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Electronic Supporting Information (ESI)

High-performance UV-activated room temperature NO_2 sensors based on TiO_2/In_2O_3 composite

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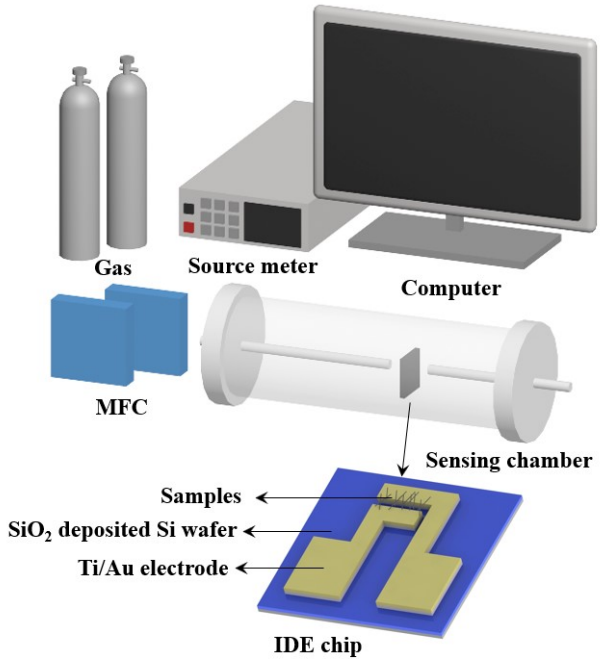

S1. The IDE chip with 10 nm Ti adhesion layer and 100 nm Au conduction layer on SiO_2-deposited Si wafer substrate and homemade gas sensing system.

Sample	In $3d_{5/2}$ binding energy (eV)	In $3d_{3/2}$ binding energy (eV)	Ti $2p_{3/2}$ binding energy (eV)	Ti $2p_{1/2}$ binding energy (eV)
S0	444.93	452.47	-	-
S1	444.61	452.15	457.29	462.83
S2	444.42	451.96	457.31	462.85
S3	443.90	451.44	257.98	463.52

Table 1. Binding energies of the In 3d and Ti 2p peaks for different samples determined using XPS.

Sample	$O_{lattice}$ binding energy (eV)	O_{vac} binding energy (eV)	O_{abs} binding energy (eV)	$O_{lattice}$ percentage (%)	O_{vac} percentage (%)	O_{abs} percentage (%)
S0	529.36	530.96	532.16	76.02	19.70	4.28
S1	530.29	531.90	533.10	66.15	24.62	9.23
S2	530.23	531.94	533.07	59.87	38.08	2.05
S3	530.20	531.80	533.01	65.02	28.33	6.65

Table 2. Binding energies and proportions of the three components of the O 1s peak for different samples determined using XPS.

Material	Temperature (ºC)	Concentration (ppm)	Response	Refs.
In_2O_3/rGO	RT	30	8.25	[1]
Walnut-like In_2O_3	RT	3	13	[2]
Mesoporous In_2O_3 nanorod arrays	RT	1	20.9	[3]
In_2O_3/ZnO	RT	10	29.1	[4]
In_2O_3/ZnO YS NFs	RT	1	6	[5]
TiO_2/In_2O_3 NFs	RT	5	49.29	This work

Table 3. Comparison of the NO_2 sensing properties of previously reported In_2O_3-based nanostructures and TiO_2/In_2O_3 NFs of the present study at RT.

References

1. F. Gu, R. Nie, D. Han and Z. Wang, *Sens. Actuator B Chem.*, 2015, **219**, 94-99.

2. H. Ma, L. Yu, X. Yuan, Y. Li, C. Li, M. Yin and X. Fan, *J. Alloy. Compd.*, 2019, **782**, 1121-1126.

3. Y. Shen, X. Zhong, J. Zhang, T. Li, S. Zhao, B. Cui, D. Wei, Y. Zhang and K. Wei, *Appl. Surf. Sci.*, 2019, **498**, 143873.

4. X. Liang, J. Zhang, L. Du and M. Zhang, *Sens. Actuator B Chem.*, 2021, **329**, 129230.

5. C. Han, X. Li, Y. Liu, X. Li, C. Shao, J. Ri, J. Ma and Y. Liu, *J. Hazard. Mater.*, 2021, **403**, 124093