A Simple Strategy for the Simultaneous Determination of Dopamine, Uric Acid, L-Tryptophan and Theophylline Based on a Carbon Dots Modified Electrode

Ziwei Wang, Rui An, Yuxuan Dai, Hongxia Luo*

Department of Chemistry, Renmin University of China, Beijing 100872, China

*E-mail: luohx@ruc.edu.cn

doi: 10.20964/2021.04.39

Received: 2 December 2020 / Accepted: 27 January 2021 / Published: 28 February 2021

In this work, carbon dots (CDs) were produced by one-step ultrasound technology with glucose as the precursor. The effective synthesis of CDs was characterized by Raman spectroscopy and UV-visible spectra. The as-prepared CDs were fixed on a glassy carbon electrode (GCE) via electrochemical deposition to fabricate CDs/GCE, which simultaneously detected dopamine (DA), uric acid (UA), L-tryptophan (Trp) and theophylline (TP). With the differential pulse voltammetry technique, the oxidation peak currents of these four biomolecules were significantly enhanced on CDs/GCE compared to those on bare GCE. The potential differences of DA-UA, UA-Trp, and Trp-TP were computed as 145 mV, 381 mV, and 323 mV, respectively. The broad linear ranges were 0.5-50 μM for DA, 3-75 μM for UA, 1-65 μM for Trp and 10-200 μM for TP with limits of detection (LODs) of 0.007 μM , 0.011 μM , 0.11 μM and 0.33 μM ($S/N = 3$), respectively. The CD/GCE sensor had good stability and strong anti-interference ability and was applicable to detecting actual samples.

Keywords: Carbon dots; Glassy carbon electrode; Electrochemical sensing; Dopamine; Uric acid; L-tryptophan; Theophylline

[FULL TEXT](#)

© 2021 The Authors. Published by ESG (www.electrochemsci.org). This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution license (<http://creativecommons.org/licenses/by/4.0/>).