

## A Monolithic Nano-Scale Sensor Architecture with Tuneable Gas Diffusion for Molecular Fingerprinting

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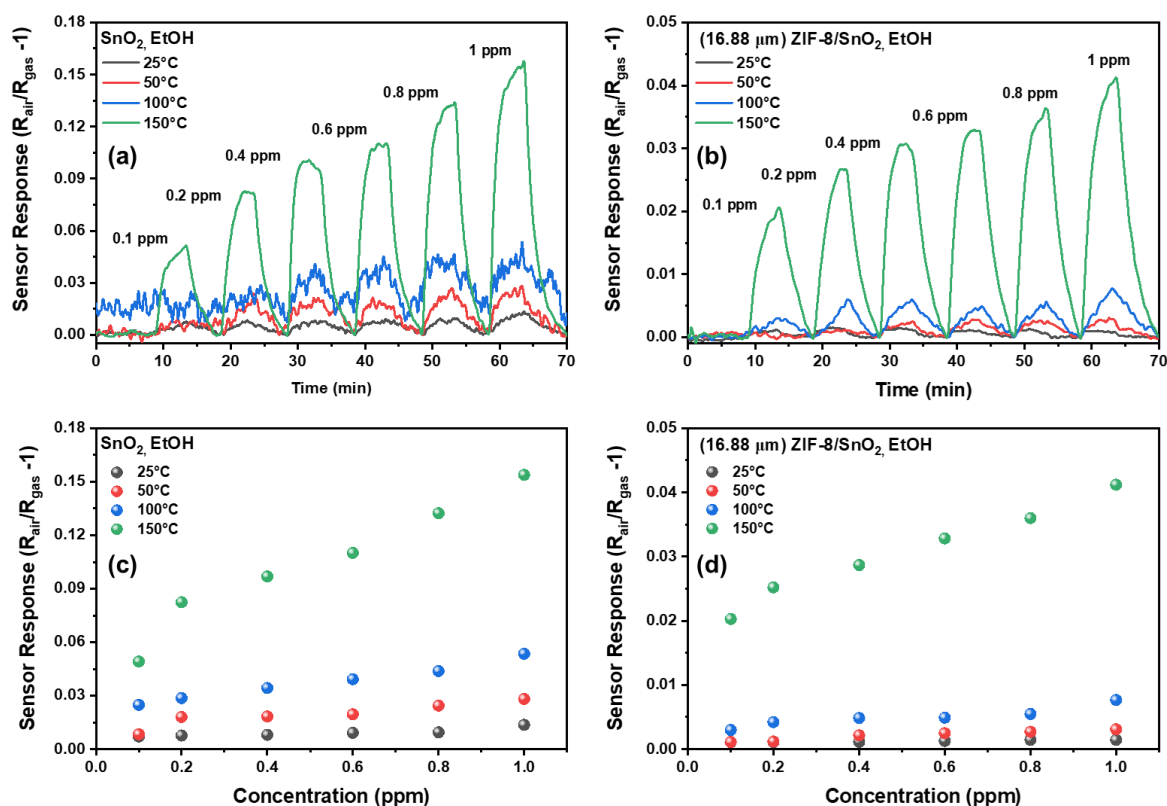
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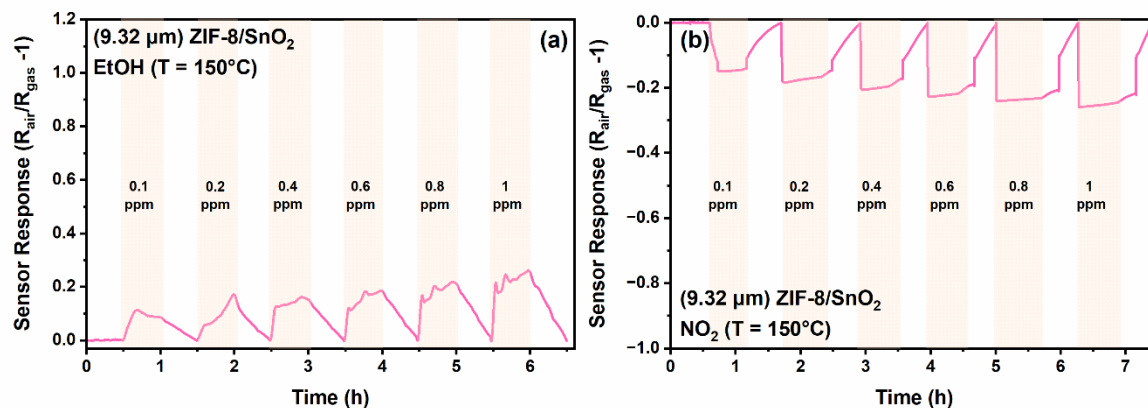
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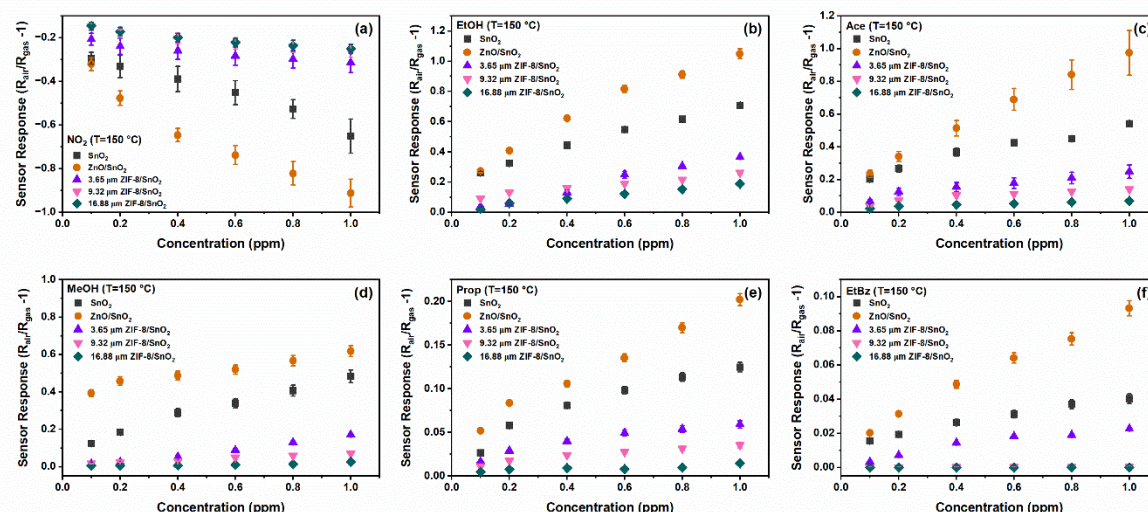


**Fig. S1** (a) Dynamic gas sensing response of SnO<sub>2</sub> against ethanol concentrations (0.1 – 1 ppm) at various temperatures: 25 °C, 50 °C, 100 °C, 150 °C. (b) (a) Dynamic gas sensing response of (16.88 μm) ZIF-8/SnO<sub>2</sub> against ethanol concentrations (0.1 – 1 ppm) at various temperatures:

25 °C, 50 °C, 100 °C, 150 °C. (c) Linear responsivity plot of SnO<sub>2</sub> for ethanol concentrations (0.1 – 1 ppm) at various temperatures: 25 °C, 50 °C, 100 °C, 150 °C. (d) Linear responsivity plot of (16.88 μm) ZIF-8/SnO<sub>2</sub> for ethanol concentrations (0.1 – 1 ppm) at various temperatures: 25 °C, 50 °C, 100 °C, 150 °C.



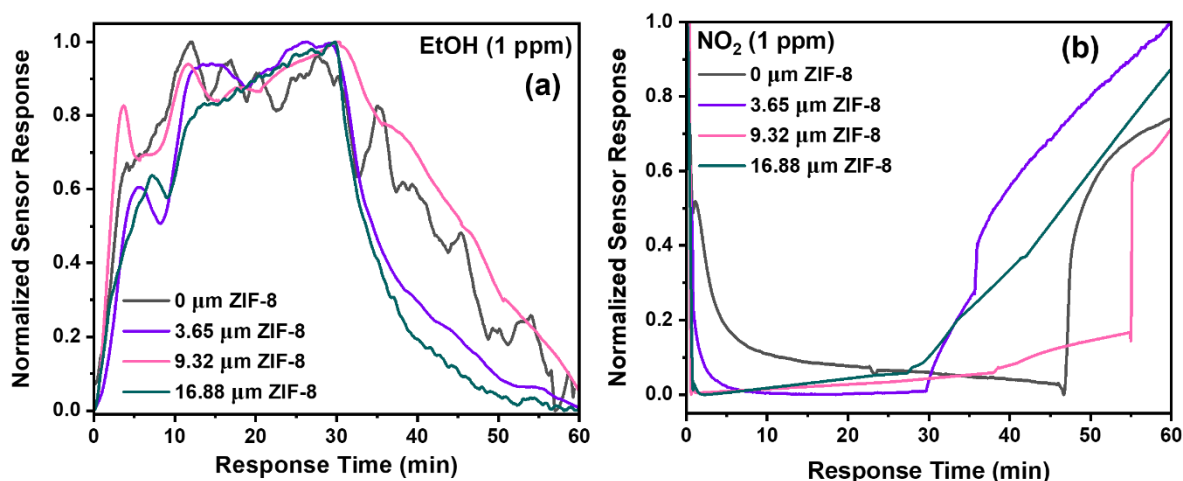
**Fig. S2.** Dynamic sensing response of (9.32 μm) ZIF-8/SnO<sub>2</sub> towards (a) Ethanol (EtOH) and (b) NO<sub>2</sub> in the concentration range of 0.1 - 1 ppm at 150 °C



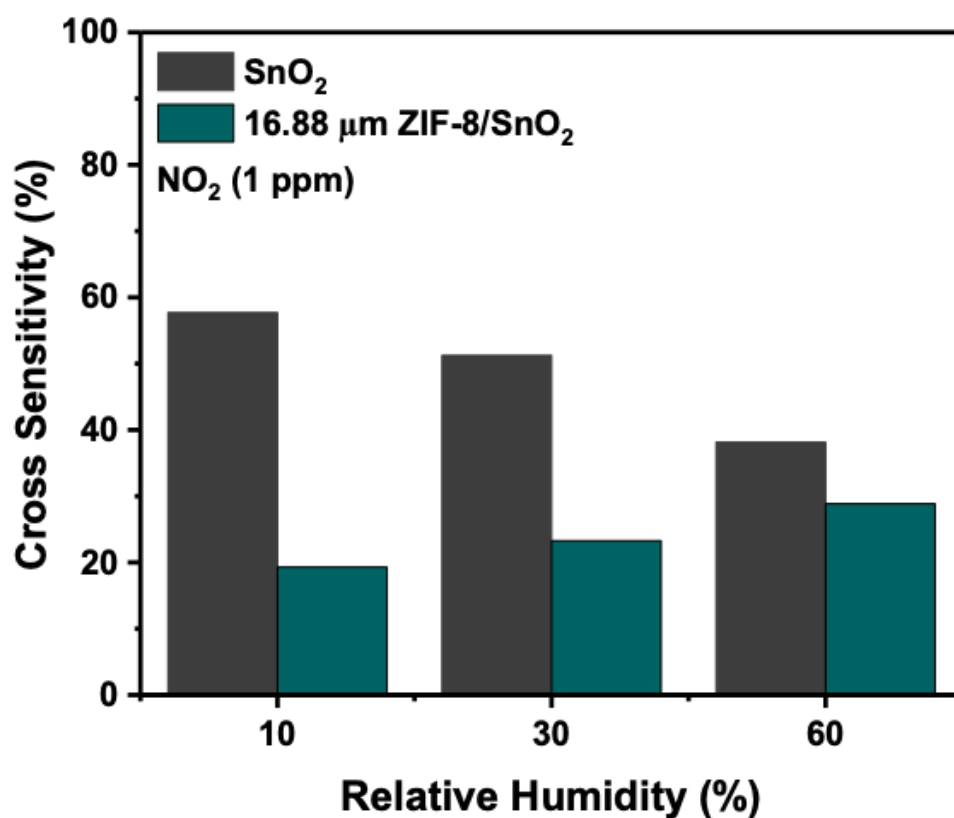
**Fig. S3** Linear responsivity of SnO<sub>2</sub> (grey, square), ZnO/SnO<sub>2</sub> (brown, circles), (3.65 μm) ZIF-8/SnO<sub>2</sub> (purple, upward triangle), (9.32 μm) ZIF-8/SnO<sub>2</sub> (pink, downward triangle) and (16.88 μm) ZIF-8/SnO<sub>2</sub> (green, diamonds) from 0.1 – 1 ppm at 150 °C towards (a) NO<sub>2</sub>, (b) Ethanol (EtOH), (c) Acetone (Ace), (d) Methanol (MeOH), (e) Propane (Prop) and (d) Ethyl Benzene (EtBz)

**Table S1:** Adsorption energies (eV) of various target molecules on ZIF-8 and SnO<sub>2</sub> (110)

	NO <sub>2</sub>	Ethanol	Acetone	Methanol	Propane	Ethyl Benzene
ZIF-8	-0.38	-0.36	-0.33	-0.35	-0.39	-0.15
SnO <sub>2</sub>	-2.00	-0.69	-0.52	-0.66	-0.24	-0.47



**Fig. S4** Response-recovery curves of SnO<sub>2</sub> (grey), 3.65 μm ZIF-8/SnO<sub>2</sub> (purple), 9.32 μm ZIF-8/SnO<sub>2</sub> (pink) and 16.88 μm ZIF-8/SnO<sub>2</sub> (green) towards 1 ppm of (a) Ethanol (EtOH) and (b) NO<sub>2</sub> at 150 °C.



**Fig. S5** Cross-sensitivity to humidity (at 20 °C) at 1 ppm NO<sub>2</sub>. All measurements were performed at 150 °C.