

TOPIC: Biosensors in Food Analysis

Marco MASCINI



Address:

University of Firenze
Department of Chemistry
Florence
Italy

Present position:

A full Professor position teaching Analytical Chemistry with research activity in biosensors development

BIOGRAPHY

HIGHLIGHTS

- Development of biosensor of many different applications in the field of environmental and food analysis and clinical analytical chemistry
- Analytical Chemistry with ion selective electrodes and gas electrochemical sensors. The use of enzymes as analytical reagents. Biosensors. Immobilized enzymes, enzyme electrodes, immunochemistry, enzymology, optical fibers for application in chemical sensors or optrodes.
- Development of new immobilization chemistries of biomolecules on transducer surfaces for the biosensor development.

EDUCATION

- Graduate in Chemistry (Dottore in Chimica) 25/Jul/1963 with 110/110 cum laude at the University of Roma (Italy).
- Assistant Professor in the period 1963-1983.
- Professor of Quantitative Chemistry in the period 1970-1983.
- Associate Professor of Analytical Chemistry at the II University of Roma Tor Vergata from 1983 till 1986.
- Full Professor of Analytical Chemistry at the University of Firenze from 1986 until present.
- Coordinator of PhD courses in Environmental Sciences.
- Visiting Professor (invited) in Cranfield Biotechnology Centre (UK), 1996-09

TECHNICAL SKILLS

- Application of modern electrochemical modern techniques (DPV, PSA, etc.), ISE, optical spectroscopy, immobilization chemistries, Surface Plasmon Resonance, piezoelectric sensing. DNA Biosensors , DNA Chips

TEACHING EXPERIENCES

- Currently supervising many undergraduate and PhD students at Florence University.
- Teaching Analytical Chemistry, Clinical Analytical Chemistry, Electroanalytical Chemistry.

PUBLICATIONS

- More than 400 papers and several reviews on the subjects listed.

HONORS

- Award of the 5th International Conference on Chemical Sensors for Biosensors (July 11-14, 1994, Roma Italy).
- Laurea Honoris Causa from University of Bucharest , September 2007
- Canneri Medal from The Analytical Chemistry Division , SCI July 2009

ABSTRACT

Aptamers for the Food Analysis

Marco Mascini^{1*}

¹ University of Firenze

* Corresponding author - E-mail: marco.mascini@unifi.it; Phone: +390554573283;

Fax: +390554573384

So far, several bio-analytical methods have used nucleic acid probes to detect specific sequences in RNA or DNA targets through hybridisation. More recently, specific nucleic acids, aptamers, selected from random sequence pools, have been shown to bind non-nucleic acid targets, such as small molecules or proteins. The development of *in vitro* selection and amplification techniques has allowed the identification of specific aptamers, which bind to the target molecules with high affinity. Many small organic molecules with molecular weights from 100 to 10000 Da have been shown to be good targets for selection. Moreover, aptamers can be selected against difficult target haptens, such as toxins or prions. The selected aptamers can bind to their targets with high affinity and even discriminate between closely related targets.

Aptamers can thus be considered as a valid alternative to antibodies or other bio-mimetic receptors, for the development of biosensors and other analytical methods. The production of aptamers is commonly performed by the SELEX (Systematic Evolution of Ligands by Exponential Enrichment) process, which, starting from large libraries of oligonucleotides, allows the isolation of large amounts of functional nucleic acids by an iterative process of *in vitro* selection and subsequent amplification through polymerase chain reaction.

Aptamers are suitable for applications based on molecular recognition as analytical, diagnostic and therapeutic tools. In this review, the main analytical methods which have been developed using aptamers, will be discussed together with an overview on the aptamer selection process.

Keywords: aptamers, biosensors, analytical electrochemistry