Electronic Supplementary Information (ESI)

Partial sulfidation for constructing Cu_2O-CuS heterostructures realizing enhanced electrochemical glucose sensing

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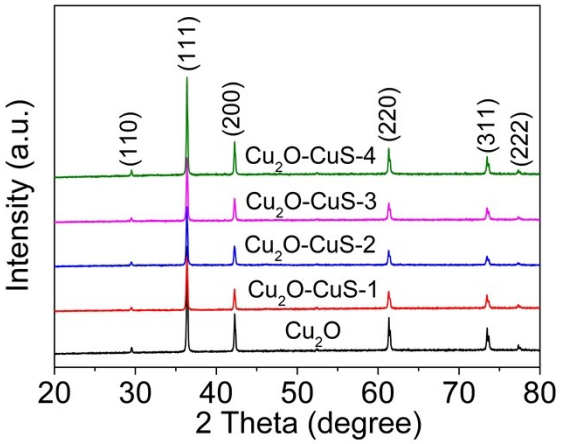

Fig. S1 XRD patterns of Cu_2O cubes and different Cu_2O-CuS hybrid structures.

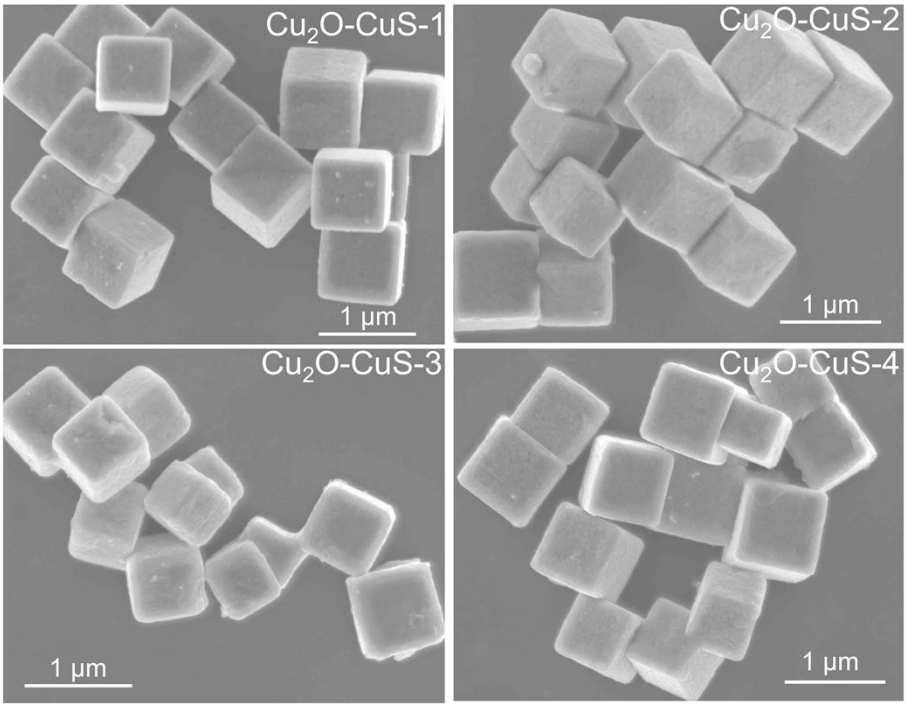

Fig. S2 SEM images of different Cu_2O-CuS hybrid structures.

Cu_2O-CuS-1, Cu_2O-CuS-2, Cu_2O-CuS-3, and Cu_2O-CuS-4 were prepared with 20 mg, 30 mg, 40 mg, and 50 mg thioacetamide (TAA), respectively.

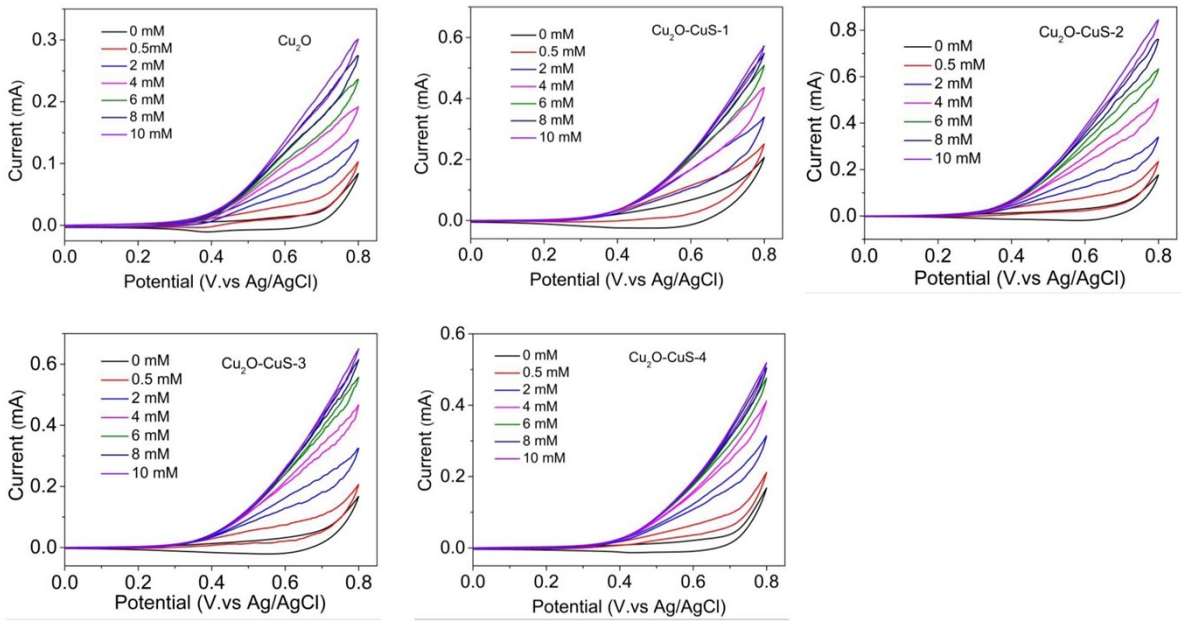

Fig. S3 CV curves of pure Cu_2O cubes and various Cu_2O-CuS hybrid structures measured in 0.1 M NaOH solution with different concentrations of glucose at a scan rate of 50 mV s^{-1}.

Table S1 Comparison of the electrochemical performance for glucose sensing between the Cu_2O-CuS-2 hybrid electrode and other transition-metal-based electrodes recently reported.

Electrode	Linear range (mM)	Detection limit (μM)	Sensitivity ($\mu A \cdot mM^{-1} \cdot cm^{-2}$)	Reference
Cu_2O-CuS-2	0.01−1	0.46	1876	This work
Cu_2O/Cu	0.05−6.75	37	62.29	Int. J. Electrochem. Sci. 2012, 7, 12587−12600.
Cu_2O MSs/S-MWCNTs	0.005−7	1.46	581.89	ACS Appl. Nano Mater. 2020, 3, 4788−4798.
Cu_2O/ graphene	0.3−3.3	3.3	285	Biosens. Bioelectron. 2013, 45, 206−212.
spiky Cu/CuO NW array	0.01−7	10	1210	ACS Omega 2019, 4, 12222−12229.
rGO-Pt NW	0.032−1.89	4.6	56.11	Int. J. Electrochem. Sci. 2018, 13, 4817−4826.
Co_3N NW/TM	0.0001−2.5	0.05	3325.6	Sens. Actuators, B 2018, 255, 1254−1261.
$W_{18}O_{49}$	0.06−1.6	0.02	167	ACS Biomater. Sci. Eng. 2020, 6, 1909−1919.
NiO/TiO_2	0.005−12.1	1.0	252.0	Sci. Total Environ. 2015, 502,70−79.

Table S2 DFT data for the formation energies of electroactive Cu(III) species.

Species	Energy (eV)	Formation energy (eV)
Cu_2O	-61431.0703	5.824285
Cu_2O-OH	-61456.2941	
CuS-Cu_2O	-77222.8434	3.066185
CuS-Cu_2O-OH	-77250.8253	
OH^*	-31.048085	--

Table S3 DFT data for the adsorption energies of glucose on the surface of catalysts.

Species	Energy (eV)	Adsorption energy (eV)
Cu_2O	-581493.4961	-4.6189
Cu_2O-$C_6H_{12}O_6$	-601175.6299	
CuS-Cu_2O	-582448.3601	-7.9101
CuS-Cu_2O-$C_6H_{12}O_6$	-602133.7851	
$C_6H_{12}O_6$	-19677.5149	--