

# Semiconductor Gas Sensors Woodhead Publishing

[Semiconductor Gas Sensors](#) **Semiconductor Gas Sensors** *Gas Sensors Based on Conducting Metal Oxides* **Fundamentals and Sensing Applications of 2D Materials** *21st Century Nanostructured Materials* [XAFS Techniques for Catalysts, Nanomaterials, and Surfaces](#) [Metal Oxide-Based Heterostructures](#) [Tin Oxide Materials](#) [Accident and Emergency Informatics](#) [Spark Ablation](#) [XIV Mediterranean Conference on Medical and Biological Engineering and Computing 2016](#) *Low-Dimensional and Nanostructured Materials and Devices* [3d Printing And Additive Manufacturing Of Electronics: Principles And Applications](#) [Nanobiosensors for Environmental Monitoring](#) **Printed Films Metal Oxide Nanoparticles, 2 Volume Set** [Environmental Applications of Carbon Nanomaterials-Based Devices](#) **Handbook of Odors in Plastic Materials** *Advances in Spectroscopic Monitoring of the Atmosphere* *Advanced Sensors for Safety and Security* [Quantum Dots](#) *Computational and Experimental Methods in Mechanical Engineering* *Volatile Organic Compounds in Environment* **Applications of Polymer Nanofibers** **Electrochemistry of Zirconia Gas Sensors** **Materials for Fuel Cells** **Nanosensors for Chemical and Biological Applications** *Proceedings of the 21st International Symposium on High Voltage Engineering* **Advancements in Intelligent Gas Metal Arc Welding Systems** *MXenes and their Composites* **Chipless RFID Sensors** **Sensors and Microsystems** *Gas Sensors* **Smart Nanostructure Materials and Sensor Technology** *Handbook of Gas Sensor Materials* **Materials for Energy Conversion Devices** **Smart Fibres, Fabrics and Clothing** **Laser Spectroscopy for Sensing** **Polymeric Nanocomposite Materials for Sensor Applications** **Functionalized Nanomaterial-Based Electrochemical Sensors**

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**Metal Oxide Nanoparticles, 2 Volume Set** Jul 20 2021 Metal Oxide Nanoparticles A complete nanoparticle resource for chemists and industry professionals Metal oxide nanoparticles are integral to a wide range of natural and technological processes—from mineral transformation to electronics. Additionally, the fields of engineering, electronics, energy technology, and electronics all utilize metal oxide nanoparticle powders. Metal Oxide Nanoparticles: Formation, Functional Properties, and Interfaces presents readers with the most relevant synthesis and formulation approaches for using metal oxide nanoparticles as functional materials. It covers common processing routes and the assessment of physical and chemical particle properties through comprehensive and complementary characterization methods. This book will serve as an introduction to nanoparticle formulation, their interface chemistry and functional properties at the nanoscale. It will also act as an in-depth resource, sharing detailed information on advanced approaches to the physical, chemical, surface, and interface characterization of metal oxide nanoparticle powders and dispersions. Addresses the application of metal oxide nanoparticles and its economic impact Examines particle synthesis, including the principles of selected bottom-up strategies Explores nanoparticle formulation—a selection of processing and application routes Discusses the significance of particle surfaces and interfaces on structure formation, stability and functional materials properties Covers metal oxide nanoparticle characterization at different length scales With this valuable resource, academic researchers, industrial chemists, and PhD students can all gain insight into the synthesis, properties, and applications of metal oxide nanoparticles.

**Laser Spectroscopy for Sensing** Aug 28 2019 Laser spectroscopy is a valuable tool for sensing and chemical analysis. Developments in lasers, detectors and mathematical analytical tools have led to improvements in the sensitivity and selectivity of spectroscopic techniques and extended their fields of application. Laser Spectroscopy for Sensing examines these advances and how laser spectroscopy can be used in a diverse range of industrial, medical, and environmental applications. Part one reviews basic concepts of atomic and molecular processes and presents the fundamentals of laser technology for controlling the spectral and temporal aspects of laser excitation. In addition, it explains the selectivity, sensitivity, and stability of the measurements, the construction of databases, and the automation of data analysis by machine learning. Part two explores laser spectroscopy techniques, including cavity-based absorption spectroscopy and the use of photo-acoustic spectroscopy to acquire absorption spectra of gases and condensed media. These chapters discuss imaging methods using laser-induced fluorescence and

phosphorescence spectroscopies before focusing on light detection and ranging, photothermal spectroscopy and terahertz spectroscopy. Part three covers a variety of applications of these techniques, particularly the detection of chemical, biological, and explosive threats, as well as their use in medicine and forensic science. Finally, the book examines spectroscopic analysis of industrial materials and their applications in nuclear research and industry. The text provides readers with a broad overview of the techniques and applications of laser spectroscopy for sensing. It is of great interest to laser scientists and engineers, as well as professionals using lasers for medical applications, environmental applications, military applications, and material processing. Presents the fundamentals of laser technology for controlling the spectral and temporal aspects of laser excitation Explores laser spectroscopy techniques, including cavity-based absorption spectroscopy and the use of photo-acoustic spectroscopy to acquire absorption spectra of gases and condensed media Considers spectroscopic analysis of industrial materials and their applications in nuclear research and industry

*Handbook of Gas Sensor Materials* Dec 01 2019 The two volumes of Handbook of Gas Sensor Materials provide a detailed and comprehensive account of materials for gas sensors, including the properties and relative advantages of various materials. Since these sensors can be applied for the automation of myriad industrial processes, as well as for everyday monitoring of such activities as public safety, engine performance, medical therapeutics, and in many other situations, this handbook is of great value. Gas sensor designers will find a treasure trove of material in these two books.

[Nanobiosensors for Environmental Monitoring](#) Sep 21 2021 This book entails detailed information on the utilization of nanobiosensor as an effective technology for the effective detection, monitoring, and management of environmental contaminations to ensure its sustainability and humanity's well-being. The higher level of anthropogenic action has been identified as a threat to humankind's existence due to the higher level of xenobiotic and toxic substances that could interrupt the normal ecosystem. This has prompted numerous agencies both locally and internationally that could play a significant role in environmental pollution mitigation. The application of nanobiosensor has been identified as a sustainable technique that could be applied to ensure proper detection and identification of several environmental contaminants. Nanomaterial's possible applications created an innovative domain called nanomaterials based biosensors machinery as one of nanotechnology's ultimate sub-divisions. The application of nanomaterials based biosensors machinery and their advancements could be applied globally to resolve numerous environmental sectors' challenges to guarantee the environment's quality and safety. The book

will be an excellent collection of reviews based on contemporary research and developments on nanomaterials utilization and applications in environmental monitoring along with their prospects. The book will attempt to give a comprehensive idea of nanomaterial concepts for nanobiosensors applications in an environmental context to help students, researchers, and professionals/practitioners recognize nanomaterials' significance in the environmental domain. The book will also help understand and address the environmental sectors' complications via nanomaterials' utilization and applications. Hence, this book will serve as a textbook and will help students, professionals/practitioners, scientists, researchers, and academicians in various research domains.

**Advancements in Intelligent Gas Metal Arc Welding Systems** Jun 06 2020 Advancements in Intelligent Gas Metal Arc Welding Systems: Fundamentals and Applications presents the latest on gas metal arc welding which plays a significant role in modern manufacturing industries and accounts for about 70% of welding processes. The importance of advancements in GMAW cannot be underestimated as they can lead to more efficient production strategies, resource savings and quality improvements. This book provides an overview of various aspects associated with GMAW, starting from the theoretical basis and ending with characteristics of industrial applications and control methods. Additional sections cover processes associated with welding and welding control, such as fuzzy logic, artificial neural networks, and others. Provides an up-to-date overview of recent GMAW developments Includes insights into intelligent welding automation Describes real-world, industrial cases of welding automation implementation

*Proceedings of the 21st International Symposium on High Voltage Engineering* Jul 08 2020 High voltage engineering is extremely important for the reliable design, safe manufacture and operation of electric devices, equipment and electric power systems. The 21st International Symposium on High Voltage Engineering, organized by the 90 years old Budapest School of High Voltage Engineering, provides an excellent forum to present results, advances and discussions among engineers, researchers and scientists, and share ideas, knowledge and expertise on high voltage engineering. The proceedings of the conference presents the state of the art technology of the field. The content is simultaneously aiming to help practicing engineers to be able to implement based on the papers and researchers to link and further develop ideas.

**Materials for Energy Conversion Devices** Oct 30 2019 This book opens with a detailed exploration of the fields of solar energy and thermoelectric conversion. Beginning with chapters on photoelectrochemical devices, properties and uses of photosensitive materials and solar cells, it then moves its focus on thermoelectricity, starting with an introduction to the subject and then explaining the field of thermoelectricity measurement. The book goes on to discuss the field of chemical and nuclear energy conversion and monitoring, including chapters on fast ionic conductors, oxygen ionic conductors and high-level radioactive waste and electrochemical gas sensors for emission control. This innovative new study is the first comprehensive survey of major new developments in energy conversion devices, with contributions from an international group of leading innovators.

**Accident and Emergency Informatics** Feb 24 2022 Time is short in emergency situations; the need for action becomes imperative. Biomedical Informatics can be invaluable in supporting the management of emergency medicine, and the need for the creation of Accident and Emergency Informatics (A&EI) as a novel subfield became obvious. As in all areas of Biomedical Informatics, A&EI must deal with issues such as relevant data collection, the management of data extracted from accident sites, health records or sensors, wearables and apps, and appropriate data processing, with the dual purpose of preventing harm and decision support. This book is an introduction to the research and application domain of A&EI, and is the product of three years' work by the Working Group in A&EI of the International Medical Informatics Association (IMIA). The book presents ten chapters organized in four sections. The first section explores the framework for achieving an emergency-informatics health information infrastructure; the second focuses on the gathering of critical clinical data related to the building up of a smart environment for A&EI; the third introduces state-of-the-art technologies for integration into virtual emergency registries; and the final part considers the delicate issues of patient safety raised by the introduction of surveillance technologies into clinical care, along with other issues presenting challenges to the domain of A&EI for the future. The book is an important contribution to the field of A&EI, and will be of interest to healthcare professionals, informaticians, and all those who want a better understanding of the domain of Accident and Emergency

Informatics.

**Polymeric Nanocomposite Materials for Sensor Applications** Jul 28 2019 Polymeric Nanocomposite Materials for Sensor Applications covers all the important aspects of polymer composite-based sensors, from fundamentals to fabrication. Key chapters focus on the materials used for sensors and their characterization, properties, fabrication and classification. Various applications of polymeric sensors are also discussed in detail. This book is an essential reference resource, not only for the materials scientist, but also for researchers, academics, technologists and students working in the sensor technology industry. In modern society, sensors are used in electronics, food packaging, construction, automobile and aerospace applications. The advancement of smart technologies has increased their usage because of their affordability and reliability. Among the materials used for the fabrication of sensors, polymer composites are the most preferred because they are lightweight, versatile, low cost and easy to process. Discusses fundamentals, classification, recent progress, and the current status of polymer nanocomposites in sensing applications Includes coverage of materials and their application-specific modeling Addresses safety issues and environmental degradation Includes broad coverage of a wide range of engineering applications, including food, safety, healthcare, automotive and aerospace Covers pressure sensors, gas sensors, pH sensors, ion selective sensors, alcohol sensors, humidity sensors, aromatic small molecule sensors, enzyme sensors, immunosensors, strain sensors and electrochemical sensors

**Metal Oxide-Based Heterostructures** Apr 28 2022 Metal Oxide-Based Heterostructures: Fabrication and Applications provides information on synthesis strategies, structural and hierarchical features, morphological characteristics of metal oxide-based heterostructures, and their diverse applications. This book begins with an introduction to the various multidimensional heterostructures, synthesis aspects, and techniques used to control the formation of heterostructures. Then, the impact of synthesis routes on the formation of mixed metal oxide heterostructures and their properties are analyzed. The effect of nonmetal doping, metal doping, and composites of metal oxide heterostructures on the properties of heterostructures is also addressed and that also includes opportunities for optimization of the material's performance for specific applications. Special attention is given to the surface characteristics of the metal oxide heterostructures and their impact on the material's performance, and the applications of metal oxide heterostructures in various fields such as environmental remediation, sensing, organic catalysis, photovoltaics, light emitting materials, and hydrogen production. Introduces key principles for metal oxide heterostructures, their properties, key characteristics, and synthesis routes Emphasizes the relationship between synthesis strategies and material performance, including optimization strategies such as tailoring the material's surface characteristics or structure Discusses metal oxide heterostructures and their application in lighting and displays, energy, environment, and sensing

**Applications of Polymer Nanofibers** Nov 11 2020 APPLICATIONS OF POLYMER NANOFIBERS Explore a comprehensive review of the practical experimental and technological details of polymer nanofibers with a leading new resource Applications of Polymer Nanofibers delivers a complete introduction to the basic science of polymer nanofibers as well as a review of their diverse applications. The book assesses their potential for commercialization and presents contributions from leading experts emphasizing their practical and technological details. New and up to date research findings are presented throughout the book in areas including filters, fabric, energy, fuel cells, batteries, sensors, biomedicine, drug delivery, tissue engineering, and wound dressings. The book also presents a fulsome analysis of the technology of electrospinning, the most convenient and scalable technique for nanofiber production. It also provides readers with practical information on relevant surface modification techniques. Applications of Polymer Nanofibers effectively balances theoretical background with practical applications of the technology, including insights into polymer nanofiber materials that will be useful for advanced students and researchers. Students, researchers, and industry professionals will also enjoy the inclusion of: A thorough introduction to electrospinning parameters and resulting nanofiber characteristics, including theoretical and practical considerations An exploration of textile applications of nanofibers, like protective clothing, filter fabrics, wearable devices, functional fabrics, and biomedical textiles A review of nanofiber mats as high-efficiency filters, including filtration developments, filters made with nanofibers, and the future outlook for nanofiber filters A treatment of nanofiber-based chemical sensors, including sensor materials,

approaches to nanofiber sensor design, and gravimetric nanofiber sensors Perfect for researchers and graduate students studying polymer science and engineering, chemical engineering, materials science, and nanotechnology. Applications of Polymer Nanofibers will also earn a place in the libraries of industrial researchers concerned with electrospinning, air filtration, fabrics, drug delivery, catalysis, and biomedicine. *MXenes and their Composites* May 06 2020 MXenes and their Composites: Synthesis, Properties and Potential Applications presents a state of the art overview of the recent developments on the synthesis, functionalization, properties and emerging applications of two-dimensional (2D) MXenes and their composites. The book systematically describes the state-of-the-art knowledge and fundamentals of MXene synthesis, structure, surface chemistry and functionalization. The book also discusses the unique electronic, optical, mechanical and topological properties of MXenes. Besides, this book covers the various emerging applications of MXenes and their composites across different fields such as energy storage and conversion, gas sensing and biosensing, rechargeable lithium and sodium-ion batteries, lithium-sulphur and multivalent batteries, electromagnetic interference shielding, hybrid capacitors and supercapacitors, hydrogen storage, catalysis and photoelectrocatalysis, gas separation and water desalination, environmental remediation and medical and biomedical applications. All these applications have been efficiently discussed in the specific chapters and in each case, the processing of MXene composites has also been discussed. This book will be an excellent reference for scientists and engineers across various disciplines and industries working in the field of highly promising 2D MXenes and their composites. The book will also act as a guide for academic researchers, material scientists, and advanced students in investigating the new applications of 2D MXenes based materials. Covers fundamentals of technologically important MAX phases, MXene derivatives, MXene synthesis methods, intercalation and delamination strategies, surface functionalization, fundamental characteristics and properties Demonstrates major application areas of MXenes, including catalytic, energy storage and energy generation, flexible electronics, EMI shielding, sensors and biosensors, medical and biomedical, gas separation and water desalination Presents a detailed discussion on the processing and performance of various MXenes towards different applications

**Electrochemistry of Zirconia Gas Sensors** Oct 11 2020 The first book to present a detailed analysis of the electrochemistry, development, modeling, optimization, testing, and technology behind modern zirconia-based sensors, *Electrochemistry of Zirconia Gas Sensors* explores how to tailor these sensors to meet specific industrial needs. The book addresses a range of different stages of development in zirconia-based sensors for gaseous and molten metal environments, focusing on an accessible form from analysis of interaction at the measuring environment-zirconia sensor interface to reliability testing of the sensors. The coverage highlights different fundamental aspects of electrochemistry and physical chemistry of zirconia, mathematical modeling, optimization parameters, and structures of the electrode materials. The author highlights the factors that determine high sensitivity, critically reviews the limitations of current technologies, and surveys the needs and possibilities of future developments. He covers technologies for vacuum-tight joining zirconia to ceramic insulators and sensor construction materials as well as sensor design and concepts of the total-NO<sub>x</sub> sensor based on mixed potential. The book includes a critical overview of existing technologies of zirconia gas sensors including nanotechnology. This book fills the gap between pure academic research of the zirconia-based gas sensors, explaining the influence of the double electrical layer on the sensor output signal and the applied, technological, down-to-earth approaches adopted by the vast majority of the industrial companies working in this field. Providing guidance on how to organize a testing program of gas sensors, the book allows readers to look forward in evaluating future trends in the zirconia gas sensors development.

**Smart Fibres, Fabrics and Clothing** Sep 29 2019 This important book provides a guide to the fundamentals and latest developments in smart technology for textiles and clothing. The contributors represent a distinguished international panel of experts and the book covers many aspects of cutting edge research and development. Smart fibres, fabrics and clothing starts with a review of the background to smart technology and goes on to cover a wide range of the material science and fibre science aspects of the technology including: Electrically active polymeric materials and the applications of nonionic polymer gel and elastomers for artificial muscles; Thermally sensitive fibres and fabrics; Cross-linked polyol fibrous substrates stimuli-responsive interpenetrating polymer network hydrogel; Permeation control through

stimuli-responsive polymer membranes; optical fibre sensors, hollow fibre membranes for gas separation; integrating fibre-formed components into textile structures; Wearable electronic and photonic technologies; Adaptive and responsive textile structures (ARTS); Biomedical applications including the applications of scaffolds in tissue engineering It is essential reading for academics in textile and materials science departments, researchers, designers and engineers in the textiles and clothing product design field. Product managers and senior executives within textile and clothing manufacturing will also find the latest insights into technological developments in the field valuable and fascinating.

**Semiconductor Gas Sensors** Nov 04 2022 *Semiconductor Gas Sensors, Second Edition*, summarizes recent research on basic principles, new materials and emerging technologies in this essential field. Chapters cover the foundation of the underlying principles and sensing mechanisms of gas sensors, include expanded content on gas sensing characteristics, such as response, sensitivity and cross-sensitivity, present an overview of the nanomaterials utilized for gas sensing, and review the latest applications for semiconductor gas sensors, including environmental monitoring, indoor monitoring, medical applications, CMOS integration and chemical warfare agents. This second edition has been completely updated, thus ensuring it reflects current literature and the latest materials systems and applications. Includes an overview of key applications, with new chapters on indoor monitoring and medical applications Reviews developments in gas sensors and sensing methods, including an expanded section on gas sensor theory Discusses the use of nanomaterials in gas sensing, with new chapters on single-layer graphene sensors, graphene oxide sensors, printed sensors, and much more

**3d Printing And Additive Manufacturing Of Electronics: Principles And Applications** Oct 23 2021 3D printed electronics have captured much attention in recent years, owing to their success in allowing on-demand fabrication of highly-customisable electronics on a wide variety of substrates and conformal surfaces. This textbook helps readers understand and gain valuable insights into 3D printed electronics. It does not require readers to have any prior knowledge on the subject. *3D Printing and Additive Manufacturing of Electronics: Principles and Applications* provides a comprehensive overview of the recent progress and discusses the fundamentals of the 3D printed electronics technologies, their respective advantages, shortcomings and potential applications. The book covers conventional contact printing techniques for printed electronics, 3D electronics printing techniques, materials and inks inks for 3D-printed electronics, substrates and processing for 3D-printed electronics, sintering techniques for metallic nanoparticle inks, designs and simulations, applications of 3D-printed electronics, and future trends. The book includes several related problems for the reader to test his or her understanding of the topics. This book is a good guide for anyone who is interested in the 3D printing of electronics. The book is also an effective textbook for undergraduate and graduate courses that aim to arm their students with a thorough understanding of the fundamentals of 3D printed electronics.

**Chipless RFID Sensors** Apr 04 2020 A systematic treatment of the design and fabrication of chipless RFID sensors This book presents various sensing techniques incorporated into chipless RFID systems. The book is divided into five main sections: Introduction to Chipless RFID Sensors; RFID Sensor Design; Smart Materials; Fabrication, Integration and Testing; and Applications of Chipless RFID Sensors. After a comprehensive review of conventional RFID sensors, the book presents various passive microwave circuit designs to achieve compact, high data density and highly sensitive tag sensors for a number of real-world ubiquitous sensing applications. The book reviews the application of smart materials for microwave sensing and provides an overview of various micro- and nano-fabrication techniques with the potential to be used in the development of chipless RFID sensors. The authors also explore a chipless RFID reader design capable of reading data ID and sensory information from the chipless RFID sensors presented in the book. The unique features of the book are: Evaluating new chipless RFID sensor design that allow non-invasive PD detection and localization, real-time environment monitoring, and temperature threshold detection and humidity Providing a classification of smart materials based on sensing physical parameters (i.e. humidity, temperature, pH, gas, strain, light, etc.) Discussing innovative micro- and nano-fabrication processes including printing suitable for chipless RFID sensors Presenting a detailed case study on various real-world applications including retail, pharmaceutical, logistics, power, and construction industries Chipless RFID Sensors is primarily written for researchers in the field of RF sensors but can serve as supplementary

reading for graduate students and professors in electrical engineering and wireless communications. *21st Century Nanostructured Materials* Jun 30 2022 Nanostructured materials (NMs) are attracting interest as low-dimensional materials in the high-tech era of the 21st century. Recently, nanomaterials have experienced breakthroughs in synthesis and industrial and biomedical applications. This book presents recent achievements related to NMs such as graphene, carbon nanotubes, plasmonic materials, metal nanowires, metal oxides, nanoparticles, metamaterials, nanofibers, and nanocomposites, along with their physical and chemical aspects. Additionally, the book discusses the potential uses of these nanomaterials in photodetectors, transistors, quantum technology, chemical sensors, energy storage, silk fibroin, composites, drug delivery, tissue engineering, and sustainable agriculture and environmental applications.

*Quantum Dots* Feb 12 2021 The book provides a thorough survey of current research in quantum dots synthesis, properties, and applications. The unique properties of these new nanomaterials offer multifunctional applications in such fields as photovoltaics, light-emitting diodes, field-effect transistors, lasers, photodetectors, solar cells, biomedical diagnostics and quantum computing. Keywords: Quantum Dots (QD), Photovoltaics, Light-emitting Diodes, Field-effect Transistors, Lasers, Photodetectors, Solar Cells, Biomedical Diagnostics, Quantum Computing, QD Synthesis, Carbon QDs, Graphene QDs, QD Sensors, Supercapacitors, Magnetic Quantum Dots, Cellular/Molecular Separation, Chromatographic Separation Column, Photostability, Luminescence of Carbon QDs, QD Materials for Water Treatment, Semiconductor Quantum Dots, QD Drug Delivery, Antibacterial Quantum Dots.

*Volatile Organic Compounds in Environment* Dec 13 2020 This book is a printed edition of the Special Issue "Volatile Organic Compounds in Environment" that was published in *Environments*

**Nanosensors for Chemical and Biological Applications** Aug 09 2020 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 of coated gold nanoparticles, and semiconductor quantum dots

*Gas Sensors Based on Conducting Metal Oxides* Sep 02 2022 *Gas Sensors Based on Conducting Metal Oxides: Basic Understanding, Technology and Applications* focuses on two distinct types of gas sensors based on conducting metal oxides. Ion conduction, applied in so-called solid-state electrolytic sensors for one, and electronic conduction used in semiconductivity gas sensors for the other. The well-known  $\lambda$ -probe, a key component to optimize combustion in car engines, is an example of the former type, and the in-cabin car air-quality control SnO<sub>2</sub> and WO<sub>2</sub> sensor array stands for the semiconductivity type. Chapters cover basic aspects of functioning principles and describe the technologies and challenges of present and future sensors. Provides reader background and context on sensors, principles, fabrication and applications Includes chapters on specific technological applications, such as exhaust sensors, environmental sensors, explosive gases alarms and more Presents a structured presentation that allows for quick reference of vital information

**Handbook of Odors in Plastic Materials** May 18 2021 *Handbook of Odors in Plastic Materials, Second Edition*, analyzes the reasons behind unwanted odor formation and the methods for preventing it. The book covers the fundamentals of odor formation and its transport within a material, the relationship between odor and toxicity, and seventeen methods of odor removal. Odor can play a significant role in the success of

a product; it can decide whether a customer purchases the product in the first place, or can be the cause of complaints or returns. Similarly, in scented products, the retention of volatile components is a particular challenge and opportunity. There are several factors which have an impact on the formation of odors in plastic materials, including the properties of the polymer, use of additives in processing, exposure to radiation and oxygen, storage, and recycling. Thirty-seven polymers and forty-one critical product groups are analyzed based on the latest research publications and patents. The book also discusses regulations related to odor in products, effects of odor on health and safety, and the effect of odors from plastic materials on indoor air quality. Analyzes the reasons behind odor formation Provides the best methods to prevent odors in various materials Contains information on testing odor changes and the relationship between odor and toxicity Includes a comprehensive list of methods for removal of unwanted odors from plastic materials

*Advanced Sensors for Safety and Security* Mar 16 2021 This book results from a NATO Advanced Research Workshop titled "Technological Innovations in CBRNE Sensing and Detection for Safety, Security, and Sustainability" held in Yerevan, Armenia in 2012. The objective was to discuss and exchange views as to how fusion of advanced technologies can lead to improved sensors/detectors in support of defense, security, and situational awareness. The chapters range from policy and implementation, advanced sensor platforms using stand-off (THz and optical) and point-contact methods for detection of chemical, nuclear, biological, nuclear and explosive agents and contaminants in water, to synthesis methods for several materials used for sensors. In view of asymmetric, kinetic, and distributed nature of threat vectors, an emphasis is placed to examine new generation of sensors/detectors that utilize an ecosystems of innovation and advanced sciences convergence in support of effective counter-measures against CBRNE threats. The book will be of considerable interest and value to those already pursuing or considering careers in the field of nanostructured materials, and sensing/detection of CBRNE agents and water-borne contaminants. For policy implementation and compliance standpoint, the book serves as a resource of several informative contributions. In general, it serves as a valuable source of information for those interested in how nanomaterials and nanotechnologies are advancing the field of sensing and detection using nexus of advanced technologies for scientists, technologists, policy makers, and soldiers and commanders.

**Materials for Fuel Cells** Sep 09 2020 A fuel cell is an electrochemical device that converts the chemical energy of a reaction (between fuel and oxidant) directly into electricity. Given their efficiency and low emissions, fuel cells provide an important alternative to power produced from fossil fuels. A major challenge in their use is the need for better materials to make fuel cells cost-effective and more durable. This important book reviews developments in materials to fulfil the potential of fuel cells as a major power source. After introductory chapters on the key issues in fuel cell materials research, the book reviews the major types of fuel cell. These include alkaline fuel cells, polymer electrolyte fuel cells, direct methanol fuel cells, phosphoric acid fuel cells, molten carbonate fuel cells, solid oxide fuel cells and regenerative fuel cells. The book concludes with reviews of novel fuel cell materials, ways of analysing performance and issues affecting recyclability and life cycle assessment. With its distinguished editor and international team of contributors, *Materials for fuel cells* is a valuable reference for all those researching, manufacturing and using fuel cells in such areas as automotive engineering. Examines the key issues in fuel cell materials research Reviews the major types of fuel cells such as direct methanol and regenerative fuel cells Further chapters explore ways of analysing performance and issues affecting recyclability and life cycle assessment

*Tin Oxide Materials* Mar 28 2022 *Tin Oxide Materials: Synthesis, Properties, and Applications* discusses the latest in metal oxides, an emerging area in electronic materials. As more is learned about this important materials system, more functionalities and applications have been revealed. This key reference on the topic covers important material that is ideal for materials scientists, materials engineers and materials chemists who have been introduced to metal oxides as a general category of materials, but want to take the next step and learn more about a specific material. Provides a complete resource on tin oxide materials systems, including in-depth discussions of properties, their synthesis, modelling methods, and applications Presents information on the well-investigated SnO<sub>2</sub>, but also includes discussions on its emerging stoichiometries, such as SnO and Sn<sub>3</sub>O<sub>4</sub> Includes the most relevant applications in varistors, sensing devices, fuel cells, transistors, biological studies, and much more

**Smart Nanostructure Materials and Sensor Technology** Jan 02 2020 This book highlights the significance and usefulness of nanomaterials for the development of sensing devices and their real-life applications. The book also addresses various means of synthesizing 2D/3D nanomaterials, e.g., hydrothermal deposition process, electrospinning, Ostwald ripening, sputtering heterogeneous deposition, liquid-phase preparation, the vapor deposition approach, and aerosol flame synthesis. It presents an informative overview of the role of nanoscale materials in the development of advanced sensor devices at nanoscale and discusses the applications of nanomaterials in different forms prepared by diverse techniques in the field of optoelectronics and biomedical devices. Major features, such as type of nanomaterials, fabrication methods, applications, tasks, benefits and restrictions, and saleable features, are also covered.

**Gas Sensors** Feb 01 2020 This book covers the whole range of gas sensing aspects starting from basics, synthesis, processing, characterization, and application developments. All sub-topics within the domain of gas sensors such as active materials, novel nanomaterials, working mechanisms, fabrication techniques, computational approach, and development of microsensors, and latest advancements such as the Internet of Things (IoT) in gas sensors, and nanogenerators, are explained as well. Related manufacturing sections and proposed direction of future research are also reviewed. Features: Covers detailed state-of-the-art specific chemiresistive sensing materials. Presents novel nanomaterial platforms and concepts for resistive gas sensing. Reviews pertinent aspects of smart sensors and IoT sensing. Explains nanotechnology-enabled experimental findings, and future directions of smart gas sensing technology. Explores implication of latest advancements such as IoT in gas sensors, and nanogenerators. This book is aimed at academic researchers and professionals in sensors and actuators, nanotechnology, and materials science.

**Spark Ablation** Jan 26 2022 Spark ablation has been used worldwide for decades. However, in many fields, the special properties of nanoparticles, which come into play especially for sizes

**Printed Films** Aug 21 2021 Whilst printed films are currently used in varied devices across a wide range of fields, research into their development and properties is increasingly uncovering even greater potential. Printed films provides comprehensive coverage of the most significant recent developments in printed films and their applications. Materials and properties of printed films are the focus of part one, beginning with a review of the concepts, technologies and materials involved in their production and use. Printed films as electrical components and silicon metallization for solar cells are discussed, as are conduction mechanisms in printed film resistors, and thick films in packaging and microelectronics. Part two goes on to review the varied applications of printed films in devices. Printed resistive sensors are considered, as is the role of printed films in capacitive, piezoelectric and pyroelectric sensors, mechanical micro-systems and gas sensors. The applications of printed films in biosensors, actuators, heater elements, varistors and polymer solar cells are then explored, followed by a review of screen printing for the fabrication of solid oxide fuel cells and laser printed micro- and meso-scale power generating devices. With its distinguished editors and international team of expert contributors, Printed films is a key text for anyone working in such fields as microelectronics, fuel cell and sensor technology in both industry and academia. Provides a comprehensive analysis of the most significant recent developments in printed films and their applications Reviews the concepts, properties, technologies and materials involved in the production and use of printed films Analyses the varied applications of printed films in devices, including printed restrictive sensors for physical quantities and printed thick film mechanical micro-systems (MEMS), among others

**Semiconductor Gas Sensors** Oct 03 2022 Semiconductor gas sensors have a wide range of applications in safety, process control, environmental monitoring, indoor or cabin air quality and medical diagnosis. This important book summarises recent research on basic principles, new materials and emerging technologies in this essential field. The first part of the book reviews the underlying principles and sensing mechanisms for n- and p-type oxide semiconductors, introduces the theory for nanosize materials and describes the role of electrode-semiconductor interfaces. The second part of the book describes recent developments in silicon carbide- and graphene-based gas sensors, wide bandgap semiconductor gas sensors and micromachined and direct thermoelectric gas sensors. Part 3 discusses the use of nanomaterials for gas sensing, including metal oxide nanostructures, quantum dots, single-walled carbon nanotubes and porous silicon. The final part of the book surveys key applications in environmental monitoring, detecting chemical

warfare agents and monitoring gases such as carbon dioxide. Semiconductor gas sensors is a valuable reference work for all those involved in gas monitoring, including those in the building industry, environmental engineers, defence and security specialists and researchers in this field. Provides an overview of resistor and non-resistor sensors Reviews developments in gas sensors and sensing methods, including graphene based sensors and direct thermoelectric sensors Discusses the use of nanomaterials in gas sensing

**Sensors and Microsystems** Mar 04 2020 This book showcases the state of the art in the field of sensors and microsystems, revealing the impressive potential of novel methodologies and technologies. It covers a broad range of aspects, including: bio-, physical and chemical sensors; actuators; micro- and nano-structured materials; mechanisms of interaction and signal transduction; polymers and biomaterials; sensor electronics and instrumentation; analytical microsystems, recognition systems and signal analysis; and sensor networks, as well as manufacturing technologies, environmental, food and biomedical applications. The book gathers a selection of papers presented at the 19th AISEM National Conference on Sensors and Microsystems. Held in Lecce, Italy in February 2017, the event brought together researchers, end users, technology teams and policy makers.

**Fundamentals and Sensing Applications of 2D Materials** Aug 01 2022 Fundamentals and Sensing Applications of 2D Materials provides a comprehensive understanding of a wide range of 2D materials. Examples of fundamental topics include: defect and vacancy engineering, doping and advantages of 2D materials for sensing, 2D materials and composites for sensing, and 2D materials in biosystems. A wide range of applications are addressed, such as gas sensors based on 2D materials, electrochemical glucose sensors, biosensors (enzymatic and non-enzymatic), and printed, stretchable, wearable and flexible biosensors. Due to their sub-nanometer thickness, 2D materials have a high packing density, thus making them suitable for the fabrication of thin film based sensor devices. Benefiting from their unique physical and chemical properties (e.g. strong mechanical strength, high surface area, unparalleled thermal conductivity, remarkable biocompatibility and ease of functionalization), 2D layered nanomaterials have shown great potential in designing high performance sensor devices. Provides a comprehensive overview of 2D materials systems that are relevant to sensing, including transition metal dichalcogenides, metal oxides, graphene and other 2D materials system Includes information on potential applications, such as flexible sensors, biosensors, optical sensors, electrochemical sensors, and more Discusses graphene in terms of the lessons learned from this material for sensing applications and how these lessons can be applied to other 2D materials

**Functionalized Nanomaterial-Based Electrochemical Sensors** Jun 26 2019 Functionalized Nanomaterial-Based Electrochemical Sensors: Principles, Fabrication Methods, and Applications provides a comprehensive overview of materials, functionalized interfaces, fabrication strategies and application areas. Special attention is given to the remaining challenges and opportunities for commercial realization of functionalized nanomaterial-based electrochemical sensors. An assortment of nanomaterials has been investigated for their incorporation into electrochemical sensors. For example, carbon- based nanomaterials (carbon nanotube, graphene and carbon fiber), noble metals (Au, Ag and Pt), polymers (nafion, polypyrrole) and non-noble metal oxides (Fe<sub>2</sub>O<sub>3</sub>, NiO, and Co<sub>3</sub>O<sub>4</sub>). The most relevant materials are discussed in the book with an emphasis on their evaluation of their realization in commercial applications. Application areas touched on include the environment, food and medicine industries. Health, safety and regulation considerations are touched on, along with economic and commercialization trends. Introduces the principles of nanomaterials for electrochemical sensing applications Reviews the most relevant fabrication strategies for functionalized nanomaterial-based electrochemical sensing platforms Discusses considerations for the commercial realization of functionalized nanomaterial-based electrochemical sensors in the environment, food and point-of-care applications

**Environmental Applications of Carbon Nanomaterials-Based Devices** Jun 18 2021 Environmental Applications of Carbon Nanomaterials-Based Devices Explore this insightful treatment of the function and fabrication of high-performance devices for environmental applications Environmental Applications of Carbon Nanomaterials-Based Devices delivers an overview of state-of-the-art technology in functionalized carbon nanomaterials-based devices for environmental applications. The book provides a powerful

foundation, based in materials science, on functionalized carbon nanomaterials in general, and environmental science and device fabrication in particular. The book focuses on the chemical and physical methods of functionalization of carbon nanomaterials and the technology of device fabrication, including lab-on-a-chip approaches and applications such as wastewater purification and gas sensing. It provides readers with a thorough understanding of effective environmental remediation techniques performed with carbon nanomaterials-based devices. In addition to topics such as cross-linked graphene oxide membranes assembled with graphene oxide nanosheets, free-standing graphene oxide-chitin nanocrystal composite membranes for dye adsorption and oil/water separation, and in-situ grown covalent organic framework nanosheets on graphene for membrane-based dye/salt separation, readers will also benefit from the inclusion of: A thorough introduction to charge-gated ion transport through polyelectrolyte intercalated amine reduced graphene oxide membranes An exploration of hydrotalcite/graphene oxide hybrid nanosheets functionalized nanofiltration membrane for desalination A discussion of the incorporation of attapulgite nanorods into graphene oxide nanofiltration membranes for efficient dyes wastewater treatment An examination of attapulgite nanofibers and graphene oxide composite membranes for high-performance molecular separation Perfect for materials scientists, analytical chemists, and environmental chemists, Environmental Applications of Carbon Nanomaterials-Based Devices will also earn a place in the libraries of sensor developers seeking a one-stop resource for high-performance devices and sensors useful for environmental applications.

*Advances in Spectroscopic Monitoring of the Atmosphere* Apr 16 2021 Advances in Spectroscopic Monitoring of the Atmosphere provides a comprehensive overview of cutting-edge technologies and monitoring applications. Concepts are illustrated by numerous examples with information on spectroscopic techniques and applications widely distributed throughout the text. This information is important for researchers to gain an overview of recent developments in the field and make informed selections among the most suitable techniques. This volume also provides information that will allow researchers to explore implementing and developing new diagnostic tools or new approaches for trace gas and aerosol sensing themselves. Advances in Spectroscopic Monitoring of the Atmosphere covers advanced and newly emerging spectroscopic techniques for optical metrology of gases and particles in the atmosphere. This book will be a valuable reference for atmospheric scientists, including those whose focus is applying the methods to atmospheric studies, and those who develop instrumentation. It will also serve as a useful introduction to researchers entering the field and provide relevant examples to researchers and students developing and applying optical sensors for a variety of other scientific, technical, and industrial uses Overview of new applications including remote sensing by UAV, laser heterodyne radiometry, dual comb spectroscopy, and more Features in-situ observations and measurements for real-world data Includes content on leading edge optical sensors

*XIV Mediterranean Conference on Medical and Biological Engineering and Computing 2016* Dec 25 2021 This volume presents the proceedings of Medicon 2016, held in Paphos, Cyprus. Medicon 2016 is the XIV in

the series of regional meetings of the International Federation of Medical and Biological Engineering (IFMBE) in the Mediterranean. The goal of Medicon 2016 is to provide updated information on the state of the art on Medical and Biological Engineering and Computing under the main theme "Systems Medicine for the Delivery of Better Healthcare Services". Medical and Biological Engineering and Computing cover complementary disciplines that hold great promise for the advancement of research and development in complex medical and biological systems. Research and development in these areas are impacting the science and technology by advancing fundamental concepts in translational medicine, by helping us understand human physiology and function at multiple levels, by improving tools and techniques for the detection, prevention and treatment of disease. Medicon 2016 provides a common platform for the cross fertilization of ideas, and to help shape knowledge and scientific achievements by bridging complementary disciplines into an interactive and attractive forum under the special theme of the conference that is Systems Medicine for the Delivery of Better Healthcare Services. The programme consists of some 290 invited and submitted papers on new developments around the Conference theme, presented in 3 plenary sessions, 29 parallel scientific sessions and 12 special sessions.

*Low-Dimensional and Nanostructured Materials and Devices* Nov 23 2021 This book focuses on the fundamental phenomena at nanoscale. It covers synthesis, properties, characterization and computer modelling of nanomaterials, nanotechnologies, bionanotechnology, involving nanodevices. Further topics are imaging, measuring, modeling and manipulating of low dimensional matter at nanoscale. The topics covered in the book are of vital importance in a wide range of modern and emerging technologies employed or to be employed in most industries, communication, healthcare, energy, conservation, biology, medical science, food, environment, and education, and consequently have great impact on our society.

*XAFS Techniques for Catalysts, Nanomaterials, and Surfaces* May 30 2022 This book is a comprehensive, theoretical, practical, and thorough guide to XAFS spectroscopy. The book addresses XAFS fundamentals such as experiments, theory and data analysis, advanced XAFS methods such as operando XAFS, time-resolved XAFS, spatially resolved XAFS, total-reflection XAFS, high energy resolution XAFS, and practical applications to a variety of catalysts, nanomaterials and surfaces. This book is accessible to a broad audience in academia and industry, and will be a useful guide for researchers entering the subject and graduate students in a wide variety of disciplines.

*Computational and Experimental Methods in Mechanical Engineering* Jan 14 2021 This book includes selected peer-reviewed papers presented at third International Conference on Computational and Experimental Methods in Mechanical Engineering held in June 2021 at G.L. Bajaj Institute of Technology and Management, Greater Noida, U.P, India. The book covers broad range of topics in latest research including hydropower, heat transfer, fluid mechanics, advanced manufacturing, recycling and waste disposal, solar energy, thermal power plants, refrigeration and air conditioning, robotics, automation and mechatronics, and advanced designs. The authors are experienced and experts in their field, and all papers are reviewed by expert reviewers in respective field. The book is useful for industry peoples, faculties, and research scholars.