

Glassy Carbon Electrode Modified with Silver Nanodendrites Implemented in Polylactide-Thiacalix[4]arene Copolymer for the Electrochemical Determination of Tryptophan

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Abstract

© 2017 Wiley-VCH Verlag GmbH & Co. KGaA, Weinheim. Glassy carbon electrode (GCE) was modified by new polymeric materials obtained from oligolactides by cross-linking with tetracarboxylated thiacalix[4]arene in cone, partial cone and 1,3-alternate configurations and then silver was deposited by potential cycling in the pores of the polymer film. The modified electrode showed highly sensitive and selective signal toward tryptophan which was irreversibly oxidized on the coating due to Ag + assisted accumulation in the surface layer. The role of macrocycle configuration and conditions for Ag nanodendrites formation are described. Granulation of the polymer films caused by the macrocycles improves both the conditions for silver deposition and tryptophan determination. The electrochemical sensor developed makes it possible to determine from 0.1 to 100 μM of tryptophan with the limit of detection down to 0.03 μM. No interference with oxidation of other amino acids (phenylalanine, histidine, cysteine and tyrosine) was found. The electrochemical sensor developed was validated in the determination of tryptophan sedative medication "Formula of calmness" in the presence of vitamins B 5 and B 6 .

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Keywords

Electrochemical sensor, Polymer film, Silver nanoparticles, Tryptophan determination, Voltammetry