

Graphene-modified biosensors used in electrochemical impedance spectroscopy. Applications in chemical and biochemical detection

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ABSTRACT

Biosensors are characterized by a biorecognition element, such as DNA sequences (genosensors) or artificial sequences of single-stranded oligonucleotides (aptasensors) which bind a broad range of targets with high affinity and specificity, associated with or integrated on a physicochemical transducer.¹

In comparison with other electrode-materials, graphene and derivatives shows improved properties for the construction of electrochemical devices, for instance high electron transfer rates, large electrode surface and low cost.²

The main purpose of this project is the development (construction and testing) of electrochemical biosensors using graphene as transducer material. A label-free detection is possible by electrochemical impedance spectroscopy (EIS) and a wide range of species can be detected at pico- and femtomolar levels.³ Applications in the fields of security, health care and food safety are a priority in our project.

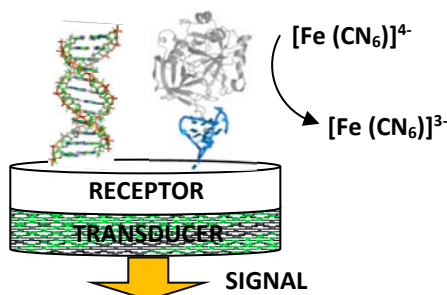


Fig.1. Diagram of a biosensor that consists of a receptor layer such as a biomolecule (e.g., DNA, protein or an aptamer), and a transducer, which is a graphene-based material. The electrochemical probes usually used are potassium ferrocyanide (II) and hexaammine-ruthenium (III) chloride.

Keywords: impedimetric, electrochemistry, biosensor, graphene, aptamer.

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