Supplementary Materials for

Highly Sensitive and Selective Triethylamine Sensor Enabled by Ag/ZnO Heterojunctions

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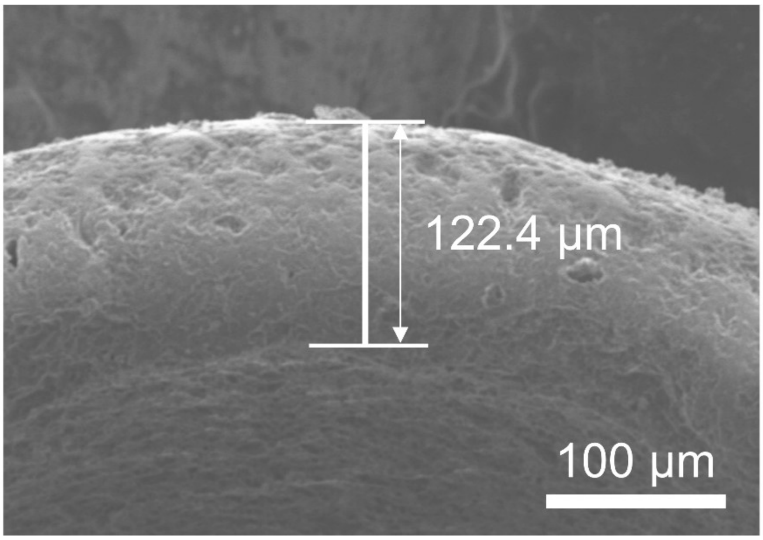

Fig. S1 SEM images of the cross section of sensing film.

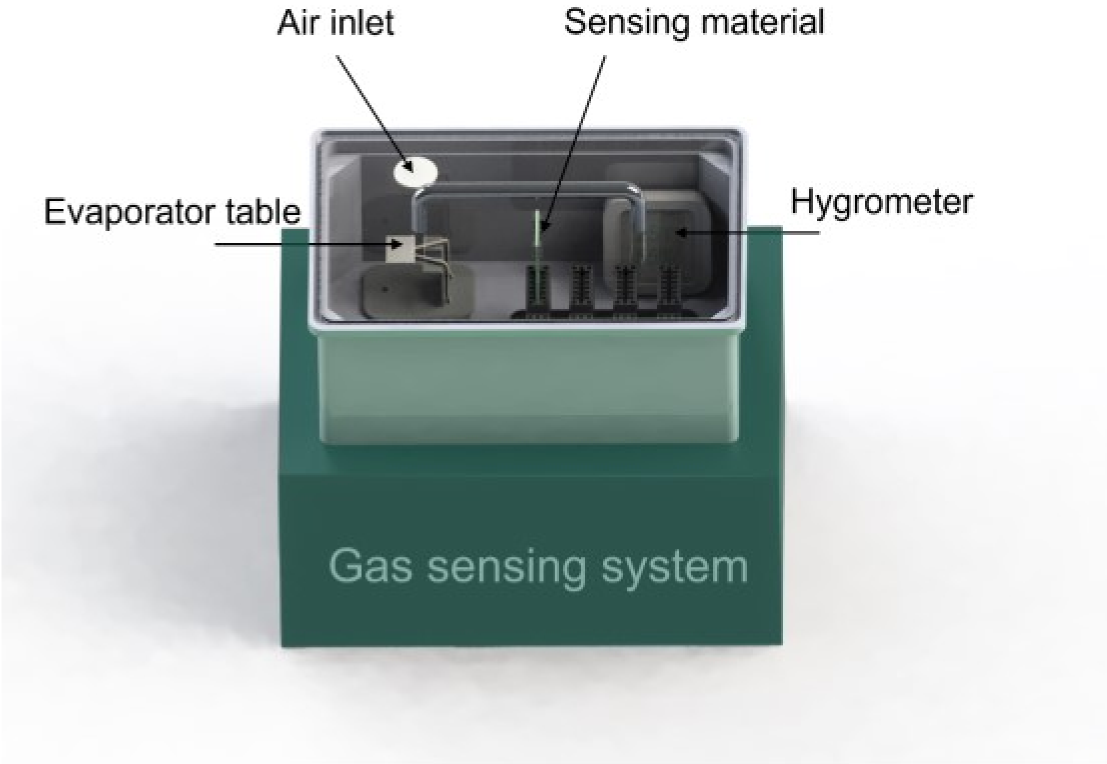

Fig. S2 Schematic diagram of the gas sensing system.

In the experimental setup, as shown in Fig. S1, the sensing chamber has a volume of 1600 mL. An evaporation table is positioned directly beneath the air inlet. Vapors of triethylamine (TEA), acetone, ethanol, toluene, methanol, formaldehyde, and ammonia are generated through liquid-phase transformation. To elaborate, taking TEA as an example, for TEA gas sensing, a micro-sampler is employed to inject liquid TEA onto the evaporation table. The evaporation table is activated (T_{on}=400°C), and the system waits for TEA to evaporate. During this process, the gas response phenomenon is monitored on the screen. Subsequently, to restore initial conditions, the lid of the sensing chamber is removed, exposing the sensing material to the ambient environment. Over time, the gas response gradually reverts to its original state.

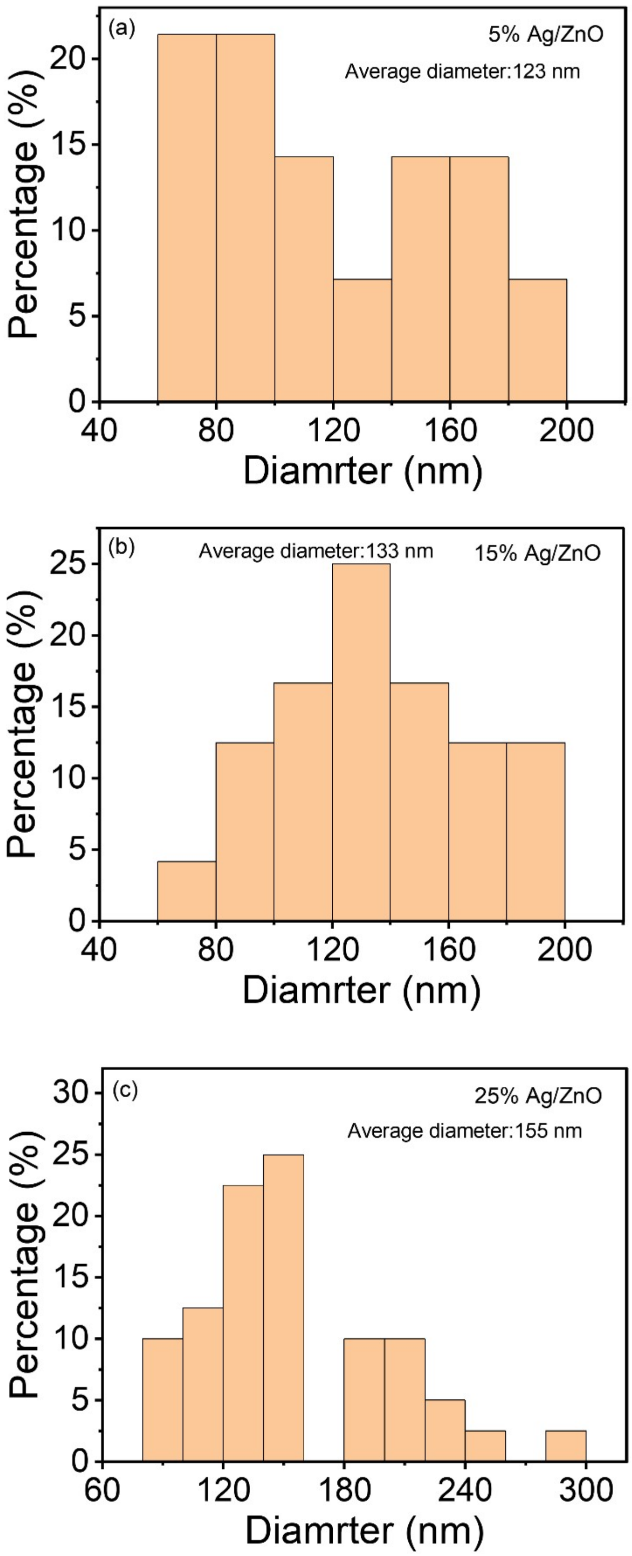

Fig. S3 (a-c) show the particle size distribution of Ag in 5% Ag/ZnO, 15% Ag/ZnO and 25% Ag/ZnO samples, respectively.

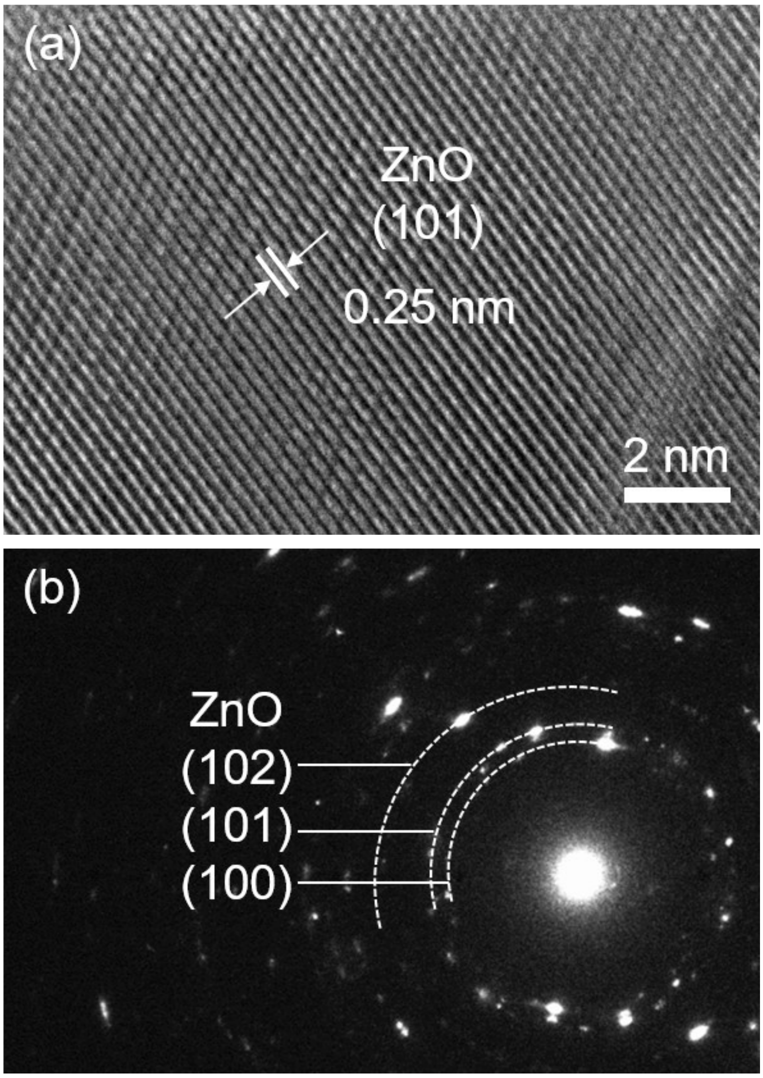

Fig. S4 (a) HRTEM image of ZnO. (b) SAED of ZnO.

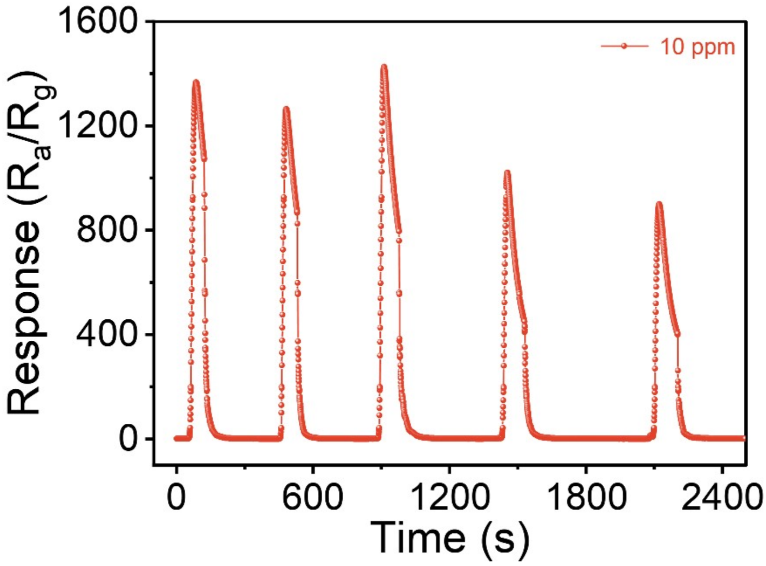

Fig. S5 Reproducibility of TEA sensing by the 15% Ag/ZnO sensor at 260°C.

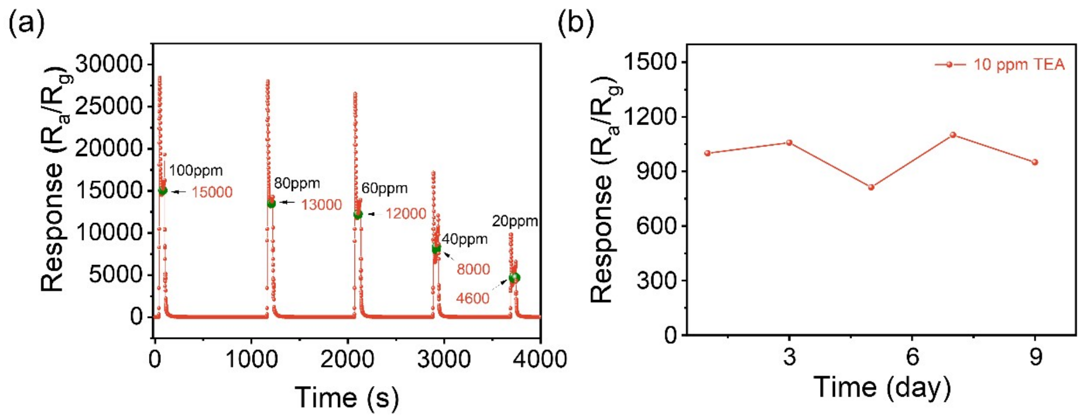

Fig. S6 (a) Dynamic sensing response of 15% Ag/ZnO to various TEA concentrations (20-100 ppm) at 260°C. (b) Long-term stability of the 15% Ag/ZnO sensor to 10 ppm TEA over a period of 9 days.

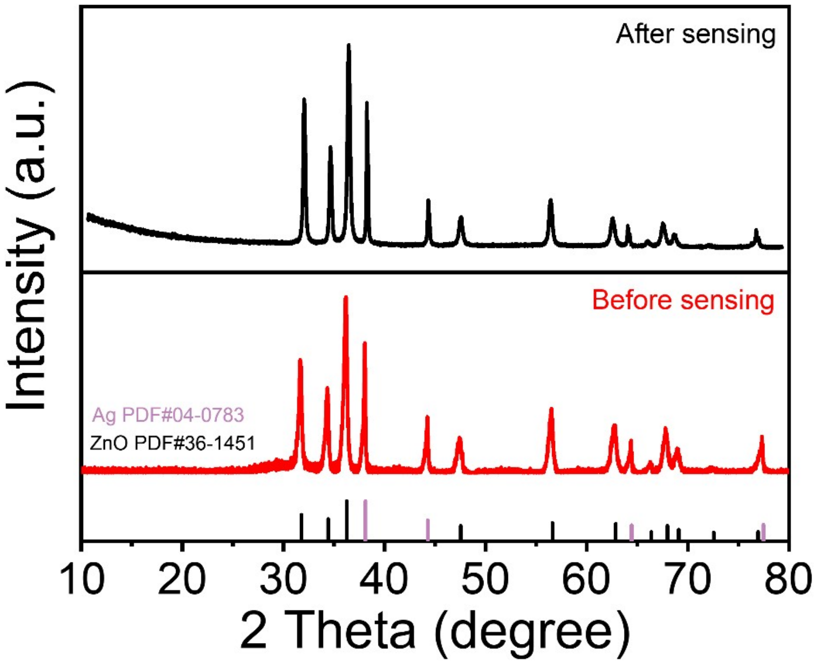

Fig. S7 XRD analysis of 15% Ag/ZnO samples before and after sensing.

Table. S1 XPS O 1S Acreage percentages of peaks of diverse oxygen sorts.

Atomic (%)	O_L (%)	O_V (%)	O_C (%)
ZnO	75.33	16.60	8.07
5% Ag/ZnO	68.52	21.09	10.39
15% Ag/ZnO	67.08	21.30	11.60
25% Ag/ZnO	70.89	21.89	7.22

Table. S2 Atomic ratios of Zn 2p and Ag 3d in XPS test results.

Atomic (%)	5% Ag/ZnO	15% Ag/ZnO	25% Ag/ZnO
Zn 2p	95.79	92.53	85.08
Ag 3d	4.21	7.47	14.92

Table. S3 Gas sensors based on MOSs gas-sensitive materials.

Material	TEA concentration	T	S = R_{air}/R_{gas} τ_{res}/τ_{rec}	LOD	Refs
Ag/MoO_3	100 ppm	240°C	137 (3/6 s)	5 ppm	1
$Ag\text{-}Pt/\alpha\text{-}Fe_2O_3$	100 ppm	125°C	926 (2.5/278 s)	50 ppb	2
Cu/MoO_3	10 ppm	240°C	135 (43/148 s)	0.25 ppb	3
Pt/ZnO	100 ppm	200°C	4170 (34/76 s)	0.1 ppm	4
Pt/ZnO	100 ppm	200°C	242 (15/70 s)	8 ppm	5
Au/ZnO	10 ppm	200°C	276 (20/216 s)	5 ppm	6
Ag/ZnO	10 ppm	200°C	293.8 (64/28 s)	3 ppm	7
Ag/SnO_2	100 ppm	170°C	1700 (6/15 s)	10 ppm	8
Ag/AgO/ZnO	50 ppm	240°C	90.3 (53/8 s)	1 ppm	9
Ag/MoO_3	50 ppm	220	70.7 (4/14 s)	1 ppm	10
Ag/ZnO	10 ppm	260°C	1000 (28/190 s)	500 ppb	This work

References

1. M. Liu, P. Song, D. Liang, Z. Yang and Q. Wang, *Materials Research Express*, 2019, **6**.
2. Y. Bi, Y. Zhao, X. Meng, H. Cong and W. Gao, *Chem Phys Lett*, 2023, **813**, 140301.
3. X. Tan, X. Chen, J. Guo, L. Wang, Z. Dong, X. Li, L. Yang, D. Zhang, L. Qian and C. He, *J. Alloy. Compd*, 2024, **976**.
4. L. Liu, C. Mao, H. Fu, X. Qu and S. Zheng, *ACS AMI*, 2023, **15**, 16654-16663.
5. J. Liu, L. Zhang, J. Fan, B. Zhu and J. Yu, *Sensor. Actuator. B Cheml*, 2021, **331**, 129425.
6. Y. Chen, Z. Wang, H. Fu, D. Han and F. Gu, *J. Mater. Chem.C*, 2022, **10**, 3318-3328.
7. Y. Sun, H. Fan, Y. Shang, L. Lei, S. Zhu, H. Wang, W. Dong, M, *Sensor. Actuator. B Cheml*, 2023, **390**, 133975.
8. J. Zhang, B. Zhang, S. Yao, H. Li, C. Chen, H. Bala and Z. Zhang, *Journal of Materiomics*, 2022, **8**, 518-525.
9. Y. Sun, Z. Liu, Y. Zhang, L. Han and Y. Xu, Sensors and Actuators B: Chemical, 2023, **391** 134027.
10. Y. Ma, S. Zhang, Q. Wang and P. Song, Inorganic Chemistry Communications, 2023, **157**, 111442.