Poster

DNA DETECTION USING CADMIUM SULPHIDE NANOCRYSTALS AS ELECTROCHEMICAL TAGS

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The biological researches as well as other application fields need a broader range of more reliable, more robust labels so as to enable high-throughput bioanalysis and determination of multiple biomolecules present in a sample. The existing labelling techniques (based on enzymes, dyes etc.) have several drawbacks: the markers used have short life-time and a limited number of combinations that practically can be used for simultaneous analysis of various analytes.

Recent progress in nanotechnology allows for a creation of new materials with nanometre scale properties with special interest for labelling technologies. Attempts to use the functionality of such "smart" nanomaterials in various applications with interests for the life sciences such as imaging of the cells as well as detection of DNA or proteins by using fluorescence have been already reported. Moreover it is possible to "bare-code" DNA and proteins, using metal nanoparticles like quantum dots (QD). The basic concept relies on finding a way to develop a large number of smart nanostructures with different electrochemical properties that have molecular-recognition abilities and built-in codes for rapid target identification.

Nanoparticles-based materials are showing to be excellent candidates for electrochemical DNA analysis owing to their many attractive properties [1]. An electrochemical genomagnetic hybridization assay has been developed to take advantage of an efficient magnetic separation/mixing process. Of the developed system couples the magnetic isolation with electrochemical detection of DNA hybridization. The new protocol employs the detection of the cadmium sulphide Quantum Dot label (CdS-QD) linked in a sandwich conjugate formed after the reaction of paramagnetic particle labelled DNA probe with the target and a secondary DNA probe (or signalling probe). Moreover the detection technique uses screen-

printed electrodes and a handheld potentiostatic device with interest for future in-field applications. The detection is based on the stripping of electrochemical reduced cadmium [2] at hybridization solution by using the square wave voltammetry.

References:

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