

ELECTROCHEMICAL GENOSENSORS LABELLED WITH CdS QDs

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The enormous information generated in the Human Genome Project has prompted of DNA sensors and high-density DNA arrays.

Nevertheless 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-molecule types presents in a sample. The existing labelling techniques have several drawbacks; the markers used have short life-time and have a limited number of combinations that practically can be used for simultaneous analysis of various analytes.

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 offer excellent prospects for 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. It represented an example of coupling a magnetic isolation with electrochemical detection of DNA hybridization. The new protocol employs linked sandwich solution hybridization, with a magnetic-particle labeled probe hybridizing to biotinylated DNA probe that captures a streptavidin. A simple method use the detection DNA is based on screen-printed electrodes and handheld potentiostatic device. The detection is based on the stripping of electrochemical reduced cadmium at hybridization solution by using the square wave voltammetry.

References:

- [1] Arben Merkoçi, Sergio Marín, María Teresa Castañeda, Martin Pumera, Josep Ros, Salvador Alegret, *Nanotechnology*, **17** (2006) 2553-2559