

Book Review

Biotechnology, Research and Application

Edited by J. Gavora, D. F. Gerson, J. Luong, A. Storer and J. H. Woodley, published by Elsevier Applied Science, Amsterdam, 1988, 321 pp., ISBN 1-85106-270-7.

This book contains the papers presented at the 'Canbiocon 1988' International Conference, held at the Palais de Congrès, Montreal, Quebec, Canada, April 12–14, 1988. The contents are divided into four distinguishable parts: Agricultural Biotechnology, Bioengineering and Bioprocessing, Biosensors, and Biotechnology and Business, of which the Biosensors section, containing nine papers, is the most interesting to the readers of *Sensors and Actuators*.

The section on Biosensors starts with a paper concerning the more general aspects of the use of sensors in biotechnology, such as the required reliability over a long period, the required sterility and the prevention of precipitation problems caused by the complex environment with a very high protein content. As an example, the problems related to the measurement of pH, pO₂, pCO₂ and cell mass in a fermentation process are discussed.

A number of papers, not in the sequence given here, are devoted to the investigation and application of neuroreceptors for biosensing. Intrinsic signal amplification is mentioned as an attractive feature of receptor-based biosensors. The binding of only one molecule of material can lead to the influx of many ions through an activated ion channel. However, it is difficult up to now to extract neuroreceptors from animal tissue. As an example of the potentiality of this type of biosensor, one of the papers describes the oscillation of ion currents through a bilayer lipid membrane; this is caused by the selective interaction of the lectin Con A with glycogen. It could be proved that the frequency of oscillation was reproducibly dependent on the relative concentrations of Con A and glycogen, even at sub-nanomolar concentrations. Another paper describes the operation of an intrinsic

optrode, consisting of a quartz optical fibre with an adsorbed monolayer of fluorescent Py-Con A, whose fluorescence spectrum could clearly be detected. The authors of both papers intend in the future to replace the Con A by actual neuroreceptors.

A new approach for electrochemical detection of biomolecules is the investigation of the adsorption of biotin and avidin-modulated biotin onto polycrystalline gold electrodes by means of a.c. impedance measurements. The biotin/avidin complex formation could be monitored as a significant variation in electrode capacity. Another paper describes an improved version of the well-known amperometric glucose sensor due to the application of platinized carbon paper as the electrode on which the glucose oxidase has been immobilized. No specific mediator appears to be necessary, while nevertheless no dependence on oxygen concentration was observed.

For the measurement of gaseous pollutants, for the first time the possible use of protein coatings on piezoelectric crystals is described. As an example, it is demonstrated that immobilized cholinesterase and parathion antibodies can be used in this way for the detection of organophosphorous pesticides at the ppb level.

In the FET area, the construction and application of a nitrate-sensitive ISFET are described. The membrane consists of a quaternary ammonium salt, mixed with dibutylphthalate. The reported detection limit is 3×10^{-5} M.

Finally, the Biosensors section contains a paper in which the use of enzyme thermistors and hydrogen- and ammonia-sensitive FETs is extensively reviewed.

Being a conference proceedings, the book is composed of camera-ready contributions, with the unavoidable differences in typesetting and layout; however, this is not a problem in reading. This can unfortunately not be said with respect to annoying mistakes in the texts of non-English authors. The touch of a professional Elsevier editor is obviously missing.

P. Bergveld