Electronic Supplementary Information (ESI) for

Facile synthesis of size-controlled Fe_2O_3 nanoparticle-decorated carbon nanotubes for highly sensitive H_2S detection

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1. Raman spectra of nanocomposites

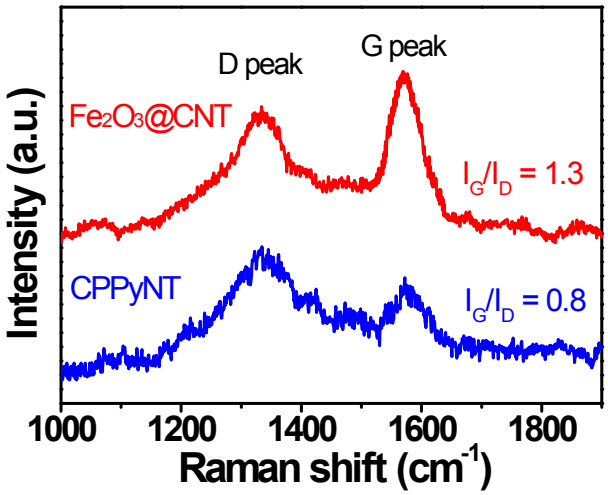

Figure S1. Raman spectra for the CPPyNT (blue) and the Fe_2O_3@CNT (red).

2. Sensing ability of nanocomposites

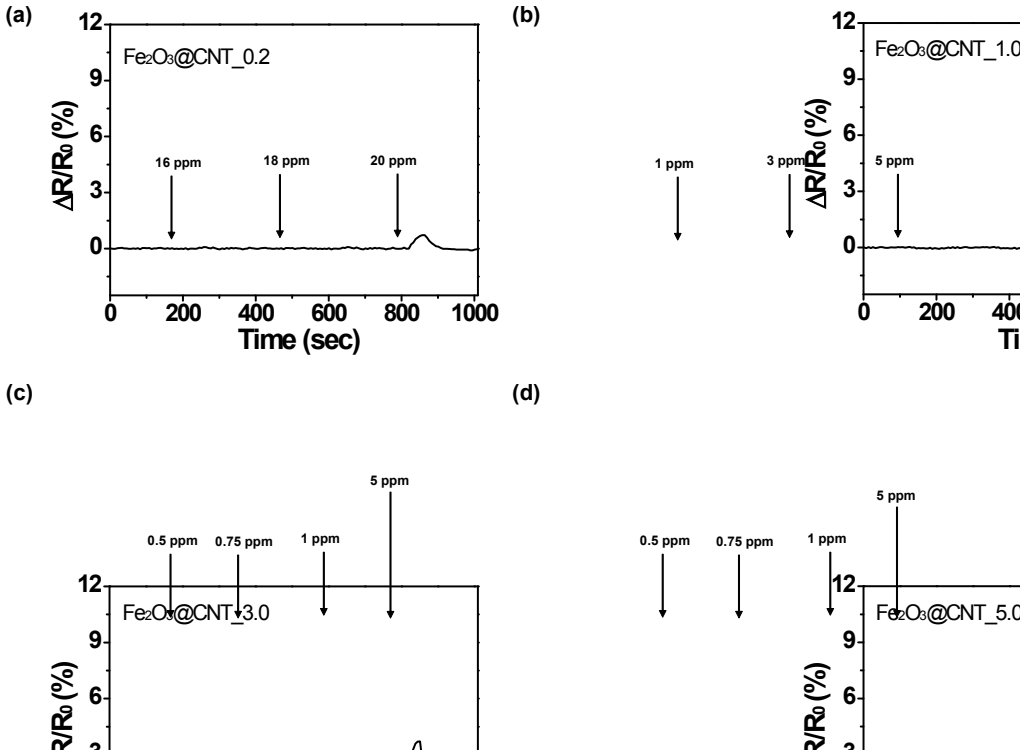

Figure S2. Normalized resistance changes upon sequential exposure to various concentrations of H_2S: (a) Fe_2O_3@CNT_0.2; (b) Fe_2O_3@CNT_1.0; (c) Fe_2O_3@CNT_3.0; (d) Fe_2O_3@CNT_5.0.

3. Comparison H_2S sensing performance of different chemical sensors

Table S1. Summary of representative sensor for H_2S detection.

Sensing material	Sensing signal	Working temperature	Limit of detection	Reference
$CuFe_2O_4$ nanoparticle	Current	200ºC	25 ppm	[S1]
α-Fe_2O_3 nanochain	Resistance	285ºC	1 ppm	[S2]
α-Fe_2O_3 nanotube	Chemiluminescence	134ºC	22 ppm	[S3]
Fe_2O_3/graphene	Chemiluminescence	190ºC	15 ppm	[S4]
Ag/α-Fe_2O_3 nanoparticle	Resistance	160ºC	50 ppm	[S5]
Fe_2O_3@CNT_3	Resistance	25ºC	1 ppm	This work

[S1] *Appl. Phys. A* 2017, **123**, 682-690.

[S2] *Nanoscale* 2013, **5**, 895-898.

[S3] *Adv. Mater.* 2005, **17**, 2993-2997.

[S4] *J. Mater. Chem. A* 2014, **2**, 6714-6714.

[S5] *Sens. Actuator B-Chem.* 2008, **131**, 183-189.

4. Stability test to H_2S gas

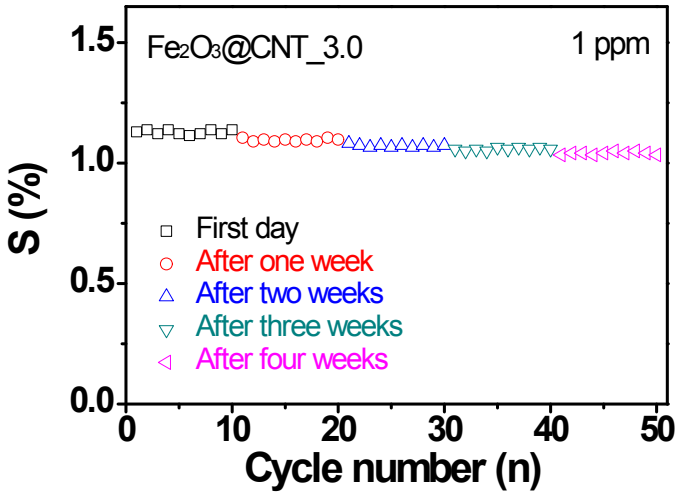

Figure S3. Cycle stability of the Fe_2O_3@CNT_3.0 to H_2S gas.