Supporting information

1. Solvothermal preparation of In_2O_3 nanoparticles

All chemicals used in this study were of analytical grade. In a typical synthesis procedure, 0.59 g $InCl_3 \cdot 4H_2O$ was first dissolved into 5 mL deionized water. Then another 15 mL deionized water and 20 mL ethylenediamine were added into the above solution under vigorous stirring at room temperature for 60 min. The resulted solution was then sealed in a teflon-lined stainless steel autoclave (70 ml capacity) and maintained at 180 °C for 5 h. After that, the autoclave was cooled to ambient temperature. The obtained products were collected by centrifugation, rinsed with deionized water and ethanol for several times, and then calcined in a crucible at 550 °C in air for 2.0 h to form the light yellow In_2O_3 powders.

2. FE-SEM image of In_2O_3 nanoparticles

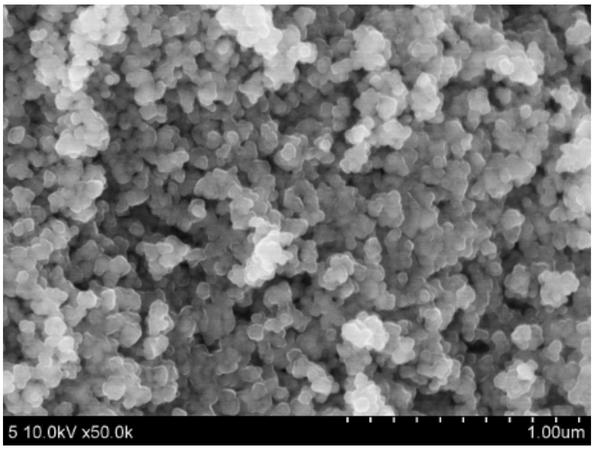

Fig. S1. FE-SEM image of In_2O_3 nanoparticles prepared by calcination of the solvothermal synthesized products.

3. TEM image of In_2O_3 nanoparticles

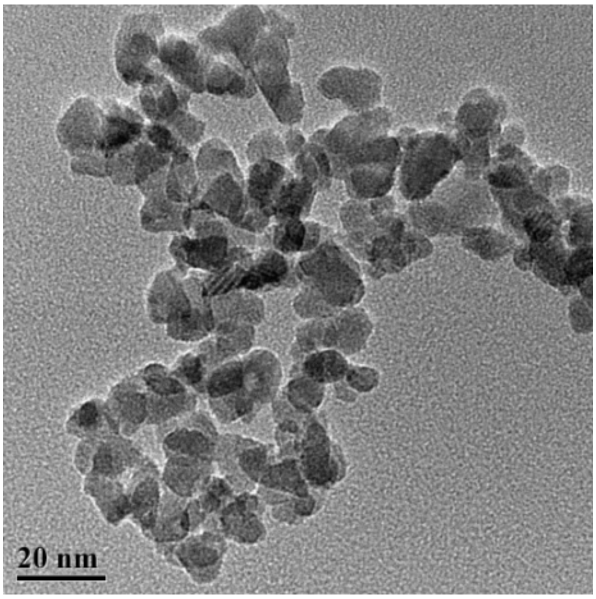

Fig. S2. TEM image of In_2O_3 nanoparticles prepared by calcination of the solvothermal synthesized products.

4. TEM images of In $In(OH)_3$ nanorod and In_2O_3 nanorod

We studied the transformation process of $In(OH)_3$ to In_2O_3 by decomposing $In(OH)_3$ *in situ* and *in vacuo* in the TEM following exposure to the electron beam.

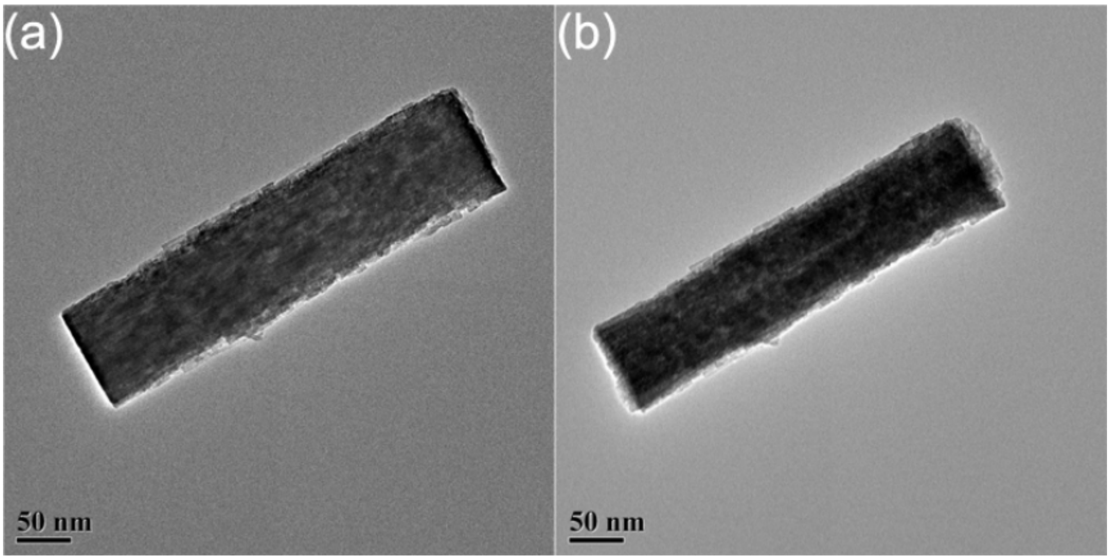

Fig. S3. (a) TEM image of $In(OH)_3$ and (b) TEM image of In_2O_3 transformed from $In(OH)_3$ in (a) *in situ* by the exposure to the electron beam.

5. The gas sensing properties of In_2O_3 nanorod flowers and In_2O_3 nanoparticles

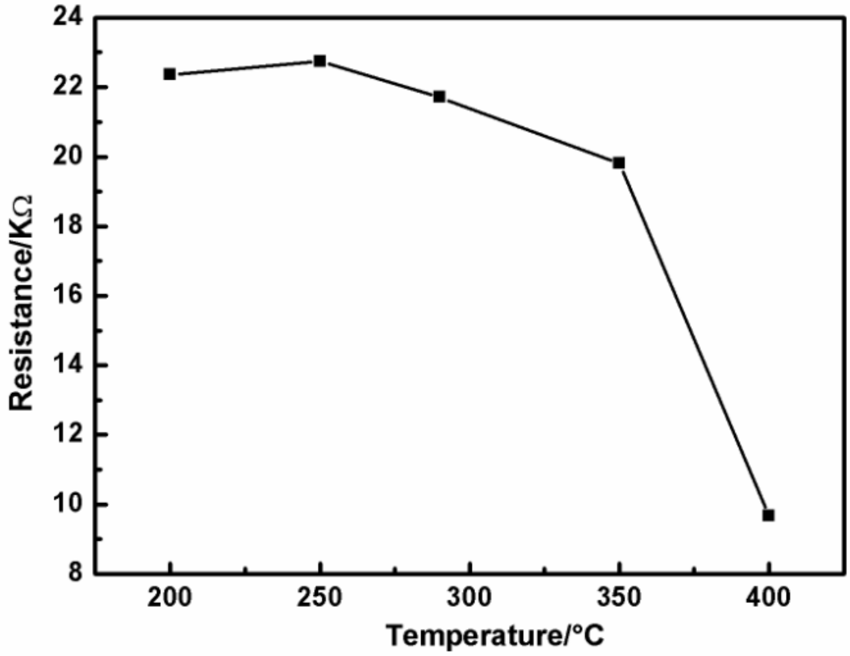

Fig. S4 The resistance-temperature curve of In_2O_3 nanorod flowers.

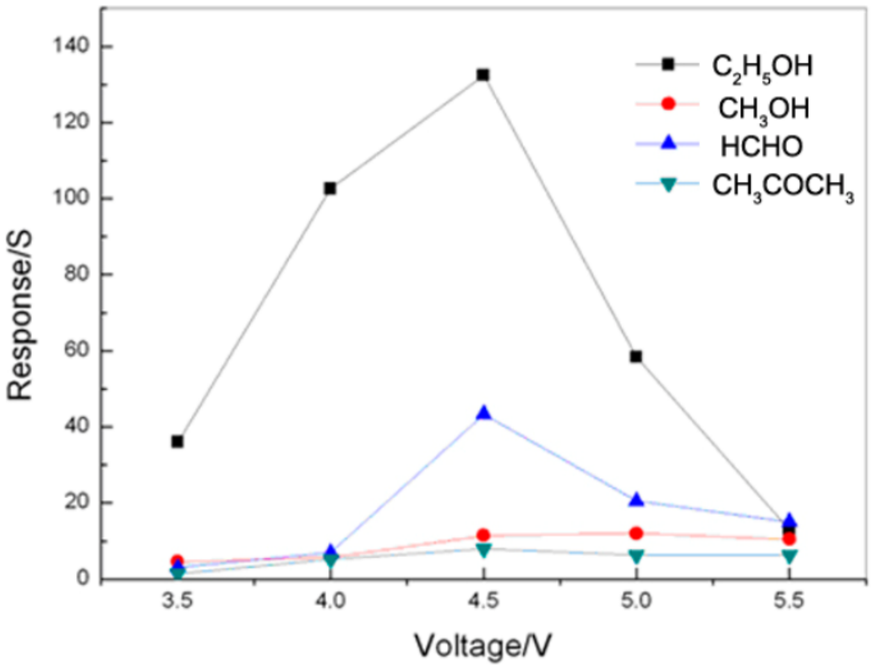

Fig. S5 The response of the gas sensor based on In_2O_3 nanorod flowers to the four gases under different voltages.

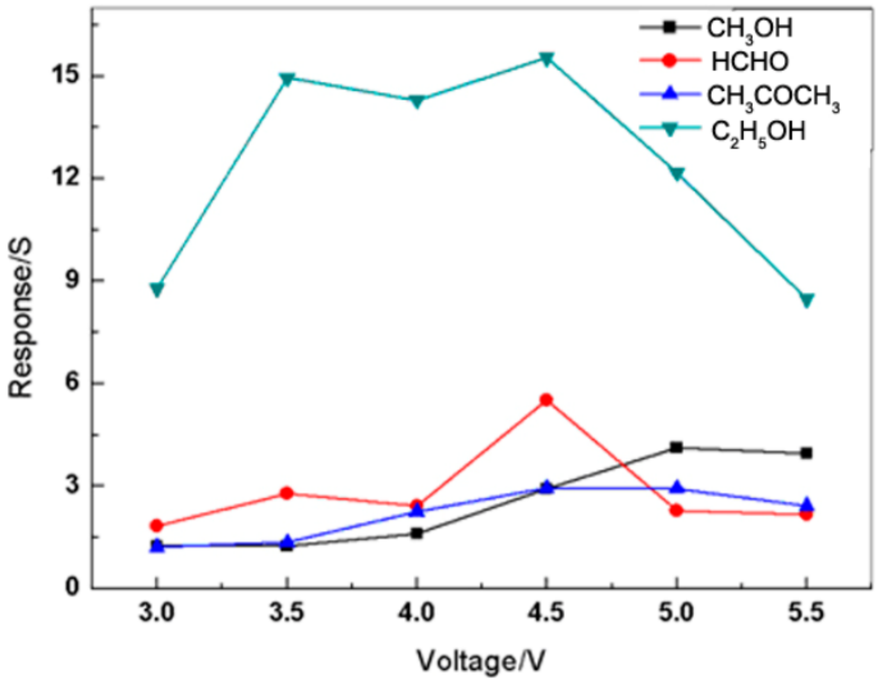

Fig. S6 The response of the gas sensor based on In_2O_3 nanoparticles to the four gases under different voltages.