

Supporting Information

Investigation of Reduced Graphene Oxide and a Nb-Doped TiO₂ Nanotube Hybrid Structure To Improve the Gas-Sensing Response and Selectivity

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Response/recovery times analysis

The response and recovery times were defined as the time to reach 90% of $G_f - G_0$ when the gas is introduced and to recover to 70% of the original conductance in air.

Given the chamber volume (1 liter) and the gas-flow (0.2 l/min) the purging/filling time of the test chamber is about 300 s, which represent the lower measurable limit of our experimental setup. Tables S1–S4 present the response, the response and recovery times of the Nb–TiO₂ and RGO/Nb–TiO₂ (obtained with the optimal concentration of GO, 9 ng/mm²) samples towards different concentrations of H₂, NH₃, C₃H₆O and CO at 200 °C.

Table S1. The sensing parameters of the Nb–TiO₂ and RGO/Nb–TiO₂ (obtained with the 9 ng/mm² of GO) structures towards 120, 240 and 480 ppm of H₂ at 200 °C.

Sample	H ₂ concentration (ppm)	Response	Response time (s)	Recovery time (s)
Nb–TiO ₂	120	2.8	≤ 300	≤ 300
	240	5.9	480	≤ 300
	480	14.8	750	≤ 300
RGO/Nb–TiO ₂	120	28.4	930	≤ 300
	240	54.9	750	≤ 300
	480	77	480	≤ 300

Table S2. The sensing parameters of the Nb–TiO₂ and RGO/Nb–TiO₂ (obtained with the 9 ng/mm² of GO) structures towards 10, 20 and 30 ppm of NH₃ at 200 °C.

Sample	NH ₃ concentration (ppm)	Response	Response time (s)	Recovery time (s)
Nb–TiO ₂	10	0.8	510	930
	20	1.6	660	810
	30	1.7	1020	870
RGO/Nb–TiO ₂	10	1.9	1500	2190
	20	6.9	1590	600
	30	7	≤ 300	720

Table S3. The sensing parameters of the Nb–TiO₂ and RGO/Nb–TiO₂ (obtained with the 9 ng/mm² of GO) structures towards 30, 60 and 120 ppm of C₃H₆O at 200 °C.

Sample	C ₃ H ₆ O concentration (ppm)	Response	Response time (s)	Recovery time (s)
Nb–TiO ₂	30	0.15	≤ 300	420
	60	0.3	≤ 300	≥ 5100
	120	0.4	≤ 300	390
RGO/Nb–TiO ₂	30	No response	–	–
	60	No response	–	–
	120	No response	–	–

Table S4. The sensing parameters of the Nb–TiO₂ and RGO/Nb–TiO₂ (obtained with the 9 ng/mm² of GO) structures towards 30, 60 and 120 ppm of CO at 200 °C.

Sample	CO concentration (ppm)	Response	Response time (s)	Recovery time (s)
Nb–TiO ₂	30	0.06	≤ 300	≤ 300
	60	0.4	1500	≤ 300
	120	1.8	1470	≤ 300
RGO/Nb–TiO ₂	30	0.2	≤ 300	≤ 300
	60	0.3	≤ 300	≤ 300
	120	0.5	≤ 300	≤ 300