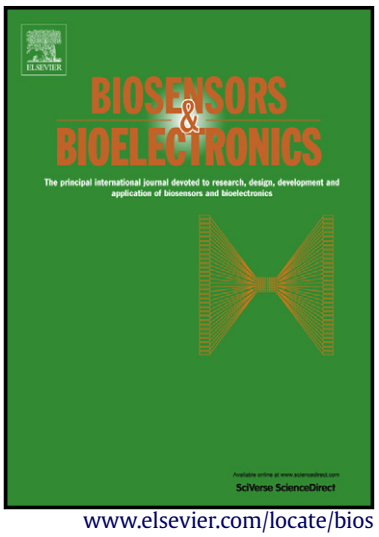

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Yit Lung Khung, Dario Narducci

PII: S0956-5663(13)00430-2
DOI: http://dx.doi.org/10.1016/j.bios.2013.06.033
Reference: BIOS6024

To appear in: *Biosensors and Bioelectronics*

Received date: 8 March 2013
Revised date: 6 June 2013
Accepted date: 17 June 2013

Cite this article as: Yit Lung Khung, Dario Narducci, Synergizing Nucleic acid Aptamers with 1-dimensional Nanostructures as label-free Field-effect transistor biosensors, *Biosensors and Bioelectronics,* http://dx.doi.org/10.1016/j.bios.2013.06.033

Review

Synergizing Nucleic acid Aptamers with 1-dimensional Nanostructures as label-free Field-effect transistor biosensors

Yit Lung Khung[1] and Dario Narducci[1*]

[1] University of Milan-Bicocca,
Department of Materials Science
Via R. Cozzi 53, I-20125 Milan (Italy)

[*]Corresponding Author:
Professor Dario Narducci
dario.narducci@unimib.it
phone +39-02-6448-5137
fax +39-02-6448-5400

Abstract

Since the introduction by Gold et al. in 1990, nucleic acid aptamers had evolved to become a true contender in biosensors for protein and cell detections. Aptamers are short strands of synthetically designed DNA or RNA oligonucleotides that can be self-assembled into unique 3-dimensional structures and can bind to different proteins, cells or even small molecules at a high level of specificity and affinity. In recent years, there had been many reports in literature in using aptamers in place of conventional antibodies as capture biomolecules on the surface. This is mainly due to the better thermal stability properties and ease in production. Consequently, also these characteristics allowed the aptamers to find use in field effect transistors (FETs) based upon 1D nanostructured (1D−NS) as label-free biosensing. In terms of designing label-free platforms for biosensors applications, 1D−NS FET had been an attractive option due to reported high sensitivities toward protein targets arising from the large surface area for detection as well as to their label-free nature. Since the first aptamer-based 1D−NS FET biosensor had surfaced in 2005, there had been many more improvements in the overall