Electronic Supplementary Information (ESI)

For

Room-temperature formaldehyde sensor based on hematite for breast cancer diagnosis

Rui Zhang[1], Chuanqun Liu[1], Pu Wang[1], Yang Li[3], Yue Su[4], Jianxun Dai*[2]

1. School of Environmental Science and Technology, Key Laboratory of Industrial Ecology and Environmental Engineering (Ministry of Education), Dalian University of Technology, Dalian, 116024, China
2. School of Optoelectronic Engineering and Instrumentation Science, Dalian University of Technology, Dalian, 116024, China.
3. Department of Electronic Systems, Norwegian University of Science and Technology, NO-7491, Trondheim, Norway.
4. Institute of Semiconductors, Chinese Academy of Sciences, Beijing, 100864, China.

Email: jianxundai@dlut.edu.cn

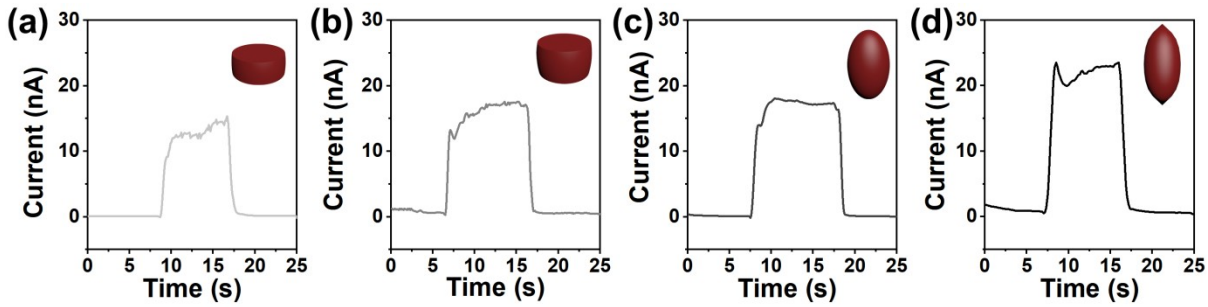

Figure S1. Response-recovery curve of four α-Fe_2O_3 NCs-based sensors to 20 ppm HCHO.

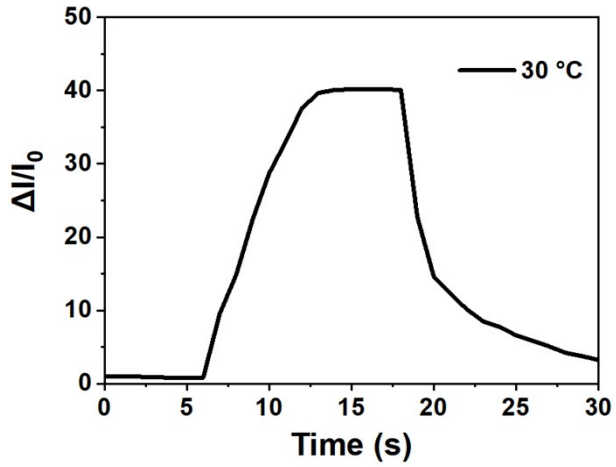

Figure S2. Response-recovery curve of the S-α-Fe_2O_3 NCs-based sensor to 100 ppm HCHO at 30 ˚C.

Compared with Figure 3e, the response of the sensor decreased from 42 to 40, indicating that the increasing working temperature of 10 ˚C has a negligible effect on the sensing response.

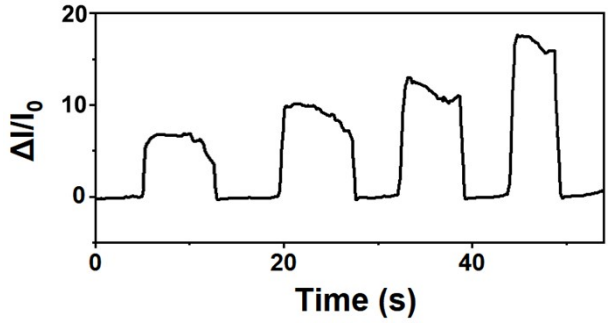

Figure S3. Response-recovery curve of the S-α-Fe_2O_3 NCs-based sensor to 1-20 ppm HCHO.

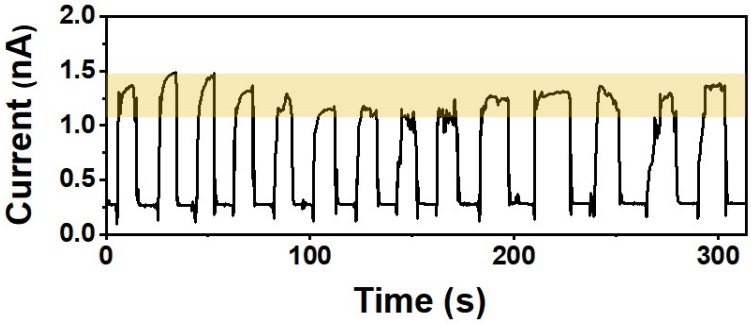

Figure S4. Response-recovery curve of S-α-Fe_2O_3 NCs-based sensor to 0.5 ppm HCHO.

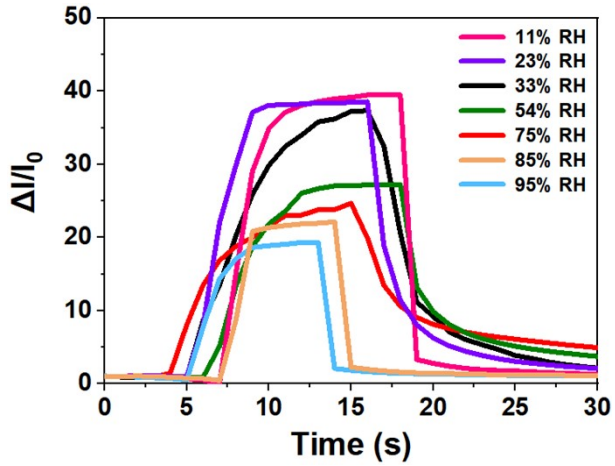

Figure S5. Response-recovery curve of S-α-Fe_2O_3 NCs-based sensor to 100 ppm formaldehyde under different humidity.

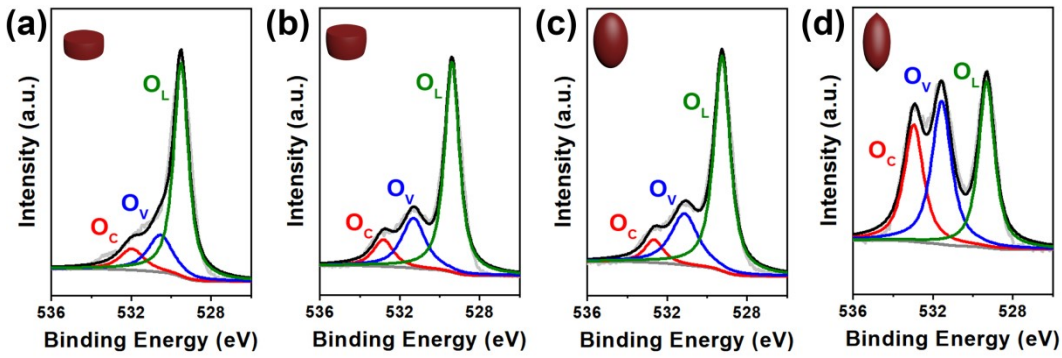

Figure S6. O 1s high-resolution spectra of four α-Fe_2O_3 NCs.

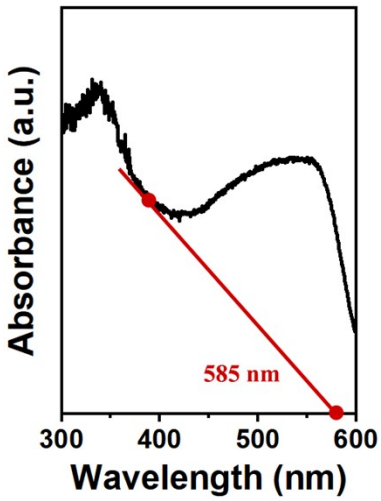

Figure S7. The UV-visible absorption spectrum of S-α-Fe_2O_3 NCs.

The calculated band gap of S-α-Fe_2O_3 NCs is about (1240/585=) 2.12 eV, which confirmed the wide band-gap property and corresponded to the previous reports.[1-2]

References:

[1] K. E. Krafft, C. Wang, W. B. Lin, *Adv. Mater.* 2012, **24**, 2014-2018.

[2] S. Huang, T. Ouyang, B. F. Zheng,M. Dan, Z. Q. Liu, *Angew. Chem. Int. Ed.* 2021, **133**, 9632-9638.