Supplementary Information (SI) for Analytical Methods.

An electrochemical sensor based on electrodeposited methylene blue on carbon nanotube decorated hydrogel for the detection of ascorbic acid

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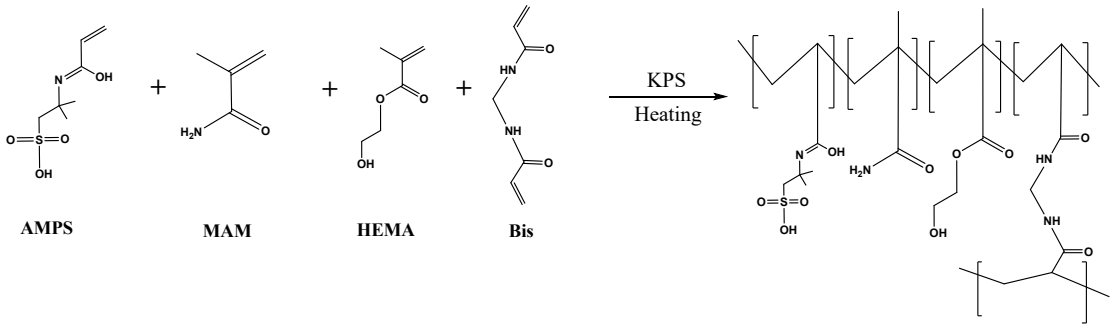
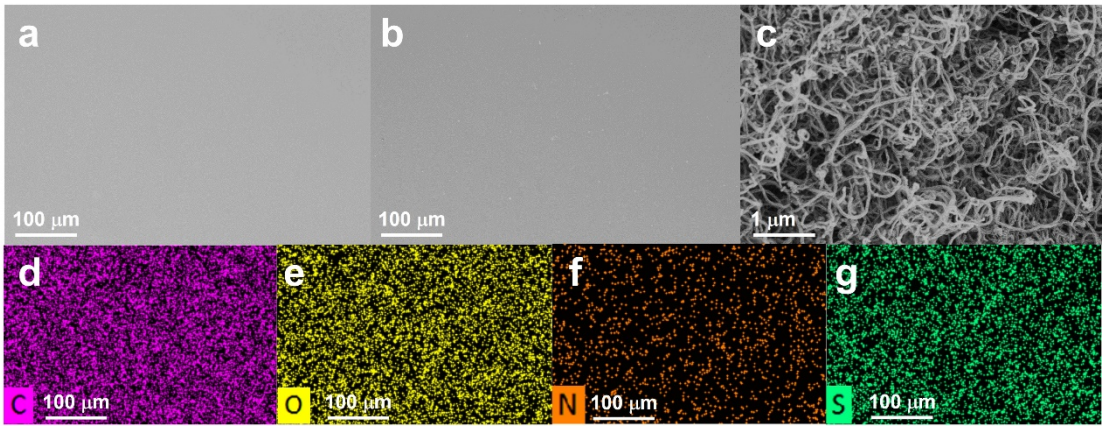


Fig. S1 Polymerization procedure of the hydrogels.



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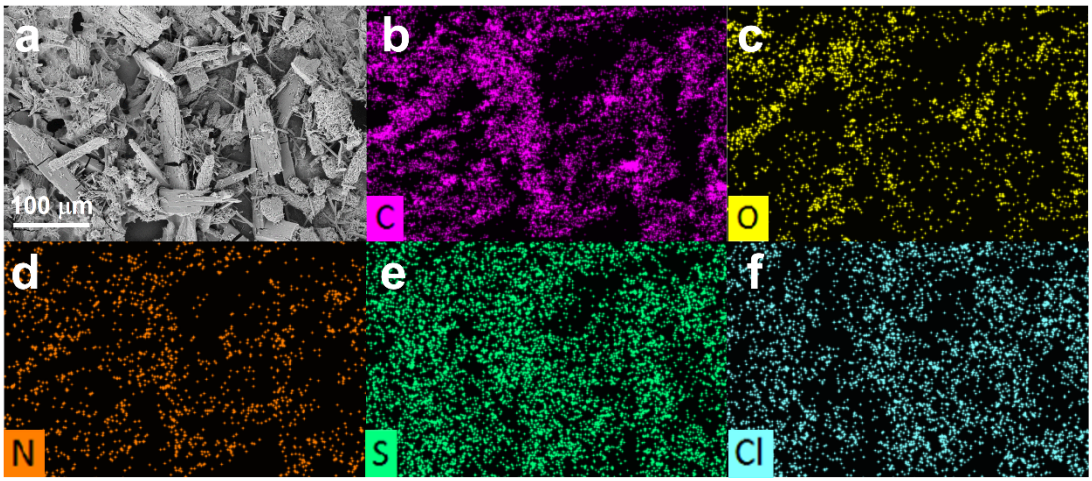

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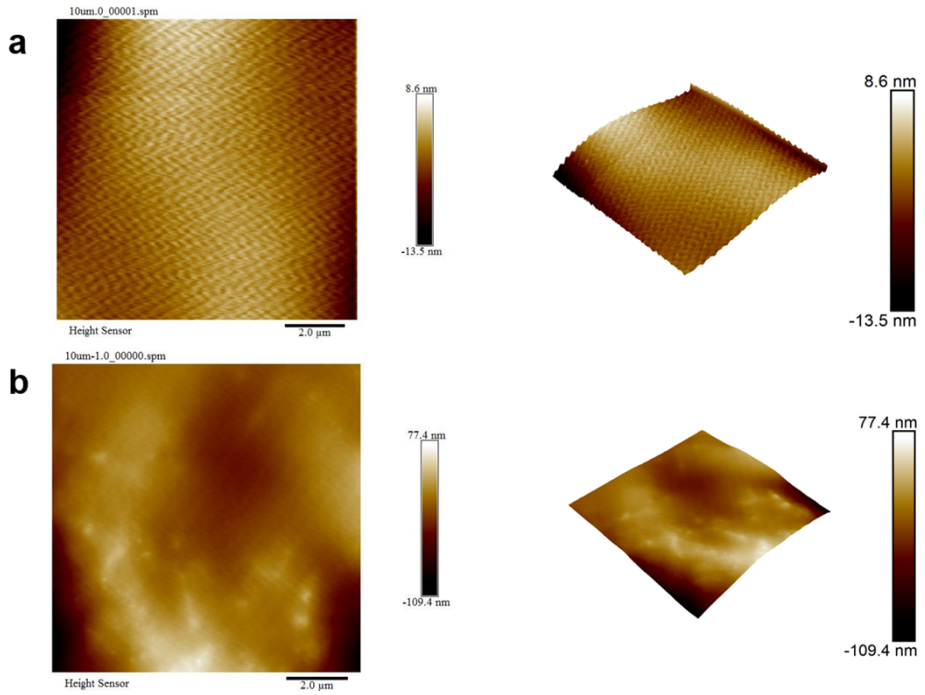

Fig. S4. AFM images of modified electrodes with 2D and 3D topographies: (a) CNT/HG/GCE; (b) MB/CNT/HG/GCE.

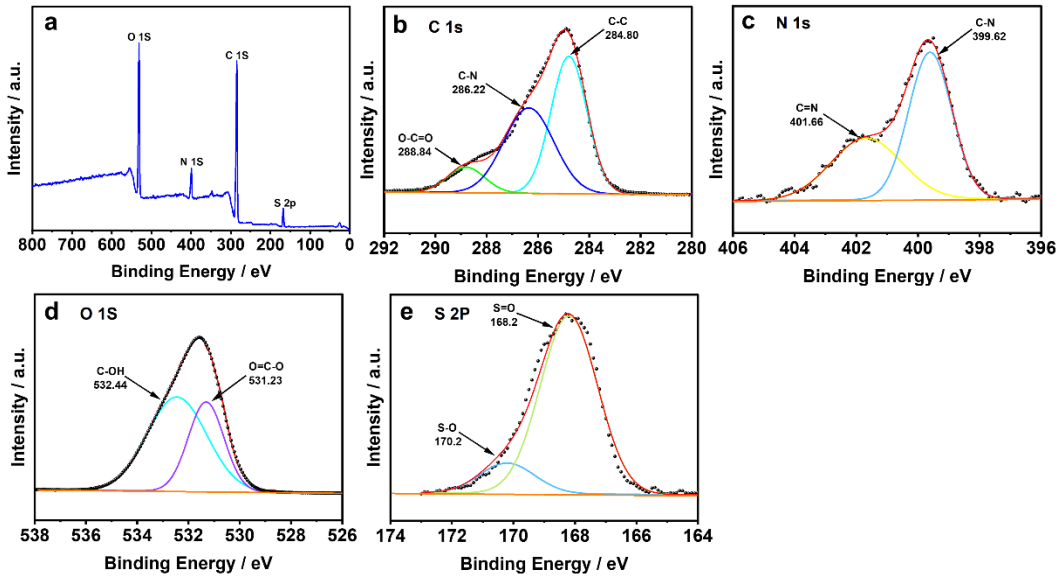

Fig. S5. (A) XPS spectra of the CNT/HG; (B) C 1s spectrum; (C) N 1s spectrum; (D) O 1s spectrum; (E) S 2p spectrum.

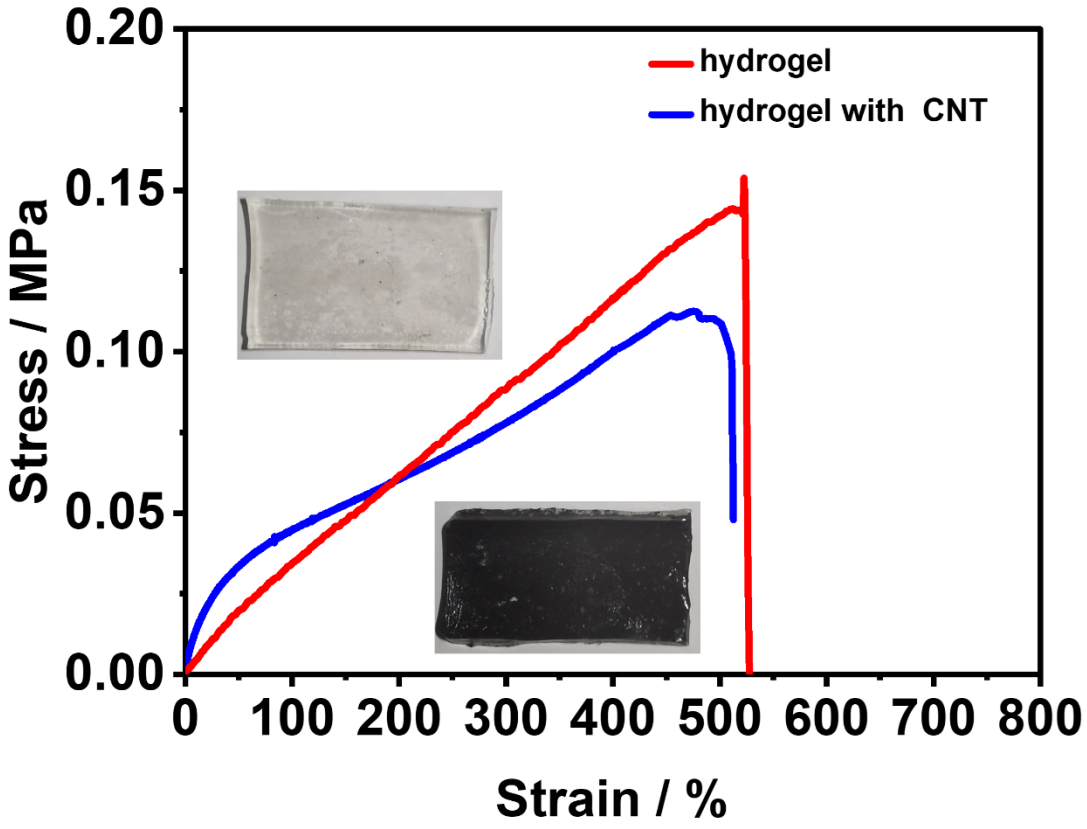

Fig. S6. Stress-strain curves of hydrogel with (blue line) and without (red line) the addition of CNT. Inset: the pictures of HG (transparent) and CNT/HG (black).

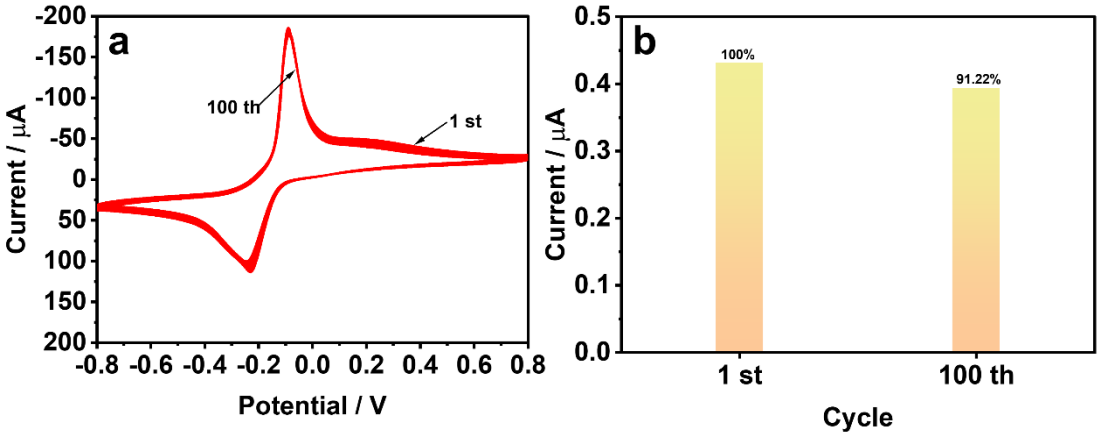

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Table. S1 Elemental content of MB/CNT/HG/GCE.

elemental	atomic number	net value	Normalized Quality%
C	6	7229	59.02
N	7	666	12.49
O	8	1110	9.59
S	16	2616	11.62
Cl	17	1304	7.28

Table. S2 Comparison of MB/CNT/HG/GCE performance with other documented non-enzymatic AA sensing features.

Materials	Detection Potential/V	linear range/mM	Detection limit /μM	Reference
CuO-SPE	+0.4	0.1-8.0	88	S1
CuO hollow sphere/SPE	+0.55	0.1-7.0	90	S2
Carbon fibers/ZnO	+0.26	0.60-1.8	156.7	S3
Graphene-PtNP/GCE	0.0	0.42-2.9	300	S4
Graphene nanosheets	+0.37	0.4-6.0	120	S5
MB/CNT/HG	+0.3	0.1-10.0	50	This work

Information S1 Calculation of Electrochemically Active Surface Area

Using the Randles-Sevcik equation, the effective surface area (A_{eff}) of the MB/CNT/HG/GCE electrode was estimated based on the CV values obtained in a 0.1 M PBS solution containing 5.0 mM Fe(CN)3-/4- 6 at a scan rate of 0.05 Vs^{-1}.

$$I_p = 2.69 \times 10^5 A n^{\frac{3}{2}} D_0^{\frac{1}{2}} v^{\frac{1}{2}} C_0$$

In the formula, *n* represents the number of electrons involved in the redox process (for Fe(CN)3-/4- 6 , n=1), D_0 is the diffusion coefficient of the molecule in solution (for Fe(CN)3-/4- 6 in 0.1 M PBS solution is 0.673×10^{-5} cm^2 s^{-1}). C_0 is the volumetric concentration of the redox probe (C_0 = 5.0 mM $Fe(CN)3^-/4^-$ 6). The measurement condition is with a scan rate of 50 mV/s. The calculated I_p was 124.4 and the A_{eff} of the electrode was 0.1594 cm^2.

Reference

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