Polymethylthiophene/Nafion-modified glassy carbon electrode for selective detection of dopamine in the presence of ascorbic acid

Huong V.T., Shimanouchi T., Quan D.P., Umakoshi H., Viet P.H., Kuboi R.

Department of Chemical Science and Engineering, Graduate School of Engineering Science, Osaka University, Osaka, Japan; Research Centre for Environmental Technology and Sustainable Development, Hanoi University of Science, Vietnam National University, Hanoi, Viet Nam

Abstract: The possible use of an electrode modified with electroactive conductive poly(3-methylthiophene) (PMeT)/Nafion as a chemical sensor was investigated for the voltammetric analysis of Dopamine (DA). The electrochemical behavior of dopamine was examined by cyclic voltammetry (CV) and differential pulse voltammetry (DPV) techniques. By using a PMeT-modified glassy carbon (GC/PMeT) electrode, DA and Ascorbic Acid (AA) signals could be separated but the AA at high concentrations still caused significant interference by overlapping the DA peak. In comparison to the GC/PMeT electrode, the glassy carbon (GC/Nafion/PMeT) electrode modified with hybrid film Nafion/PMeT was found to permit a superior separation by shifting the oxidation of AA peak toward the less positive potential. The DPV curves for a mixture of DA and AA at an GC/Nafion/PMeT electrode in a 0.1 M H_2SO_4 solution showed peaks of DA and AA, at 0.45 and 0.21 V, respectively, indicating that the difference in the oxidation potential was 240 mV. In the 0.1 M H_2SO_4 solution, the oxidation peak current on the differential pulse voltammograms for the GC/PMeT electrode increased linearly with the concentration of DA in the range 1 ?? 10^{-6} to 1 ?? 10^{-3} M, and the oxidation peak current on the differential pulse voltammograms for the GC/Nafion/PMeT electrode in the range 5 ?? 10^{-7} to 2 ?? 10^{-4} M. The DA detection sensitivity of the GC/Nafion/PMeT electrode (26.7 ?A ?M^{-1} cm^{-2}) was 22 times higher than that of the GC/PMeT electrode (1.21 ?A ?M^{-1} cm^{-2}). ?? 2009 Springer Science+Business Media B.V.

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Correspondence Address: Kuboi, R.; Department of Chemical Science and Engineering, Graduate School of

Engineering Science, Osaka University, Osaka, Japan; email: kuboi@cheng.es.osaka-u.ac.jp
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Authors with affiliations:

1. Huong, V.T., Department of Chemical Science and Engineering, Graduate School of Engineering Science, Osaka University, Osaka, Japan
2. Shimanouchi, T., Department of Chemical Science and Engineering, Graduate School of Engineering Science, Osaka University, Osaka, Japan
3. Quan, D.P., Research Centre for Environmental Technology and Sustainable Development, Hanoi University of Science, Vietnam National University, Hanoi, Viet Nam
4. Umakoshi, H., Department of Chemical Science and Engineering, Graduate School of Engineering Science, Osaka University, Osaka, Japan
5. Viet, P.H., Research Centre for Environmental Technology and Sustainable Development, Hanoi University of Science, Vietnam National University, Hanoi, Viet Nam
6. Kuboi, R., Department of Chemical Science and Engineering, Graduate School of Engineering Science, Osaka University, Osaka, Japan

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