

Nanomaterial Included Biosensors as POC Diagnostic Systems

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Abstract

Effective diagnostic systems with Point of Care (POC) nature, are very important in terms of diagnosis hence treatment of the patient [1]. POC systems can be defined as on-site diagnostic tests carried out at the patient bed-site using mobile devices like hand-held devices or a cart. These tests provide faster diagnosis by avoiding the need for laborious procedures and trained personnel. If the adaptation of biosensor systems to these POC diagnostic platforms is concerned, then practical, accurate, sensitive and economical biosensors must be developed. From this point of view, it is possible to say that the practical natures of electrochemical and colorimetric biosensors make them good candidates as being turned into diagnostic POC systems [2].

On the other hand, introduction of nanomaterials in diagnostic biosensing systems provides many advantages like high surface-to-volume ratio- which enables suitable surface modifications with bioactive compounds- excellent capacity, electrical conductance, good biocompatibility, localized surface plasmon resonance that results with intense visible color and selectively and sensitively altered color properties [2, 3]. For example, for electrochemical biosensors gold nanoparticles (Au-NPs) provide suitable environment for biological molecules and facilitate the reach out of electrons to the enzyme active center. On the other hand, carbon-based nanomaterials like carbon nanotubes and graphene have been widely used because they increase the electron transfer rate and provide higher surface area for the immobilization of biological molecules. Also, decoration of these two carbon-based nanomaterials with metal nanoparticles is easy and produces robust material in terms of electrochemical catalysis [1, 3].

Considering colorimetric biosensors, it has been reported that AuNPs have unique optoelectronic behavior. Also, Fe-based nanomaterials provide the necessary redox reactions in order to create color while with Au and Ag NPs it is possible to obtain intense visible color [3]. Apart from those, recently metal organic frameworks have gained considerable attention because of their surface areas and mimicking properties [4].

So, as a conclusion it can be stated that, development of effective biosensors with the help of nanomaterials, increase their effectiveness and probable usage potentials in POC diagnostic systems.

Keywords: Biosensors, Nanomaterials, POC, Nano-Diagnostic Systems, MOF,

References

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