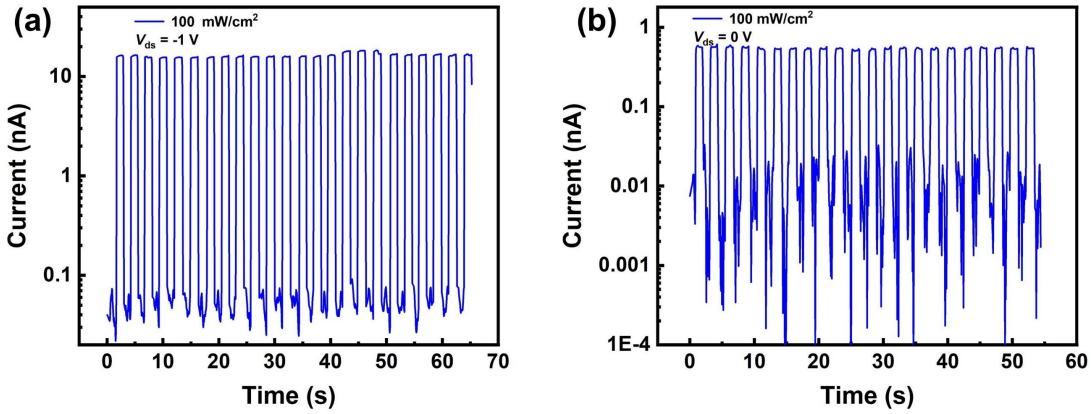


Figure S5. The stability of the device No.2 with long-time operation under (a) -1 V and (b) 0 V.