

## Supporting information

### **Photochemical fabrication of defects abundant Pd/SnO<sub>2</sub> with promoted performance for dioctyl phthalate gas sensor**

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## Supporting Tables

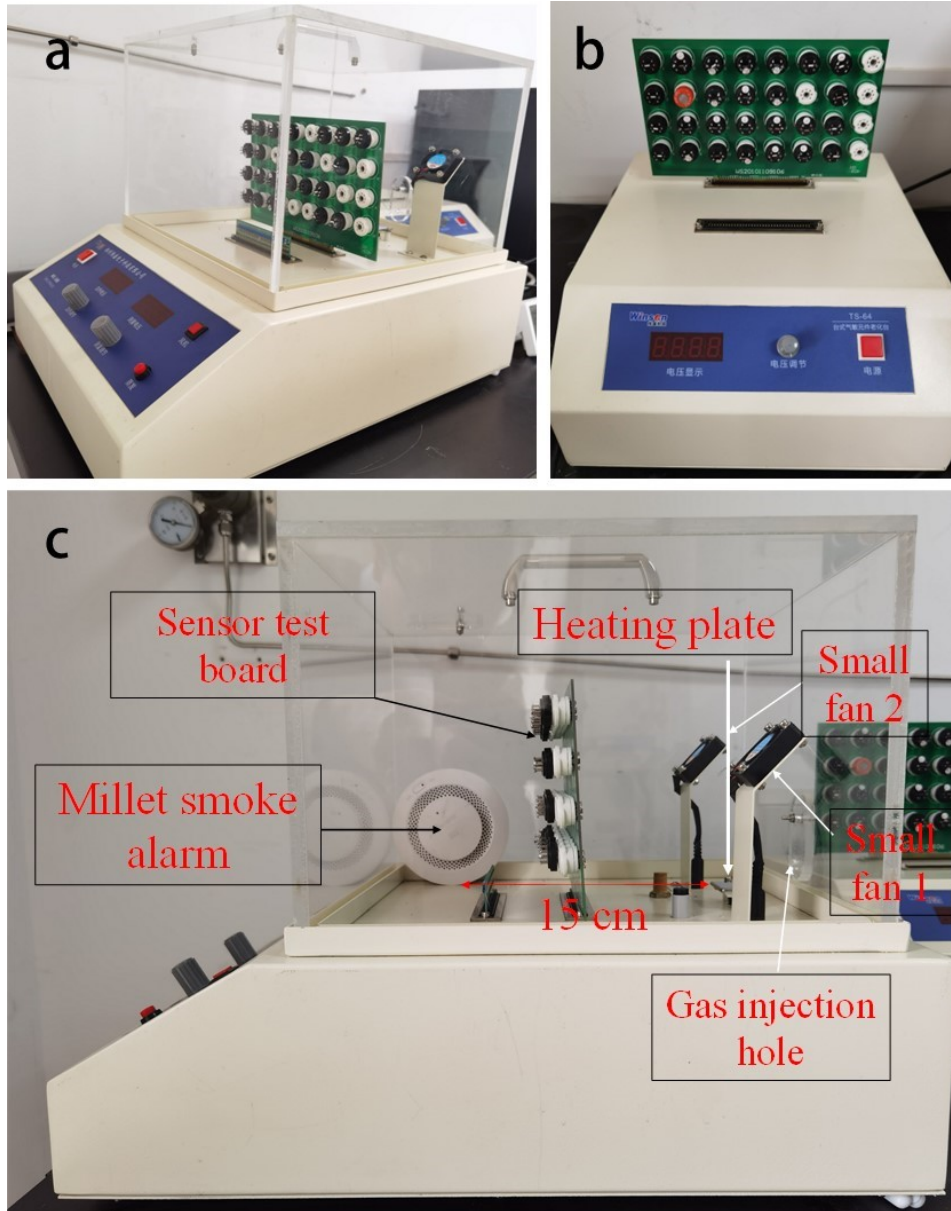
**Table S1.** The profiles of different materials.

Sample	BET surface area (m <sup>2</sup> /g)	Pore volume (cm <sup>3</sup> /g)	Pore size (nm)
SnO <sub>2</sub>	40.7	0.01	6.5
5%Pd/SnO <sub>2</sub>	8.2	0.01	14.5
7.5%Pd/SnO <sub>2</sub>	8.3	0.02	15.2

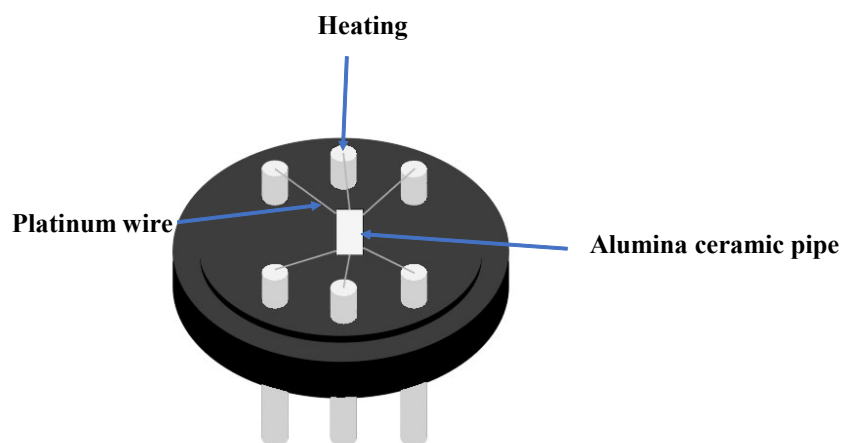
**Table S2.** Designed loading amount and the estimated numbers by ICP-MS.

<b>Sample</b>	<b>Designed loading</b>	<b>Actual loading by ICP-MS</b>
3%Pd/SnO <sub>2</sub>	3%	2.61%
5%Pd/SnO <sub>2</sub>	5%	4.53%
7.5%Pd/SnO <sub>2</sub>	7.5%	5.61%
10%Pd/SnO <sub>2</sub>	10%	7.34%

## Supporting Figures



**Fig. S1** The photos of (a) the sensing test setup; (b) the TS-64 table-top gas sensor aging platform; (c) the millet smoke alarm placement.



**Fig. S2** Diagrammatic sketch of ceramic tube sensor device.

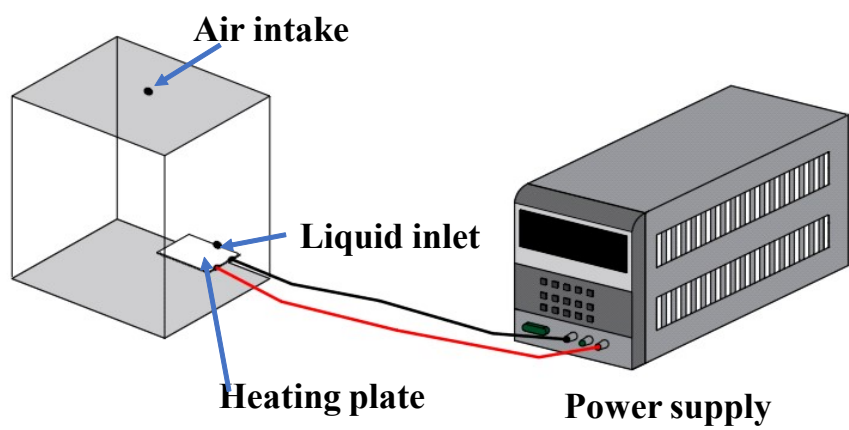
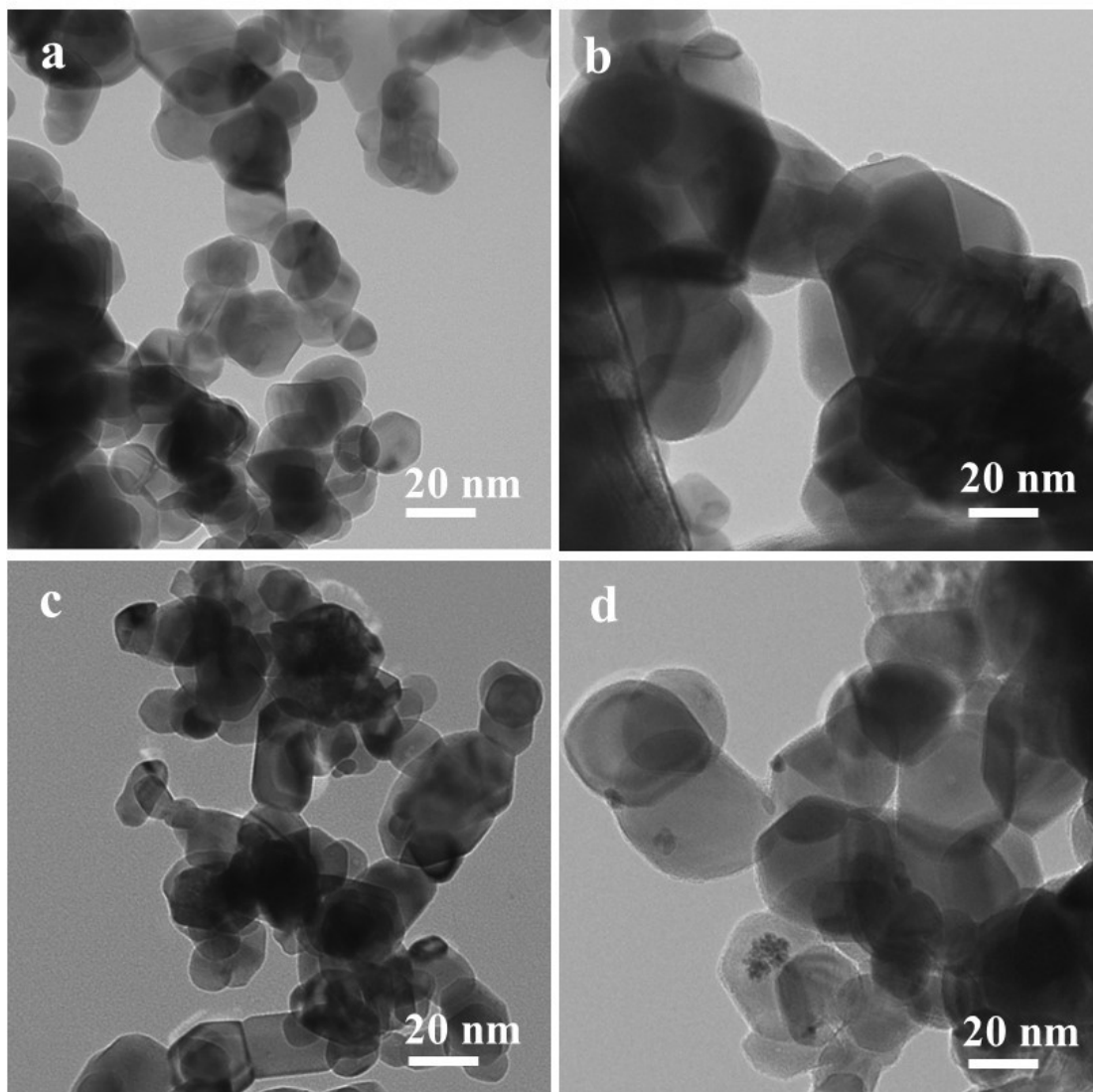


Fig. S3 DOP vapor generator.



**Fig. S4** TEM image of (a) pure SnO<sub>2</sub>; (b) 3 % Pd/SnO<sub>2</sub>; (c) 7.5 % Pd/SnO<sub>2</sub>; (d) 10 % Pd/SnO<sub>2</sub>.

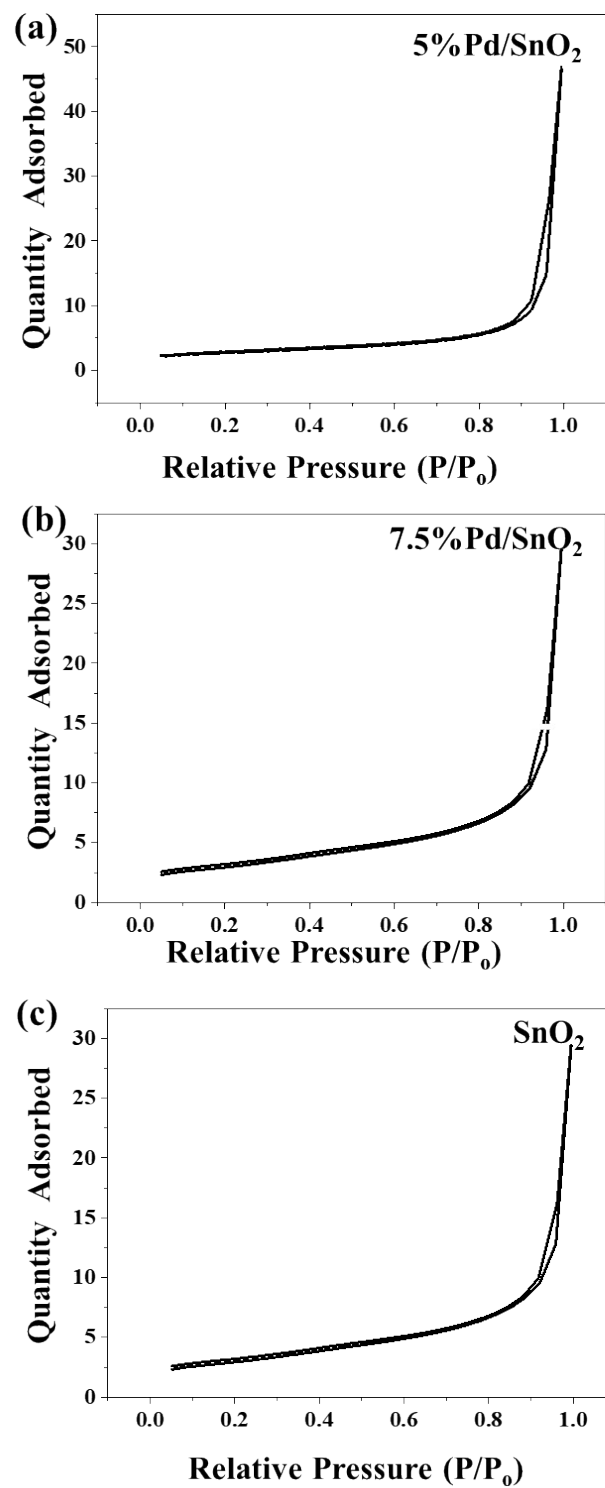
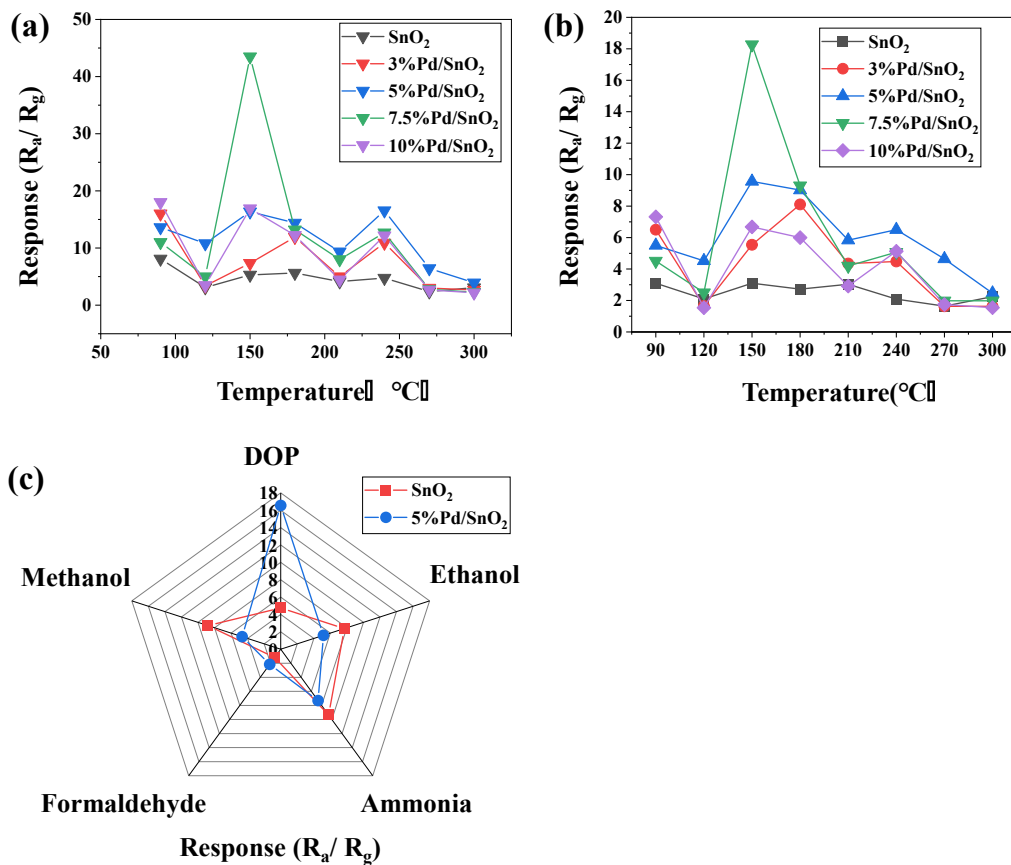


Fig. S5 N<sub>2</sub> adsorption-desorption isotherms curves of different samples.





**Fig. S6** The response of DOP with the concentration of (a) 25 ppm and (b) 10 ppm at different temperatures. (c) The selectivity of different gases at 25 ppm.

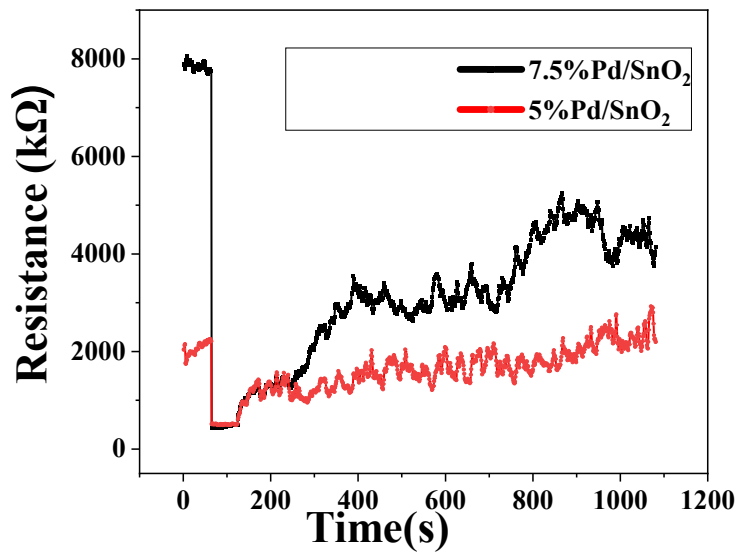


Fig. S7 5%Pd/SnO<sub>2</sub> and 7.5%Pd/SnO<sub>2</sub> response-recovery curves to 10 ppm DOP at 150 °C.

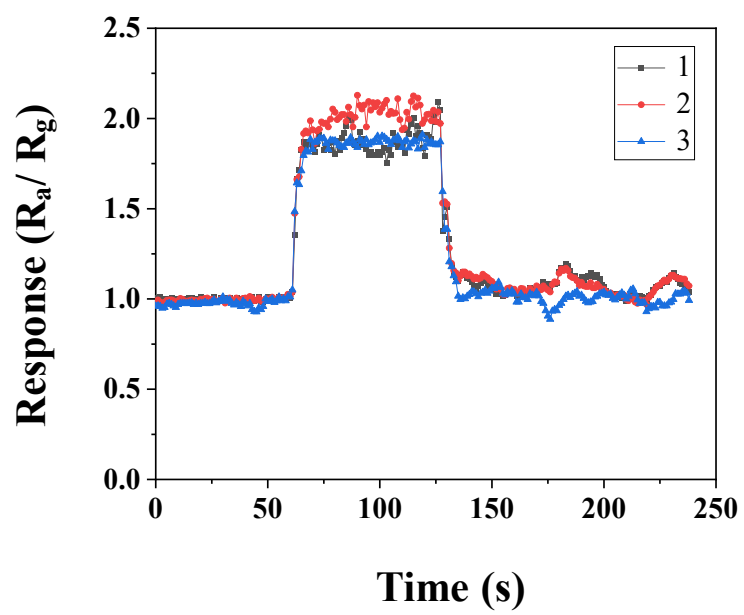
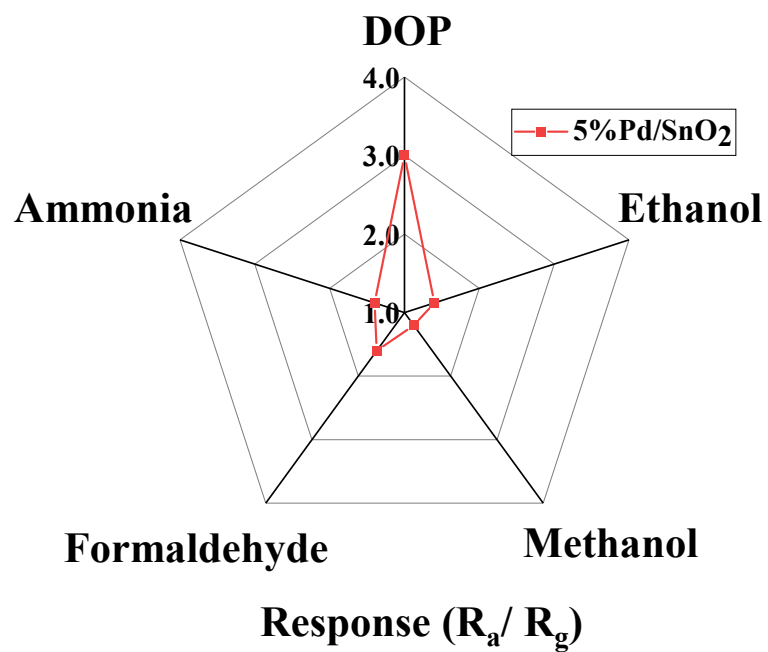
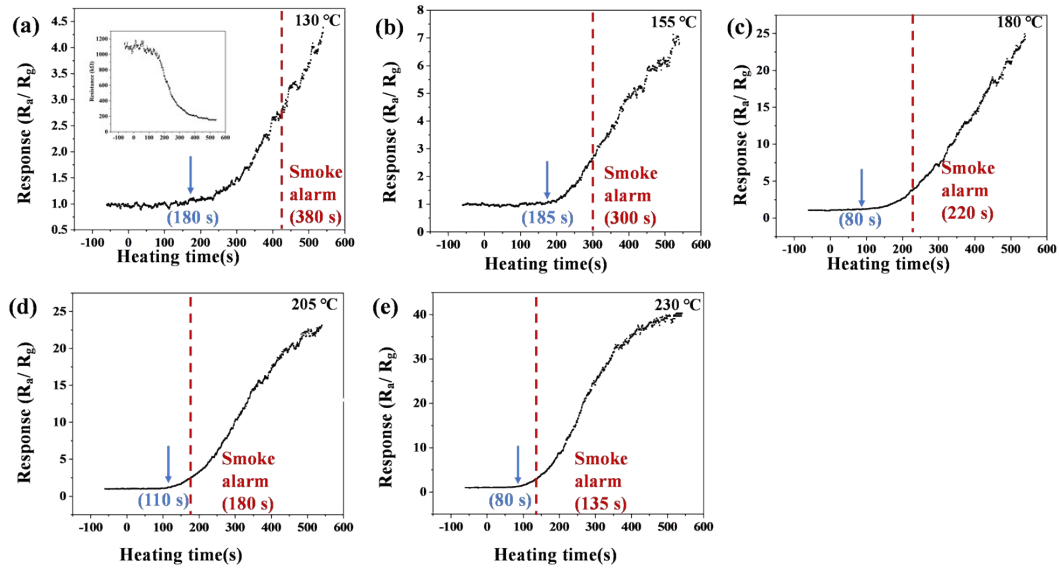


Fig. S8 Repeatability of sensors in different batches at 240 °C.



**Fig. S9** The selectivity of 5 % Pd/SnO<sub>2</sub> towards five gases (formaldehyde, ammonia, ethanol, methanol and DOP, 5 ppm) at a test temperature of 240 °C and an ambient humidity of 70 % RH.



**Fig. S10** Comparison of response signals between 5%Pd/SnO<sub>2</sub> gas sensor (worked at 150 °C) and commercial smoke detector at different PVC cable heating temperatures: (a) 130 °C, (b) 155 °C, (c) 180 °C, (d) 205 °C and (e) 230 °C.