

Abstract

Effect of Graphene Oxide Modification on a DNA Biosensor Developed for the Detection of Methylated DNA Associated with Cancer [†]

Eliska Sedlackova ^{1,2,*}, Lukas Richtera ^{1,2}, Pedro Estrela ³ and Vojtech Adam ^{1,2}

¹ Department of Chemistry and Biochemistry, Mendel University in Brno, Zemedelska 1, CZ-613 00 Brno, Czech Republic

² Central European Institute of Technology, Brno University of Technology, Purkynova 123, CZ-612 00 Brno, Czech Republic

³ Centre for Biosensors, Bioelectronics and Biodevices (C3Bio) and Department of Electronic and Electrical Engineering, University of Bath, Bath BA2 7AY, UK

* Correspondence: eliska.sedlackova@mendelu.cz

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Abstract: Methylated DNA is a covalent post-translational modification, which plays a crucial role in pathological and physiological processes including several diseases, such as cardiovascular disease, diabetes or cancer. Despite that, methylated DNA presents a new generation of biomarkers, which brings a promising alternative for using in point-care diagnostic. Regarding this fact, DNA based electrochemical sensors enable fast, reliable, low-cost, time-consuming and efficient detection. The application of these biosensors as possible alternatives for the determination of methylated DNA is recently growing. Therefore, a biosensor for the determination of methylated DNA was fabricated. This study was aimed to develop an efficient biosensor, with an amplified electrochemical signal which is suited for the detection of the low-level concentration of methylated DNA. The bare gold electrode was first covered with the graphene oxide modified with gold, silver and copper nanoparticles. These composites have a strong affinity to DNA probe and their effect on the sensitivity and selectivity of the biosensor was investigated. The developed biosensor shows promising analytical characteristics with a wide detection linear range. The electrochemical impedance spectroscopy (EIS) was used to detect the hybridization of the DNA probe with methylated DNA target.

Keywords: methylated DNA; DNA biosensor; modified graphene oxide; nanomaterials



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