Experimental

Preparation of α-Fe_2O_3 nanospheres

In a typical synthesis, 0.5 mmol of $FeCl_2 \cdot 4H_2O$ and 1.5 mmol of sodium acetate were dissolved into 40 ml of distilled water, and then heated by microwave method with power of 800 W for 10 min. Finally, the product was cooled, washed, dried and annealed at 500 ºC for 2h in order to study their gas-sensing performance.

Preparation of α-Fe_2O_3 nanorods

The preparation procedure of α-Fe_2O_3 nanorods was the same as that of the α-Fe_2O_3 nanospheres, except the amount of sodium acetate was changed into 0.5 mmol from 1.5 mmol.

Characterization

The morphology and structural characteristics were observed using X-ray diffraction (XRD, Rigaku D/max 2500 diffractometer), scanning electron microscopy (SEM, Hitachi S4800) and transmission electron microscope (TEM; JEOL 2010 with an accelerating voltage of 200 kV).

Gas sensing measurements

The fabrication and testing principles of the gas sensor are similar to that described in our previous reports. Firstly, the α-Fe_2O_3 samples were mixed with terpineol to form a paste and then coated onto the outside surface of an alumina tube with a diameter of 1 mm and a length of 5 mm. A platinum coil through the tube was employed as a heater to control the operating temperature. To improve their stability and repeatability, the gas sensors were aged at 300 ºC for 10 h in air. Here, the sensing properties of the sensors were measured by a NS-4003 series gas-sensing measurement system (China Zhong-Ke Micro-nano IOT, Internet of Things, Ltd.). The relative humidity (RH) is about 45%. The response and recovery times were defined as the time required for a change of the resistance to reach 90 % of the equilibrium value after injecting and that for removing the detected gas, respectively.

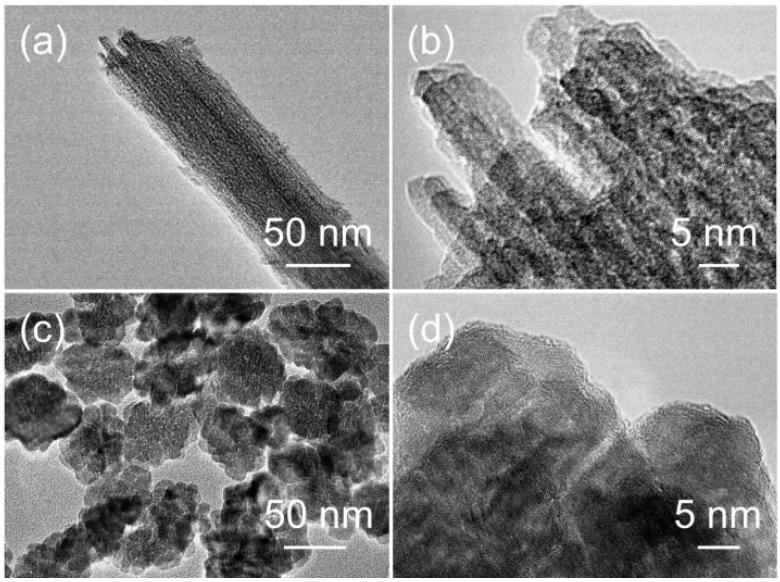

Fig. S1 TEM images of nanostructured iron oxides: (a and b) nanorods; and (c and d) nanoparticles.