Electronic Supplementary Information

Au decoration of graphene microchannel for self-activated chemoresistive flexible gas sensors with substantially enhanced response to hydrogen

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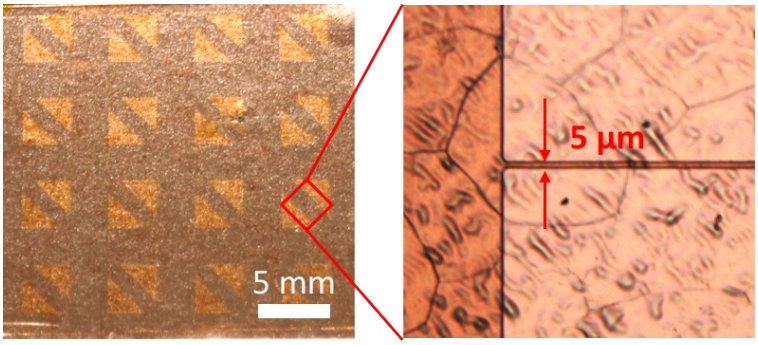

Figure S1. Micro patterning of 3LG grown on a Cu foil.

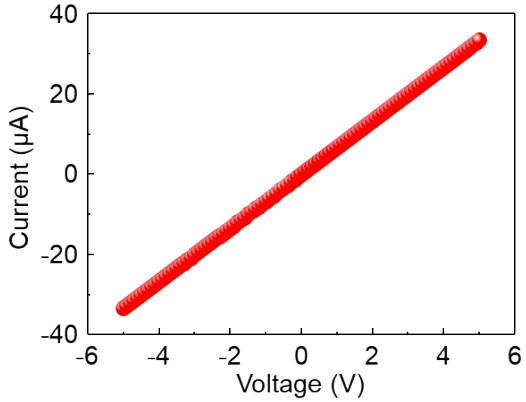

Figure S2. I-V characteristic of Au decorated graphene sensor

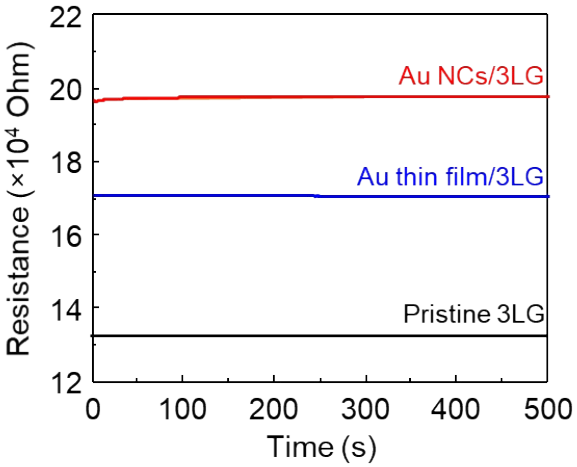

Figure S3. Resistance of pristine 3LG, Au thin film/3LG (before formation of Au NCs), and Au NCs/3LG.

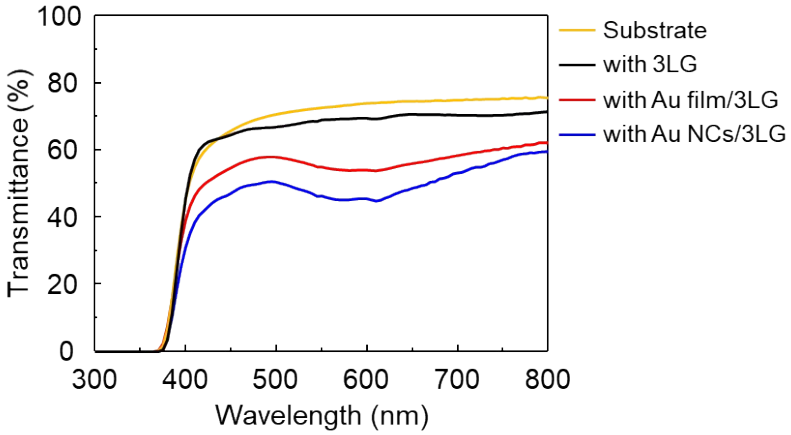

Figure S4. UV−vis transmittance spectra of the PI substrate, the substrate with 3LG, Au film/3LG (before formation of Au NCs), and Au NCs/3LG.

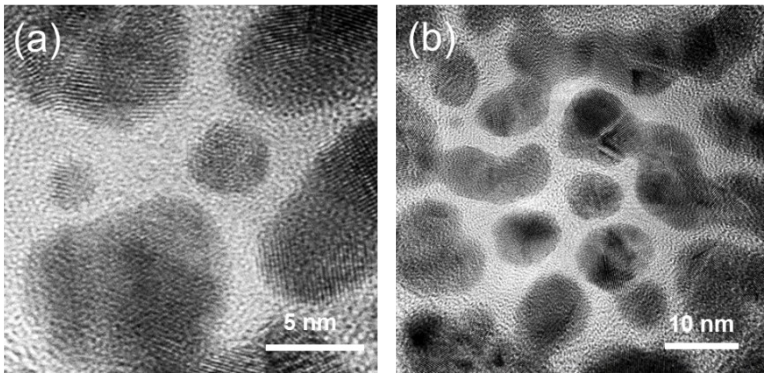

Figure S5. TEM images of Au decorated 3LG at different magnifications.

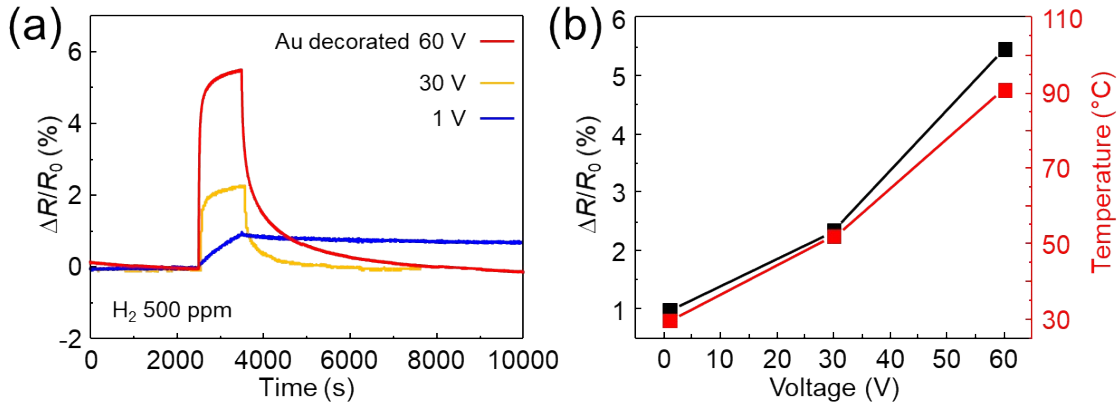

Figure S6. (a) H_2 gas sensing curves at different voltages. (b) Relationship between gas responses and temperatures according to the applied bias voltages.

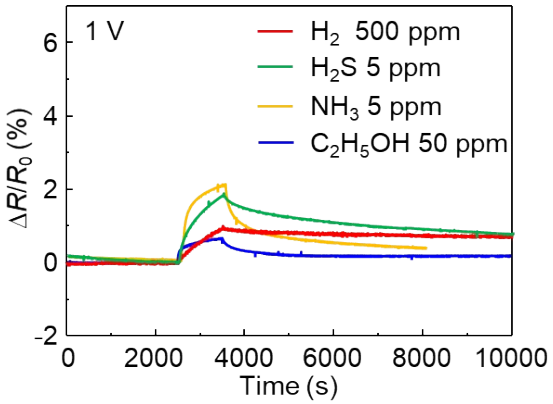

Figure S7. Sensing curves of the Au decorated graphene sensor at 1 V

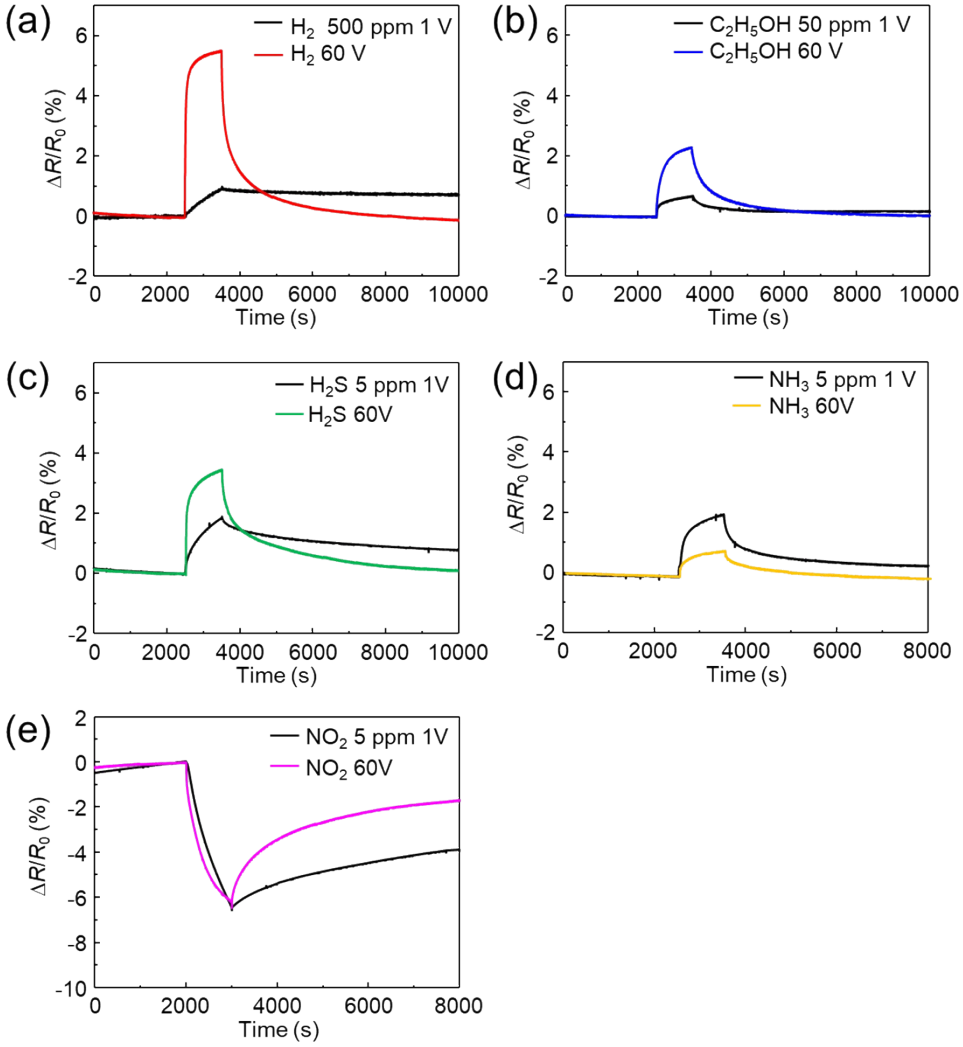

Figure S8. Comparison of the sensing properties of Au decorated graphene sensor at bias voltage of 1 and 60 V to H_2, C_2H_5OH, H_2S, NH_3, and NO_2 gas.

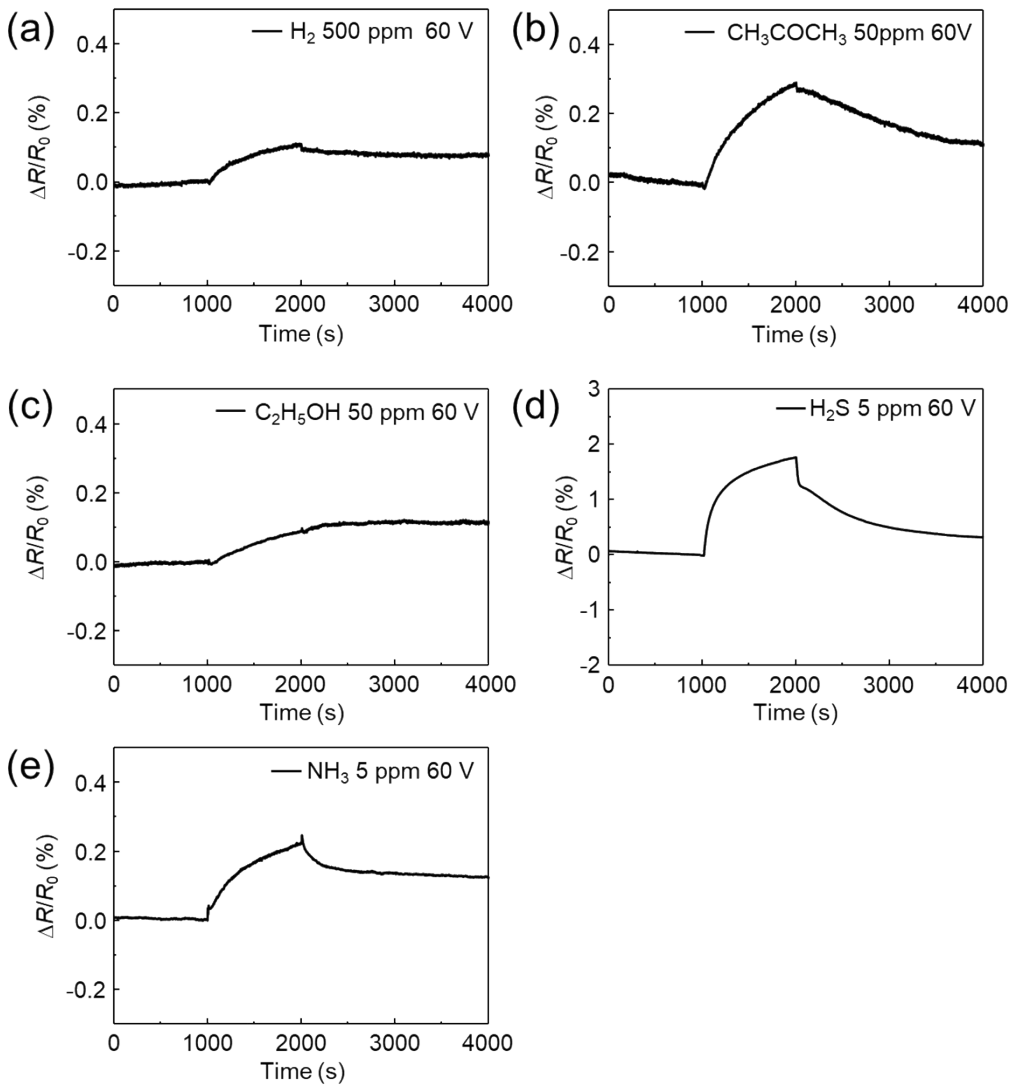

Figure S9. Response curves of pristine graphene sensor upon exposure to different gases.

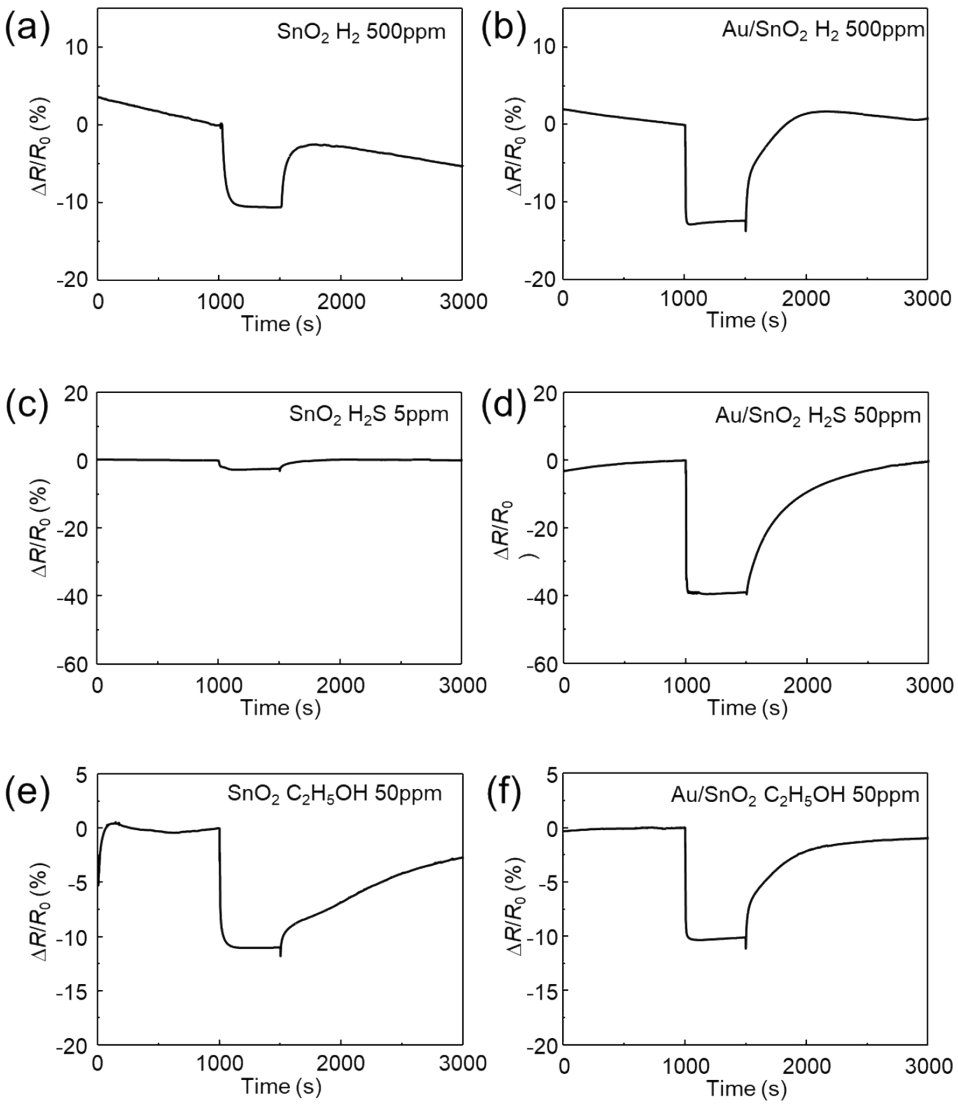

Figure S10. Response curves of SnO_2 thin film sensor and the sensor with Au decoration upon exposure to H_2, H_2S, and C_2H_5OH.

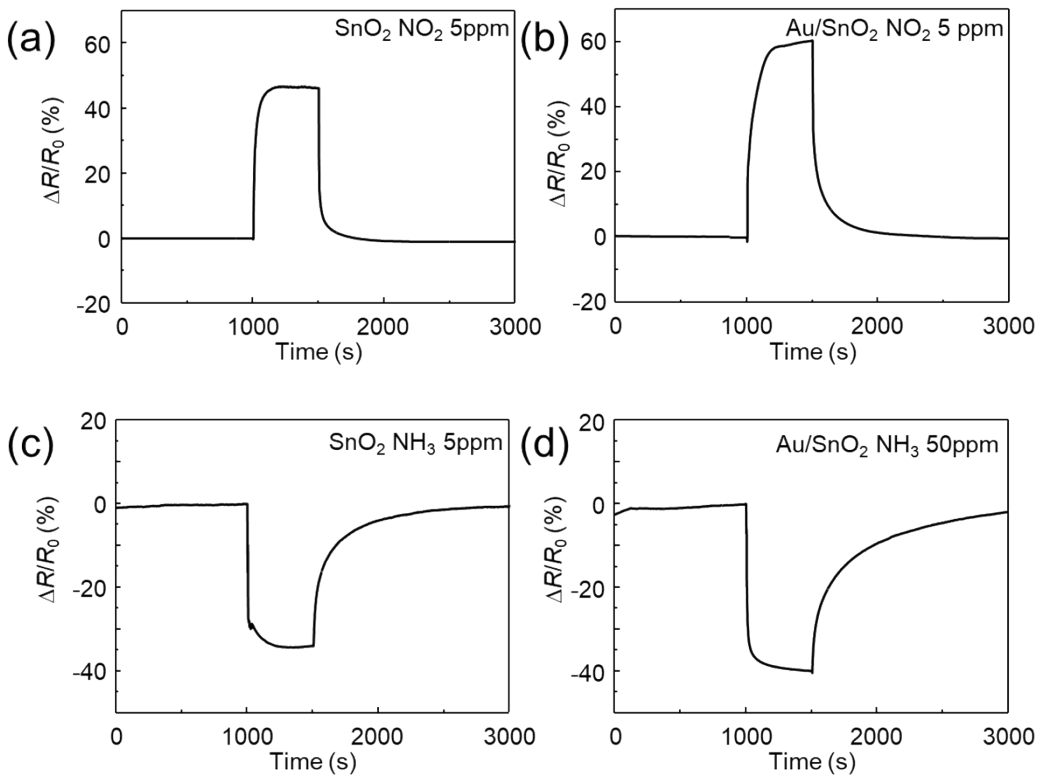

Figure S11. Response curves of SnO_2 thin film sensor and the sensor with Au decoration upon exposure to NO_2, and NH_3

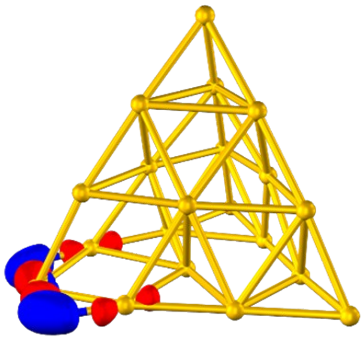

Figure S12. Variation of charge density after 2H adsorption; blue and red colors show the regions where charge density is increased and decreased the adsorption.

Sensing materials	Temp. (°C)	H_2 concentration (ppm)	Ambient	Gas response	Response time (s)	Recovery time (s)	Flexibility & transparency	Ref.
Au/graphene	27	500	Air	~6 %	16	274	Flexible and transparent	This work
Pt/CNT	27	40000	Air	~16 %	~540	~5000	Non	20
Pt/rGO	27	1000	N_2	~100 %	~600	~700	Non	23
Pt-Pd composites	22	20000	Ar	~4.1%	~1	~10	Non	28
Pd/graphene	27	500	Air	~4 %	~250	~250	Non	50
Pd/GNR	27	500	N_2	~2.5 %	~30	~90	Non	51
Pd/graphene	27	250	Air	~3.5 %	~100	~330	Non	52

Table S1. Comparison with hydrogen gas sensing properties of noble metal decorated graphene-based sensors in previous literatures.[20, 23, 28, 53-56]