Functional materials chemistry

Functional nanomaterials for electrochemical biosensoring

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Electrochemical biosensors are analytical system of choice when rapid and on-site results are needed in medical diagnostics and food safety, for environmental protection, process control, wastewater treatment and life sciences discovery. Electrochemical biosensors have played active roles at the forefront of bioanalysis because they have the potential to achieve sensitive, specific and low-cost detection of biomolecules. [1]

Current research focuses on developing sensors for specific analytes in these application fields and addresses challanges that need to be solved. These challanges typically include the lowering of the limit of detection, the integration of sample preparation into the device, finding strategies for long time in vitro use. [2]

In this field of study main goal is to synthesize functional nanomaterials which are invistigated and applied in electrochemical beiosensors. The unique properties of nanoscale materials offer excellent prospects for interfacing biological recognition with electronic signal tranduction and for designing a new generation of bioelectronic devices exhibiting novel functions.

In order to increase sensitivities and to lower detection limits down to even individual molecules, nanomaterials are promising candidates due to the possibility to immobilize an enhanced quantity of bioreceptor units at reduced volumes and even to act itself as transduction element. [3]

Functional nanomaterials possess good conductivity, catalytic activity, biocompatability and high surface area. Among such nanomaterials, gold nanoparticles, semi-conductor quantum dots, polymer nanoparticles, carbon nanotubes, and graphene are intensively studied and used.

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