Chemical Sensors And Biosensors For Medical And Biological Applications

Recent advances in nanotechnology has led the nanomaterials into the realm of sensing applications. This descriptive book utilizes a multi-disciplinary approach to provide extensive information about sensors and elucidates the impact of nanotechnology on development of chemical and biosensors for diversified applications. The main focus of this book is not only the inclusion of various research works, which have already been reported in literature, but also to make a potential conclusion about the mechanism behind this. This book will serve as an invaluable tool for both frontline researchers and academicians to work towards the future development of nanotechnology in sensing devices.

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The Handbook of Chemical and Biological Sensors focuses on the development of sensors to recognize substances rather than physical quantities. This fully inclusive book examines devices that use a biological sensing element to detect and measure chemical and biological species as well as those that use a synthetic element to achieve a similar result. A first port of call for anyone with a specific interest, question, or problem relating to this area, this comprehensive source of reference serves as a guide for practicing scientists and as a text for many graduate courses. It presents relevant physics to chemists, chemistry to materials scientists, materials science to electronic engineers, and fabrication technology to all of the above. In addition, the handbook is useful both to newcomers and to experienced researchers who wish to broaden their knowledge of the constituent disciplines of this wide-ranging field.

Electrochemical Biosensors summarizes fundamentals and trends in electrochemical biosensing. It introduces readers to the principles of transducing biological information to measurable electrical signals to identify and quantify organic and inorganic substances in samples. The complexity of devices related to biological matrices makes this challenging, but this measurement and analysis are critically valuable in biotechnology and medicine. Electrochemical biosensors combine the sensitivity of electroanalytical methods with the inherent bioselectivity of the biological component. Some of these sensor devices have reached the commercial stage and are routinely used in clinical, environmental, industrial and agricultural applications. Describes several electrochemical methods used as detection techniques with biosensors Discusses different modifiers, including nanomaterials, for preparing suitable pathways for immobilizing biomaterials at the sensor Explains various types of signal monitoring, along with several recognition systems, including antibodies/antigens, DNA-based biosensors, aptamers (protein-based), and more

Fundamentals

Technology and Performance

Disposable And Flexible Chemical Sensors And Biosensors Made With Renewable Materials

Engineering and Technology

Chemical Sensors and Biosensors

Electrochemical Sensors: From Working Electrodes to Functionalization and Miniaturized Devices provides an overview of the materials, preparation and fabrication methods for biosensor applications. The book introduces the field of electrochemistry and its fundamentals, also providing a practical overview of working electrodes as key components for the implementation of sensors and assays. Features covered include the prompt transfer of electrons, favorable redox behavior, biocompatibility, and inertness in terms of electrode fouling. Special attention is dedicated to analyzing the various working materials systems for electrodes used in electrochemical cells such as gold, carbon, copper, platinum and metal oxides. This book is suitable for academics and practitioners working in the disciplines of materials science and engineering, analytical chemistry and biomedical engineering. Introduces key concepts for electrochemistry and biosensors Reviews the most common and emerging materials-based electrodes for sensor applications, including gold, carbon, platinum and metal oxides Discusses both macro and miniaturized electrodes, including their cleaning, engineering, fabrication, examples of working biosensors, and advantages and disadvantages

Covering the huge developments in sensor technology and electronic sensing devices that have occurred in the last 10 years, this book uses an open learning format to encourage reader understanding of the subject. An invaluable distance learning book Applications orientated providing invaluable aid for anyone wishing to use chemical and biosensors Key features and subjects covered include the following: Sensors based on both electrochemical and photometric transducers Mass-sensitive sensors Thermal-sensitive sensors Performance factors for sensors Examples of applications Detailed case studies of five selected sensors 30 discussion questions with worked examples and 80 self-assessment questions 140 explanatory diagrams An extensive bibliography

This book presents an exhaustive overview of electrochemical sensors and biosensors for the analysis and monitoring of the most important analytes in the environmental field, in industry, in treatment plants and in environmental research. The chapters give the reader a comprehensive, state-of-the-art picture of the field of electrochemical sensors suitable to environmental analytes, from the theoretical principles of their design to their implementation, realization and application. The first three chapters discuss fundamentals, and the last three chapters cover the main groups of analytes of environmental interest.

The central goal of this book is to broadly review the modem techniques and significant applications of chemical sensors and biosensors. Chapters are written by experts in the field – including Professor Joseph Wang, the most cited scientist in the world and renowned expert on sensor science who is also co-editor. Each chapter provides technical details beyond the level found in typical journal articles, and explores the application of chemical sensors and biosensors to a significant problem in biomedical science, also providing a prospectus for the future. This book compiles the expert knowledge of many specialists in the construction and use of chemical sensors and biosensors including nitric oxide sensors, glucose sensors, DNA sensors, hydrogen sulfide sensors, oxygen sensors, superoxide sensors, immuno sensors, lab on chip, implatable microsensors, et al. Emphasis is laid on practical problems, ranging from chemical application to biomedical monitoring and from in vitro to in vivo, from single cell to animal to human measurement. This provides the unique opportunity of exchanging and combining the expertise of otherwise apparently unrelated disciplines of chemistry, biological engineering, and electronic engineering, medical, physiological. The reader is not only provided with user-oriented guidelines for the proper choice and application of new chemical sensors and biosensors, but also with new methodological advancements related to and correlated with the measurement of interested species in biomedical samples. Many case studies are included to illustrate the range of application and importance of the chemical sensors and biosensors. Provides with user-oriented guidelines for the proper choice and application of new chemical sensors and biosensors Details new methodological advancements related to and correlated with the measurement of interested species in biomedical samples Contains many case studies to illustrate the range of application and importance of the chemical sensors and biosensors

Optical Sensors

Volume 1

Surface Plasmon Resonance Based Sensors

Wearable Physical, Chemical and Biological Sensors

Recent progress in the synthesis of nanomaterials and our fundamental understanding of their properties has led to significant advances in nanomaterial-based gas, chemical and biological sensors. Leading experts around the world highlight the latest findings on a wide range of nanomaterials including nanoparticles, quantum dots, carbon nanotubes, molecularly imprinted nanostructures or plastibodies, nanometals, DNA-based structures, smart nanomaterials, nanoprobes, magnetic nanomaterials, organic molecules like phthalocyanines and porphyrins, and the most amazing novel nanomaterial, called graphene. Various sensing techniques such as nanoscaled electrochemical detection, functional nanomaterial-amplified optical assays, colorimetry, fluorescence and electrochemiluminescence, as well as biomedical diagnosis applications, e.g. for cancer and bone disease, are thoroughly reviewed and explained in detail. This volume will provide an invaluable source of information for scientists working in the field of nanomaterial-based technology as well as for advanced students in analytical chemistry, biochemistry, electrochemistry, material science, micro- and nanotechnology.

This book discusses in detail the analysis and monitoring of the most important analytes in the environmental field. It also reviews the implementation, realization and application of sensor designs mentioned in the first volume of this set, dividing the coverage into global parameters, sensors of organics and sensors of inorganics.

Traditional biological sensors, based on enzymatic receptors and potentiometric or amperometric transducers are well reviewed and are nowadays even included extensively in many textbooks. The editors of this volume, the 2nd in the new Springer Series on Chemical and Biosensors, have focussed exclusively on alternative types of chemical and biological sensors or sensor-like structures. Special attention is given to sensor principles based on the use of linear or non-linear impedance spectroscopy. After self-assembled monolayers have become a viable technology for the immobilization of organic molecules on electrodes and for the formation of covalently stabilized receptor layers and even more sophisticated organic nano- and microstructures, this has led to the development of numerous analytical applications of impedometric sensor methods. These new and very promising types of sensors, their technology and performance in real world applications form the main topic of this book written by leading experts from around the world.

For the first time, distinguished scientists from key institutions worldwide provide a comprehensive approach to optical sensing techniques employing the phenomenon of guided wave propagation for chemical and biosensors. This includes both state-of-the-art fundamentals and innovative applications of these techniques. The authors present a deep analysis of their particular subjects in a way to address the needs of novice researchers such as graduate students and post-doctoral scholars as well as of established researchers seeking new avenues. Researchers and practitioners who need a solid foundation or reference will find this work invaluable. This second of two volumes covers the incorporation of periodic structures in waveguides to exploit the Bragg phenomenon, optical fiber sensors, hollow waveguides and micro-resonators as well as a review of the tremendous expansion of terahertz technology for sensing applications.

Fiberoptic Chemical Sensors and Biosensors

Electrochemical Sensors, Biosensors and Their Biomedical Applications

Nanosensors for Chemical and Biological Applications

Sensing with Nanotubes, Nanowires and Nanoparticles

Materials for Chemical Sensing

Wearable Physical, Chemical and Biological Sensors introduces readers of all backgrounds—chemistry, electronics, photonics, biology, microfluidics, materials, and more—to the fundamental principles needed to develop wearable sensors for a host of different applications. The capability to continuously monitor organ-related biomarkers, environmental exposure, movement disorders, and other health conditions using miniaturized devices that operate in real time provides numerous benefits, such as avoiding or delaying the onset of disease, saving resources allocated to public health, and making better decisions on medical diagnostics or treatment. Worn like glasses, masks, wristwatches, fitness bands, tattoo-like devices, or patches, wearables are being boosted by the Internet of Things in combination with smart mobile devices. Besides, wearables for smart agriculture are also covered. Written by experts in their respective fields, Wearable Physical, Chemical and Biological Sensors provides insights on how to design, fabricate, and operate these sensors. Provides a holistic view of the field, covering physical, chemical, and biosensing approaches along with the advantages of their various functionalities Covers all necessary elements for developing wearable sensors, including materials, biorecognition elements, transductions systems, signal amplification strategies, and system design considerations Each chapter includes examples, summaries, and references for further reading

This is a comprehensive treatment of the field of SPR sensors, in three parts. Part I introduces principles of surface plasmon resonance bio-sensors, electromagnetic theory of surface plasmons, theory of SPR sensors and molecular interactions at sensor surfaces. Part II examines the development of SPR sensor instrumentation and functionalization methods. Part III reviews applications of SPR biosensors in the study of molecules, and in environmental monitoring, food safety and medical diagnostics.

Chemical sensors are in high demand for applications as varied as water pollution detection, medical diagnostics, and battlefield air analysis. Designing the next generation of sensors requires an interdisciplinary approach. The book provides a critical analysis of new opportunities in sensor materials research that have been opened up with the use of combinatorial and high-throughput technologies, with emphasis on experimental techniques. For a view of component selection with a more computational perspective, readers may refer to the complementary volume of Integrated Analytical Systems edited by M. Ryan et al., entitled "Computational Methods for Sensor Material Selection".

This book broadly reviews the modem techniques and significant applications of chemical sensors and biosensors. Chapters are written by experts in the field – including Professor Joseph Wang, the most cited scientist in the world and renowned expert on sensor science who is also co-editor. Each chapter provides technical details beyond the level found in typical journal articles, and explores the application of chemical sensors and biosensors to a significant problem in biomedical science, also providing a prospectus for the future. This book compiles the expert knowledge of many specialists in the construction and use of chemical sensors and biosensors including nitric oxide sensors, glucose sensors, DNA sensors, hydrogen sulfide sensors, oxygen sensors, superoxide sensors, immuno sensors, lab on chip, implatable microsensors, et al. Emphasis is laid on practical problems, ranging from chemical application to biomedical monitoring and from in vitro to in vivo, from single cell to animal to human measurement. This provides the unique opportunity of exchanging and combining the expertise of otherwise apparently unrelated disciplines of chemistry, biological engineering, and electronic engineering, medical, physiological. Provides user-oriented guidelines for the proper choice and application of new chemical sensors and biosensors Details new methodological advancements related to and correlated with the measurement of interested species in biomedical samples Contains many case studies to illustrate the range of application and importance of the chemical sensors and biosensors

Electrochemical Sensors

Electrochemical Sensors, Biosensors and their Biomedical Applications

Fundamentals and Applications

Fundamentals, Materials and Applications

Applications of Nanomaterials in Sensors and Diagnostics

This book covers the full scope of biochemical sensors and offers a survey of the principles, design and applications of the most popular types of biosensing devices. It is presented in 19 chapters, written by 20 distinguished scientists as well as their co-workers. The topics include the design of signal transducers, signal tags and signal amplification strategies, the structure of biosensing interfaces with new biorecognition elements such as aptamers and DNAzymes, and different newly emerging nanomaterials such as Au nanoclusters, carbon nitride, silicon, upconversion nanoparticles and two-dimensional materials, and the applications in wearable detections, biofuel cells, biomarker analyses, bioimaging, single cell analysis and in vivo sensing.By discussing recent advances, it is hoped this book will bridge the common gap between research literature and standard textbooks. Research into biochemical sensors and their biomedical applications is proceeding in a number of exciting directions, as reflected by the content. This book is published in honor of the 90th birthday of Professor Shaojun Dong, who performed many pioneering studies on modified electrodes and biochemical sensors.

With their similarity to the organs of the most advanced creatures that inhabit the Earth, sensors are regarded as being the "senses of electronics": arti?cial eyes and ears that are capable of seeing and hearing beyond the range of - man perception; electronic noses and tongues that can recognise odours and ?avours without a lifetime training; touch that is able not only to feel the texture and temperature of the materials but even to discern their chemical compo- tion. Among the world of chemical sensors, optical devices (sometimes termed "optodes", from the Greek "the optical way") have reached a prominent place in those areas where the features of light and of the light-matter interaction show their advantage: contactless or long-distance interrogation, detection sensitivity, analyte selectivity, absence of electrical interference or risks, and lack of analyte consumption, to name just a few. The introduction of optical ?bres and integrated optics has added more value to such sensing since now light can be con?ned and readily carried to dif?cult-to-reach locations, higher information density can be transported, indicator dyes can be immobilised at the distal end or the evanescent ?eld for unique chemical and biochemical sensing (including multiplexed and distributed measurements), optical s- sors can now be subject to mass production and novel sensing schemes have been established (interferometric, surface plasmon resonance, ?uorescence energy transfer, supramolecular recognition . . .).

A biosensor is a detecting device that combines a transducer with a biologically sensitive and selective component. Biosensors can measure compounds present in the environment, chemical processes, food and human body at low cost if compared with traditional analytical techniques. This book covers a wide range of aspects and issues related to biosensor technology, bringing together researchers from 16 different countries. The book consists of 24 chapters written by 76 authors and divided in three sections: Biosensors Technology and Materials, Biosensors for Health and Biosensors for Environment and Biosecurity.

Do not learn the tricks of the trade, learn the trade I started teachinggraduate coursesin chemical sensors in early 1980s, ?rst as a o- quarter (30 h) class then as a semester course and also as several intensive, 4–5-day courses. Later I organized my lecture notes into the ?rst edition of this book, which was published by Plenum in 1989 under the title Principles of Chemical Sensors. I started working on the second edition in 2006. The new edition of Principles of Chemical Sensors is a teaching book, not a textbook. Let me explain the difference. Textbooks usually cover some more or less narrow subject in maximum depth. Such an approach is not possible here. The subject of chemical sensors is much too broad, spanning many aspects of physical and analytical chemistry, biochemistry, materials science, solid-state physics, optics, device fabrication, electrical engine- ing, statistical analysis, and so on. The challengefor me has been to present uniform logical coverage of such a large area. In spite of its relatively shallow depth, it is intended as a graduate course. At its present state the amount of material is more thancan be coveredin a one-semestercourse (45h). Two one-quartercourseswould be more appropriate. Because of the breadth of the material, the sensor course has a somewhat unexpected but, it is hoped, bene?cial effect.

Optical Chemical Sensors and Biosensors

Opportunities in Biotechnology for Future Army Applications

Novel Principles and Techniques

Chemical, Gas, and Biosensors for Internet of Things and Related Applications

Principles of Chemical Sensors

Since four decades, rapid detection and monitoring in clinical and food diagnostics and in environmental and biodefense have paved the way for the elaboration of electrochemical biosensors. Thanks to their adaptability, ease of use in relatively complex samples, and their portability, electrochemical biosensors now are one of the mainstays of analytical chemistry. In particular, electrochemistry has played a pivotal role in the development of transduction methods for biological processes and biosensors. In parallel, the explosion of activity in nanoscience and nanotechnology and their huge success have profoundly affected biosensor technology, opening new avenues of research for electrode materials and transduction. This book provides an overview of biosensors based on amperometry, conductimetry, potentiometry, square-wave voltammetry, impedance, and electrochemiluminescence and describes the use of ultramicroelectrodes for the real-time monitoring and understanding of exocytosis. Areas of particular interest are the use of silver and gold nanoparticles for signal amplification, photocurrent transduction, and aptamer design. Moreover, advanced insights in the innovative concept of self-powered biosensors derived from biofuel cells are also discussed.

Fluorescence is the most popular technique in chemical and biological sensing and this book provides systematic knowledge of basic principles in the design of fluorescence sensing and imaging techniques together with critical analysis of recent developments. Its ultimate sensitivity, high temporal and spatial resolution and versatility enables high resolution imaging within living cells. It develops rapidly in the directions of constructing new molecular recognition units, new fluorescence reporters and in improving sensitivity of response, up to the detection of single molecules. Its application areas range from the control of industrial processes to environmental monitoring and clinical diagnostics. Being a guide for students and young researchers, it also addresses professionals involved in basic and applied research. Making a strong link between education, research and product development, this book discusses prospects for future progress.

Hydrogels are a fascinating class of polymers which show an immense ability of swelling under the influence of temperature, pH value or concentrations of different species in aqueous solutions. The volume change can amount up to several hundred percent. This unique behaviour is already used in such applications like disposable diapers, contact lenses or drug-delivery systems. The ability to perform mechanical work has been shifted the technical interest more and more towards sensors and actuators exploiting the thermo-chemo-mechano-electrical coupling within hydrogels. The accuracy requirements for such devices are much more demanding than for previous applications. Therefore, a deep knowledge of both the material and the functional properties of hydrogel sensors and actuators is needed. The monograph describes state of the art and recent developments for these materials in sensor and actuator technology.

This book covers new materials used as analytical devices for increasing the interactions between the development of new analytical devices and materials science. The authors describe how different types of materials such as polymers, self-assembled layers, phthalocyanines, and nanomaterials can further enhance sensitivity and promote selectivity between analytes for different applications. They explain how continuing research and discussion into materials science for chemical sensing is stimulating the search for different strategies and technologies that extract information for these chemical sensors in order to obtain a chemical fingerprint of samples.

Application of Nanomaterials in Chemical Sensors and Biosensors

Handbook of Chemical and Biological Sensors

Chemical Sensors and Biosensors for Medical and Biological Applications

Frontiers in Chemical Sensors

Anti-Idiotypic Antibodies As Vaccines

This book deals with biomimetic sensors that can quantify taste and smell - the electronic tongue and nose. Of all sensor technologies, these have been widely considered as the most difficult to realise and the development of these sensors significantly contributes to the understanding of the reception mechanisms in gustatory and olfactory systems. The author begins by dealing with the basic principles of measurement and multivariate analysis. Reception mechanisms in biological systems are briefly reviewed. Several types of biosensor, including enzyme-immobilized membranes, SPR, the quartz resonance oscillator and IC technologies are explained in detail. This book is the first to focus on artificial taste and smell sensors and also reviews conventional biosensors, such as enzyme sensors, in detail.

This ECS Transactions issue is a compilation of papers presented at the PRiME 2008 Joint International Meeting, held in Hawaii from October 12 - October 17, 2008. The papers presented covered the research and development in the field of chemical (gas, ion, bio and other) sensors, including molecular recognition surface, transduction methods, and integrated and micro sensor systems.

Sensors for measuring and detecting chemical and biological substances are comprehensively used and are, for the most part, unobtrusive. They can help monitor our health through alerting us to chemical or biological changes in our bodies, our environment through checking air quality or pollution levels and they can contribute towards a more sustainable future. Polymer-based sensors are the subject of much attention due to their ability to collect molecules on their flexible sensory surfaces. However, most petroleum-based polymers are not renewable, leading to problems of waste-disposal. By using renewable materials, such as paper, cotton or starch, these problems can be overcome. This book reviews the current state-of-play in renewable-material-based chemical sensors and biosensors, and suggests applications in industry, environment and biomedicine. Contents: Introduction (Jaehwan Kim)Renewable Materials (Bong Sup Shim)Sensing Principles (Joo-Hyung Kim)Chemical Sensors (Bong Sup Shim)Biosensors (Joo-Hyung Kim)Summary and Suggestions (Jaehwan Kim) Readership: Graduate students and researchers of nanomaterials, nanoscience, and those interested in their applications in nanomedicine, biotechnology and the environment. Keywords: Biosensors;Chemical Sensors;Polymer-Based Sensors;Renewable Sensors;Waste-Management;Biomedicine;Biotechnology;NanomedicineReview:0

Key features include: Self-assessment questions and exercises Chapters start with essential principles, then go on to addressmore advanced topics More than 1300 references to direct the reader to keyliterature and further reading Highly illustrated with 450 figures, including chemicalstructures and reactions, functioning principles, constructivedetails and response characteristics Chemical sensors are self-contained analytical devices thatprovide real-time information on chemical composition. A chemicalsensor integrates two distinct functions: recognition andtransduction. Such devices are widely used for a variety ofapplications, including clinical analysis, environment monitoringand monitoring of industrial processes. This text provides anup-to-date survey of chemical sensor science and technology, with agood balance between classical aspects and contemporary trends.Topics covered include: Structure and properties of recognition materials and reagents,including synthetic, biological and biomimetic materials,microorganisms and whole-cells Physicochemical basis of various transduction methods(electrical, thermal, electrochemical, optical, mechanical andacoustic wave-based) Auxiliary materials used e.g. synthetic and natural polymers,inorganic materials, semiconductors, carbon and metallicmaterials properties and applications of advanced materials (particularlynanomaterials) in the production of chemical sensors andbiosensors Advanced manufacturing methods Sensors obtained by combining particular transduction andrecognition methods Mathematical modeling of chemical sensor processes Suitable as a textbook for graduate and final year undergraduatestudents, and also for researchers in chemistry, biology, physics,physiology, pharmacology and electronic engineering, this bookisvaluable to anyone interested in the field of chemical sensors andbiosensors.

Environmental Analysis by Electrochemical Sensors and Biosensors

Electrochemical Sensors Technology

Biochemical Sensors (In 2 Volumes)

Industrial Environmental and Diagnostic Applications

Optical Guided-wave Chemical and Biosensors II

This book introduces the principles and concepts of chemical and biochemical sensors for analyzing medical as well as biological samples. For applications like analyzing or monitoring gastric juice or blood plasma, the potential of sensors is exceptionally large. Focussed on these applications, the interpretation of analytical results is explained. Specific advantages are compared to other analytical techniques. Numerous tables with data provide useful information not easily found elsewhere and make a handy source of reference. Ursula E. Spichiger-Keller is head of the Center for Chemical Sensors/Biosensors and Bioanalytical Chemistry at the Swiss Federal Institute of Technology (ETH) in Zurich.

This report surveys opportunities for future Army applications in biotechnology, including sensors, electronics and computers, materials, logistics, and medical therapeutics, by matching commercial trends and developments with enduring Army requirements. Several biotechnology areas are identified as important for the Army to exploit, either by direct funding of research or by indirect influence of commercial sources, to achieve significant gains in combat effectiveness before 2025.

This book Electrochemical Sensors Technology mostly reviews the modem methods and significant electrochemical and electroanalytical applications of chemical sensors and biosensors. Chapters of this book are invited and contributed from the experts throughout the world from prominent researchers and scientists in the field of sensors and in the field of electro- and biochemistry. Each chapter provides technical and methodological details beyond the level found in typical journal articles or reviews and explores the application of chemical sensors, environmental sensors, and biosensors to a significant problem in biomedical and environmental science, also providing a prospectus for the future. This book compiles with the expert knowledge of many specialists in the construction and use of chemical sensors and biosensors including chemical sensors, biological sensors, DNA sensors, immunosensors, gaseous sensors, ionic sensors, bioassay sensors, lab-on-chips, devices, portable sensors, microchips, nanosensors, implantable microsensors, and so on in the field of fundamental and applied electrochemistry. Highlights and importance are laid on real or practical problems, ranging from chemical application to biomedical monitoring, from in vitro to in vivo, and from single cell to animal to human measurement. This offers a unique opportunity of exchanging and combining the scientist or researcher in electrochemical sensors in largely chemistry, biological engineering, electronic engineering, and biomedical and physiological fields.

Chemical Sensors and BiosensorsFundamentals and ApplicationsJohn Wiley & Sons

Hydrogel Sensors and Actuators

Electrochemical Biosensors

Chemical Sensors 8: Chemical (Gas, Ion, Bio) Sensors and Analytical Systems

Ultrathin Electrochemical Chemo- and Biosensors

Biomimetic Sensor Technology

Chemical, Gas, and Biosensors for the Internet of Things and Related Applications brings together the fields of sensors and analytical chemistry, devices and machines, and network and information technology. This thorough resource enables researchers to effectively collaborate to advance this rapidly expanding, interdisciplinary area of study. As innovative developments in the Internet of Things (IoT) continue to open new possibilities for quality of life improvement, sensor technology must keep pace, Drs. Mitsubayashi, Niwa and Ueno have brought together the top minds in their respective fields to provide the latest information on the numerous uses of this technology. Topics covered include life-assist systems, network monitoring with portable environmental sensors, wireless livestock health monitoring, point-of-care health monitoring, organic electronics and bio-batteries, and more. Describes the latest advances and underlying principles of sensors used in biomedicine, healthcare, biotechnology, nanotechnology and food and environment safety Focuses on sensors' methods of data communication, logging and analysis for IoT applications Explains the specific requirements of sensor design and performance improvement, helping researchers enhance sensitivity, selectivity, stability, reproducibility and response time

Nano-scale materials are proving attractive for a new generation of devices, due to their unique properties. They are used to create fast-responding sensors with good sensitivity and selectivity for the detection of chemical species and biological agents. Nanosensors for Chemical and Biological Applications provides an overview of developments brought about by the application of nanotechnology for both chemical and biological sensor development. Part one addresses electrochemical nanosensors and their applications for enhanced biomedical sensing, including blood glucose and trace metal ion analysis. Part two goes on to discuss spectrographic nanosensors, with chapters on the use of nanoparticle sensors for biochemical and environmental sensing and other techniques for detecting nanoparticles in the environment. Nanosensors for Chemical and Biological Applications serves as a standard reference for R&D managers in a range of industrial sectors, including nanotechnology, electronics, biotechnology, magnetic and optical materials, and sensors technology, as well as researchers and academics with an interest in these fields. Reviews the range electrochemical nanosensors, including the use of carbon nanotubes, glucose nanosensors, chemiresistor sensors using metal oxides, and nanoparticles Discusses spectrographic nanosensors, such as surface-enhanced Raman scattering (SERS) nanoparticle sensors, the use

Technological needs for chemical, ionic and biological species detection are giving rise to continuous research and development in physico-chemistry and biology. The constant progress being made in the theoretical and technological aspects concerning studies and developments of chemical sensors, biosensors and biochips is presented in this book by different scientists and professors from different universities and constitutes an updating of the state of the art for chemical sensors, biosensors and biochips. This book places a large emphasis on interaction between chemical and biological species, in a gaseous or liquid state, and details mineral and biological materials acting as sensitive elements. The role of electrical, electrochemical, piezoelectric and optical transducers in detection mechanisms are presented through their developments and from a performance point-of-view. Micro-reactors, nanotechnologies and flexible substrates, are considered in relation to their role in neural networks. Contents 1. Chemical and Biological Recognition, Nicole Jaffrezic-Renault. 2. Adsorption Phenomena, René Lalauze. 3. Microcantilever Transduction, Isabelle Dufour. 4. Piezoelectric Transduction (QCM), Hubert Perrot. 5. Metal Oxide Gas Sensors, Christophe Pijolat. 6. Molecular Material-based Conductimetric Gas Sensors, Marcel Bouvet. 7. Responses and Electrical Properties of Gas Microsensors, Khalifa Aguir. 8. Gas Microsensor Technology, Philippe Menini. 9. Multisensors: Measurements and Behavior Models, Philippe Breuil. 10. Development of Microtechnologies for the Realization of Chemical, Biochemical and/or Biological Microsensors, Pierre Temple-Boyer. 11. Development of Micro-preconcentrators for the Detection of Gaseous Species at Trace Level, Jean-Paul Viricelle. 12. Microfluidics: Manipulation of Nanovolume Samples, Louis Renaud. 13. Electrochemical Biosensors, Chantal Gondran. 14. Fiber-optic Biosensors, Neso Sojic. 15. In Vivo Analyses with Electrochemical Microsensors, Stéphane Arbault. 16. Microbial Biosensors for Environmental Applications, Gérald Thouand and Marie José Durand. 17. Biofuel Cells, Serge Cosnier.

This interesting book covers latest aspects of a highly sophisticated technology; results treated in critical detail; demonstrates applicability of this technology to practical problems in process control, biochip methods, clinical analysis, environmental sciences

Combinatorial Methods for Chemical and Biological Sensors

Fiber Optic Chemical Sensors and Biosensors

Introduction to Fluorescence Sensing

Biosensors for Health, Environment and Biosecurity

From Working Electrodes to Functionalization and Miniaturized Devices