Electronic Supplementary Material (ESI) for Analytical Methods.

Etching process enhanced H_2O_2 sensing performance of SnO_2/Zn_2SnO_4 with reliable anti-humidity ability

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Experimental

Raw material

Zinc sulfate heptahydrate ($ZnSO_4·7H_2O$), Potassium stannate trihydrate ($K_2SnO_3·3H_2O$), Ammonium hydroxide ($NH_3·H_2O$), Formaldehyde (HCHO), Ethanol (C_2H_6O), Acetone (C_3H_6O) and Hydrogen peroxide (H_2O_2) were purchased from Sinopharm Chemical Reagent Co., Ltd., Beijing, China. All the reagents used in this experiment were of analytical grade.

Synthesis of SnO_2/Zn_2SnO_4 composites

Fig.S1 shows the sample preparation process intuitively.

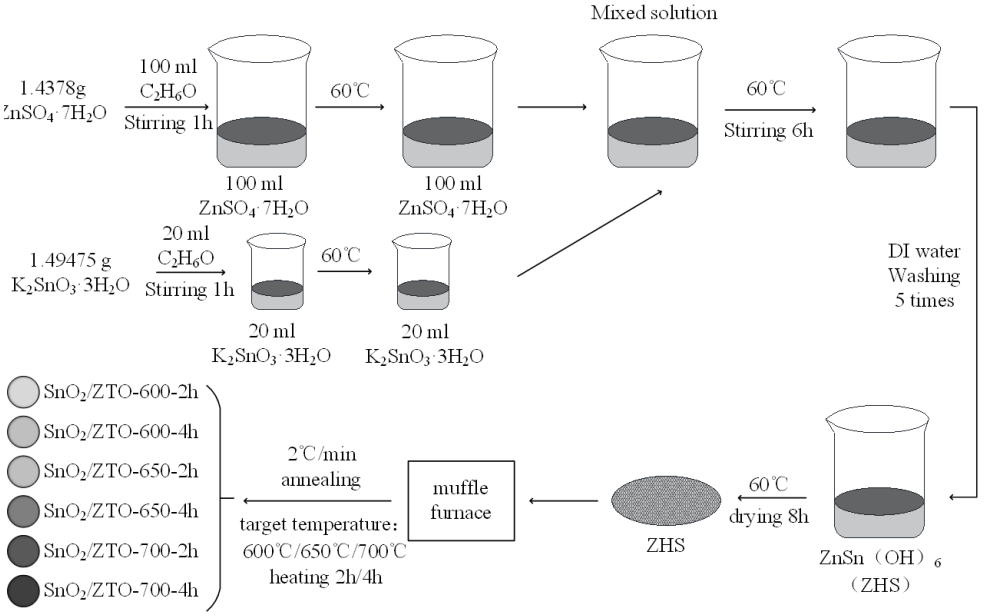

Fig. S1 Schematic diagram of SnO_2/Zn_2SnO_4 composite preparation process.

Synthesis of SnO_2/Zn_2SnO_4 composites with etching process

Fig.S2 visually shows the etching process performed during sample preparation.

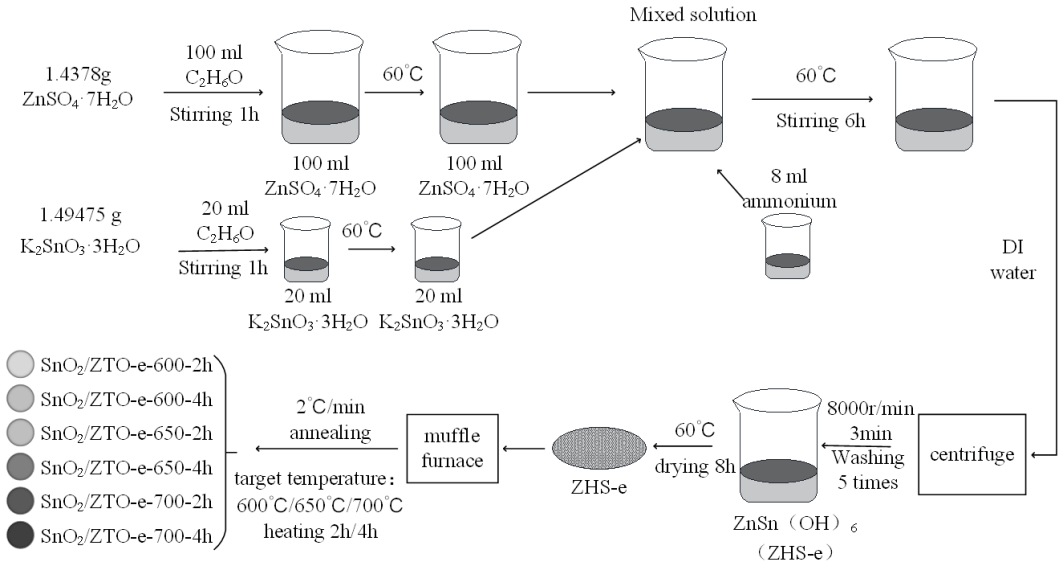

Fig. S2 Schematic diagram of preparation process of SnO_2/Zn_2SnO_4 composite combined with etching process.

Sensor element fabrication

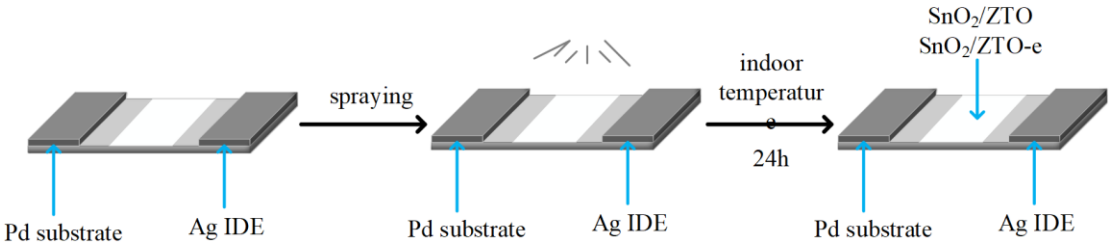

Fig. S3 Schematic diagram of sensor element preparation process.

Gas sensitivity test of sensors

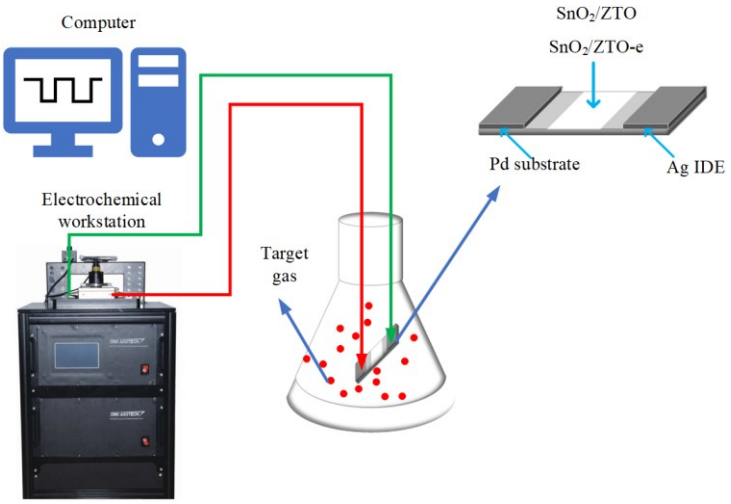

Fig. S4 Schematic diagram of gas sensitivity test.

Connect the CGS-MT photoelectric test platform with the test elements. The prepared element is fixed by a metal clip, so that the element can be stably moved to different target gases during testing. When the sensor element is inserted into the target gas, the current changes. When the current reaches a constant value, remove the sensor and insert the element into the target gas when the current decreases to the initial value. Repeat several times to complete the gas sensing performance test.

Moisture resistance test of sensors

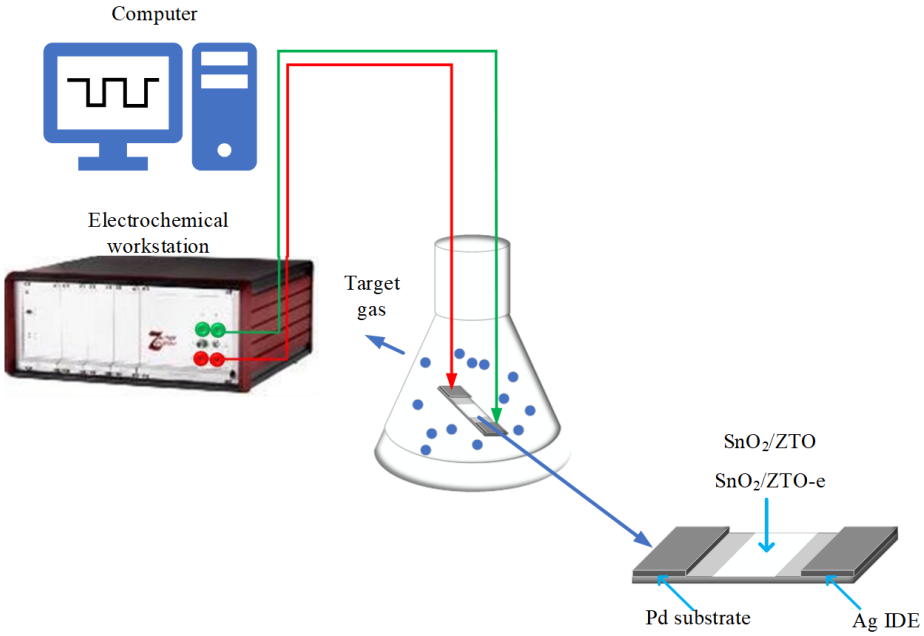

Fig. S5 Schematic diagram of moisture resistance test.

Connect ZAHNER-IM6EX electrochemical workstation with test elements. When the sensor element is inserted into the test environment with different humidity, the current changes. When the current reaches a constant value, remove the sensor, and insert the element into the target gas after the current is reduced to the initial value. Repeat several times to complete the moisture resistance test.