Construction of PdO-decorated double-shell ZnSnO₃ hollow microspheres for n-propanol detection at low temperature

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The n-propanol gas was derived by a static liquid-gas method.¹² The relationship between the volume of n-propanol solution and the concentration of n-propanol gas could be calculated by the following formula:

\[ C = \left( \frac{22.4 \times d \times \rho \times V_1}{M \times V_2} \right) \times 1000 \]

Where \( C \) (ppm) is the target gas concentration, \( d \) is the purity of n-propanol solution, \( \rho \) (g/mL) is the density of n-propanol solution, \( V_1 \) (μL) is the injection volume of n-propanol solution, \( V_2 \) (L) is the volume of the glass chamber and \( M \) (g/mol) is the molecular weight of n-propanol solution. The n-propanol solution is purchased from Aladdin Chemistry Co. Ltd. (Shanghai, China).

References


Fig. S1. Schematic structure of the overall gas sensor.

Fig. S2. The XRD pattern of ZnSn(OH)$_6$ precursor.
Fig. S3. The FESEM images of (a) ZnSn(OH)$_6$ precursor and (c) ZnSnO$_3$; the TEM images of (b) ZnSn(OH)$_6$ precursor and (d) ZnSnO$_3$.

Fig. S4. The elemental mapping image of 4 wt% PdO-loaded ZnSnO$_3$ samples.
Fig. S5. The XPS spectrum of pure ZnSnO$_3$: (a) overall spectrum; (b) Zn 2p and (c) Sn 3d.

Fig. S6. The room-temperature PL spectrum of pure ZnSnO$_3$ and 4 wt% PdO-loaded ZnSnO$_3$ samples.
Fig. S7. The response/recovery speed of pure ZnSnO$_3$ to 100 ppm n-propanol at 200°C.

Fig. S8. The long-term stability of the sensor based on 4 wt% PdO-loaded ZnSnO$_3$ to 100 ppm n-propanol at 140°C.