Electronic Supplementary Material (ESI) for Journal of Materials Chemistry C.

Supplementary Information

Low temperature and highly sensitive ethanol sensor based on Au modified In_2O_3 nanofibers by coaxial electrospinning

Baoyu Huang[a, b], Yanrong Wang[a], Qiang Hu[a,b], Xuemei Mu[a,b], Yaxiong Zhang[a,b], Jinglong Bai[a,b], Qiao Wang[a,b], Yingzhuo Sheng[a,b], Zhenxing Zhang[a, b]*, Erqing Xie[a,b]*

[a] School of Physical Science and Technology, Lanzhou University, Lanzhou 730000, China

[b] Key Laboratory for Magnetism and Magnetic Materials of the Ministry of Education, Lanzhou University, Lanzhou 730000, China

*Corresponding authors. E-mail address: zhangzx@lzu.edu.cn (Z. Zhang), xieeq@lzu.edu.cn (E. Xie).

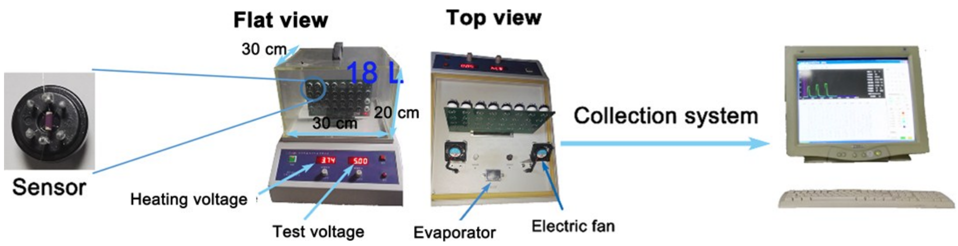

Fig. S1 Schematic illustration of test equipment.

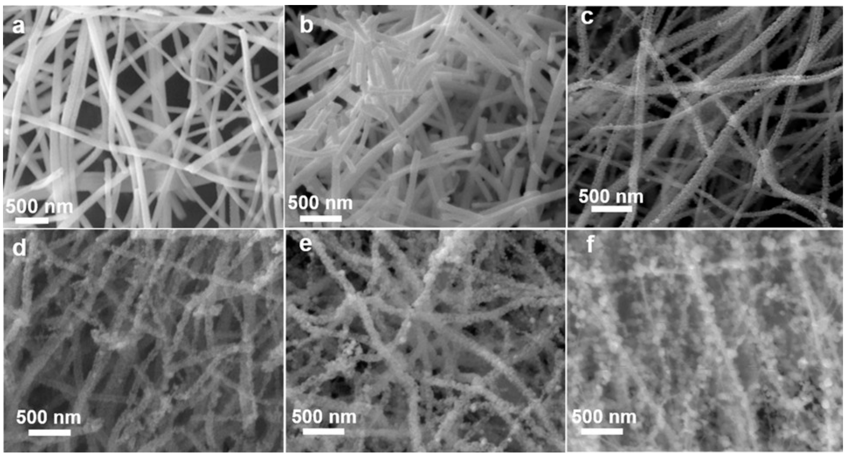

Fig. S2 SEM images of (a) the pristine In_2O_3 NFs; (b) the IO-Au-0.14 NFs; (c) the IO-Au-0.19 NFs; (d) the IO-Au-0.28 NFs; (e) the IO-Au-0.42 NFs; (f) the IO-Au-0.58 NFs.

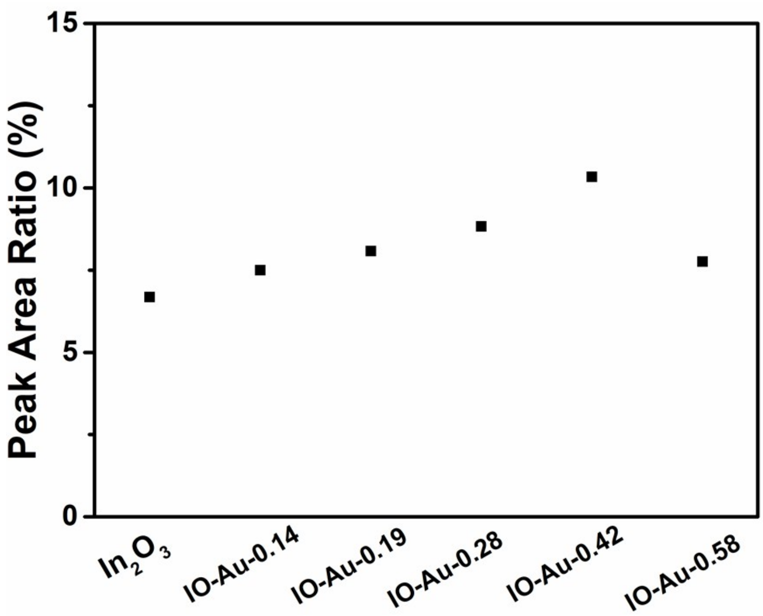

Fig. S3 The peak area ratios of deficient oxygen peaks to total In 3d peak.

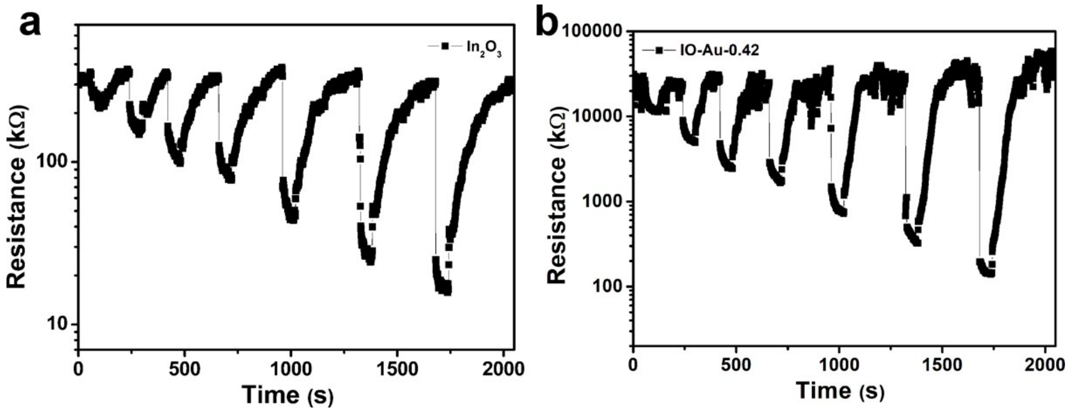

Fig. S4 Response/recovery characteristics of sensor resistance to 1-200 ppm ethanol gas, (a) the pristine In_2O_3 NFs (b) the IO-Au-0.42 NFs.

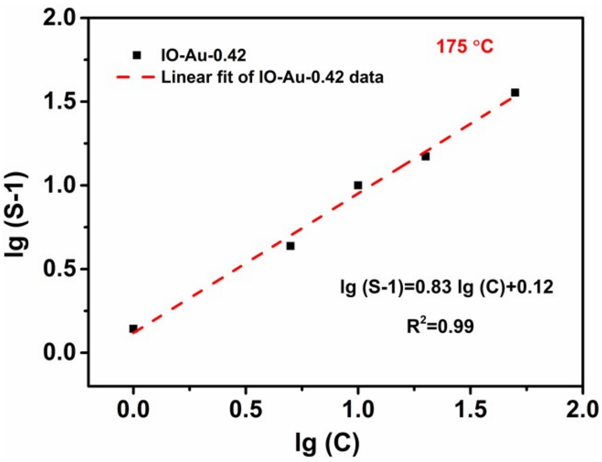

Fig. S5 The linear relationship of log (S-1)-log (C) plot to ethanol gas at 175 °C.

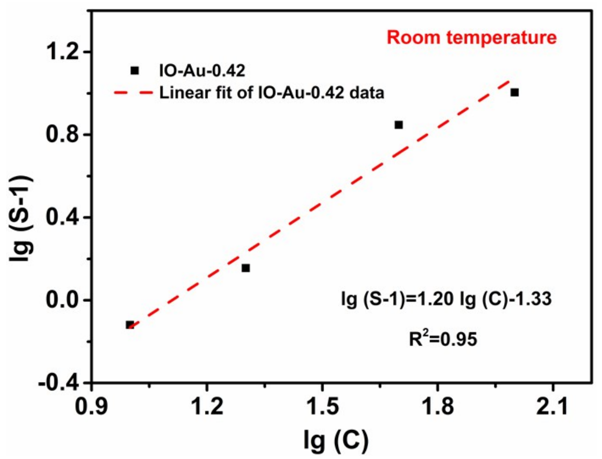

Fig. S6 The linear relationship of log (S-1)-log (C) plot to ethanol gas at room temperature.

According to literatures[1, 2] (45,72), to further explore the response to lower ethanol concentration, the linear relationship of log (S-1) – log (C) plot to ethanol was given in Fig. S4 and S5. In the low concentration range, the response (S) of metal oxide semiconductors gas sensors can be represented as:

$$S = a(C)^b + 1, \quad (1)$$

Where a and b are the constants, C is the concentration of ethanol gas. Under a certain temperature, the above equation can be expressed as follow:

$$lg(S-1)=blg(C)+ lg(a) \quad (2)$$

As shown in Fig.S4 and S5, the response of IO-Au-0.42 sensor present excellent linear relationship with ethanol concentration, and the measured correlation coefficient (R^2) of fitted curves at 175 °C and room temperature are 0.99 and 0.95, respectively. It indicates that the IO-Au-0.42 sensor is well suitable for lower concentration detecting.

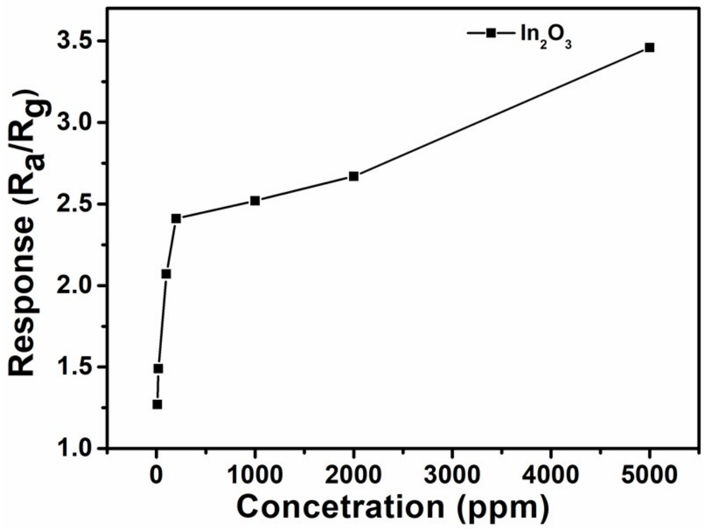

Fig. S7 Response of In_2O_3 NFs sensor *versus* ethanol gas concentration (10-5000 ppm) at room temperature.

Table S1 A comparison of sensing response toward ethanol of different gas sensors [3-10].

Samples	Concentration (ppm)	Operating temperature (ºC)	Response (R_a/R_g)	reference
Au-modified ZnO microwires	120	RT	85%	[3]
Ag@SnO_2 core–shell material	200	RT	2.24	[4]
SnO_2 Doped PDDAC	150	RT	71.6%	[5]
ZnO–CuO hetero junction	200	RT	3.32	[6]
carbon-doped ZrO_2 films	500	RT	19.7	[7]
m-CNTs/$NaClO_4$/Ppy	30000	RT	1.93	[8]
V_2O_5 nanowires decorated with SnO2 nanoparticles	1000	RT	1.46	[9]
Co_3O_4/Ta_2O_5 heterostructure hollow nanospheres	100	RT	180%	[10]
IO-Au-0.42 NFs	100	RT	11.12	This work

References

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