Supplementary Information (SI) for Inorganic Chemistry Frontiers.
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Supporting Information

Rapid room-temperature H_2S detection based on Bi_2S_3/CuO heterostructures: the synergy of increased surface-adsorbed oxygen and heterojunction effect

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Experimental section

Materials

Anhydrous ethanol (CH_3COOH), Anhydrous bismuth nitrate ($Bi(NO_3)_3·5H_2O$) and Copper acetate ($Cu(CH_3COO)_2$) was purchased from China National Pharmaceutical Group Chemical Reagent Co., Ltd. sodium sulfide nonahydrate ($Na_2S·9H_2O$, purity≥99.0%) was purchased from Shanghai Aladdin Biochemical Technology Co., Ltd. Ethylene glycol was purchased from Tianjin Fuyu Fine Chemical Co., Ltd. All precursors were of analytical grade and used without further purification.

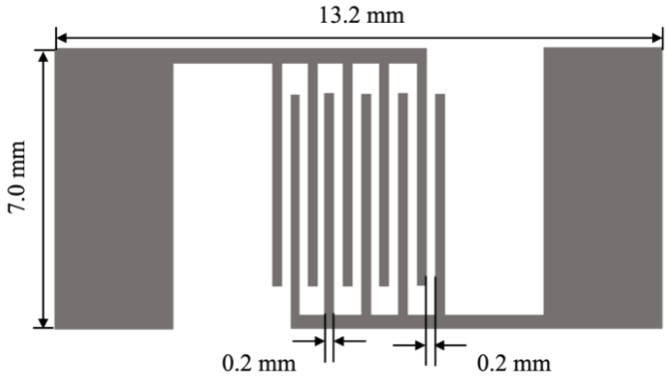

Fig. S1 Schematic diagram of the Ag-Pd interdigital electrode.

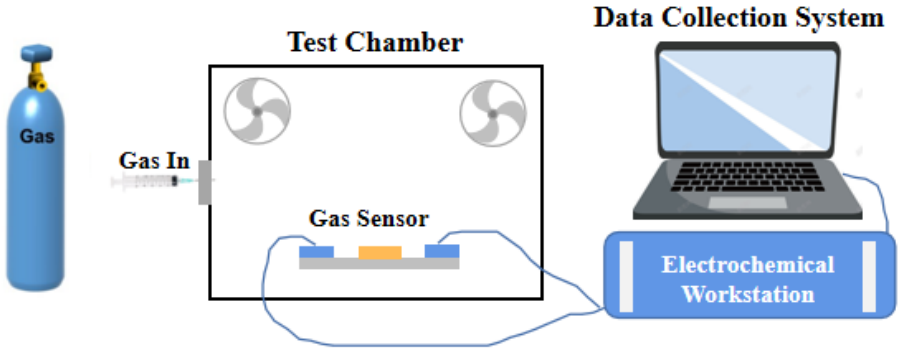

Fig. S2 Schematic diagram of the sensor measurement.

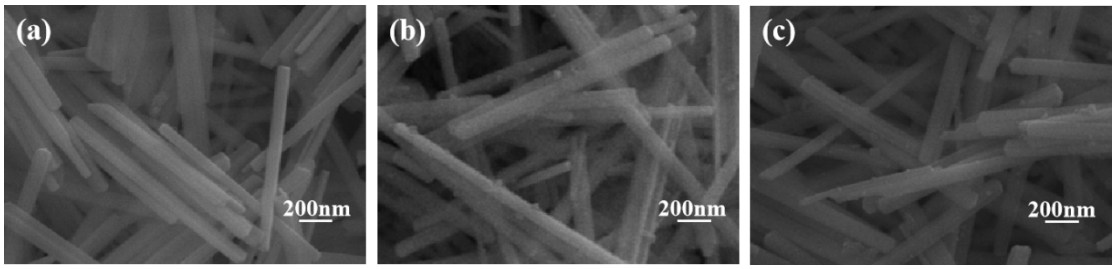

Fig. S3 SEM images of (a) pristine Bi_2S_3 nanorods, (b) Bi_2S_3/CuO-1 heterostructures, and (c) Bi_2S_3/CuO-3 heterostructures.

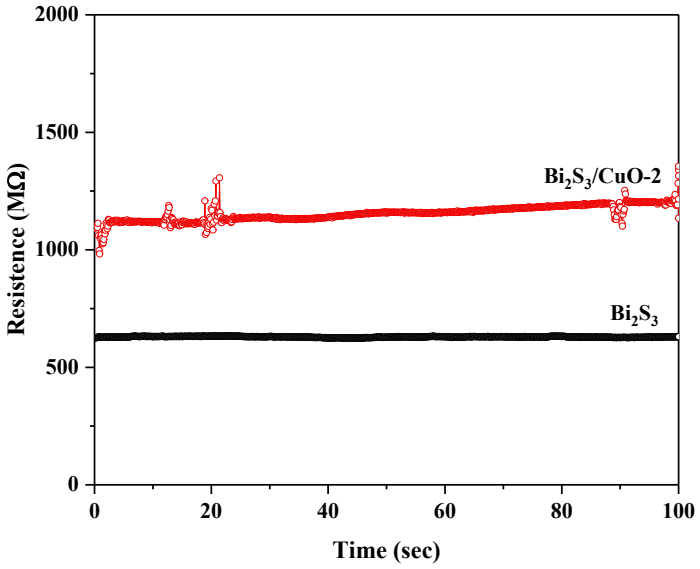

Fig. S4 The baseline curves of devices based on Bi_2S_3/CuO-2, Bi_2S_3

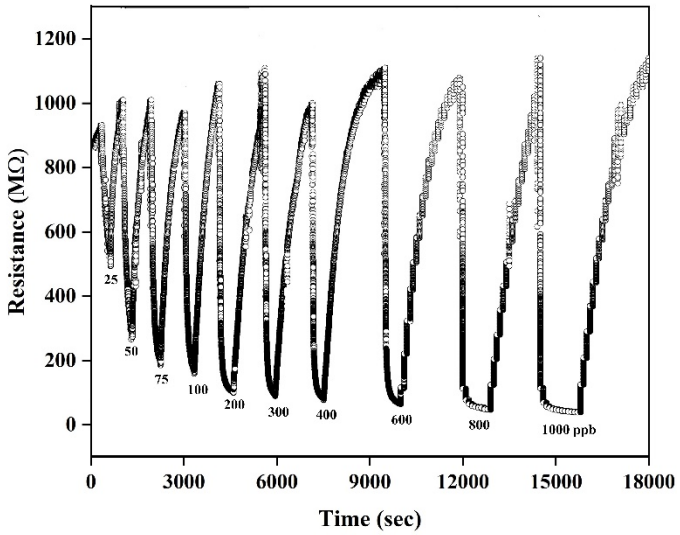

Fig. S5 Dynamic resistance curve of the Bi_2S_3/CuO-2 sensor to 25-1000 ppb H_2S

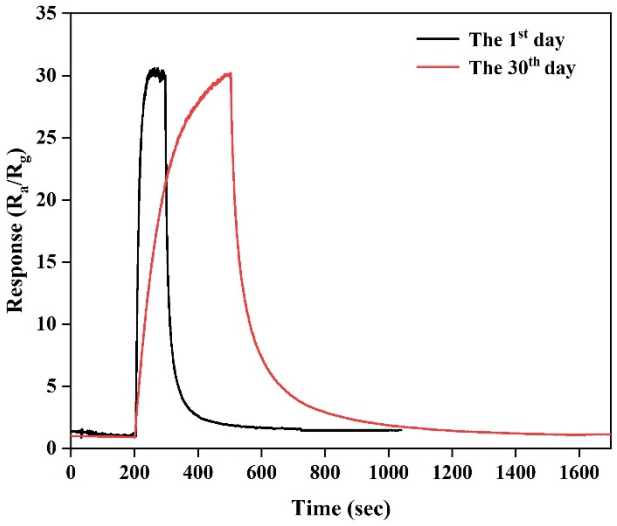

Fig. S6 Comparison of response curves to 1 ppm H_2S on 1st and 30th day.

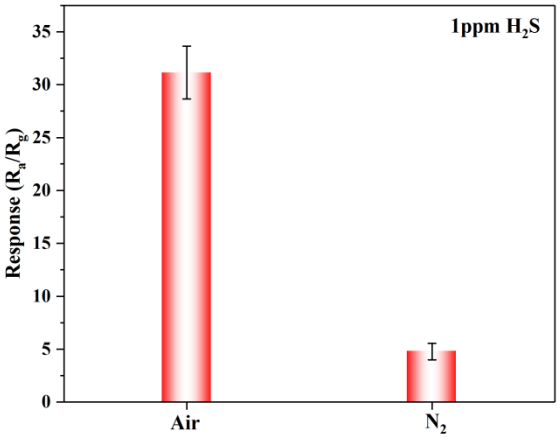

Fig. S7 The sensing response of Bi_2S_3/CuO-2 to 1 ppm H_2S in different test condition: Air and N_2 as the background gases

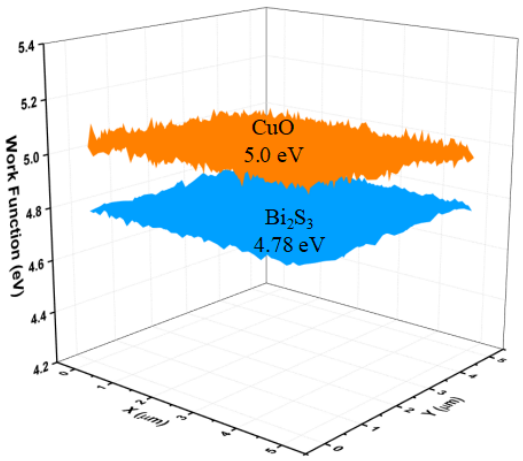

Fig. S8 Work functions of Bi_2S_3 and CuO measured by KPFM

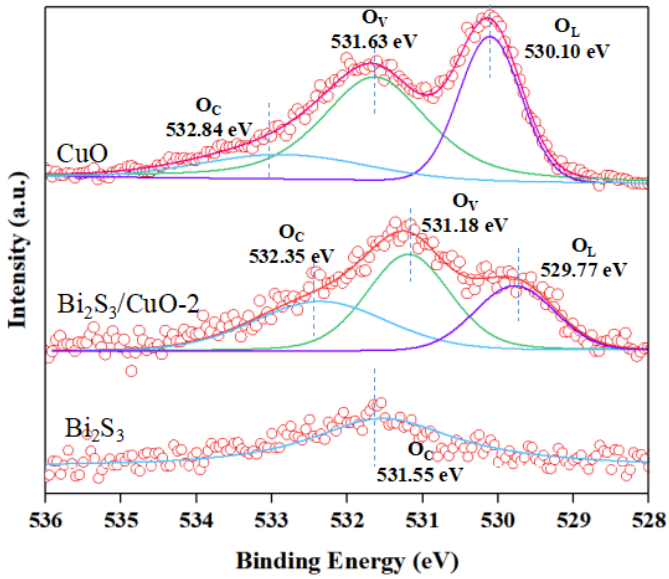

Fig. S9 O1s high-resolution XPS spectra of Bi_2S_3/CuO-2, Bi_2S_3 and CuO

Table S1 Comparison of response and recovery time of Bi_2S_3/CuO-2 sensor to 1 ppm H_2S on 1st and 30th day.

	1th	**30th**
Response time (s)	7.5	57.2
Recovery time (s)	620.6	626.3

Table. S2 The proportion of various types of oxygen in Bi_2S_3/CuO-2, CuO, Bi_2S_3

Sample	O_C	O_V	O_L
CuO	15.01%	54.41%	33.58%
Bi_2S_3/CuO-2	33.06%	42.32%	24.62%
Bi_2S_3	100%	—	—