Aiguo Wu, Waheed S. Khan (Eds.): Nanobiosensors: from design to applications

Lothar Leidner¹

© The Author(s) 2020

Bibliography

Nanobiosensors: from design to applications
Aiguo Wu, Waheed S. Khan (Eds.)
Wiley-VCH
ISBN: 978-3-527-34510-6
Hardcover, 416 pages
March 2020, £125/
€149.00

Book's topic Nanobiosensors are used for the detection and sometimes quantitative measurement of bioanalytes. Applications range from biomarker detection and other diagnostics in medicine, epidemiology, environmental pollution detection, etc. The conventional way (and mostly the gold standard) to analysis is laboratory evaluation with well-known drawbacks like sample preparation (e.g., PCR), need of sophisticated equipment, and experienced personnel. Laboratory analysis is time-consuming and expensive. To circumvent these difficulties, different kinds of biosensors are being developed around the world. Biosensors produce fast

results and are simple and inexpensive. Miniaturization reduces volume (and thus sample quantity). Physical laws in nanosized volumes often differ from their macroscopic counterpart.

Nanobiosensors: from design to applications gives an introduction into this world. Different kinds of analytic devices are presented, consisting of biological recognition elements and electrochemical, optical, piezoelectric, thermometric, or magnetic transducers. Important fields of application are introduced. Although not directly mentioned in the book, biosensors can contribute to COVID-19 epidemic research.

Contents The first four chapters focus on the basics of biosensor design and further development including new materials and biomarkers. The vast majority of the book deals with applications. Biosensors are designed to play a major role in clinical diagnostics, such as cancer and bacterial and viral detection including HIV. There are examples in the field of food quality (mycotoxins) and drug detection. Epidemiological issues are introduced in case of avian influenza and swine virus. Monitoring of environmental parameters, such as pesticides and marine toxins, is discussed. Smartphone-based devices have great potential as point-of-care platforms for healthcare, food safety, environmental monitoring, and biosecurity. The final chapter reflects the use of smartphones in the field of bio-sensing.

Comparison with the existing literature Books about nanobiosensors exist since more than 15 years. To have a look into older ones gives some historical view of the progress made in the last decade and the changes in perspective. *Current trends in nanobiosensor technology*, edited by Bellan, Wu, and Langer (Wiley, 2011), falls into this category. In 2015, *Nanobiosensors and nanobioanalyses*, edited by Vestergaard, Kerman, Hsing, and Tamiya (Springer), was published, which gives a comprehensive overview of biosensors and their applications and future trends in the

✉ Lothar Leidner
lothar.leidner@ipc.uni-tuebingen.de

¹ Eberhard Karls Universität Tübingen, Mathematisch-Naturwissenschaftliche Fakultät, Institut für Physikalische und Theoretische Chemie, Arbeitskreis Prof. Gauglitz Auf der Morgenstelle 18, D-72076 Tübingen, Germany

development. A newer book specialized in healthcare is *Advanced biosensors for health care applications advanced biosensors for health care applications*, edited by Inamuddin, Khan, Mohammad, and Asiri (Elsevier, 2019). Novel strategies for developing new systems to retrieve health information of patients in real time are presented.

Critical assessment There is a tremendous amount of research done in the field of nanobiosensors by a great number of international researchers. Looking at Google Scholar, one gets more than 10,000 references within the last decade. The fifteen chapters of the book at hand offer a wisely chosen, but necessarily subjective selection of sensor designs and applications introduced by experienced authors. More than thousand references are added for further reading. Nevertheless, it would have been enlightening, if the editors had mentioned criteria for their selection of topics and motivation in an introduction.

Because different chapters have been written by different authors, there is some redundant information in some places. This has the advantage, however, that the book does not have to be worked through from front to back, but can be read in the order of one's own interest.

Readership recommendation The book gives an introduction for students, who want to get involved in the field of biosensors. As sensor development is a multi-disciplinary task, even

the experienced researcher will find interesting information in fields slightly away from his own competence.

Summary *Nanobiosensors* gives an overview over many biosensing techniques based on nanotechnology. The book covers both sensing principles and their application in the fields of personal health care, drug discovery, epidemiology, and environmental issues. It offers an introduction for researchers, who want to get involved in the field of biosensors.

Funding Open access funding provided by Open Access funding enabled and organized by Projekt DEAL.

Open Access This article is licensed under a Creative Commons Attribution 4.0 International License, which permits use, sharing, adaptation, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons licence, and indicate if changes were made. The images or other third party material in this article are included in the article's Creative Commons licence, unless indicated otherwise in a credit line to the material. If material is not included in the article's Creative Commons licence and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder. To view a copy of this licence, visit <http://creativecommons.org/licenses/by/4.0/>.

Publisher's note Springer Nature remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.