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Analytica-2015: Electrochemical DNA biosensors and their potential applications to nanobiotechnology – Seda Nur Topkaya - Ege University

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Electrochemical based biosensors have been recently recognized as potential candidates for the requirements of nanotechnology applications. Sensitive and rapid detection of very few amounts of target nucleic acids (DNA or RNA) in biological matrices has attracted considerable attention from many fields, such as clinical diagnosis, drug researches and environmental analysis. Electrochemical DNA biosensors offer a highly sensitive and promising method for the detection of hybridization, genetic polymorphisms and mutations, alterations of genes and potential drug-DNA interactions because of their short assay time, miniaturization, portability, and low-cost. The main principle of electrochemical DNA biosensors is based on the conversion of hybridization events into the analytical signals via a transducer. The most common way is the direct detection of DNA oxidation signals of guanine bases through voltammetric techniques by evaluating the intrinsic signal changes of bases. Specific DNA/RNA hybridization can also be monitored using selective redox indicators, amperometric techniques, nanomaterials or electrochemical impedance measurements indirectly. Electrochemical based detection methods meet the sensitivity requirements with its picomolar detection limit in real samples and selective for the target DNA/RNA.

Location of ailment at a beginning time is probably the greatest test in medication. Various orders of science are cooperating in such manner. The objective of nanodiagnostics is to give progressively exact devices to prior conclusion, to lessen cost and to rearrange human services conveyance of powerful and customized medication, particularly with respect to interminable infections (e.g., diabetes and cardiovascular sicknesses) that have high medicinal services costs. Cutting-edge results propose that DNA-based nanobiosensors could be utilized adequately to give straightforward, quick, savvy, delicate and explicit discovery of some hereditary, malignancy, and irresistible ailments. What's more, they might be utilized as a stage to recognize immunodeficiency, and neurological and different infections. This survey inspects various kinds of DNA-based nanobiosensors, the fundamental standards whereupon they are based and their focal points and potential in finding of intense and ceaseless infections. We examine ongoing patterns and utilizations of new methodologies for DNA-based nanobiosensors, and underline the difficulties in making an interpretation of essential examination to the clinical research center.

As of late, the field of nanotechnology has quickened the procedure of coordination of different logical fields, along these lines improving the breakdown of limits between definitely known controls. This in the long run prompted the rise of the new interdisciplinary study of nanotechnology and its interrelated science part of nanobiotechnology. Advances and improvements in this branch finished in the building up of nanomedicine, which incorporates among different orders, symptomatic materials and gadgets, atomic imaging, sedate conveyance frameworks and regenerative medication. Amazingly, nanomedicine empowers in vitro and in vivo non-obtrusive determination and focused on treatment by novel disclosures in detecting, preparing, and working procedures. Presently, imaging apparatuses dependent on nanotechnology have been therapeutically applied as non-intrusive strategies for analysis. The classifications of nanodiagnostic advancements, notwithstanding DNA-based nanobiosensors, incorporate nanoproteomic-based diagnostics, nanoparticle-based immunoassays, nanoparticulatebiolabels, nanoscale perception (e.g., filtering test microscopy, checking electron microscopy), biobarcode examines, nanobiotechnology-based, biochips and microarrays, and blends of numerous diagnostics advances.

Biography:
Seda Nur Topkaya has completed his PhD in 2013 at Analytical Chemistry from Faculty of Pharmacy, Ege University, Turkey. She also conducted her PhD researches at Harvard and MIT for 1 year about tissue engineering. Her main research interests are electrochemistry, electrochemical based DNA biosensors, detection of drug-DNA applications and also 2D-3D tissue engineering. She has published more than 10 papers in reputed journals and serving as a reviewer of many international journals.

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