The simultaneous electrochemical detection of ascorbic acid, dopamine, and uric acid using graphene-based nanomaterials

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In this study, a graphene/Pt-modified glassy carbon (GC) electrode was created to simultaneously characterize ascorbic acid (AA), dopamine (DA), and uric acid (UA) levels via cyclic voltammetry (CV) and differential pulse voltammetry (DPV). During the preparation of the nanocomposite, size-selected Pt nanoparticles with a mean diameter of 1.7 nm were self-assembled onto the graphene surface. In the simultaneous detection of the three aforementioned analytes using CV, the electrochemical potential differences among the three detected peaks were 185 mV (AA to DA), 144 mV (DA to UA), and 329 mV (AA and UA), respectively. In comparison to the CV results of bare GC and graphene-modified GC electrodes, the large electrochemical potential difference that is achieved via the use of the graphene/Pt nanocomposites is essential to the distinguishing of these three analytes. In addition, some preliminary results using other graphene-based composite nanomaterials will be presented and discussed in this work.

Figure 1. Cyclic voltammograms of bare GC (black), graphene-modified GC (red), and graphene/Pt-modified GC (blue) electrodes in 0.1 M PBS (pH 7.0) containing 0.3 mM AA, 3 μM DA, and 0.3 mM UA. Scan rate: 50 mVs⁻¹.

Reference