

## Supporting Information

# High Selectivity of Sulfur Doped SnO<sub>2</sub> in NO<sub>2</sub> Detection at Lower Operating Temperature

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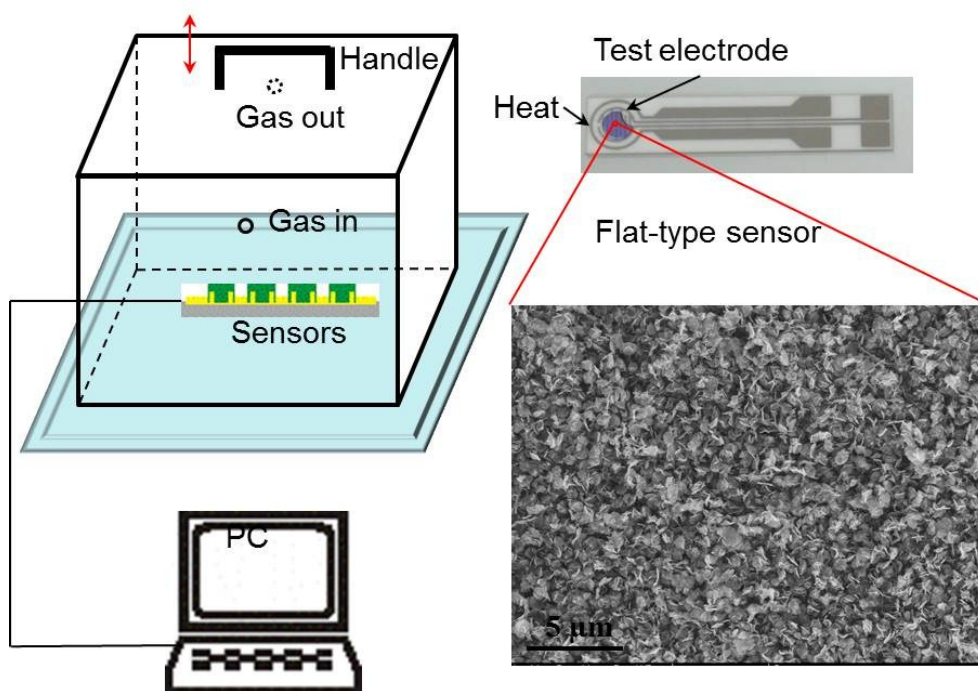
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## EXPERIMENTAL SECTION

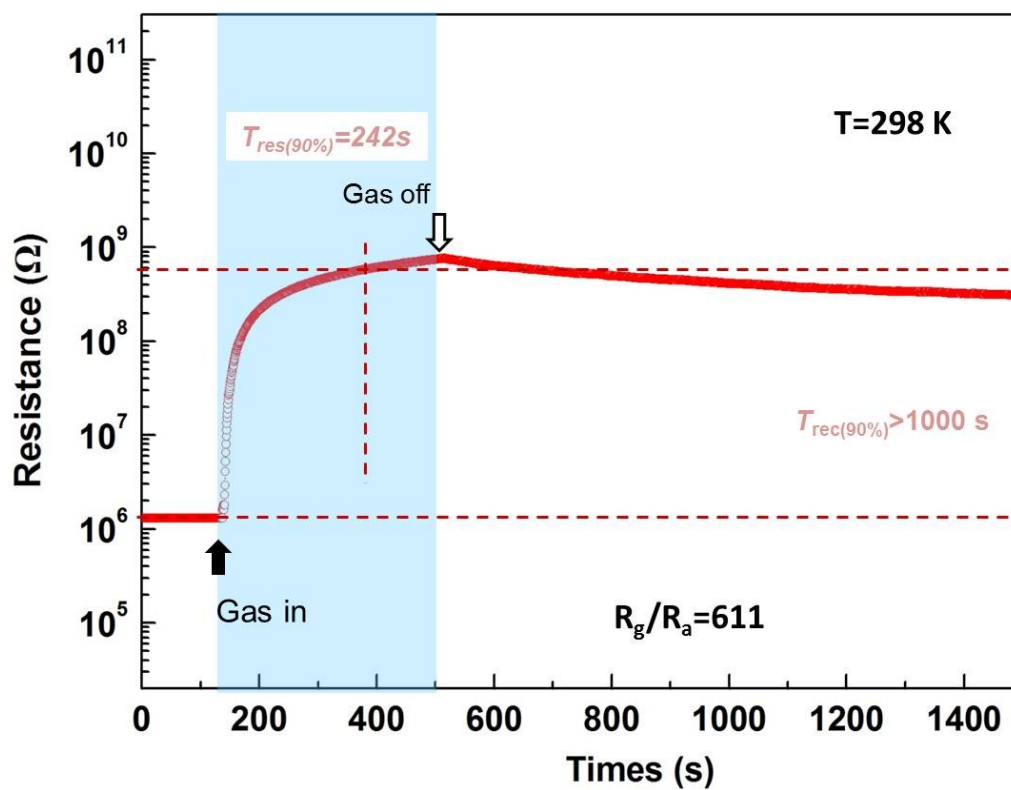
Homogenous slurry was formed by adding 5 mg SnO<sub>2</sub>-400 in 1 ml ethanol by ultrasonication (30 min). Then SnO<sub>2</sub>-400 film was obtained by dropping this slurry on the surface of glassy carbon electrode (diameter 3 mm). The electrochemical characteristics were tested on CHI 660E electrochemical workstation (Chenghua instrument, Shanghai, China) in a three-electrode electrochemical cell with a Pt plate electrode and a saturated calomel electrode. Here, 0.1 M Na<sub>2</sub>SO<sub>4</sub> aqueous solution was served as supporting electrolyte solution. The Mott-Schottky curve was obtained by the potential-impedance method, with a frequency of 1000 Hz, an amplitude of 5 mV, and a potential interval of 50 mV. The potential was tested from -0.8V to 0.5V.



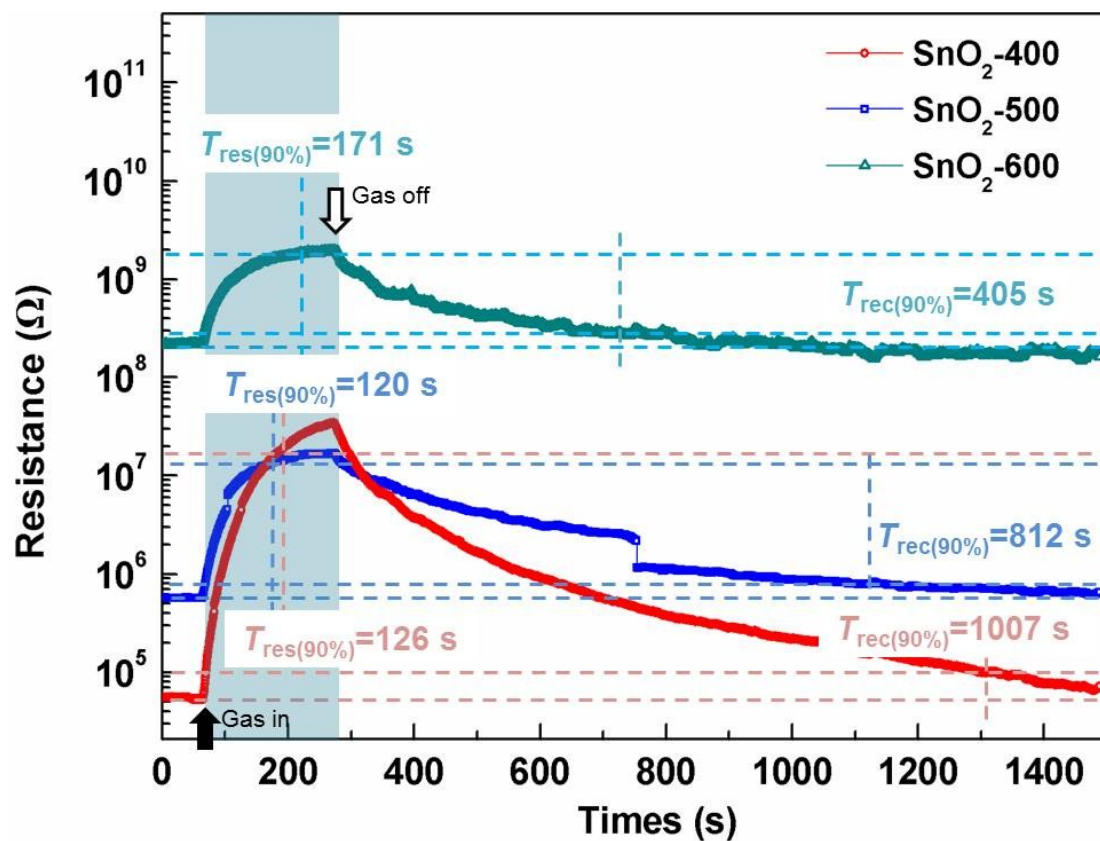
**Figure S1** The image of in-situ Raman instrument.



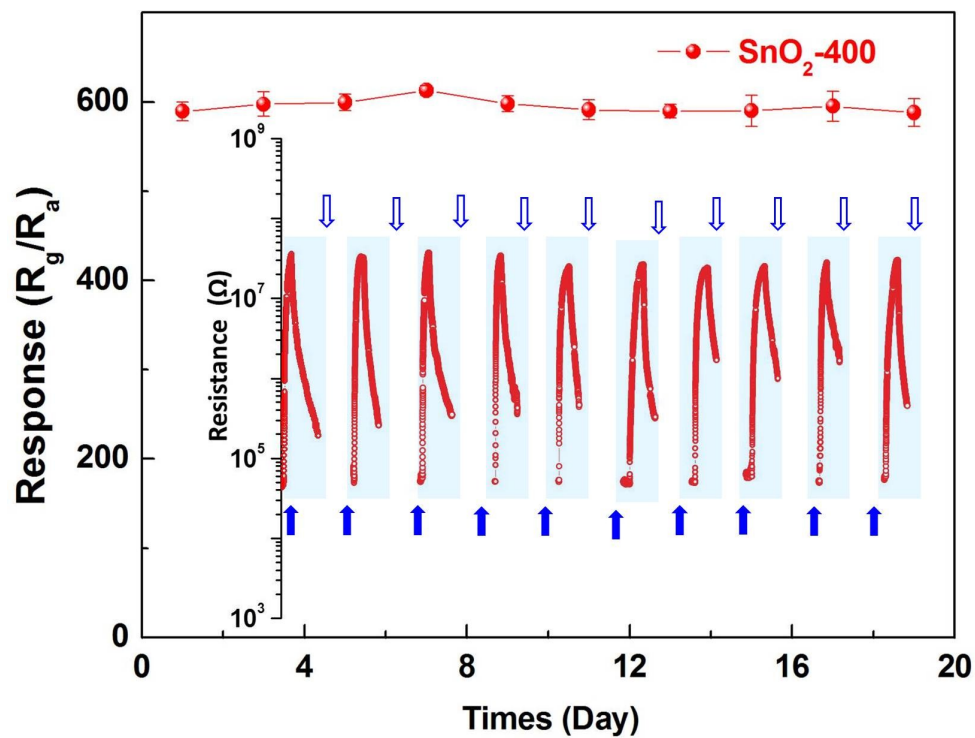
**Figure S2** Schematic diagram of the gas-sensing measurement system (left). The right is the structure of the sensor and the morphology of sensing material (SnO<sub>2</sub>-400) on the surface of sensor.



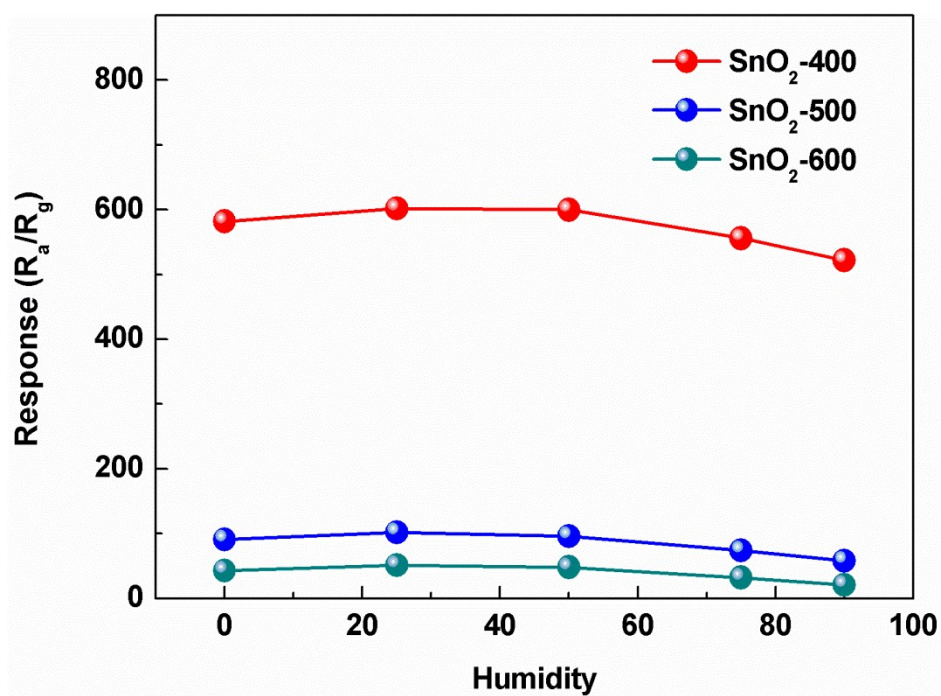
**Figure S3** Response–recovery characteristics of SnO<sub>2</sub>-400 to 5 ppm NO<sub>2</sub> at room temperature (20 °C).



**Figure S4** response–recovery characteristics of SnO<sub>2</sub>-400, SnO<sub>2</sub>-500, and SnO<sub>2</sub>-600 to 5 ppm NO<sub>2</sub>.



**Figure S5** Gas response of SnO<sub>2</sub>-400 towards 5 ppm NO<sub>2</sub> tested every two days for 10 days.



**Figure S6** Effect of ambient relative humidity on the response of the sensors based on SnO<sub>2</sub>-400, SnO<sub>2</sub>-500, and SnO<sub>2</sub>-600 to 5 ppm NO<sub>2</sub> at 50 °C.



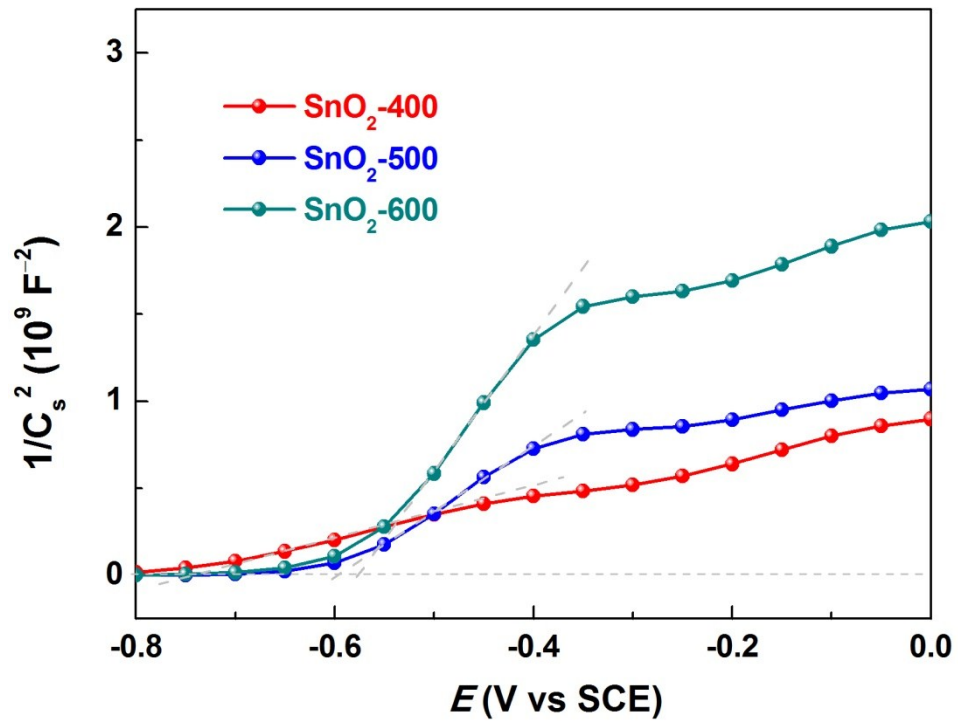
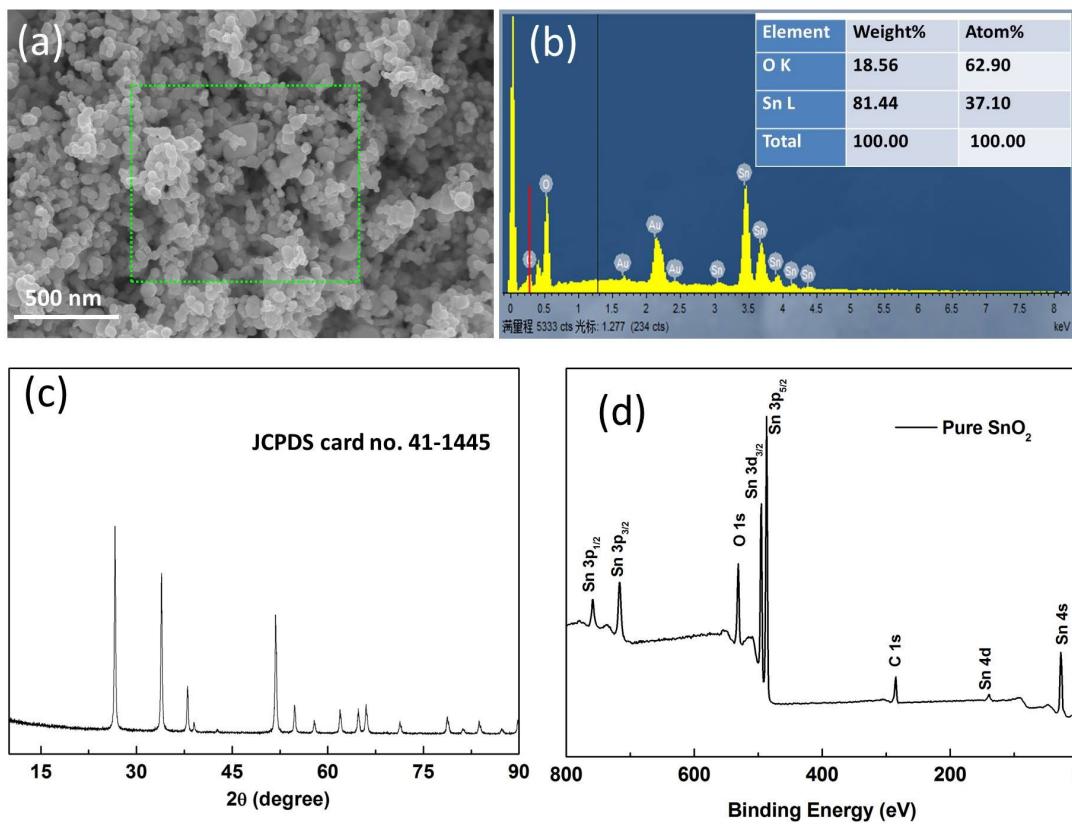
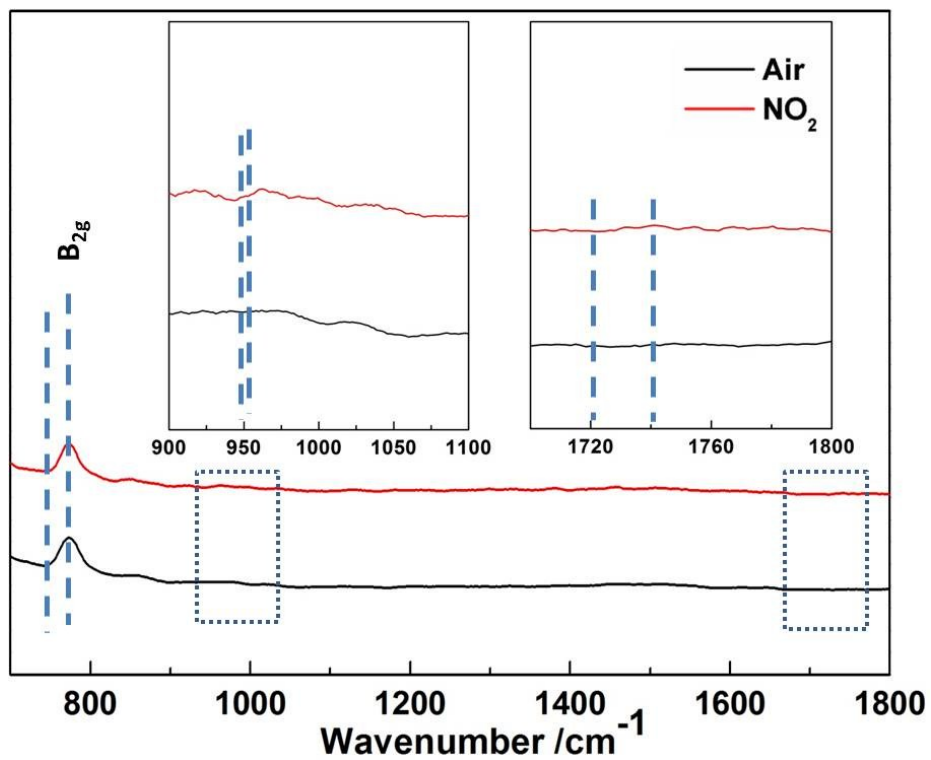


Figure S7 Mott-Schottky plots of SnO<sub>2</sub>-400, SnO<sub>2</sub>-500, and SnO<sub>2</sub>-600.



**Figure S8** (a) SEM image of pure SnO<sub>2</sub>; (b) EDX spectra; (c) XRD pattern; (d) XPS spectra of pure SnO<sub>2</sub>.



**Figure S9** In situ Raman spectra of pure SnO<sub>2</sub> upon exposure to air and 500 ppm NO<sub>2</sub> at 50 °C.

Operation Temperature (°C)	Response Time (s)	Recovery Time (s)
25	242	>1000
50	126	1007
100	109	159
150	64	126
200	62	121
250	47	112
300	20	62
350	11	45

**Table S1.** The response and recovery times of SnO<sub>2</sub>-400 toward 5 ppm NO<sub>2</sub> at different operating temperature.