Supplementary Information

Anodized Nanoporous WO$_3$ Schottky Contact Structure for Hydrogen and Ethanol Sensing

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BET surface area analysis

The Brunauer–Emmett–Teller (BET) specific surface area measurement was carried out by the nitrogen gas adsorption–desorption method at 77 K using Micromeritics ASAP2000 instrument. The surface area and average pore diameter of the sample was found to be 24.5 m^{2}g^{-1} and 16.8 nm, respectively. However, it is believed that the porous WO$_3$ should possess a much larger BET surface area as well as larger than estimated pores. It is suggested that some amount of surface has not been accounted in the BET measurement due to the discontinuity of pores, hindering the gas diffusion.[1]
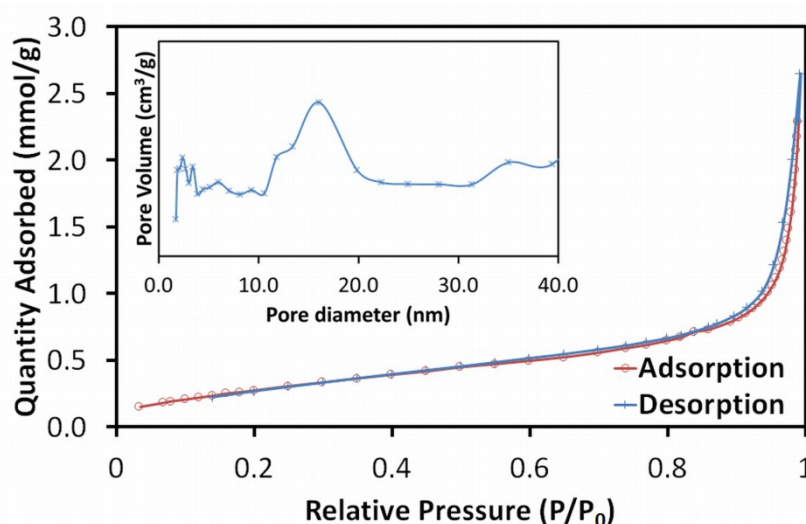
Figure S1 N_2 adsorption–desorption isotherms and pore size distribution (inset) of the nanoporous WO_3 film measured at 77 K.

Scherrer equation for wall thickness calculations

The thicknesses of the nanowalls, encompassing the pores, can also be estimated from high intensity peaks of the XRD pattern (Figure 4a- in the manuscript) using the full width at half max (FWHM) values. Here, the dimensions calculated using the Scherrer equation can be linked to the wall thicknesses.[2] The sizes of the walls at different directions can be associated the numbers calculated from the two high intensity peaks of crystallographic orientations (001) and (220) which are obtained as 16.9 and 10.8 nm, respectively. These numbers are in agreement with the 10 to 15 nm range obtained using SEM images.

References

1.   Walton, K. S.; Snurr, R. Q., Applicability of the BET Method for Determining Surface Areas of Microporous Metal−Organic Frameworks. *J. Am. Chem. Soc.,* 2007, **129**, 8552-8556.

2.   Patterson, A. L., The Scherrer Formula for X-Ray Particle Size Determination. *Phys. Rev.,* 1939, **56**, 978-982.