

## Supporting document

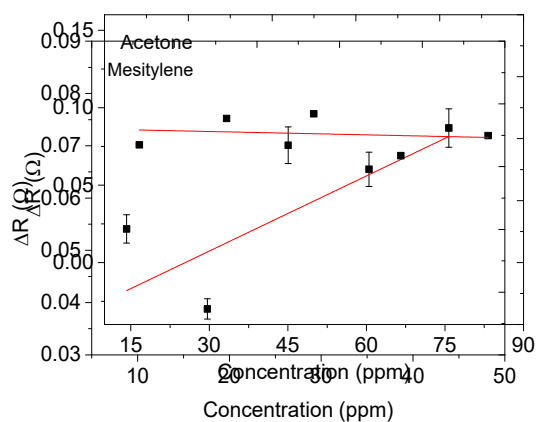
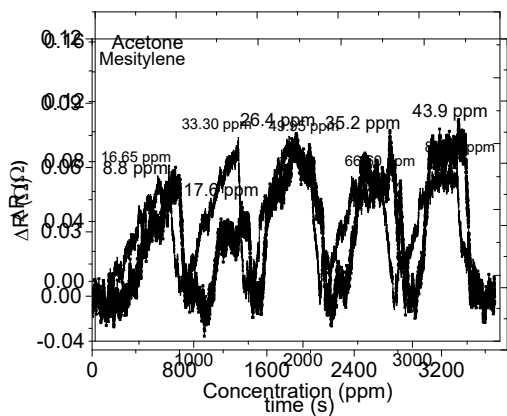
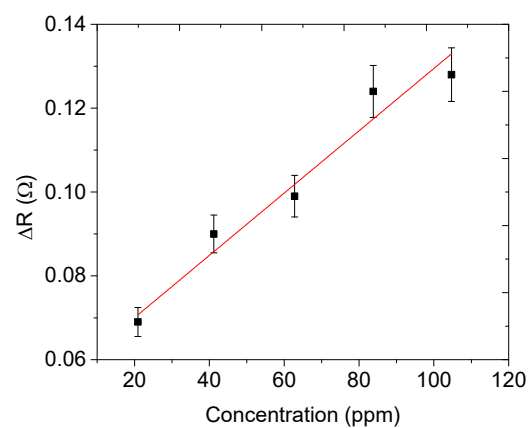
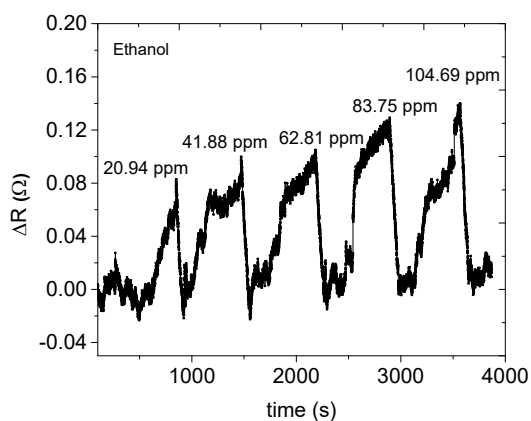
# Preliminary mechanistic insights into the detection of ethanol vapour using MnO<sub>2</sub> NRs-CNPs-Poly-4-(vinylpyridine) based solid-state sensor operating at room temperature

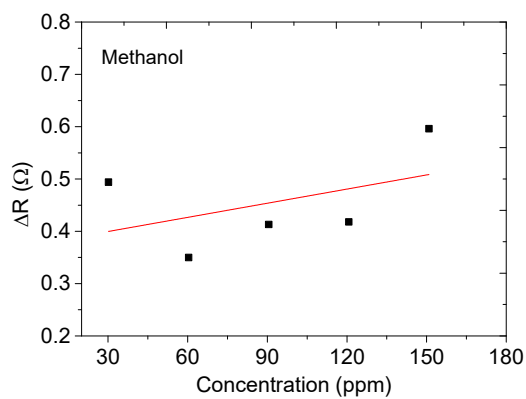
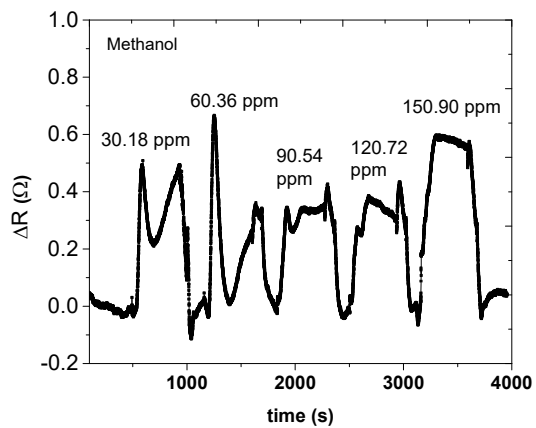
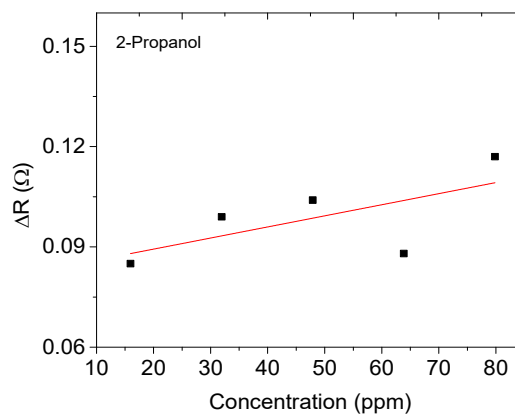
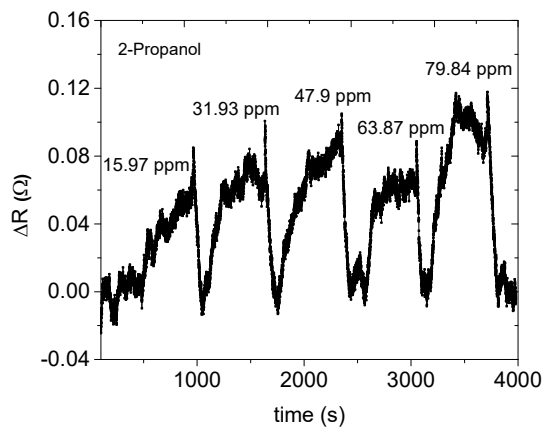
Lesego Malepe<sup>1</sup>, Derek Tantoh Ndinteh<sup>1</sup>, Patrick Ndungu<sup>2</sup>, Messai Adenew Mamo<sup>1\*</sup>

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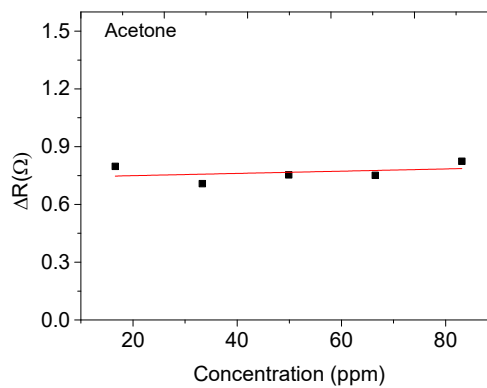
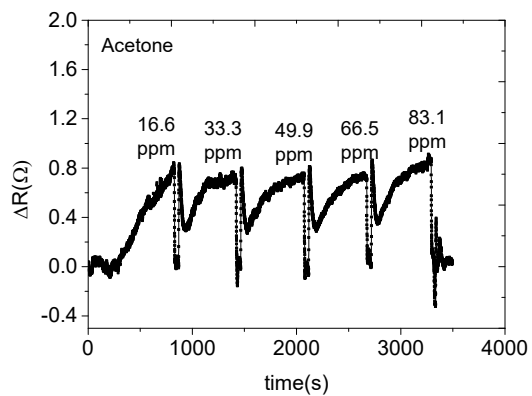
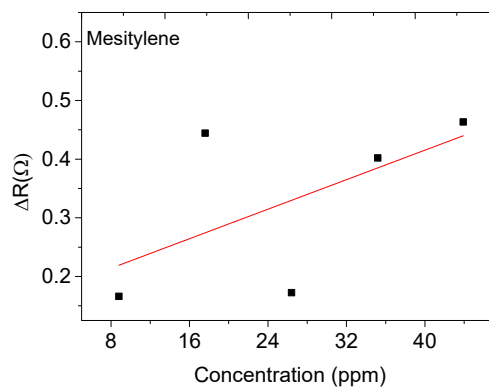
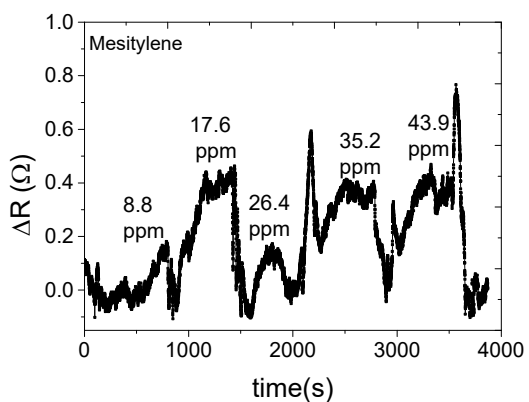
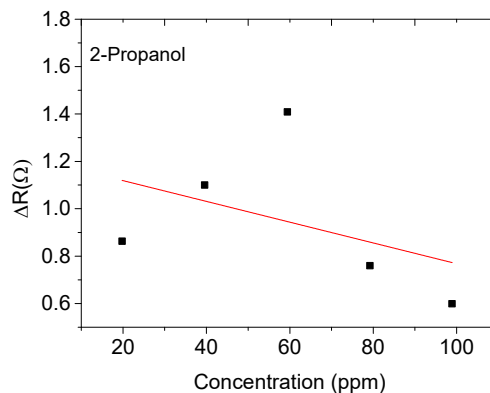
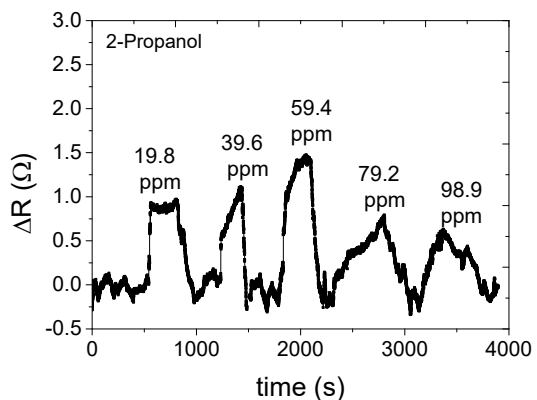
### 1. CNPs sensor

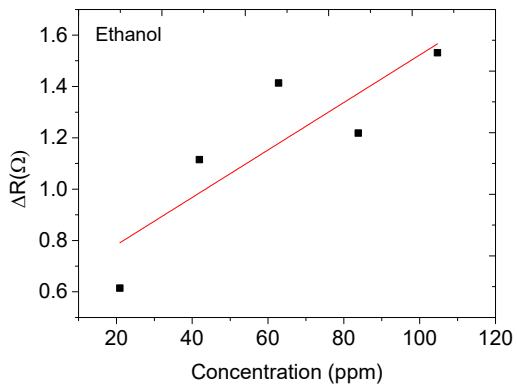
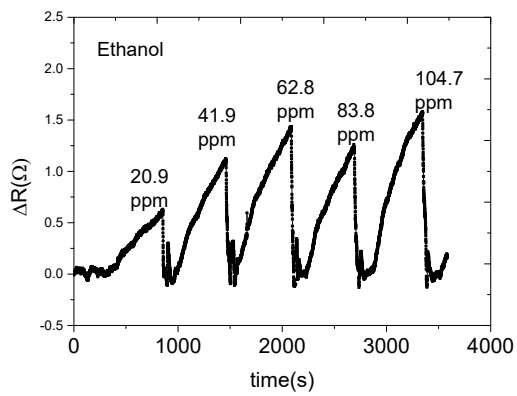
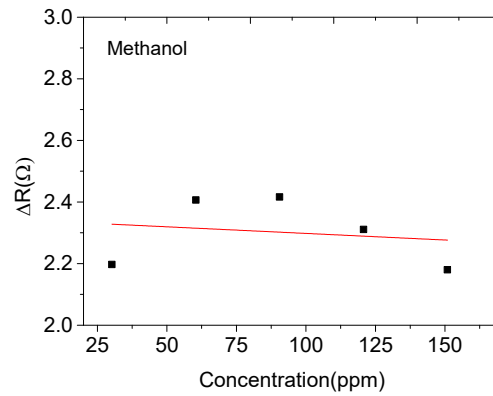
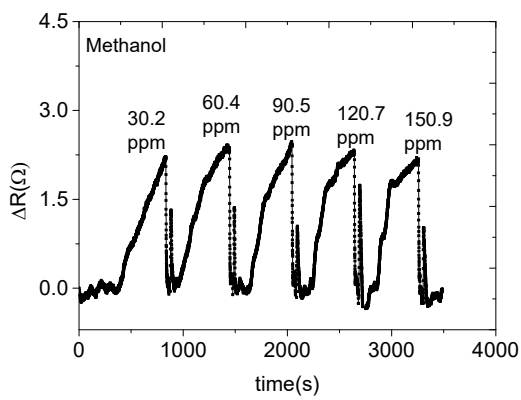




**Figure S1:** Relative electrical resistance response curves and their respective sensitivity calibration curves of volatile organic compounds on CNPs sensor.

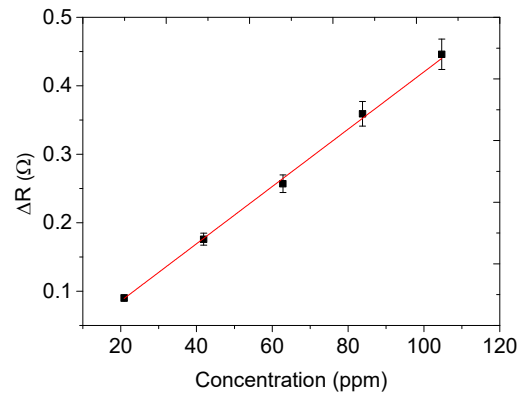
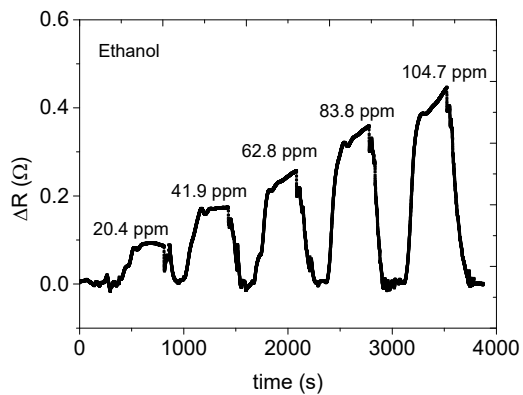
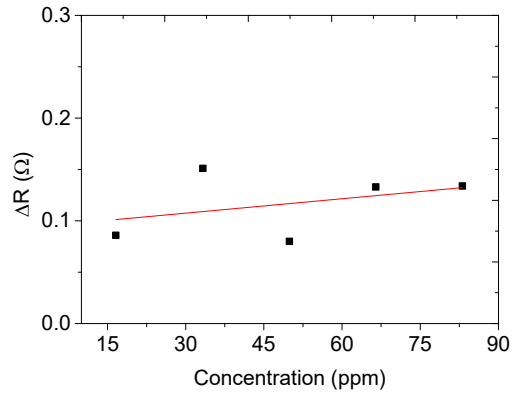
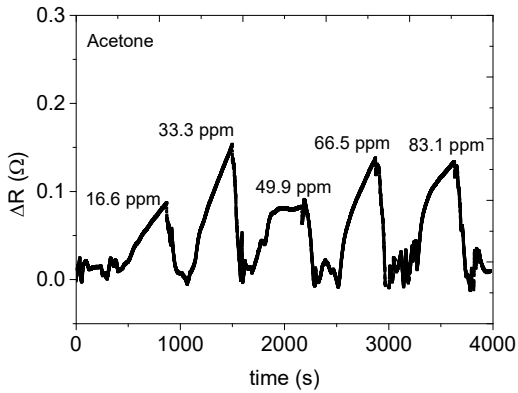
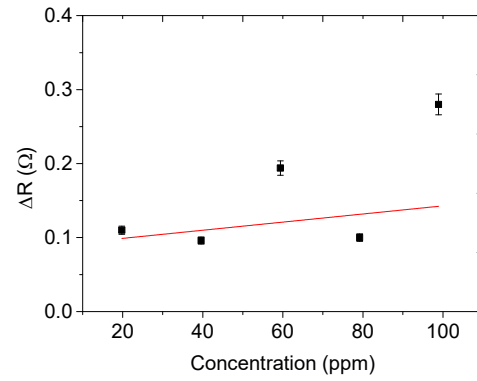
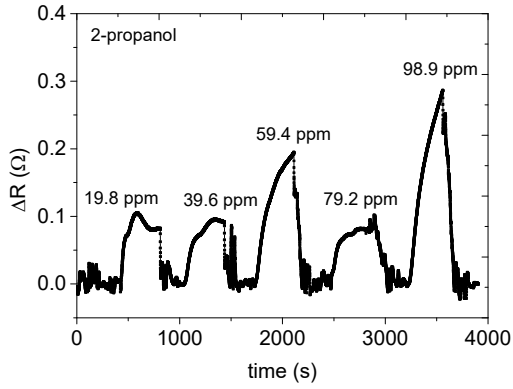
## 2. CNP-P4VP with a mass ratio 1:3 composite sensor

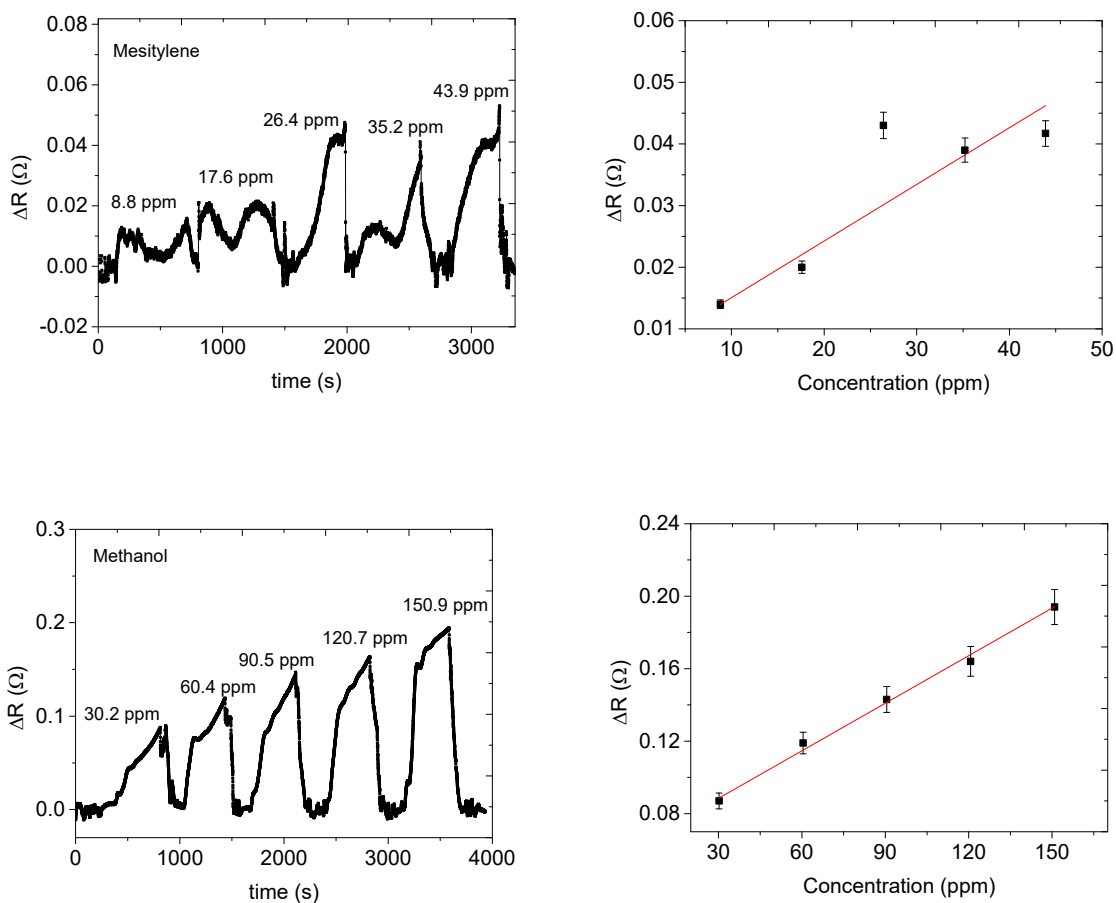




**Figure S2:** Relative electrical resistance response curves and their respective sensitivity calibration curves of VOCs on sensor made up of CNPs-P4VP with a mass ratio 1:3 composite.

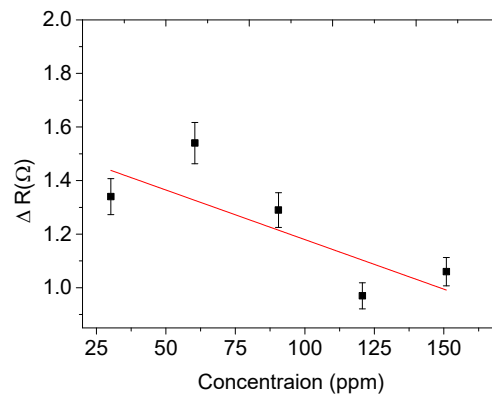
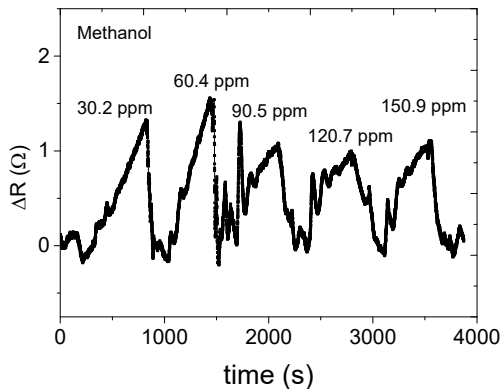
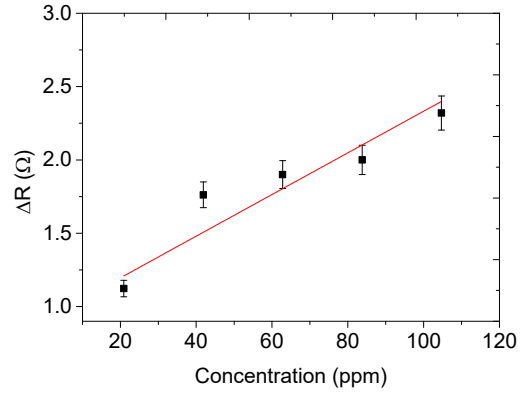
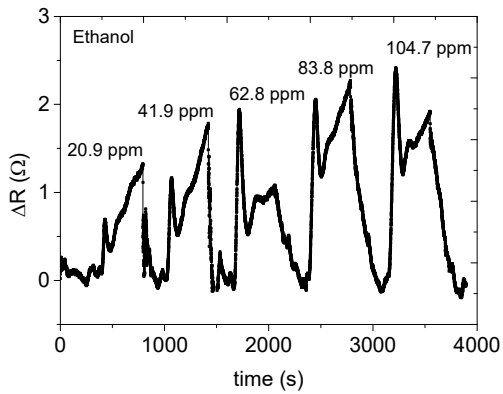
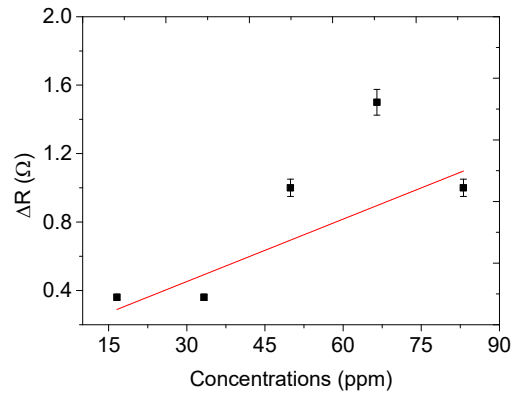
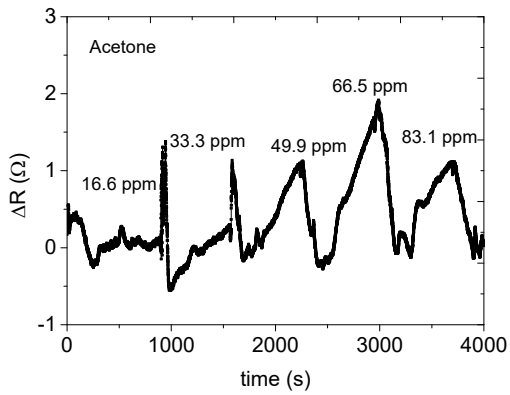
3. A sensor made up of the mass ratio 1:1:3 of MnO<sub>2</sub>-CNPs-P4VP composite for the detection of VOCs.

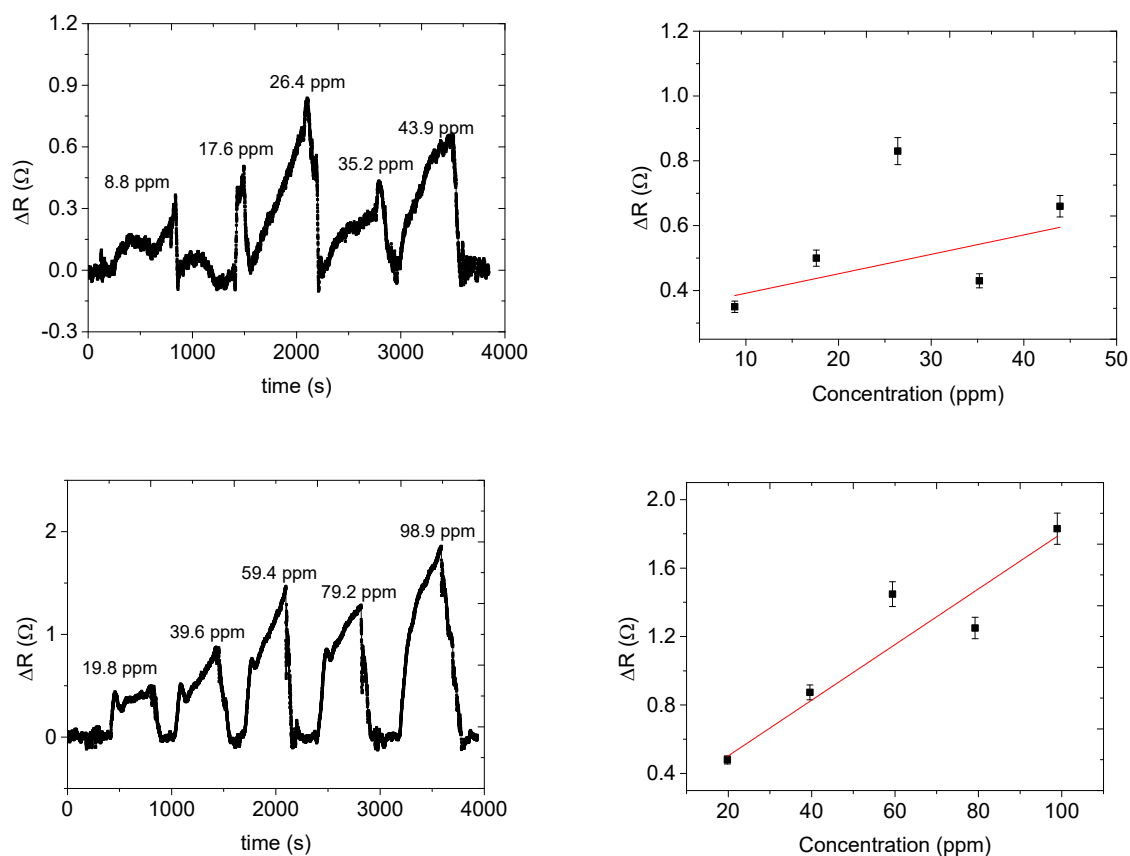




**Figure S3:** Relative electrical response curves and their respective sensitivity calibration curves of VOCs on sensor made up of  $\text{MnO}_2$ -CNPs-P4VP composite (1:1:3).

4. MnO<sub>2</sub>-CNPs- P4VP composite sensor made up of mass ratio (3:1:3)





**Figure S4:** Relative electrical resistance response curves of VOCs and their respective calibration curves on sensor made up of MnO<sub>2</sub>-CNPs-P4VP composite (3:1:3 mass ratio).

**Table S1:** Vapour sensitivity values of the prepared sensors.

Analytes	Sensor 1 (Ω ppm <sup>-1</sup> )	Sensor 2 (Ω ppm <sup>-1</sup> )	Sensor 3 (Ω ppm <sup>-1</sup> )	Sensor 4 (Ω ppm <sup>-1</sup> )	Sensor 5 (Ω ppm <sup>-1</sup> )
2-Propanol	0.00031	0.00021	0.00438	0.000549	0.0156
Acetone	0.00010	0.00158	0.00093	0.000467	0.0126
Ethanol	0.00177	0.000035	0.00312	<b>0.00418</b>	0.0142
Mesitylene	0.00061	0.00009	0.00013	0.000874	0.0037
Methanol	0.00011	0.00040	0.00629	0.000919	0.0060

