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## Book reviews

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**Biosensor Technology: Fundamentals and Applications.** R.P. Buck, E.F. Bowden, M. Umaña and W.E. Hatfield (Editors). Marcel Dekker, New York, 1990, x + 408 pp, \$99.75 (USA/Canada) or \$119.50 (elsewhere).

This book constitutes the hard copy of papers presented at an eponymous Symposium held at the University of North Carolina in September 1989. As such, its contributions are as up-to-date as one may expect. The coverage is dominated by North American authors, which serves to show that, after something of a sluggish start, the subject of biosensor technology is being pursued with vigour and imagination by many scientists across the Atlantic, their eyes set firmly of the production of usable devices.

Although the major technologies covered are, as usual, electrochemically based (both potentiometric and amperometric, but not impedimetric), there is here an almost equal coverage of optical and acoustically-based sensors. In an overview chapter, Buck comments that although sensors have been known (and successfully commercialised) for many years, it is the availability of new technology, coupled to better communications between biologists, chemists and physicists, that has made the modern biosensor field such an active one. Certainly, reading these papers shows one that in many cases we are well past the research phase and well into the development phase of the production of a great many sensors which have thus far remained at the laboratory stage. Thus, Janata gives a thoughtful survey of the problems which have plague ISFETs over the years, and of the means by which many of these have now been largely solved.

Given the activity in the field, one should not expect symposia like these to be full of real novelties (and I did not find many); a continuous accretion of knowledge is more to be expected. However, Aizawa's elegant homogenous immunosensor based on electrochemical luminescence detected by a fibre-optic electrode was new to me.

As more of an electrochemist, it was in the non-electrochemical sections that I found the most interesting work, in particular a quite beautiful study by Andrade and colleagues using the atomic force microscope, which allowed them to demonstrate, by real-time imaging, that the deposition of IgG onto freshly cleaved mica occurred cooperatively. Dessy et al. also described three clever means by which to detect heat generation by immobilised enzymes, each of which seems to hold promise for commercialisation. Indeed, several papers show that fibre optic-based approaches are probably the route of choice for generating remote-sensing devices.

Overall, I can recommend this book to those who want an overview of what is going on in the biosensor world, and would conclude that whilst most present devices continue to be electrochemical, the optically-based sensors are coming up hard on the fast track.

D.B. KELL  
Aberystwyth

Beams, Waves, Fields, Reasons and Effects on Environment and Health (in German). Norbert Leitgeb. Georg Thieme Verlag, Stuttgart, 1990, ISBN 3-13-750601-8, xii + 310 pp., DM 16.80.

From a detailed technical point of view all chapters are clearly written, contain fundamental knowledge, and an abundance of data, schemes and diagrams. Chapters 1: Static electricity, e.g. atmospheric discharges. 2. Low frequency electric fields, e.g. electrifying. 3. Magnetostatic fields, e.g. utilized in the tomograph. 4. Low frequency magnetic fields, e.g. inductions. 5. High frequency emission, e.g. RADAR, micro-waves. 6. Optical radiation: IR–UV. 7. Ionisation radiation: X-rays. 8. Earth radiation, -beyond physics?

Of considerable interest are possible biological consequences which can be outlined under the subtitle: "Effects on environment and health" some examples are: Chapter 1, a broad description of dangerous effects is presented in terms of current densities. Chapter 2, strong effects in the surface and inside the body, especially on the heart (shock, heat). Chapter 3, effects on orientation by some animals (particularly migrating birds). For chemical changes fields of  $> 6$  T are necessary. Chapter 4 covers irritations, optical illusions and magnetophenes for fields of the order of mT or at  $> 1 \mu\text{A cm}^{-2}$ . Chapter 5 describes the heat effects, Ca release in the brain, and mentions that no chronic diseases occur at emissions  $< 15 \mu\text{W/cm}^2$ . Chapter 6 mentions skin reddening, damage of retina, skin cancer as effects of excessive radiation. The many risks associated with radical production are also mentioned.

In chapter 4 (pp. 125–127) the epidemic and laboratory results on carcinogenesis are mentioned only briefly, which is in sharp contrast to warnings voiced in recent studies from USA, e.g. ELF electromagnetic fields: The question of "Cancer" (Battelle Press, 1990), "Electromagnetic biointeraction" (Plenum Press, 1990) reviewed in this Journal (24 (1990) 377). Nevertheless this monograph represents a competent counterpart to the "Veröffentlichungen der Strahlenschutzkommission Bd. 16: Nichtionisierende Strahlung" (Gustav Fischer V., 1990).

H. BERG  
Jena