Electronic supplementary information (ESI) for

Van der Waals Epitaxy of Large-Area Continuous ReS_2 Films on Mica Substrate

Jing-Kai Qin,[ac] Wen-Zhu Shao,[a] Yang Li,[ab] Cheng-Yan Xu,[*abc] Dan-Dan Ren,[ac] Xiao-Guo Song,b and Liang Zhen[*ac]

[a] School of Materials Science and Engineering, Harbin Institute of Technology, Harbin 150001, China

[b] Shandong Provincial Key Laboratory of Special Welding Technology, Harbin Institute of Technology at Weihai, Weihai 264209, China

[c] MOE Key Laboratory of Micro-Systems and Micro-Structures Manufacturing, Harbin Institute of Technology, Harbin 150080, China

E-mail: cy_xu@hit.edu.cn; lzhen@hit.edu.cn

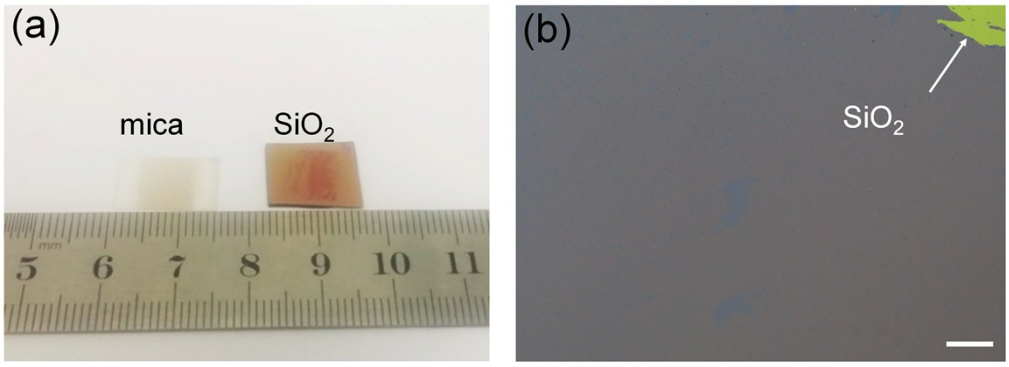

Fig. S1 (a) Digital photograph of monolayer ReS_2 films grown on mica and SiO_2. (b) Optical image of ReS_2 films transferred onto SiO_2 substrate.

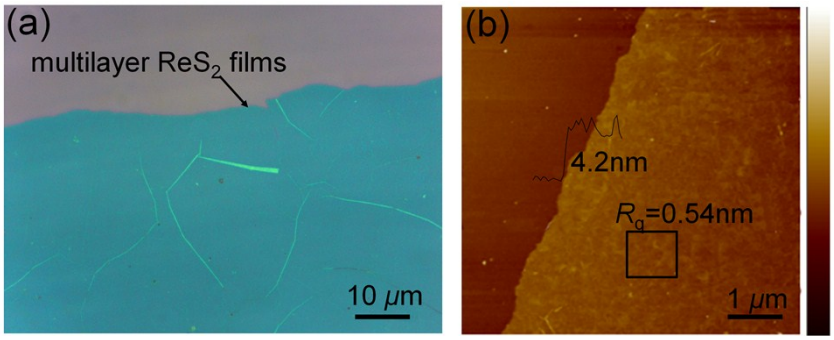

Fig. S2 (a) Optical image of multilayer ReS_2 film transferred on SiO_2 substrate. (b) AFM tomography image and height profile of multilayer ReS_2.

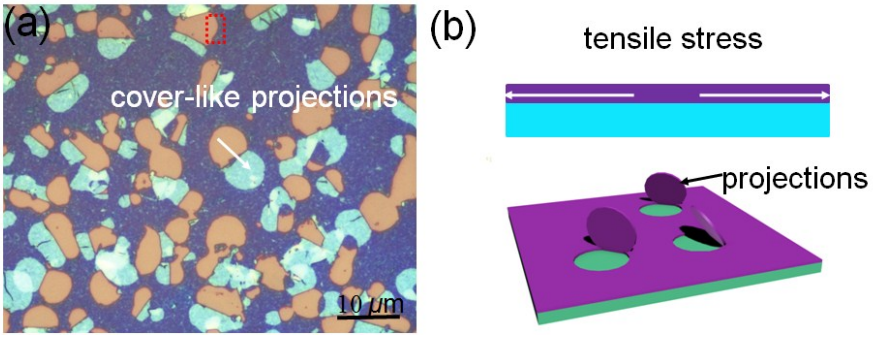

Fig. S3 (a) Optical image of the thick ReS_2 film with numerous cover-like embossment. (b) Schematic formation mechanism for cover-like embossment.

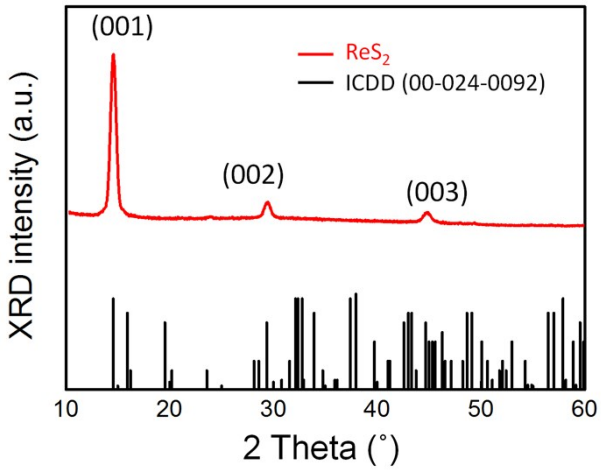

Fig. S4 XRD patterns of multilayer ReS_2 films.

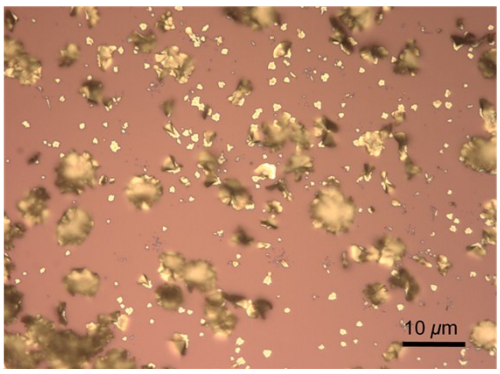

Fig. S5 Optical image of flower-like ReS_2 growth on SiO_2 substrate.

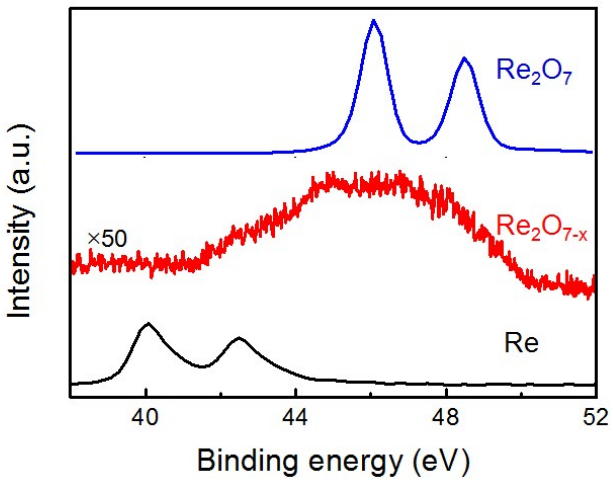

Fig. S6 XPS spectra of Re 4f region in: (a) Re_2O_7; (b) intermediate species; (c) Re powder.

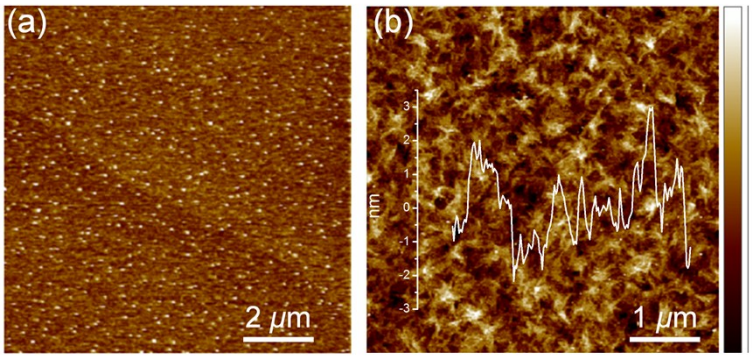

Fig. S7 (a) AFM image of the products with only Re_2O_7 as precursor. (b) AFM image of products with excess Re_2O_7 as precursors. The mass of Re_2O_7 and Re are 20 and 50mg, respectively.

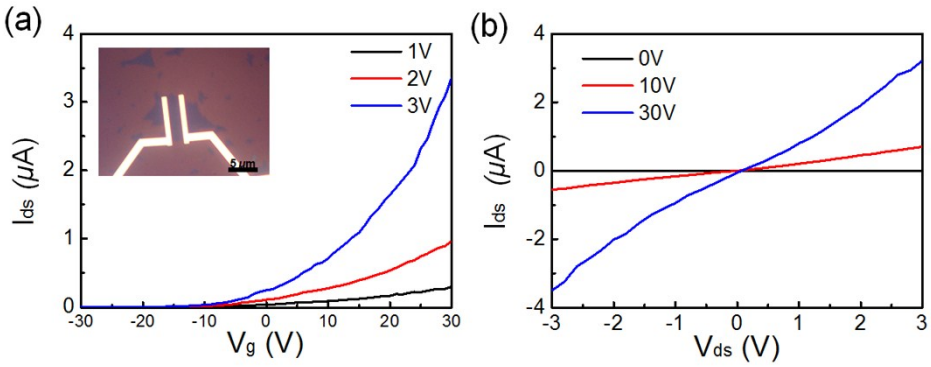

Fig. S8 Electrical properties of single-crystal ReS_2 films. (a) Transfer curve of the device. Inset shows the optical image. (b) output curve of the device.

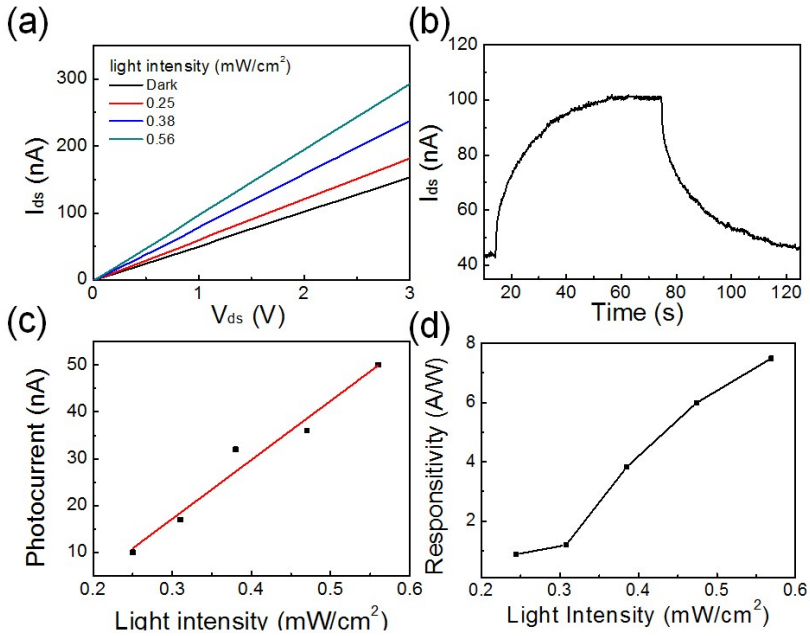

Fig. S9 (a) *I*−*V* curves in the dark and in the presence of 490 nm incident light with different intensities. (b) Time-dependent photoresponse of device under 490 nm incident light with intensity 0.56 mW/cm^2 at 1 V. (c-d) the measured photocurrent and calculated responsitivity as a function of incident power.