Electronic Supplementary Information

Ultrathin graphitic carbon nitride nanosheets: a low-cost, green, and highly effecient electrocatalyst toward the reduction of hydrogen peroxide and its glucose biosensing application

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Experimental section

Materials

H_2O_2 (30 wt%), and chitosan were purchased from Aladin Ltd. (Shanghai, China). GOD was purchased from Aldrich Chemical Comp. Na_2HPO_4, NaH_2PO_4 and glucose

was purchased from Beijing Chemical Comp. All the chemicals were used as received without further purification. The water used throughout all experiments was purified through a Millipore system. Phosphate buffer saline (PBS) was prepared by mixing stock solutions of NaH_2PO_4 and Na_2HPO_4 and a fresh solution of H_2O_2 was prepared daily.

Preparation of ultrathin g-C_3N_4 nanosheets

The bulk g-C_3N_4 was prepared by direct pyrolysis of melamine in the semiclosed system. In a typical synthesis, 20 g melamine was placed in an alumina crucible with a cover and then heated at 600 °C for 2 h with a heating rate of 3 °C min^{-1}, leading to yellow powder. The ultrathin g-C_3N_4 nanosheets were obtained via a liquid exfoliating method according to the literature with minor modification. In brief, 50 mg of the bulk g-C_3N_4 powder was dispersed in 50 mL water and the mixture was ultrasounded consecutively for 10 h. The initial formed suspension was then centrifugated at 5000 rpm to remove the residual unexfoliated g-C_3N_4 before use. The product yield is measured to be 14.5 %.

Preparation of g-C_3N_4 modified GCE

A 3 μL of the colloidal solution was placed on bare GCE surfaces and air-dried at room temperature, followed by rinsing the film form on the electrode surfaces with water. The preparation of bulk g-C_3N_4 modified GCE was following the same method and the amount of bulk g-C_3N_4 on GCE was the same as that of ultrathin g-C_3N_4 nanosheets.

Preparation of g-C_3N_4 –GOD

In a typical synthesis, 8 μL of GOD solution (40 mg/mL) was added into 6 μL of g-C_3N_4 colloidal solution, followed by ultrasonic treatment 5 min. Then the mixture was kept at 4 °C for further use.

Fabrication of the g-C_3N_4 –GOD modified GCE

The modified electrodes were prepared by a simple casting method. Prior to the surface coating, the GCE was polished with 1.0 and 0.3 μm alumina powder, respectively, and rinsed with doubly distilled water sucessfully. Then, the electrode was allowed to dry in a stream of N_2. For the cyclic voltammetry experiment, 3.5 μL of the g-C_3N_4 –GOD nanostructures dispersion was dropped on the clean surface of GCE, and dried at 4 °C. Then the modified electrode was further modified by dropping 2.0 μL of 0.5 M chitosan aqueous solution and dried at ambinent temperature before use.

Characterizations

Scanning electron microscopy (SEM) measurements were made on a XL30 ESEM FEG scanning electron microscope at an accelerating voltage of 20 kV. Atomic force microscopy (AFM) study in the present work was performed by means of MultiMode-V (Veeco Metrology, Inc.). Transmission electron microscopy (TEM) measurements were made on a HITACHI H-8100 electron microscopy (Hitachi, Tokyo, Japan) with an accelerating voltage of 200 kV. The sample for TEM characterization was prepared by placing a drop of sample solution on carbon-coated copper grid and dried at room temperature. Powder X-ray diffraction (XRD) datum

was recorded on a RigakuD/MAX 2550 diffractometer with Cu Kα radiation (λ=1.5418 Å). Electrochemical measurements are performed with a CHI 660D electrochemical analyzer (CH Instruments, Inc., Shanghai). A conventional three-electrode cell is used, including a GCE (geometric area = 0.07 cm^2) as the working electrode, an Ag/AgCl (saturated KCl) electrode as the reference electrode, and platinum foil as the counter electrode. The potentials are measured with an Ag/AgCl electrode as the reference electrode. All the experiments are carried out at ambient temperature.