Electronic Supplementary Information

Surfactant-free synthesis of 3-dimensional nitrogen-doped hierarchically porous carbon and its application as electrode modification material for simultaneous sensing of ascorbic acid, dopamine and uric acid

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The electrochemical behavior of the 3-D~NHPC

The electrochemical properties of the modified electrodes were studied by (CV) in the presence of an external redox probe $[Fe(CN)_6]^{3-/4-}$ (Fig. S1). Quasi-reversible one-electron redox behavior of $[Fe(CN)_6]^{3-/4-}$ was observed on the bare GCE with peak separation (ΔE_P) of 0.16 V at a probe concentration of 5 mM $K_4Fe(CN)_6$/0.1M KCl solution. The peak current (I_p) of GCE is 82.55 μA. After the GCE surface was coated with 3-D~NHPC nanocomposites, the peak current (I_p) increased significantly to 122.6 μA at the 3-D~NHPC/GCE. At the same time, the ΔE_P of the modified electrode changed to 0.13 V. These electrochemical behaviors indicate the ability of 3-D~NHPC to facilitate fast electron transfer between the redox probe and electrode surface. This reveals its good electrocatalytic properties.

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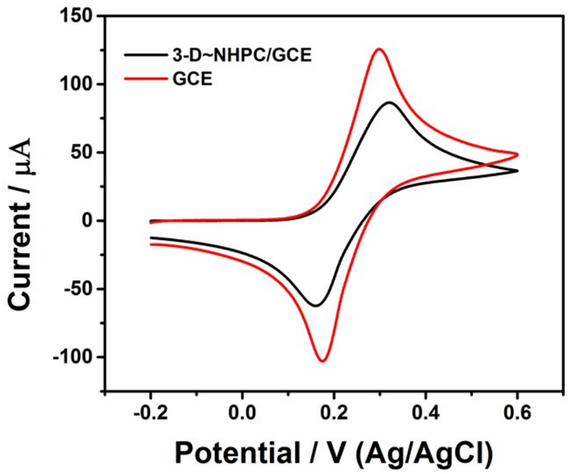

Fig. S1. CVs obtained at the bare GC (a) and 3-D~NHPC/GC (b) electrodes in 5 mM $Fe(CN)_6^{3-/4-}$ (1:1) and 0.1 M KCl aqueous solution. Scan rate: 50 mV/s.

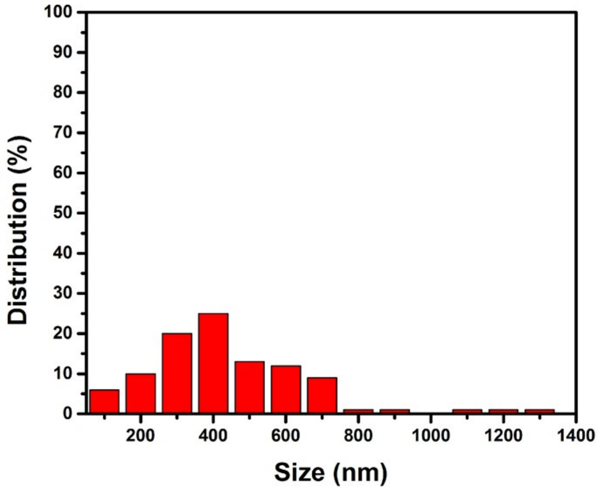

Fig. S2. Size distribution of the spheres in Figure 2b.

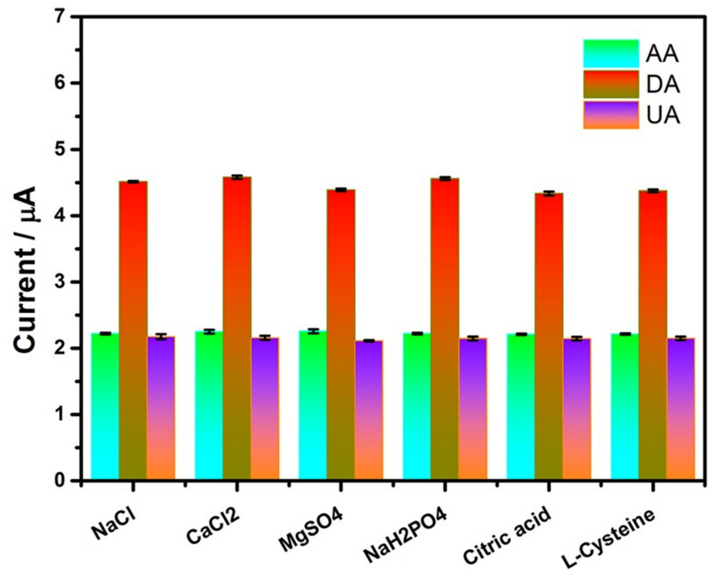

Fig. S3. Effect of NaCl, $MgCl_2$, $MgSO_4$, NaH_2PO_4, citric acid and L-cysteine on simultaneous detection of AA, DA and UA at 3D~NHPC/GCE.

Table S1. XPS peak analysis of high resolution N1s spectrum

Area %		
Pyrrolic (400.4 eV)	Graphitic N (401.3 eV)	Oxidized N (403.3 eV)
46.13	26.77	27.10

Table S2. Determination of AA, DA, and UA in human urine samples using 3-D~NHPC/GCE and SWV in 0.1 M PBS (pH = 7.4).

Sample	Analyte	Detected (μM)	Added (μM)	Found (μM)	Recovery (%)	RSD (%)
Urine 1	AA	-	30.00	31.61 ± 1.10	105.40	2.57
	DA	-	5.00	4.83 ± 0.30	96.60	0.32
	UA	3.94 ± 0.10	6.00	10.02 ± 0.19	100.81	0.20
Urine 2	AA	-	60.00	60.16 ± 0.90	100.30	1.00
	DA	-	6.00	5.78 ± 1.10	96.38	1.61
	UA	4.07 ± 0.02	10.00	14.00 ± 0.90	99.54	1.08