

Supplementary Information

Simultaneous electrochemical determination of uric acid and dopamine in the presence of ascorbic acid using nitrogen-doped carbon hollow spheres

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Experimental Details

Reagents

O-phenylenediamine (*o*PD), potassium hydroxide, ammonium persulfate (APS), aqueous ammonia, KCl, K₂HPO₄, KH₂PO₄ and ascorbic acid (AA) were received from Shanghai Chemical Reagent Corporation (Shanghai, China). Uric acid (UA) and dopamine (DA) were purchased from Aladdin Chemistry Co., Ltd. (Shanghai, China). All other chemicals were of analytical grade and were used without further purification. In all the experiments, aqueous solutions were prepared with secondarily distilled water. KH₂PO₄ and K₂HPO₄ were used to prepare 0.1 M phosphate buffer solution (PBS, pH 7.0).

Preparation of nitrogen-doped carbon hollow spheres (NCHSs)

The *Po*PD hollow microspheres were synthesized according to the report.^{S1} NCHSs were obtained through heat treating the *Po*PD at 850 °C for 4 h with a heating rate of 5 °C/min under a nitrogen atmosphere in the tube furnace. The tube furnace was KTL1400 from Nanjing NanDa Instrument Plant (Nanjing, China).

Preparation of NCHS-modified electrode

Before electrochemical measurements or NCHS modification, a glassy carbon (GC) electrode was polished with a 0.3 and 0.05 μm alumina slurry, respectively. Then, the GC electrode was

ultrasonically cleaned in water and dried under nitrogen gas. Thereafter, 2.0 mg of the NCHSs were ultrasonically dispersed in 1.0 mL ethanol for 30 min to make a homogeneous ink, and then 7.0 μ L aliquot of the NCHS slurry was pipetted on the GC electrode surface. After being dried at room temperature, the NCHS-modified electrode was used as the working electrodes. For comparison, the carbon nanotube (CNT) modified electrode was prepared and tested in the same way.

Apparatus

The morphologies and the microstructures of the samples were observed by field-emission scanning electron microscopy (SEM) using an ULTRA plus microscope (Zeiss, Germany) and a JEM-2100 field-emission transmission electron microscopy (TEM) (Jeol, Japan) with an acceleration voltage of 200 kV. And the specific surface areas were calculated through the liquid nitrogen physisorption experiments with the Brunauer-Emmett-Teller (BET) method by using tester (ASAP 2000, America). Electrochemical measurements were performed on a CHI 660C electrochemical workstation (CH Instruments, USA) with a typical three-electrode cell. A saturated calomel electrode (SCE) was used as reference electrode, and a Pt coil as counter electrode, respectively. The modified or unmodified GC electrodes were used as the work electrodes. To evaluate the catalyst performances of the NCHSs for DA and UA, cyclic voltammetry (CV) and differential pulse voltammetry (DPV) were carried out. For all electrochemical measurements, a 0.1 M PBS (pH 7.0) was used as the electrolyte. All of the potentials in this study referred to the SCE. All electrochemical measurements were carried out at room temperature (25 ± 2 °C).

Fig. S1 CV (A) and DPV (B) profiles recorded in 0.1 M PBS containing 200 μM UA at the bare GC (a), CNT (b) and NCHS (c) electrodes. Scan rate: 100 mV s^{-1} .

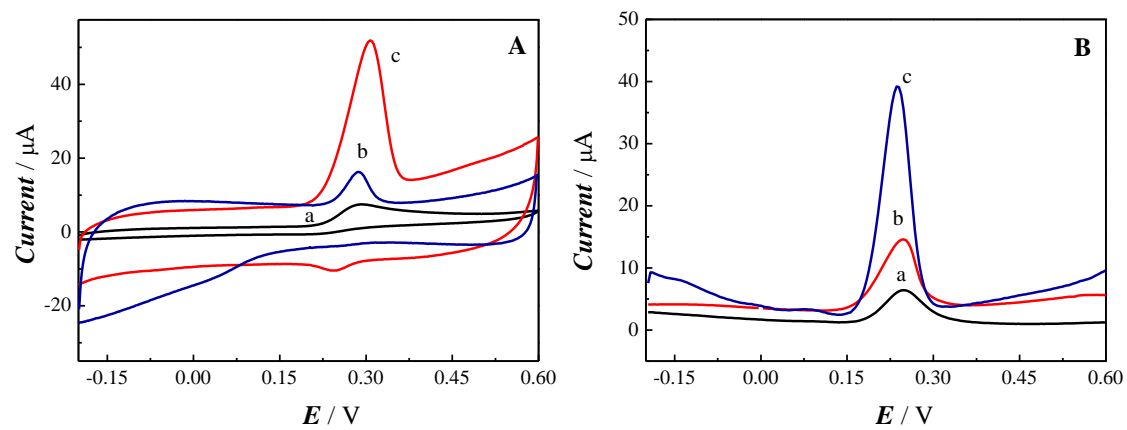


Fig. S2 CV (A) and DPV (B) profiles recorded in 0.1 M PBS containing 100 μM DA at the bare GC (a), CNT (b) and NCHS (c) electrodes. Scan rate: 100 mV s^{-1} .

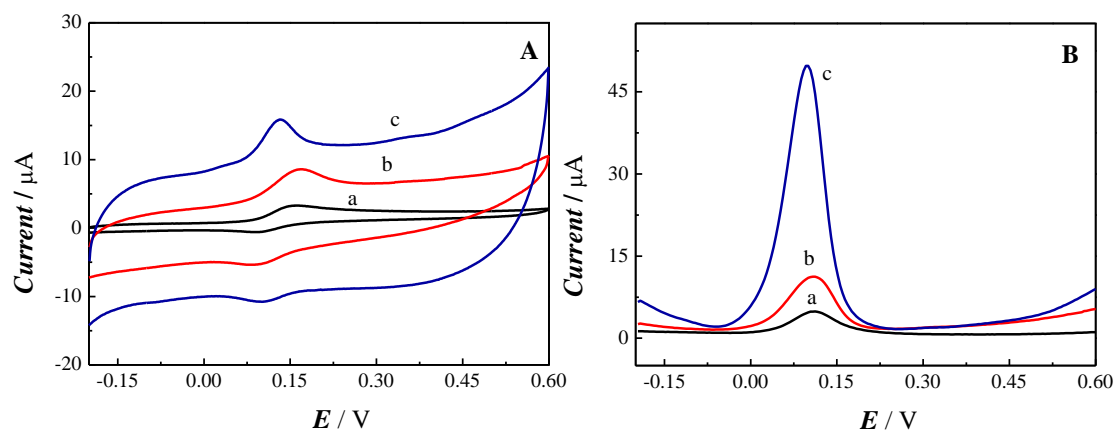
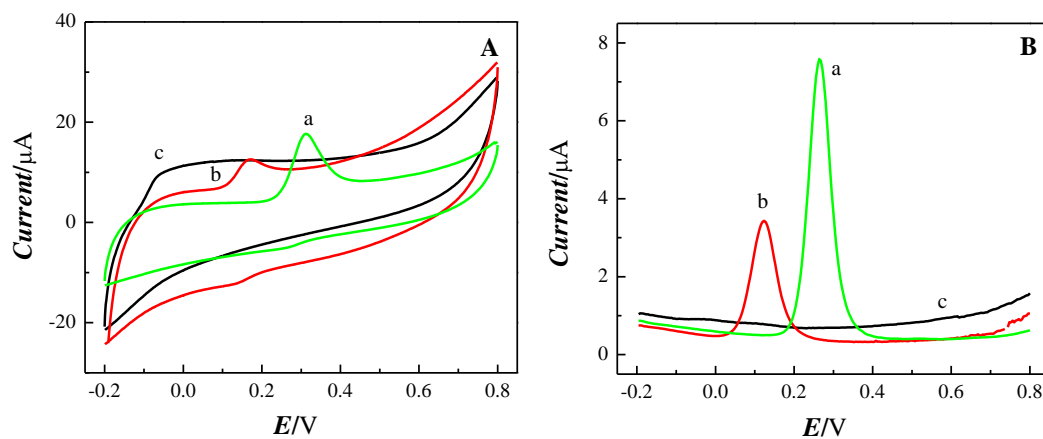


Fig. S3 CV (A) and DPV (B) profiles recorded at the NCHS electrodes in 0.1 M PBS containing 200 μ M UA (a), 100 μ M DA (b) and 1 mM AA (c). Scan rate: 10 mV s^{-1} .



Reference

S1 J. B. Yin, X. Xia, L. Q. Xiang and X. P. Zhao, *Carbon*, 2010, **48**, 2958.