Electronic Supplementary Information (ESI)

Cross-linked P-type Co_3O_4 octahedron in 1 D N-type TiO_2 nanofibers for high-performance electrochemical devices

Lili Wang, Jianan Deng, Zheng Lou, Tong Zhang*

State Key Laboratory on Integrated Optoelectronics, College of Electronic Science and Engineering, Jilin University, Changchun, 130012, China.

Fax: +86 431 85168270; Tel: +86 431 85168385;

E-mail: zhangtong@jlu.edu.cn

***Fabrication of gas sensor*:** The fabrication of the sensors started with the synthesis of product on ceramic tube-electrode using a spin-coating method, which has been reported by us and other groups.[1-3] The sensing paste consists of two components (our as-prepared samples and deionized water) at a weight ratio of 4:1. The sensing pastes were coated on the surface of ceramic tube with the diameter of 1.2 mm, which has

two gold electrodes. Then, the gas sensor was achieved after aging at 100 mA relative current with a voltage of 5 V, for 24 h to the perfection of durability and stability.

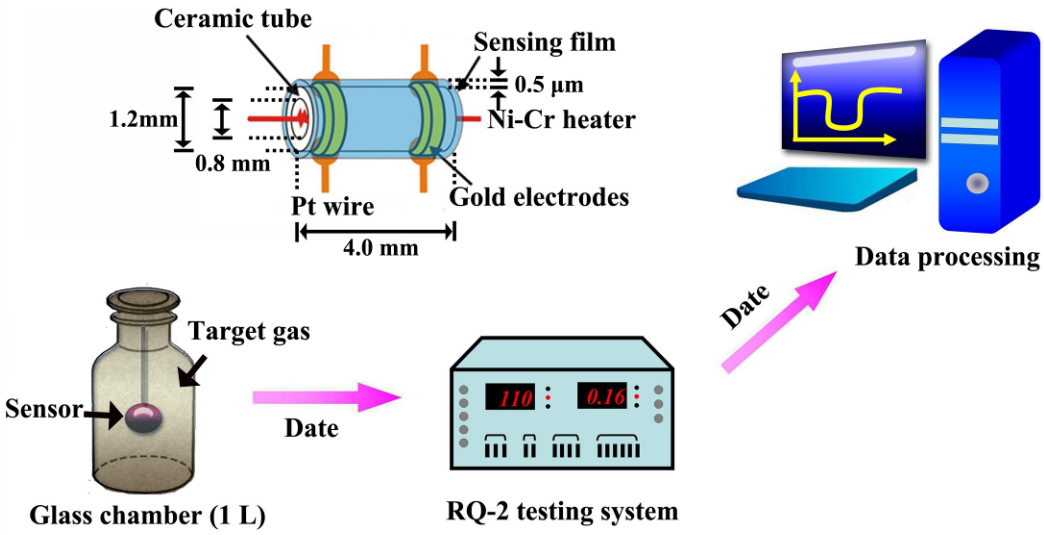

Figure S1. A schematic illustration of sensing testing process.

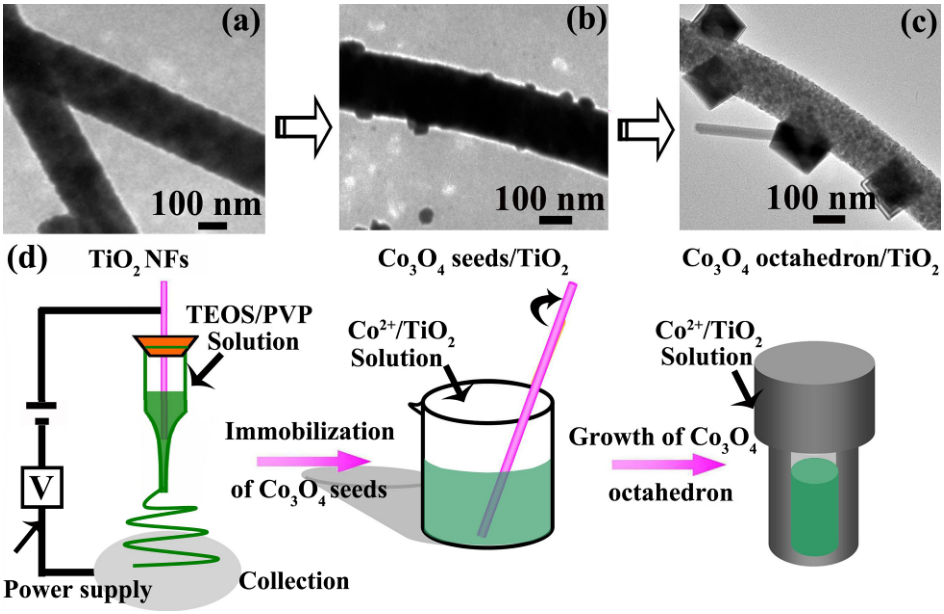

Figure S2. TEM images of the products obtained after each step: (a) TiO_2 NFs; (b) Co_3O_4 nanoparticles/TiO_2 NFs heterostructure; (c, g) Co_3O_4 octahedron/TiO_2 NFs heterostructure; (d) synthesis strategy to the Co_3O_4/TiO_2 NFs heterostructure.

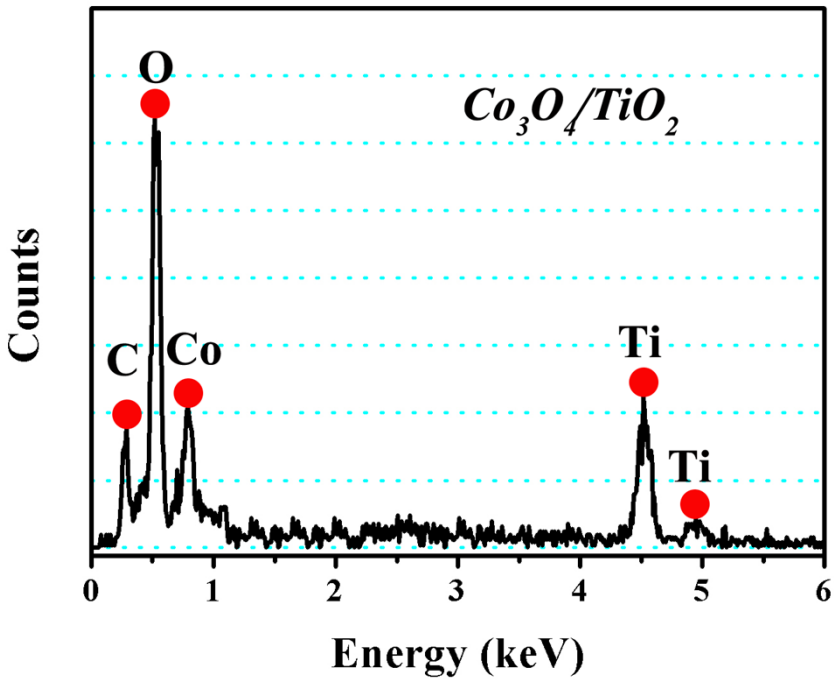

Figure S3. EDX patter of Co_3O_4/TiO_2 NFs heterostructure.

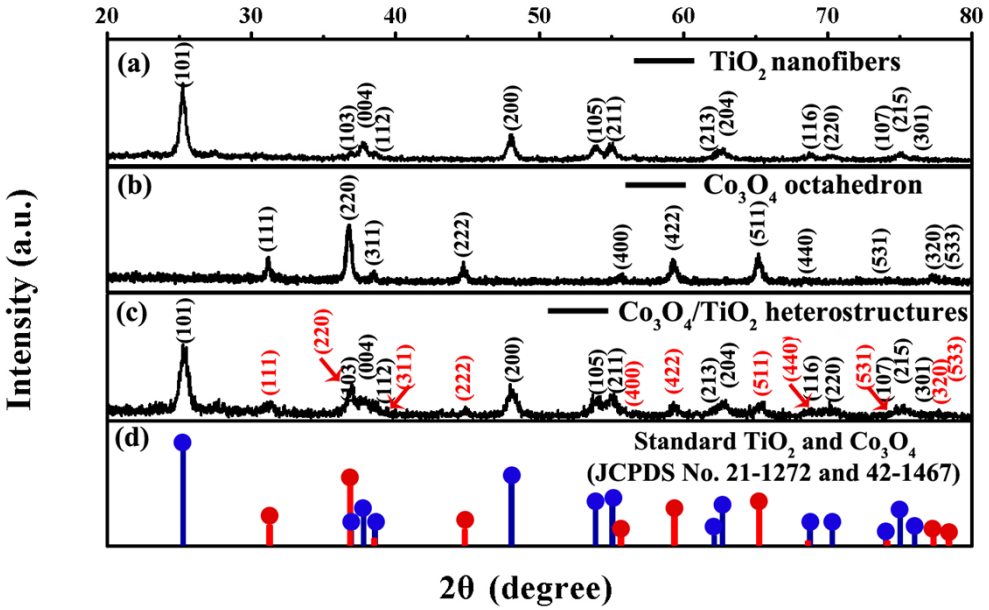

Figure S4. XRD patterns of (a) TiO_2 NFs; (b) Co_3O_4 octahedron; (c) Co_3O_4/TiO_2 NFs heterostructure; (d) standard card TiO_2 (JCPDS No. 21–1272) and Co_3O_4 (JCPDS No. 42–1467).

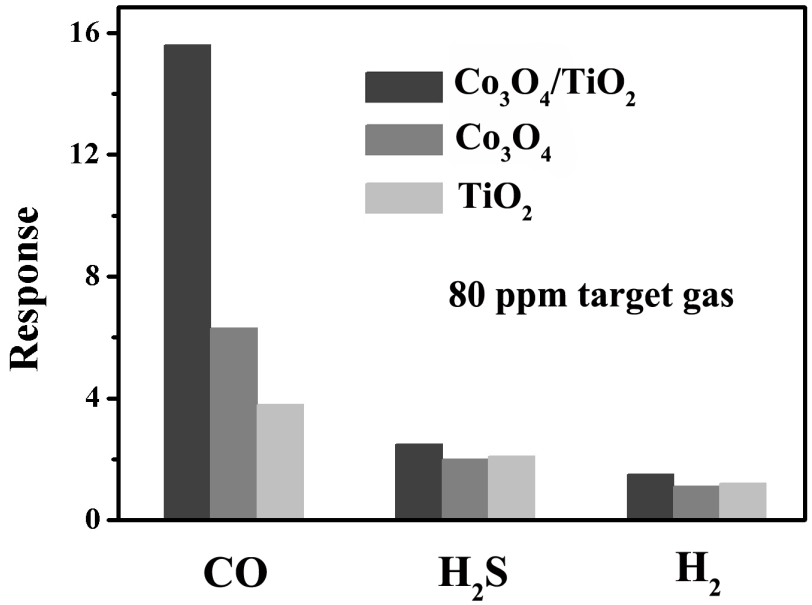

Figure S5. Selectivity of three sensors towards various harmful gases (80 ppm).

References:

1. L. L. Wang, H. M. Dou, Z. Lou and T. Zhang, *Nanoscale*, 2013, **5**, 2686.

2. F. Q. Sun, W. P. Cai, Y. Li, L. C. Jia and F. Lu, *Adv. Mater.*, 2005, **17**, 2872.

3. L. L. Wang, Z. Lou, T. Fei and T. Zhang, *J. Mater. Chem.*, 2012, **22**, 4767.