

Supporting information for  
**Selective detection of NO<sub>2</sub> and C<sub>2</sub>H<sub>5</sub>OH using a Co<sub>3</sub>O<sub>4</sub>-decorated ZnO  
nanowire network sensor†**

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### **Experimental**

ZnO Nanowires were grown on the alumina substrates (size: 1.5mm×1.5mm) with two Au electrodes (on its top surface) by thermal evaporation using the mixture between ZnO powders (99.9%, Aldrich), graphite powders (<20 micron, Aldrich) and Sn powders (99.8%, Acros). The source (ZnO: graphite: Sn = 1 : 1 : 0.01 by weight%) was loaded in the Al<sub>2</sub>O<sub>3</sub> boat and was located in the center of quartz tube (diameter: 2.5 cm) and the alumina substrates placed 5 cm downstream from the source. After evacuating the quartz tube to ~ 9 x 10<sup>-2</sup> torr using a rotary pump, the furnace temperature was increased to 900°C. The ZnO nanowires were formed by a reaction between the source and Ar-O<sub>2</sub> mixture gas (Ar: 100 sccm, O<sub>2</sub>:1 sccm). The Co<sub>3</sub>O<sub>4</sub>-decorated ZnO nanowires were prepared by the following procedures. The as-grown ZnO nanowires on the patterned Al<sub>2</sub>O<sub>3</sub> substrates and CoCl<sub>2</sub> powders (99.9%, Aldrich) were placed in the left and right part of Al<sub>2</sub>O<sub>3</sub> boat (length 4 cm), respectively. After evacuating the quartz tube to ~ 9 x 10<sup>-2</sup> torr using a rotary pump, the furnace temperature was increased to 500°C. The lenticular configuration of nano-scale Co<sub>3</sub>O<sub>4</sub> islands could be coated on the surface of ZnO nanowires by the reaction between the source and Ar-O<sub>2</sub> mixture gas (Ar: 200 sccm, O<sub>2</sub>: 2 sccm).

For the X-ray analysis, ZnO and Co<sub>3</sub>O<sub>4</sub>-decorated ZnO nanowires were grown on the large area of Si substrates by the same thermal evaporation procedure.

### **Characterization:**

The structural properties were investigated by X-ray diffraction (XRD, Rigaku D/MAX-2500 V/PC), scanning electron microscopy (SEM, Hitachi S-4700), field-emission transmission electron microscopy (FE TEM, FEI TECNAI G2 200 kV) and Energy dispersive X-ray spectroscopy (EDX).

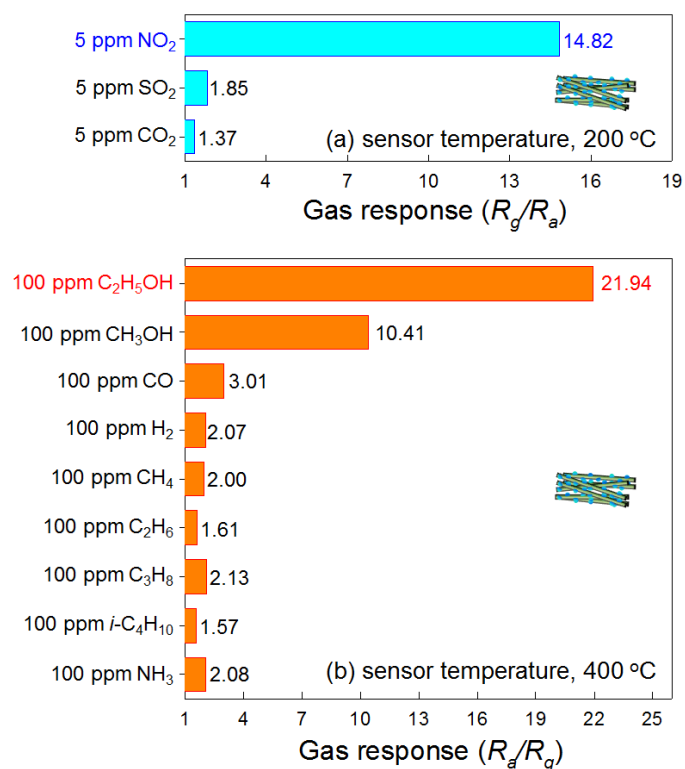


Fig. S1 Gas responses of the Co<sub>3</sub>O<sub>4</sub>-decorated ZnO nanowire sensor: (a) gas responses ( $R_g/R_a$ ) to 5 ppm NO<sub>2</sub>, SO<sub>2</sub>, and CO<sub>2</sub> at 200°C; (b) gas responses ( $R_a/R_g$ ) to 100 ppm C<sub>2</sub>H<sub>5</sub>OH, CH<sub>3</sub>OH, CO, H<sub>2</sub>, CH<sub>4</sub>, C<sub>2</sub>H<sub>6</sub>, C<sub>3</sub>H<sub>8</sub>, *i*-C<sub>4</sub>H<sub>10</sub>, and NH<sub>3</sub> at 400°C.