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Enhanced electrochemical response of carbon quantum dot modified electrodes

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Abstract

A glassy carbon electrode (GCE) was surface-modified with carbon quantum dots (CQDs) and applied for the effective enhancement of the electrochemical signal for dopamine and uric acid determination. CQDs were prepared from graphite by a green modification of the Hummers method. They were characterized by FTIR-ATR, XPS, solid-state NMR, fluorescence and Raman spectroscopies. TPD-MS analysis was applied to characterize the functionalization of the surface. The CQDs were assembled on the glassy carbon electrode by adsorption because of the large number of carboxy groups on their surface warrants effective adsorption. The modified GCE exhibits a sensitivity that is almost 10 times better than of the bare GCE. The lower limits of detection are 1.3 μM for uric acid and 2.7 μM for dopamine.

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