Supplementary Information

Catalytic amplification platform based on Fe_2O_3 nanoparticles decorated graphene nanocomposite for highly sensitive detection of rutin

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1. Instruments and reagents

FePc, melamine, rutin, disodium hydrogen phosphate (Na_2HPO_4), and potassium dihydrogen phosphate (KH_2PO_4) were acquired from Macklin Industrial Co., Ltd. (Shanghai, China). Other chemical reagents of analytical grade were obtained from Sinopharm Chemical Reagent Co., LTD. (Shanghai, China). Rutin tablets with the label amount of 20.0 mg/tablet were obtained from Ningbo Dahongying Pharmaceutical Co., LTD. (Ningbo, China). Doubly distilled water was utilized in this experiment. A 0.1 M phosphate buffer solution (PBS) was made by mixing the solutions of KH_2PO_4 and Na_2HPO_4 and used as the supporting electrolyte.

Scanning electron microscopy (SEM) measurements and energy-dispersive X-ray (EDX) spectrometry were detected on GeminiSEM 360 scanning electron microscope. Transmission electron microscopy (TEM) was taken from a JEM-1200EX microscope. Powder X-ray diffraction (XRD) analysis was analyzed on a Bruker D8 Advance X-ray diffractometer. X-ray photoelectron spectroscopy (XPS) was explored by Thermo ESCALAB 250XI. Electrochemical experiments were performed on a Shanghai Chenhua CHI 660E electrochemical workstation. The electrochemical cell included a three-electrode system containing a glassy carbon electrode (GCE, 3 mm in diameter), a platinum (Pt) wire, and a saturated calomel electrode (SCE).

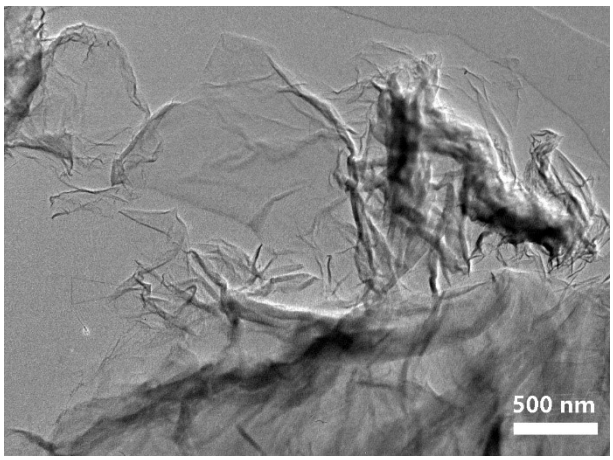


Fig. S1. TEM image of N-rGO.

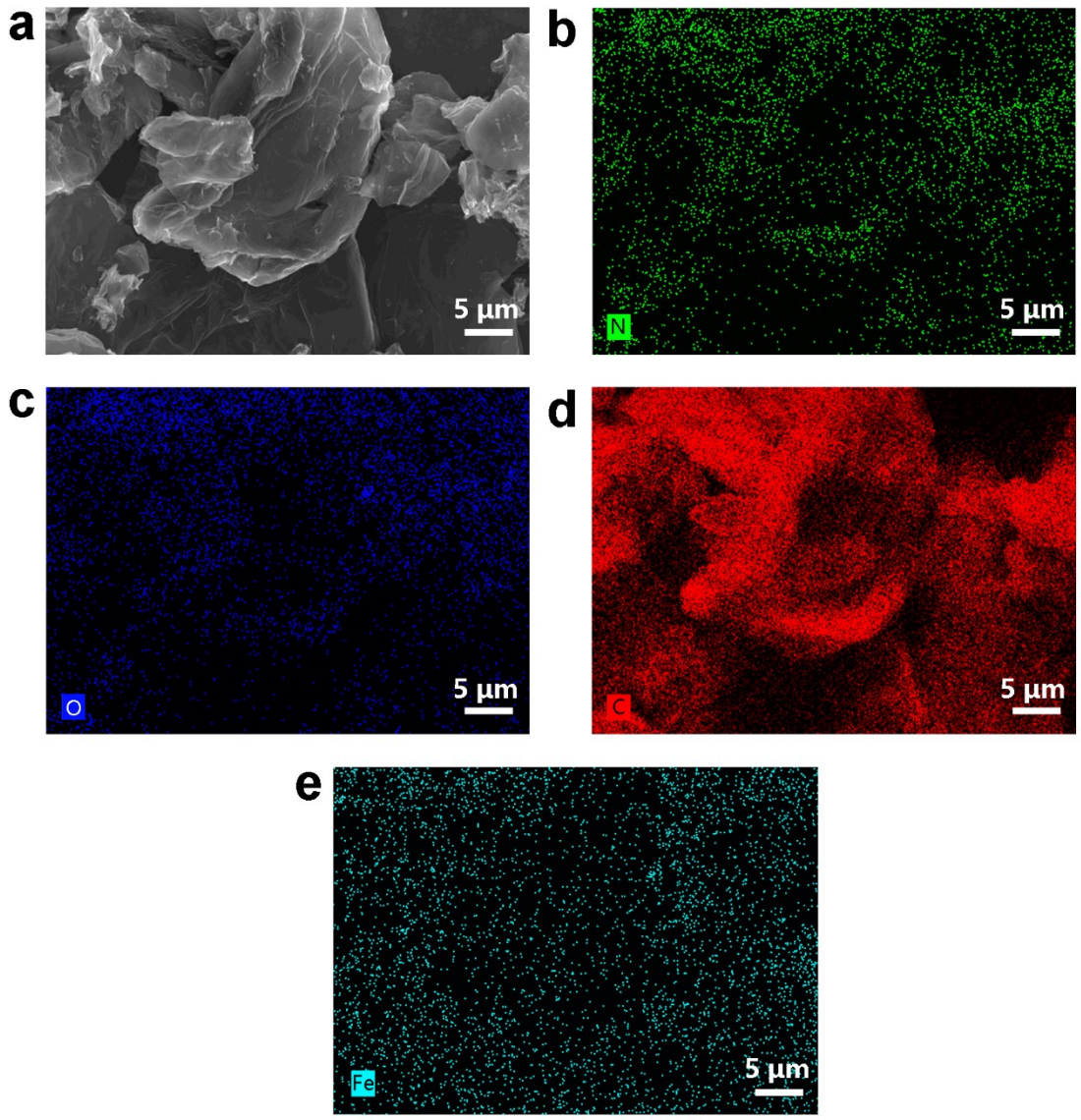
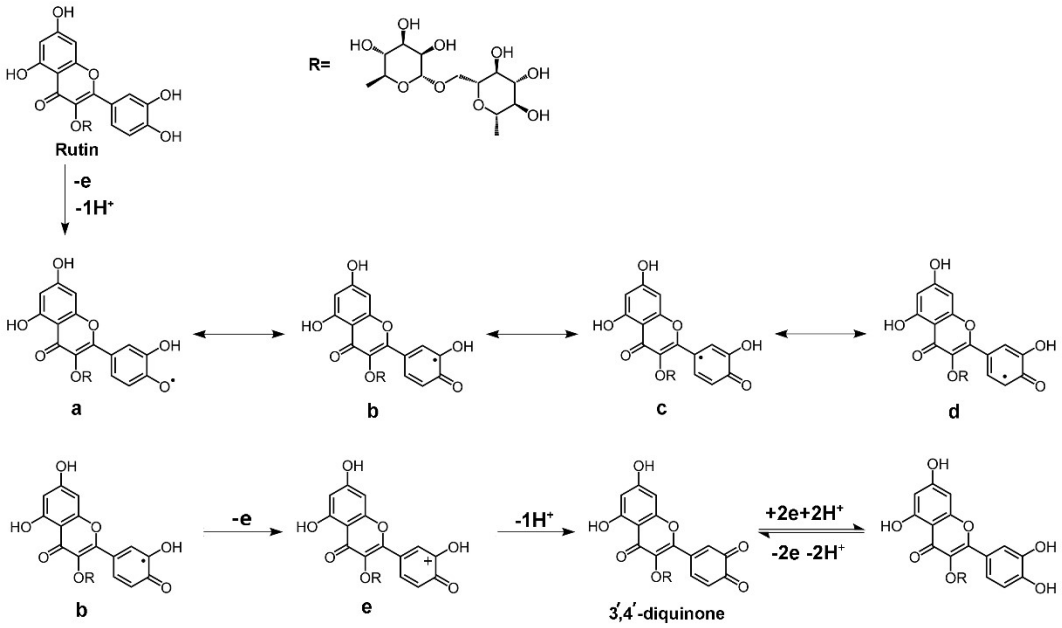


Fig. S2. (a) SEM of Fe_2O_3/N-rGO, (b) N, (c) O, (d) C, and (e) Fe element mapping images of Fe_2O_3/N-rGO.



Scheme S1. Electrochemical oxidation mechanism of rutin.

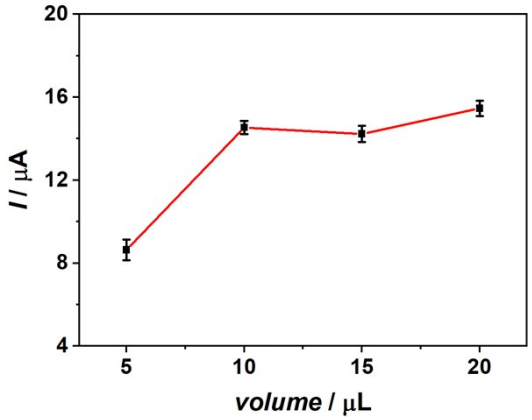


Fig. S3. Plot of oxidation peak current of rutin versus volume of the dropped suspension.

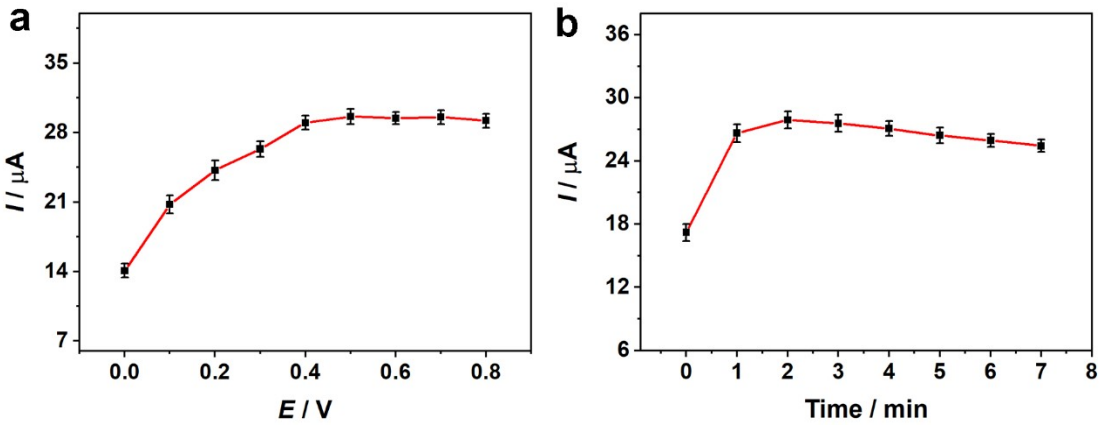


Fig. S4. (a) The oxidation currents of 100 μM rutin on Fe_2O_3/N-rGO/GCE with different accumulation potential at the accumulation time of 30 s. (b) The oxidation currents of 100 μM rutin on Fe_2O_3/N-rGO/GCE with different accumulation time at the accumulation potential of 0.4 V.

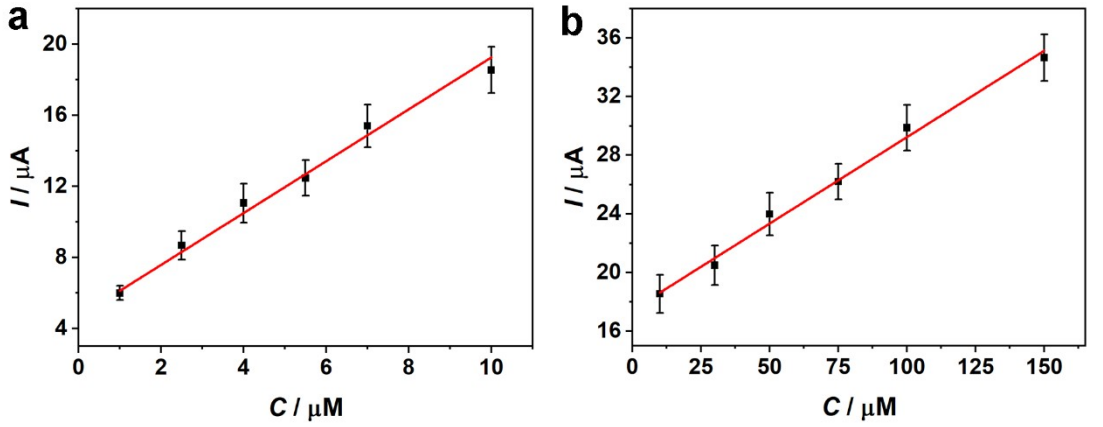


Fig. S5. (a) The linear plot of current versus concentration of rutin in the range of 1-10 μM. (b) The linear plot of current versus concentration of rutin in the range of 10-150 μM.

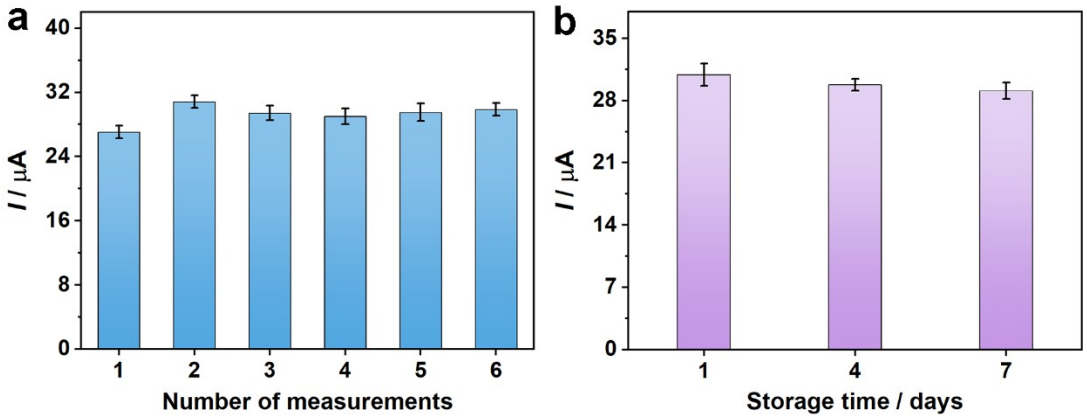


Fig. S6. (a) Repeatability of Fe_2O_3/N-rGO/GCE in six detections of 100 μM rutin. (b) Stability of Fe_2O_3/N-rGO/GCE for 7 days.

Table S1. Weight percentage of individual atoms in Fe_2O_3/N-rGO as determined by EDS analysis.

Elements	C (wt. %)	N (wt. %)	Fe (wt. %)	O (wt. %)
Content	75.01	14.34	1.64	9.01

Table S2. Result of element content of Fe_2O_3/N-rGO detected by XPS.

Elements	C (at. %)	N (at. %)	Fe (at. %)	O (at. %)
Content	78.96	8.69	1.9	10.45

Table S3. Determination of rutin with commercial tablet samples (n=3).

Sample	Added (μM)	Fe_2O_3/N-rGO/GCE			Spectrum method		
		Found (μM)	Recovery (%)	RSD (%)	Found (μM)	Recovery (%)	RSD (%)
Rutin tablet	-	61.5	-	-	61.1	-	-
	10.0	71.8	103.0	3.98	70.6	95.0	3.40
	20.0	82.8	106.5	2.09	81.4	101.5	2.23
	30.0	89.5	93.3	3.14	90.5	98.0	4.02