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Abstract

Bacteriophages-Carbon Nanofibre Modified Electrodes for Biosensing Applications †

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Carbon nanomaterials have aroused substantial interest in various research fields. Their uniqueness derives from their remarkable surface properties, good electrical conductivity and well developed surface. These properties make them suitable for application as elements in electrochemical sensors [1]. The improvement of their properties might be achieved via the application of viral particles which could change the surface and electrical properties of carbon nanomaterials. Recently, bacteriophage particles due to their unique properties (high active surface area, the ability to form self-assembled, periodically ordered, three-dimensional structures) have appeared as an interesting addition to electrochemical devices [2].

We show that utilization of these particles for modifying an electrode with carbon nanofibres (CNF) leads to the generation of a material with a highly developed surface and thus an electrode with a large active area which is desirable when preparing sensing platforms.

The obtained electrode was thoroughly characterized by SEM, AFM and cyclic voltammetry. Our results show that electroactive surface area is better developed when the bacteriophages are added to the CNF-based electrodes, than for bare electrodes, or those modified only with CNFs. Also, the electrocatalytic activity towards the oxidation of cysteine, homocysteine and gluthatione, is improved in the case of additional application of bacteriophages for CNF-based electrode modification.

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