Electronic Supplementary Material (ESI) for RSC Advances.

SnO_2 mesoporous nanoparticles-based gas sensor for high sensitive and low concentration formaldehyde detection

Pengfei Liu,[1, ‡] Jianbin Wang,[3,5, ‡] Han Jin,[4] Meiying Ge,[2 *] Fang Zhang,[2] Cheng Wang,[5] Yan Sun,[3,6 *] Ning Dai,[3]

1 School of Material Science and Engineering, Shanghai Jiao Tong University, No.800 Dongchuan Road, Shanghai 200240, PR China

2 National Engineering Research Center for Nanotechnology, 28 East Jiang Chuan Rd, Shanghai 200241, China

3 National Laboratory for Infrared Physics, Shanghai Institute of Technical Physics, Chinese Academy of Sciences, No. 500 Yutian Road, Shanghai 200083, PR China

4 Institute of Micro-Nano Science and Technology, School of Electronic Information and Electrical Engineering, Shanghai Jiao Tong University, No.800 Dongchuan Road, Shanghai 200240, P. R. China

5 Institute of Biomedical Optics and Optometry, Key Laboratory of Medical Optical Technology and Instruments, Ministry of Education, University of Shanghai for Science and Technology, Shanghai 200093, China

6 Research Center for Sensing Materials and Devices Zhejiang Lab, Hangzhou, Zhejiang, 311121, China

E-mail: meiyingge@163.com, sunny@mail.sitp.ac.cn

Test process: Firstly, place the sensor in a test chamber filled with air and the volume of the chamber is 18L. Then, a certain amount of test gas or solution is injected into the indoor heating table using a microinjector to cause rapid evaporation, so that the gas molecules can diffuse to fill the entire chamber quickly. When the voltage reaches the final equilibrium value, the test chamber can be opened，then the sensor will make contact with the air quickly and begin to recover.

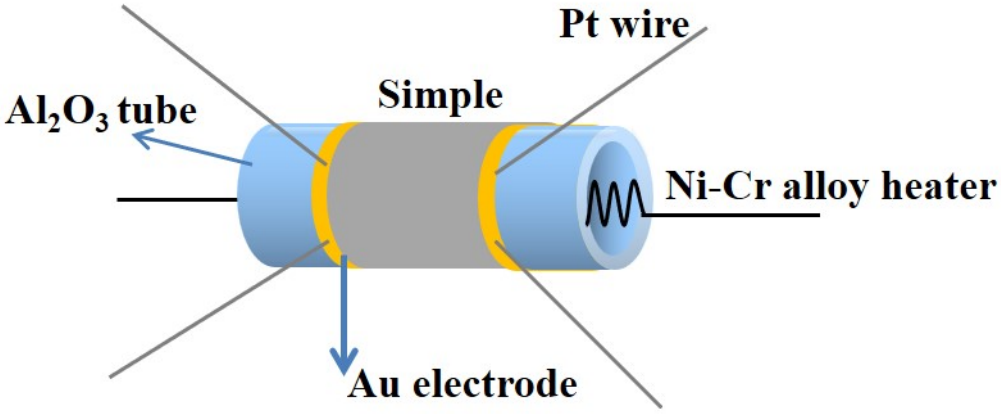

Fig. S1 Structure diagram of the gas sensor

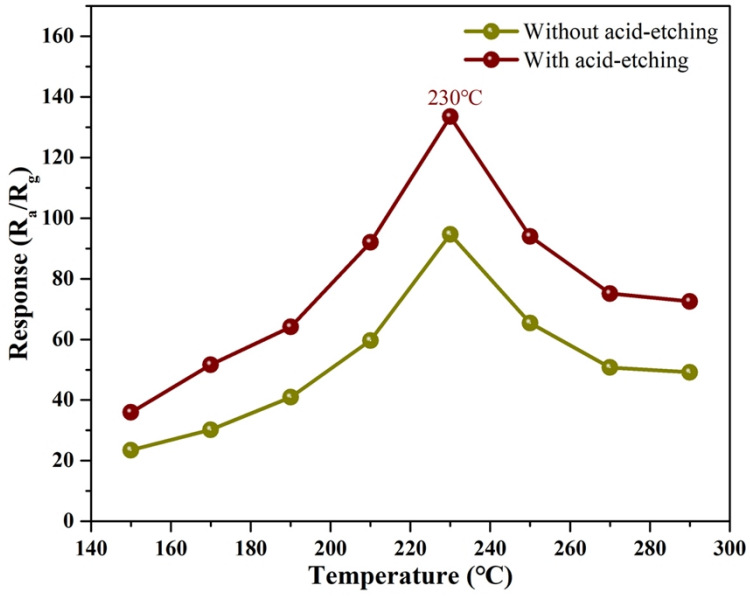

Fig. S2 Responses of SnO_2/ZnO composites and SnO_2 mesoporous nanoparticles to 100ppm formaldehyde at different operating temperatures

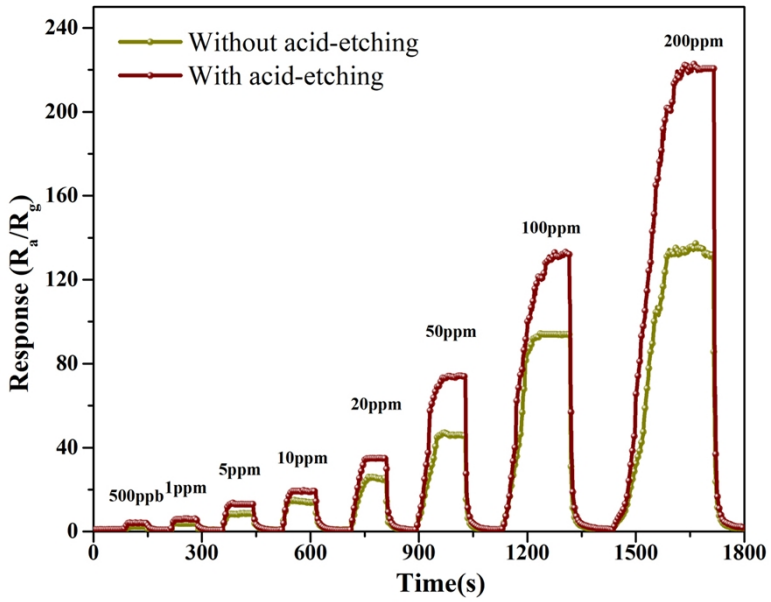

Fig. S3 Real-time response curves of the sensor device upon exposure to different concentrations of formaldehyde for SnO_2/ZnO composites and SnO_2 nanoparticles at 230 °C

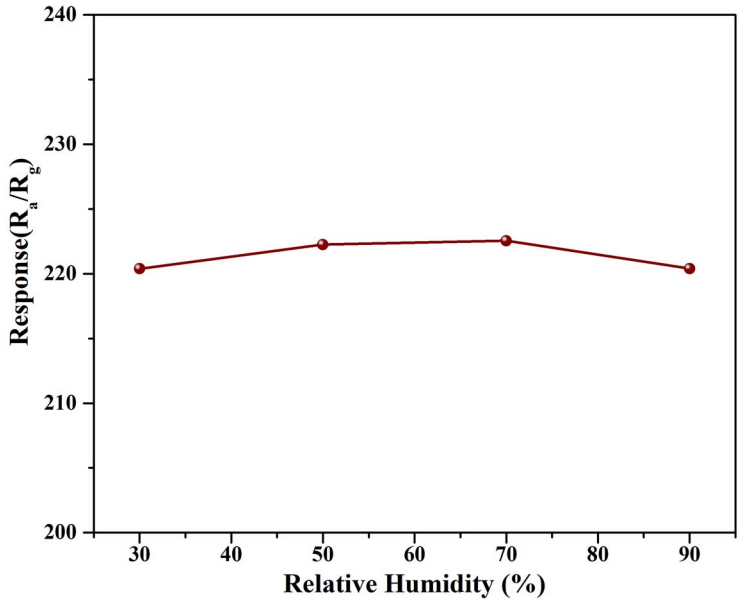

Fig. S4 The responses of the sensors under different relative humidity at 230 ℃ towards 200 ppm HCHO