Supporting Information

Hydrothermal synthesis of hierarchical SnO_2 microspheres for gas sensing and lithium-ion batteries applications: Fluoride-mediated formation of solid and hollow structures

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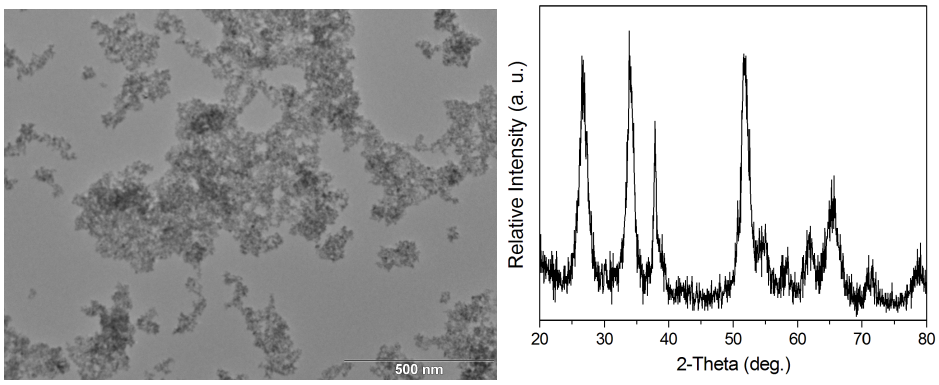

Figure S1. TEM image and XRD pattern of SnO_2 nanoparticles obtained by hydrothermal treatment of the single precursor $SnCl_4 \cdot 5H_2O$ at 180°C for 24h, without addition of fluorides.

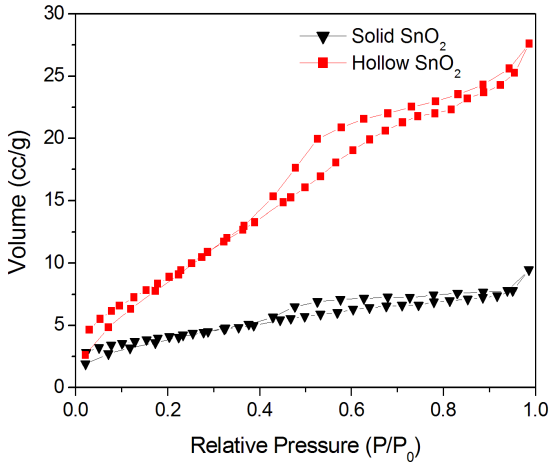

Figure S2. Nitrogen adsorption-desorption isotherms of the hierarchical SnO_2 solid/hollow microspheres synthesized by using NH_4F/NaF as controlling agents, respectively.

Table S1. Relative atomic concentration analyzed through XPS

Elements	O1s	F1s	Sn3d5
SnO_2 without sintering	62.42	10.63	26.95
SnO_2 sintered at 700°C for 4h	64.74	2.29	32.97

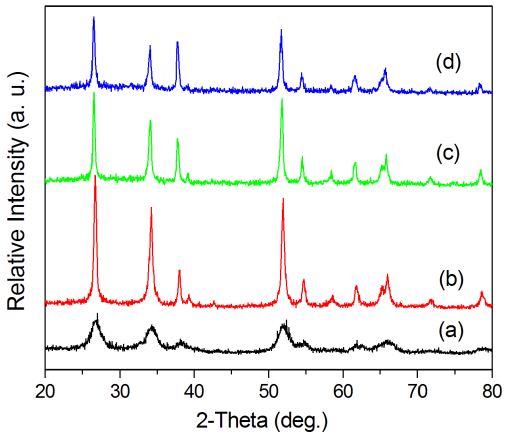

Figure S3. XRD patterns of SnO_2 samples synthesized with different $F(NH_4F)$ /Sn mole ratio. (a) $R_{F/Sn}$ =0, (b) $R_{F/Sn}$ =3, (c) $R_{F/Sn}$ =4, (d) $R_{F/Sn}$ =5.

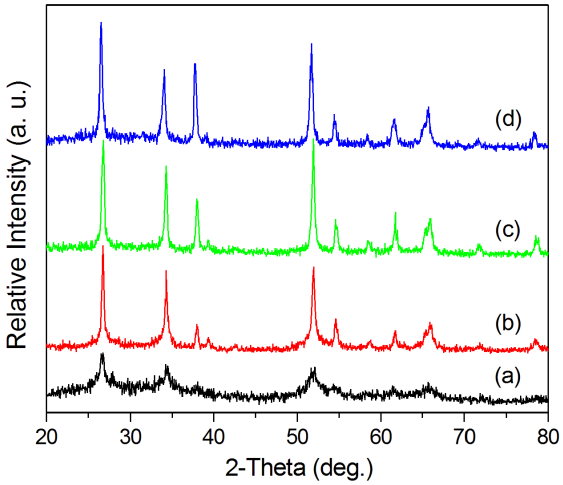

Figure S4. XRD patterns of SnO_2 samples synthesized at 180°C for different hydrothermal time with $R_{F/Sn}$ =4.77. (a) 1h, (b) 5h, (c) 16h, (d) 24h.

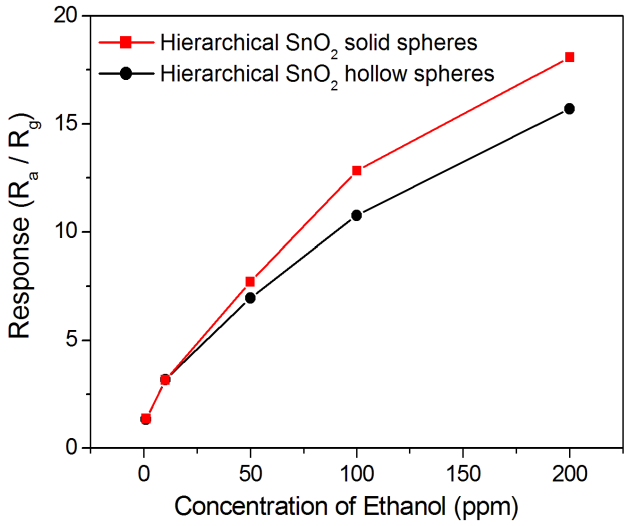

Figure S5. Gas response (R_a/R_g) of the hierarchical SnO_2 solid and hollow spheres upon exposure to different concentrations of ethanol.

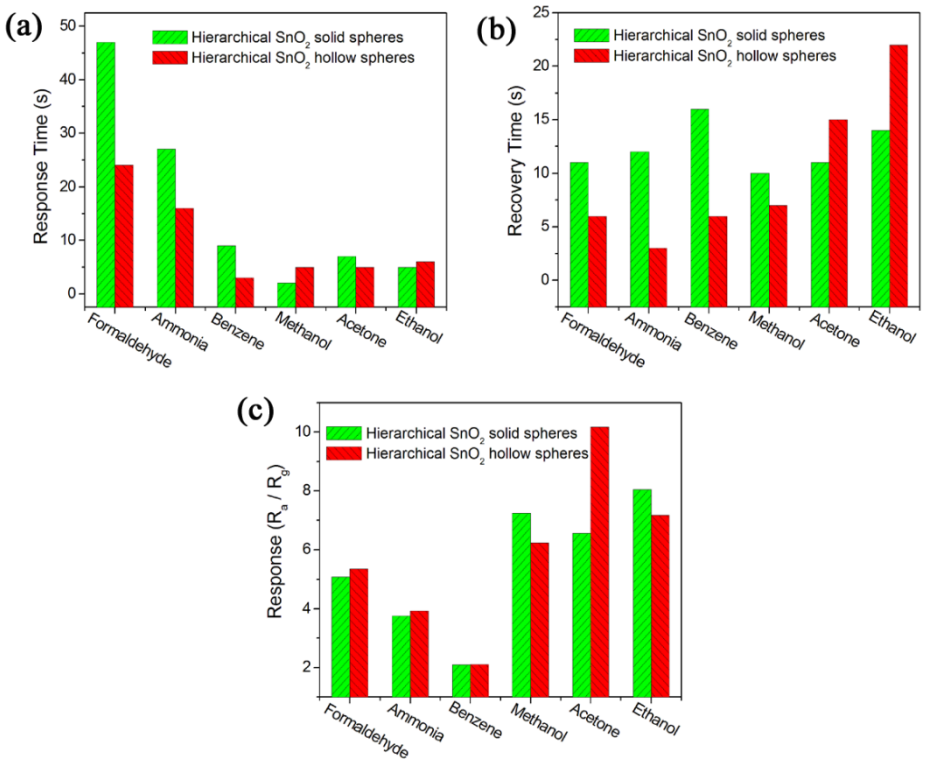

Figure S6. Response time (a), recovery time (b) and sensitivity (c) of the hierarchical SnO_2 solid and hollow spheres sensors to different kinds of gases with concentration of 50 ppm.