Supporting Information

Calibration of non-stationary gas sensors based on two-dimensional materials

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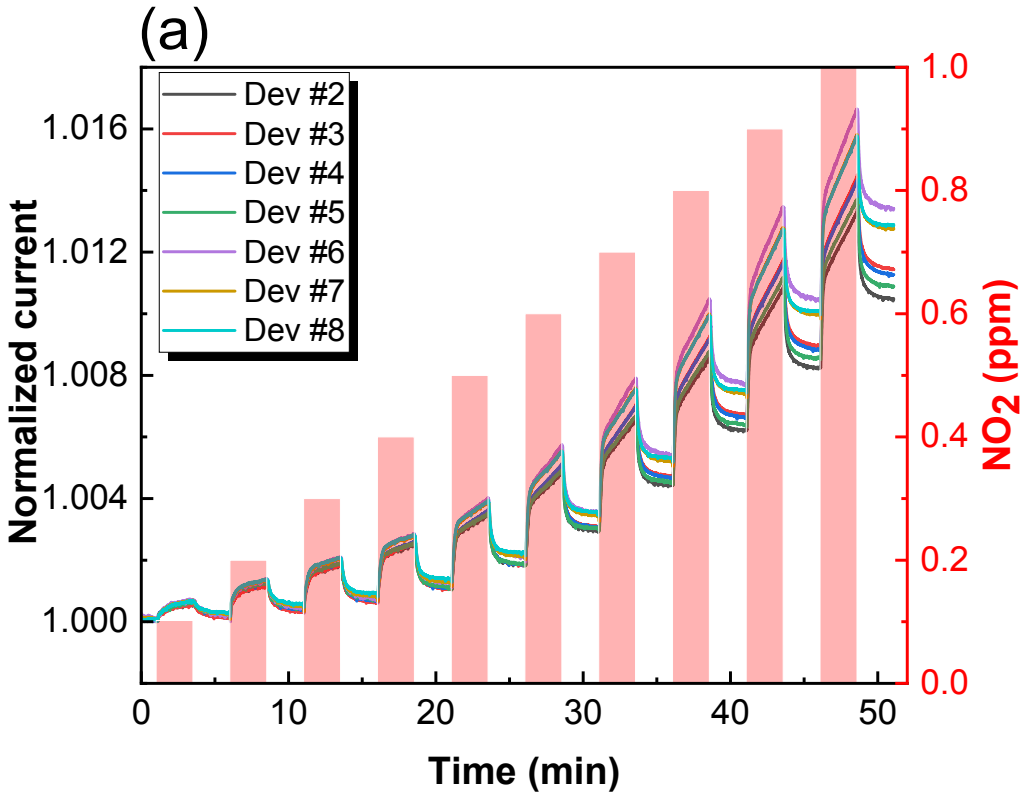
SENSOR ANALYSES

Table S1. Sheet resistance (R_S) values of $PtSe_2$-based resistors.

Device	Pads	Sheet resistance (kΩ/sq)
#1	2-3	130
#2	4-5	840
#3	5-6	490
#4	6-7	790
#5	7-8	680
#6	8-9	320
#7	9-10	245
#8	10-11	420

Table S1 reports the values of the sheet resistance (R_S) of the eight sensors based on $PtSe_2$.

Figure S1 illustrates the real-time current behavior (panel a) and TDSO (panel b) of $PtSe_2$-based chemi-resistors (CR) upon sequential exposures of NO_2 (red rectangles).



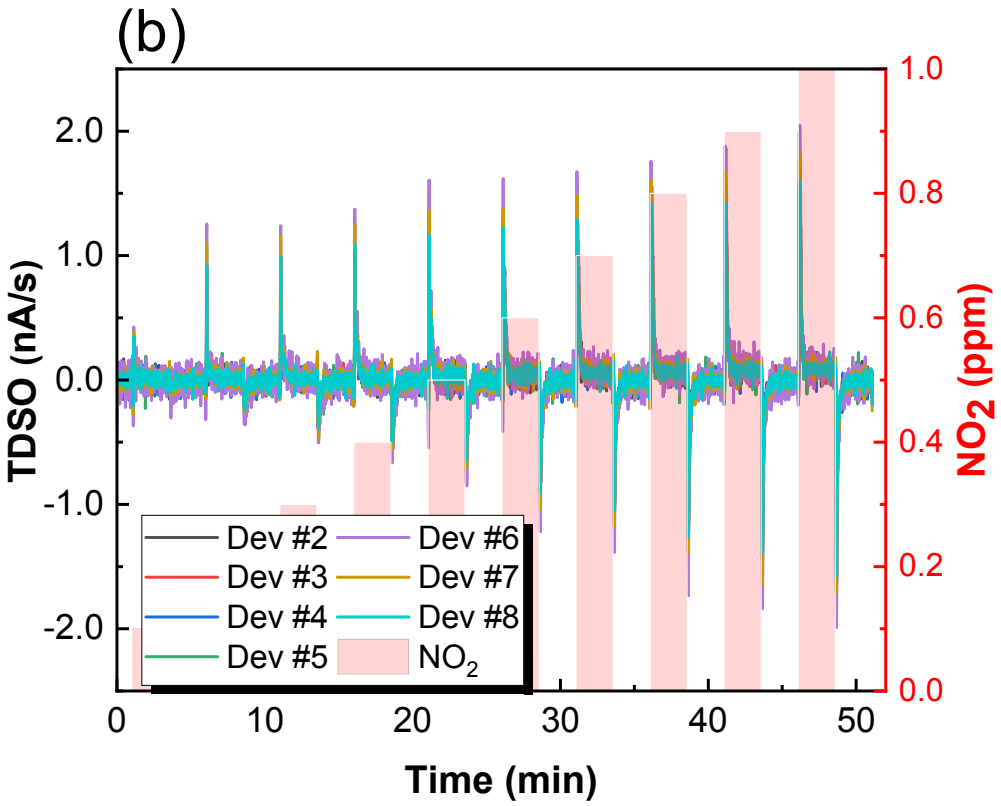


Figure S1. (a) Real-time behaviour and (b) corresponding TDSO of $PtSe_2$-based devices (from *#2* to *#8)* during the exposure upon NO_2 (red rectangles). The current in panel (a) is normalized at the value I_0 reached at the gas inlet of the first pulse exposure.

In both panels, the curves are closely overlapped, showing the reproducible sensing behavior of the devices.

TDSO maxima obtained from figure S1a are reported in the main text, showing the linear behavior of TDSO maxima as a function of the NO_2 concentration for the investigated $PtSe_2$-CRs.

In figure S2(a), the close-up of the exposure step upon 1 ppm (black line) and corresponding TDSO (red line) are reported. The dashed lines highlight the position of the gas inlet (t_0) and TDSO maximum (t_1).

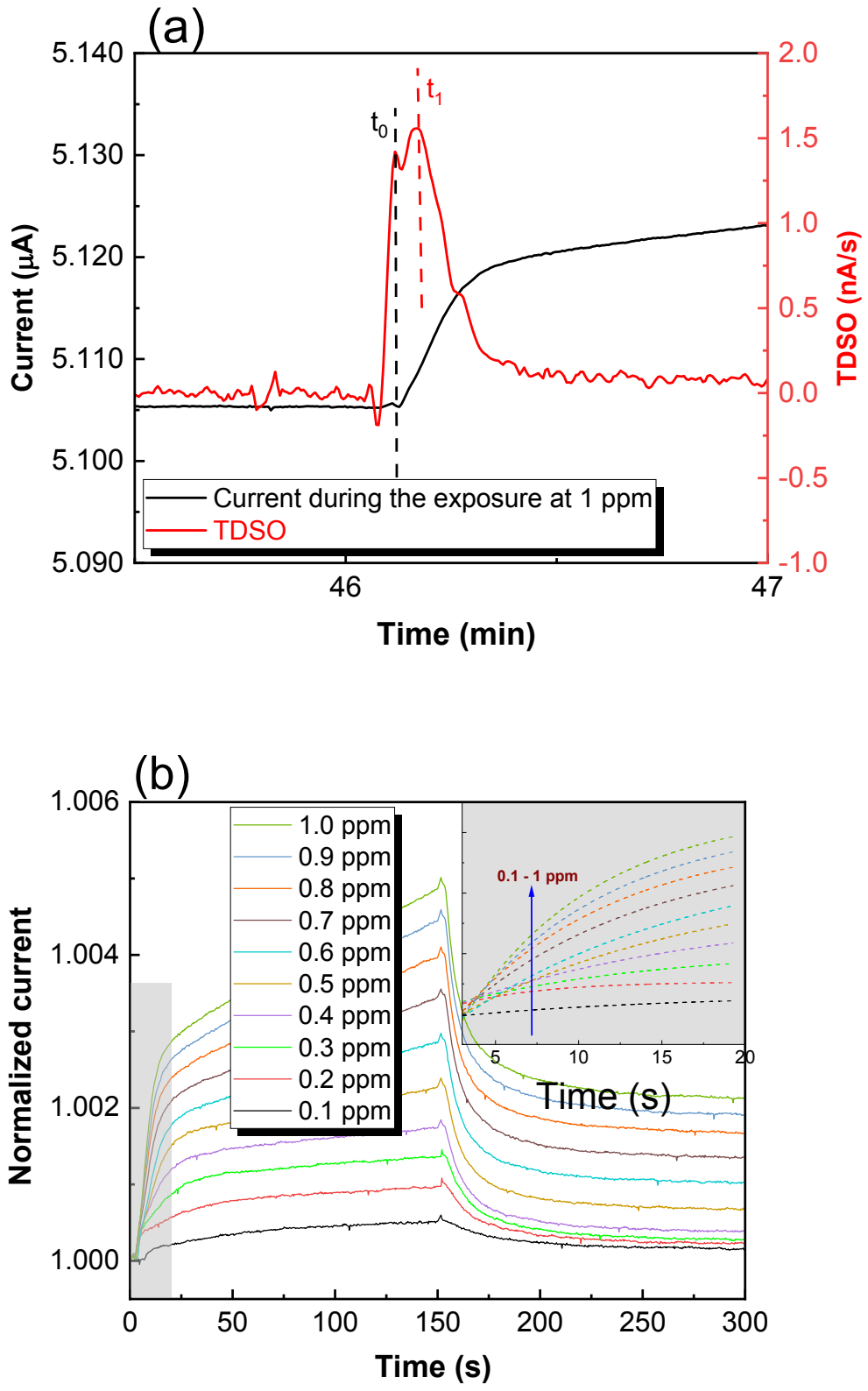


Figure S2. (a) Zoom on the current signal upon NO_2 pulse at 1 ppm (black line) and the corresponding TDSO (red line). (b) Signals recorded by *PtSe2-CR #1* upon exposure to different concentrations (see main text). Inset: fit of the curves enclosed in the grey rectangle of the panel.

The TDSO peak lies only few seconds later the instant of the gas injection, as expected by the mathematical model presented in our previous work[1]. The short delay between t_0 and t_1 is further clarified in figure S2(b). The grey rectangle of the figure highlights the portion of the signal which originates the peak of TDSO. Fitting this part of the signal (inset of Figure S2), a rising time (τ_1) of about few seconds is determined. As proved in our previous work, the smaller τ_1, the closer t_0 and t_1[1].
This analysis has been accomplished as example only on *$PtSe_2$-CR #1* due to the reproducibility of the behavior of the sensors (figure S1).

REFERENCES

(1) Ricciardella, F.; Polichetti, T.; Vollebregt, S.; Alfano, B.; Massera, E.; Sarro, L. Analysis of a Calibration Method for Non-Stationary CVD Multi-Layered Graphene-Based Gas Sensors. *Nanotechnology* **2019**. https://doi.org/10.1088/1361-6528/ab2aac.