
Oligonucleotide-based signal amplification for ultrasensitive electrochemical biosensor

Abdel-Nasser Kawde

Center of Excellence in Nanotechnology, and Chemistry Department,
Faculty of Sciences,
King Fahd University of Petroleum and Minerals,
Dhahran 31261, KSA
and
Chemistry Department, Faculty of Science,
Assiut University,
Assiut 71516, Egypt
E-mail: akawde@kfupm.edu.sa

Abstract: There is a need for an inexpensive, non-invasive and quick investigation with high sensitivity and specificity for early and accurate diagnosis of cancers. The present amplified bioassay takes advantage of the state-of-the-art electrical DNA detection methods, including the highly sensitive stripping response based on the intrinsic electroactivity of guanine and adenine nucleobases, and the amplification potential of latex microspheres carrying numerous oligonucleotide tags. The dramatic signal amplification advantage of this type of detection has been combined with efficient magnetic removal of non-complementary DNA for maximum selectivity, use of microlitre sample volumes and disposable transducers. The advantages of this procedure were demonstrated by its application in the detection of DNA segments related to the BRCA1 breast cancer gene.

Keywords: biosensor; signal amplification; breast cancer gene detection; intrinsic electroactivity of nucleic acids; DNA hybridisation detection; oligonucleotides; nano-tags.

Reference to this paper should be made as follows: Kawde, A-N. (2011) 'Oligonucleotide-based signal amplification for ultrasensitive electrochemical biosensor', *Int. J. Biomedical Nanoscience and Nanotechnology*, Vol. 2, No. 2, pp.177–186.

Biographical notes: Abdel-Nasser Kawde received his BS (1991) and MS (1996) in Chemistry from Assiut University; he completed his PhD in Electroanalytical Chemistry at NMSU (2003). He holds an Assistant Professor position at Assiut University since 2003. On October 2004, he left to work as Associate Researcher at Arizona State University. On April 2006, he moved to California to work as Electrochemist for a medical company. On September 2007, he joined KFUPM, where he is currently an Assistant Professor of Chemistry. He has co-authored 30 scientific publications and US patents. His current research focuses on the development of electrochemical sensors and biosensors.