Electronic Supplementary Material (ESI) for RSC Advances.

Supporting information

β-Cyclodextrin Functionalized 3D Reduced Graphene Oxide Composite-Based Electrochemical Sensor for the Sensitive Detection of Dopamine

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Fig. S1. EDS of 3D-rGO/β-CD composites.
Fig. S2 Contact-angle photographs of GO (a), 3D-rGO (b) and 3D-rGO/β-CD (c) modified substrates
**Fig. S3** CV curves of various modified electrodes with bare GCE, 3D-rGO/GCE, and 3D-rGO/β-CD/GCE were recorded in the 0.1 M PB solution of contained DA (100.0 μM) (pH 7.0). Scan rate: 0.1 V/s; working potential: −0.2 V - 0.6 V (vs SCE)
Method for calculating of limit of detection (LOD) [1-3].

LOD is calculated using the following relation based on the linear calibration equation according to IUPAC definition, S/N=3 (signal-to-noise ratio). LOD = 3S/b, where S is the standard deviation of the blank experiment (namely, standard deviation of background current at the peak position via running parallel determination for ten times in blank electrolytes at 3D-rGO/β-CD/GCE), and b is slope of calibration plot of DA (0.296 μA μM⁻¹). Putting the values in the above formula gives the LOD.

References

1. Y. Wang, Y. Q. Chen, H. Bian, Y. W. Sun, L. J. Zhu, D. H. Xia, Sens. Actuators B-Chem., 2021, 341, 130044.
2. P. Lei, Y. Zhou, R. Q. Zhu, Y. Liu, C. Dong, S. M. Shuang, Biosens. Bioelectron., 2020, 147, 111735.
3. M. Zheng, Y. Wang, C. Wang, W. Wei, S. Ma, X. Sun, J. He, Spectrochim. Acta A., 2018, 19, 315-321.
Fig. S4 The cartograms of (a) storage stability (b) repeatability and (c) reproducibility of the 3D-rGO/β-CD/GCE sensor.
Fig. S5 (a) DPV responses of bare/GCE (a), 3D-rGO/GCE (c) in 0.1 M PB solution (pH = 7.0) for 1 mM AA, 100 μM DA, 100 μM 5-HT and the mixture of 1 mM AA, 100 μM DA and 100 μM 5-HT. (b) Amperometric responses of the bare/GCE (b), 3D-rGO/GCE (d) for the addition of 100 μM DA and 200 μM glucose, 200 μM KCl and 200 μM NaCl in 0.1 M PB solution (pH = 7.0).
Table S1. Determination of DA in human serum and urine samples by DPV

| Samples       | Original (µM) | Spiked (µM) | Found (µM) | Recovery (%) | RSD* (%) |
|---------------|---------------|-------------|------------|--------------|----------|
| Serum samples | 5.00          | 5.12        | 102.4      | 2.63         |          |
|               | 10.00         | 10.05       | 100.5      | 2.14         |          |
|               | 20.00         | 19.88       | 99.40      | 1.99         |          |
|               | 30.00         | 30.09       | 100.3      | 1.45         |          |
|               | 50.00         | 49.89       | 99.78      | 2.08         |          |
| Serum samples | 5.00          | 5.66        | 98.8       | 2.35         |          |
| Urine samples | 10.00         | 10.89       | 101.7      | 2.71         |          |
|               | 20.00         | 20.78       | 100.3      | 1.98         |          |
|               | 30.00         | 30.65       | 99.8       | 2.51         |          |
|               | 50.00         | 50.84       | 100.2      | 3.39         |          |

* RSD value reported is for n=5.

a Dilute 5 times with PB (0.1 M, pH=7.0).
b Dilute 2 times with PB (0.1 M, pH=7.0).