World Academy of Science, Engineering and Technology
International Journal of Biotechnology and Bioengineering
Vol:10, No:01, 2016

Integrated Microsystem for Multiplexed Genosensor Detection of Biowarfare Agents

Authors : Samuel B. Dulay, Sandra Julich, Herbert Tomaso, Ciara K. O'Sullivan

Abstract : An early, rapid and definite detection for the presence of biowarfare agents, pathogens, viruses and toxins is required in different situations which include civil rescue and security units, homeland security, military operations, public transportation securities such as airports, metro and railway stations due to its harmful effect on the human population. In this work, an electrochemical genosensor array that allows simultaneous detection of different biowarfare agents within an integrated microsystem that provides an easy handling of the technology which combines a microfluidics setup with a multiplexing genosensor array has been developed and optimised for the following targets: Bacillus anthracis, Brucella abortis and melitensis, Bacteriophage lambda, Francisella tularensis, Burkholderia mallei and pseudomallei, Coxiella burnetii, Yersinia pestis, and Bacillus thuringiensis. The electrode array was modified via co-immobilisation of a 1:100 (mol/mol) mixture of a thiolated probe and an oligoethyleneglycol-terminated monopodal thiol. PCR products from these relevant biowarfare agents were detected reproducibly through a sandwich assay format with the target hybridised between a surface immobilised probe into the electrode and a horseradish peroxidase-labelled secondary reporter probe, which provided an enzyme based electrochemical signal. The potential of the designed microsystem for multiplexed genosensor detection and cross-reactivity studies over potential interfering DNA sequences has demonstrated high selectivity using the developed platform producing high-throughput.

Keywords : biowarfare agents, genosensors, multipled detection, microsystem
Conference Title : ICNA 2016 : International Conference on Nucleic Acids
Conference Location : Singapore, Singapore
Conference Dates : January 07-08, 2016

Open Science Index, Biotechnology and Bioengineering Vol:10, No:01, 2016 publications.waset.org/abstracts/42951.pdf