Supporting Information

Rapid and Stable Hydrogen Detection Based on Pd-Modified WO_3 Nanosheets

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1. Measurement of hydrogen sensors

Fig.S1 shows the WS-30A gas-sensing system and the volume of test chamber is 18 L. Gas sensing performance can be tested by injecting a certain volume of gas from the gas injection hole. In this work, hydrogen was produced by a hydrogen generator (Success Hydrogen Energy Co., Ltd., Shandong, China). The detailed testing processes are as follows. Firstly, we tested the resistance of hydrogen sensor (R_a) in the test chamber filled with air. Then, we injected a certain volume of hydrogen, the hydrogen was mixed with air quickly. The changed resistance could be recorded by the test system. When the resistance value (R_g) was stable, we opened the test chamber and the sensor exposed to air again. The gas response was defined as $S=R_a/R_g$ (R_a represents initial resistance of the sensor in air and R_g represents its resistance in the target gas). The response and recovery time were defined as the time needed to reach 90% of the resistance change during gas adsorption and desorption.

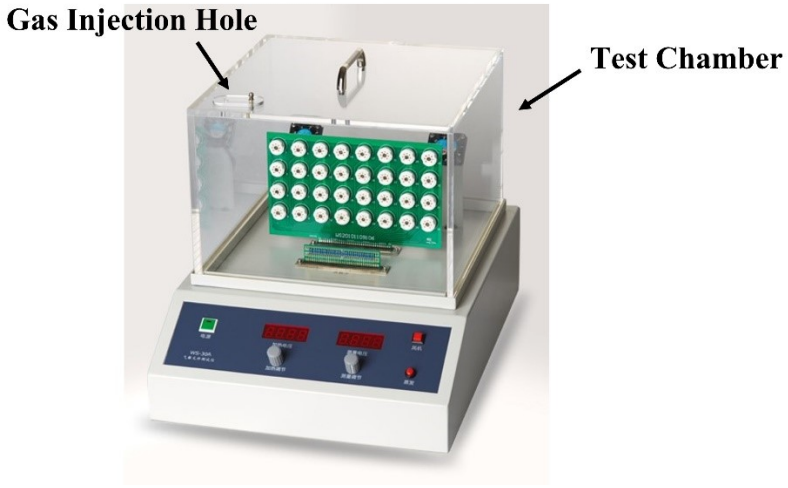

Fig. S1 WS-30A gas-sensing system.

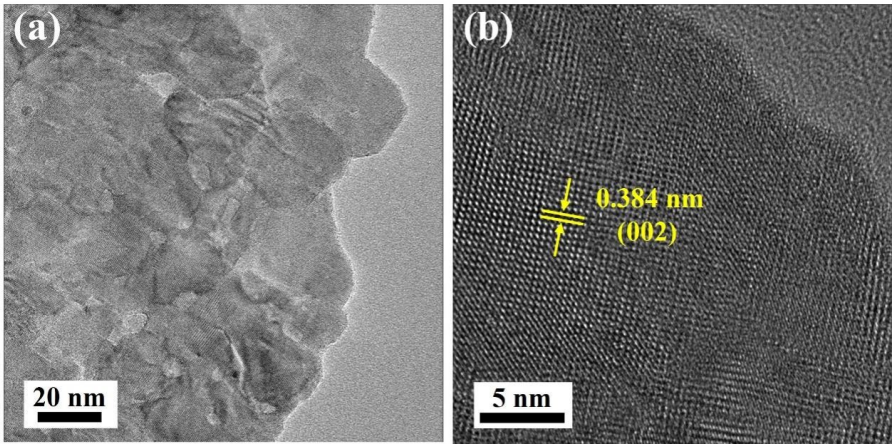

Fig. S2 (a) TEM and (b) HRTEM images of Pd/WO_3-1 sample.

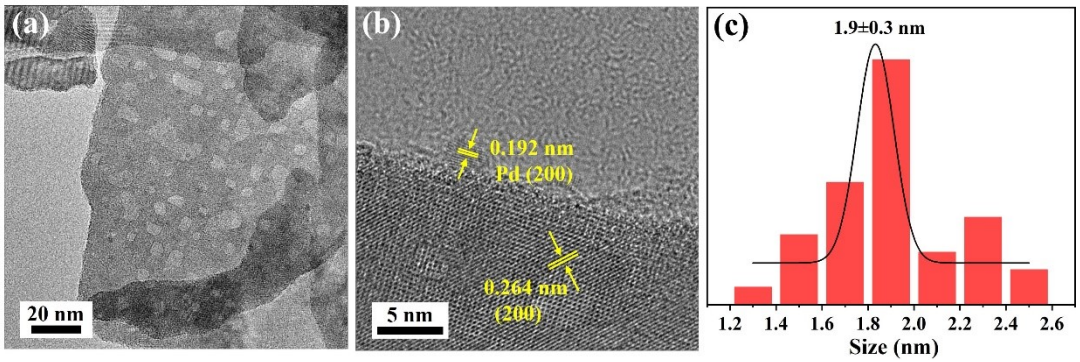

Fig. S3 (a-c) TEM, HRTEM images and corresponding size histogram of Pd/WO_3-2 sample.

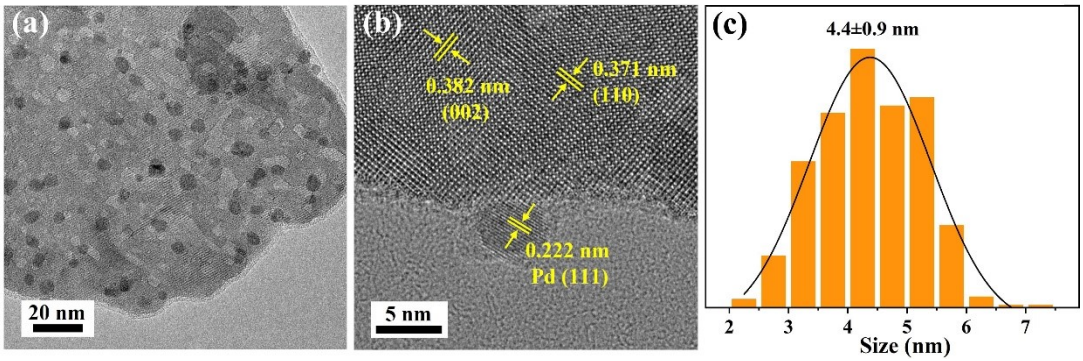

Fig. S4 (a-c) TEM, HRTEM images and corresponding size histogram of Pd/WO_3-3 sample.

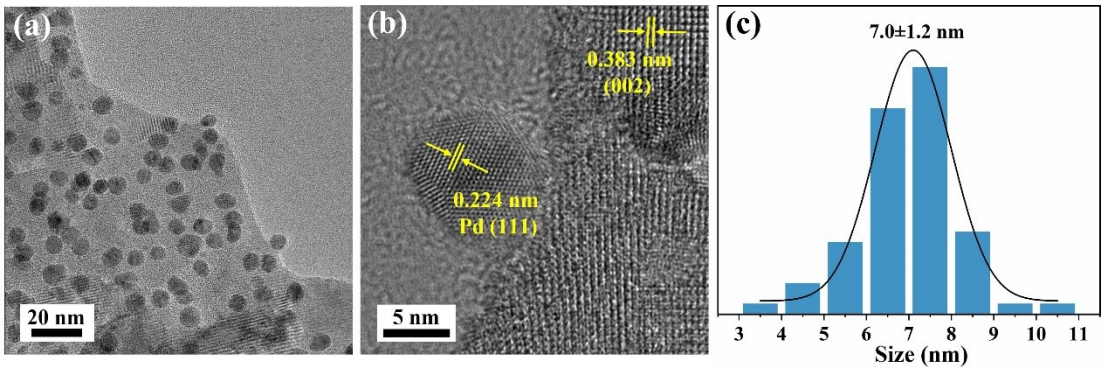

Fig. S5 (a-c) TEM, HRTEM images and corresponding size histogram of Pd/WO_3-4 sample.

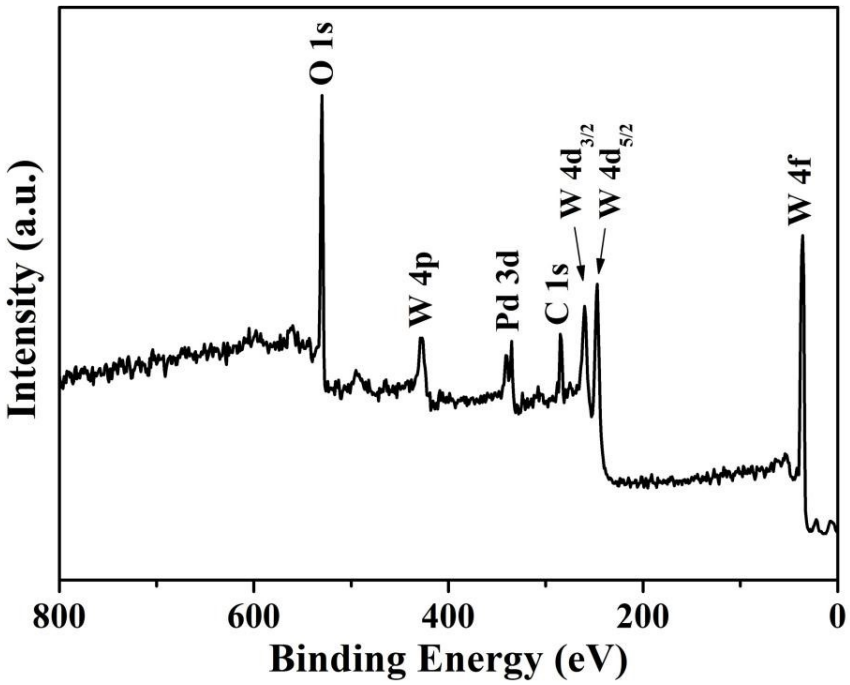

Fig. S6 XPS spectrum of full survey of Pd/WO_3-3 sample.

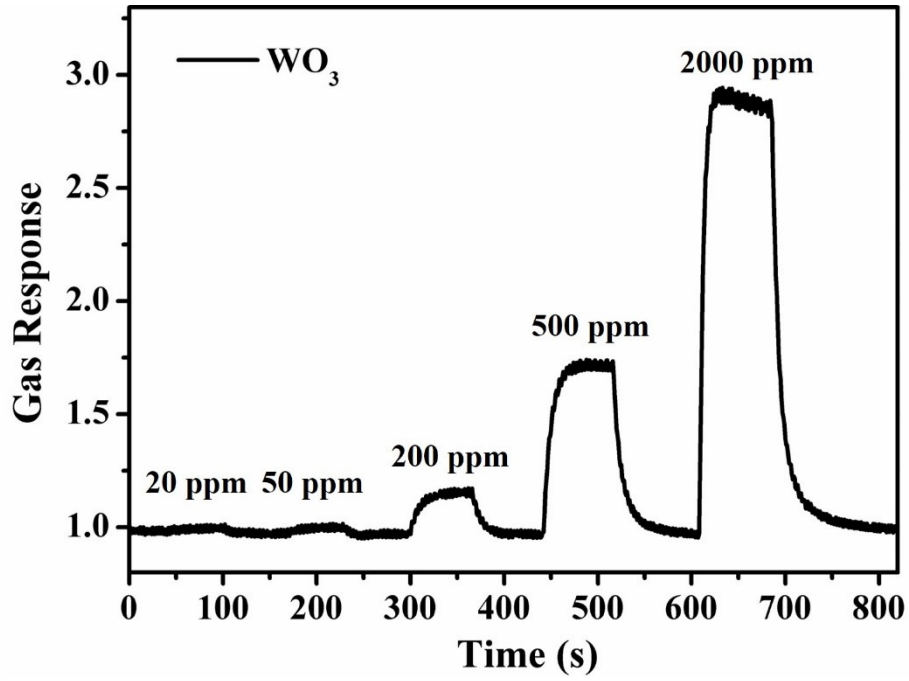

Fig. S7 (a) Gas response of WO_3 sample in the range of 20-2000 ppm of H_2 under 160 °C.

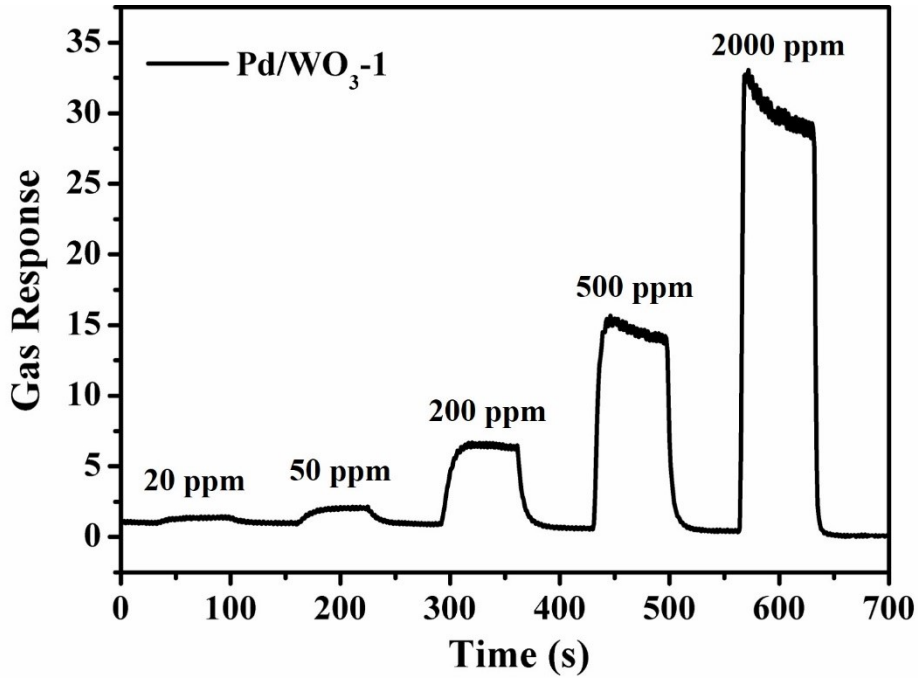

Fig. S8 (a) Gas response of Pd/WO_3-1 sample in the range of 20-2000 ppm of H_2 under 160 °C.

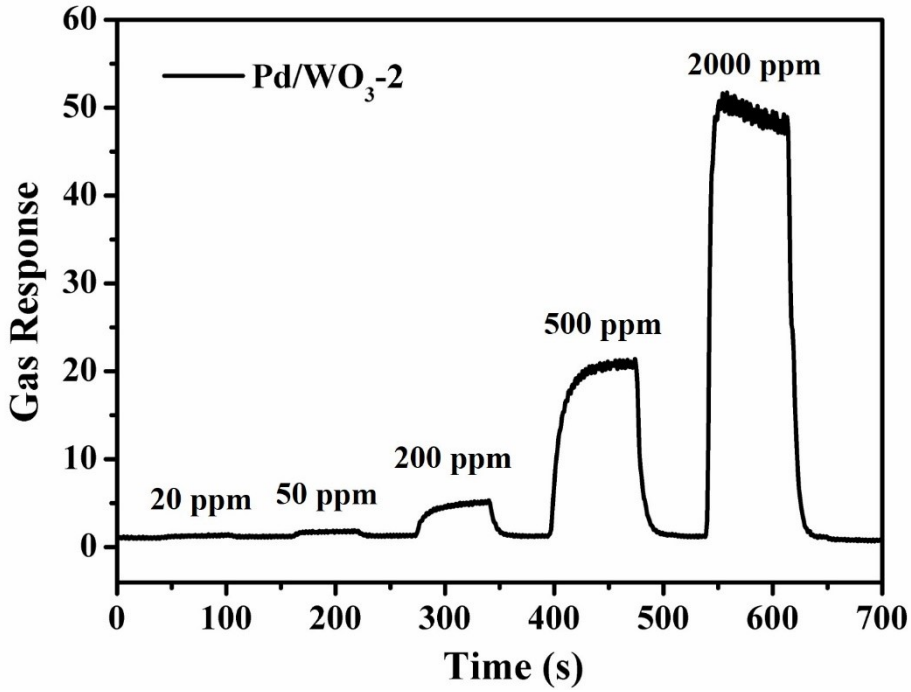

Fig. S9 (a) Gas response of Pd/WO_3-2 sample in the range of 20-2000 ppm of H_2 under 160 °C.

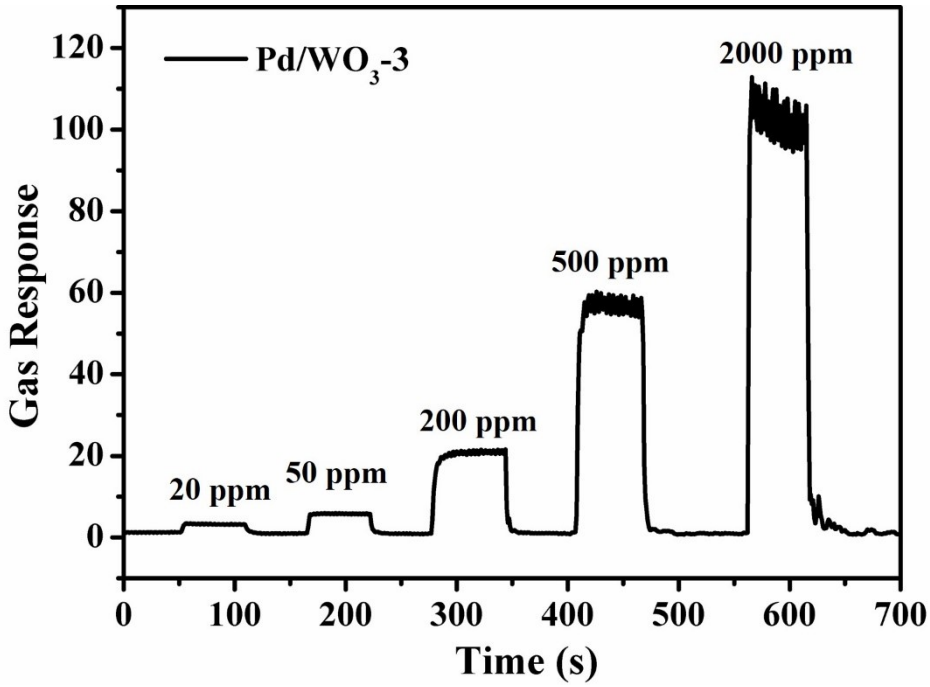

Fig. S10 (a) Gas response of Pd/WO_3-3 sample in the range of 20-2000 ppm of H_2 under 160 °C.

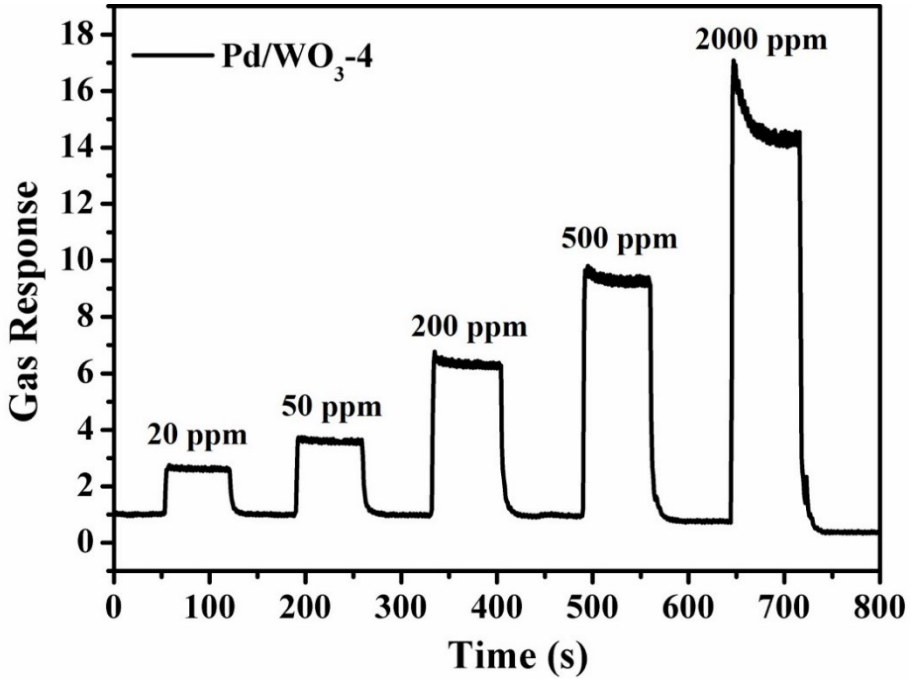

Fig. S11 (a) Gas response of Pd/WO_3-4 sample in the range of 20-2000 ppm of H_2 under 160 °C.

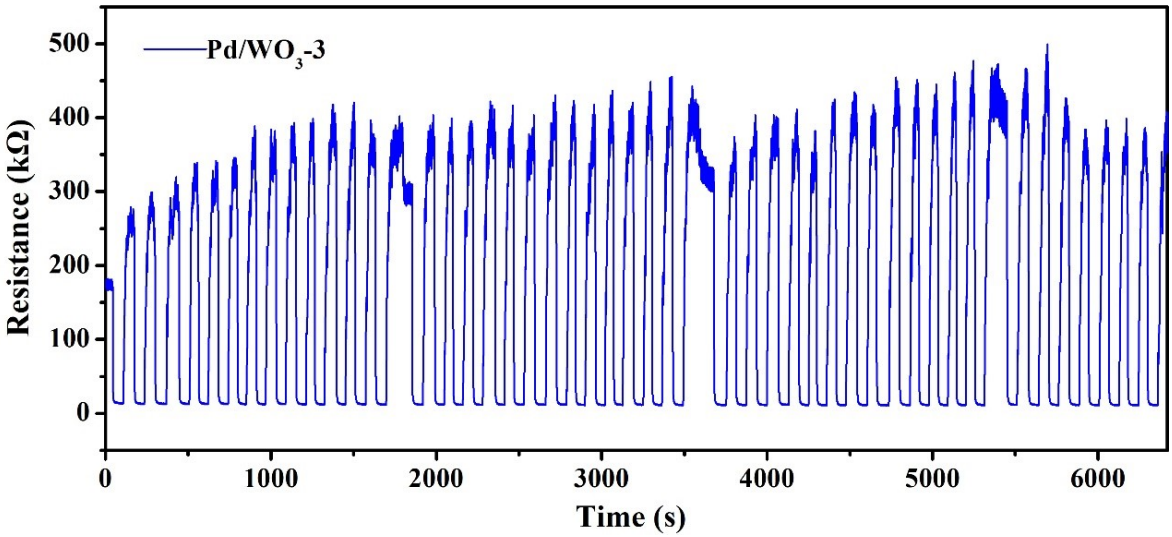

Fig. S12 Resistance of the sensor based Pd/WO_3-3 to 200 ppm H_2 at 160℃ during 50 cycles stability test.

Table S1. Pd content in the samples was measured by ICP.

Samples	Pd content
Pd/WO_3-1	0.19 %
Pd/WO_3-2	0.77 %
Pd/WO_3-3	3.51 %
Pd/WO_3-4	16.07 %

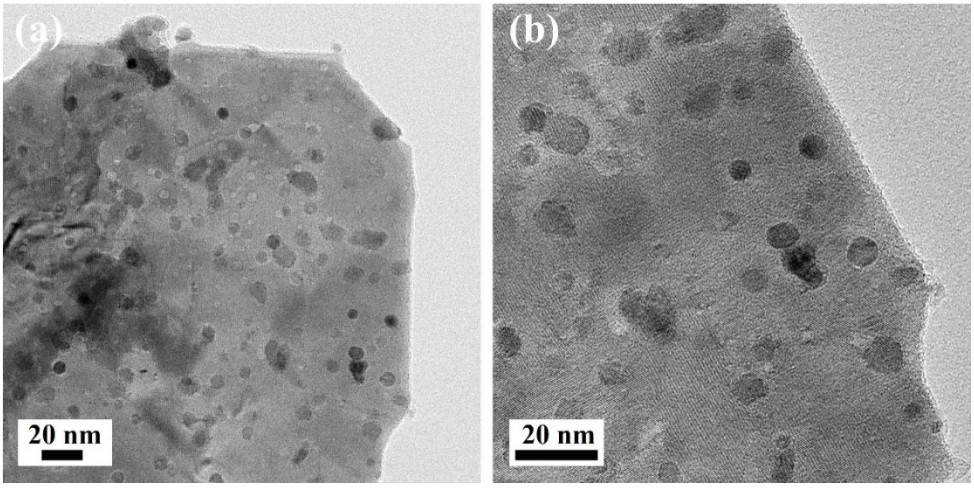

Fig. S13 (a) and (b) TEM images of Pd/WO_3-3 sample after all hydrogen sensing test.