

Surface Enhanced Raman Spectroscopy Bioanalytical Biomolecular And Medical Applications Biological And Medical Physics Biomedical Engineering

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Surface-Enhanced Raman Spectroscopy - Marek Prochazka 2015-12-12

This book gives an overview of recent developments in RS and SERS for sensing and biosensing considering also limitations, possibilities and prospects of this technique. Raman scattering (RS) is a widely used vibrational technique providing highly specific molecular spectral patterns. A severe limitation for the application of this spectroscopic technique lies in the low cross section of RS. Surface-enhanced Raman scattering (SERS) spectroscopy overcomes this problem by 6-11 orders of magnitude enhancement compared with the standard RS for molecules in the close vicinity of certain rough metal surfaces. Thus, SERS combines molecular fingerprint specificity with potential single-molecule sensitivity. Due to the recent development of new SERS-active substrates, labeling and derivatization chemistry as well as new instrumentations, SERS became a very promising tool for many varied applications,

including bioanalytical studies and sensing. Both intrinsic and extrinsic SERS biosensing schemes have been employed to detect and identify small molecules, nucleic acids and proteins, and also for cellular and in vivo sensing.

Bioanalytical Chemistry - Paolo Ugo 2021-02-08
The urgent need for rapid and reliable analytical tools suitable to perform a large number of high quality analyses of biological molecules has been dramatically stressed by the recent crisis caused by the COVID-19 pandemic. This book provides graduate students and young researchers with the elements of interdisciplinary knowledge necessary to apply the wide arsenal of bioanalytical devices and methods available today.

Principles and Clinical Diagnostic Applications of Surface-Enhanced Raman Spectroscopy - Yuling Wang 2021-09-17

Principles and Clinical Diagnostic Applications of Surface-Enhanced Raman Spectroscopy summarizes the principles of surface-enhanced

Raman scattering/spectroscopy (SERS) and plasmonic nanomaterials for SERS, with a focus on SERS applications in clinical diagnostics. This book covers the key concepts from the fundamentals, materials, experimental aspects, and applications of SERS in clinical diagnostics with discussions on label-free/direct SERS assay, design and synthesis of SERS nanotags, SERS nanotags for point-of-care diagnostics, microfluidic SERS assay, and in vitro and in vivo sensing and imaging. Written by experts from around the world, this comprehensive volume showcases the recent progress of SERS applications in clinical diagnostics and helps readers understand when and how to use SERS in a clinical setting. Introduces the basics of SERS and suitable nanomaterials for SERS application Gives an overview of the cutting-edge research on SERS applications for clinical diagnosis, including the latest advances in our understanding of underlying principles to enable material design and clinical applications

Gradually builds from the fundamental concepts to the applications of SERS for clinical diagnostics

Handbook of Graphene - Barbara Palys
2019-07-30

The sixth volume in a series of handbooks on graphene research and applications The Handbook of Graphene, Volume 6: Biosensors and Advanced Sensors discusses the unique benefits that the discovery of graphene has brought to the sensing and biosensing sectors. It examines graphene's use in leading-edge technology applications and the development of a variety of graphene-based sensors. The handbook looks at how graphene can be used as an electrode, substrate, or transducer in sensor design. Graphene-based sensor detection has achieved up to femto-levels, with performances delivering the advantages of greater selectivity, sensitivity, and stability.

Food Safety and Protection - V Ravishankar Rai
2017-09-18

This book provides an overview of issues associated primarily with food safety, shelf-life assessment and preservation of foods. Food safety and protection is a multidisciplinary topic that focuses on the safety, quality, and security aspects of food. Food safety issues involve microbial risks in food products, foodborne infections, and intoxications and food allergenicity. Food protection deals with trends and risks associated with food packaging, advanced food packaging systems for enhancing product safety, the development and application of predictive models for food microbiology, food fraud prevention, and food laws and regulations with the aim to provide safe foods for consumers. Food Safety and Protection covers various aspects of food safety, security, and protection. It discusses the challenges involved in the prevention and control of foodborne illnesses due to microbial spoilage, contamination, and toxins. It starts with documentation on the microbiological and

chemical hazards, including allergens, and extends to the advancements in food preservation and food packaging. The book covers new and safe food intervention techniques, predictive food microbiology, and modeling approaches. It reviews the legal framework, regulatory agencies, and laws and regulations for food protection. The book has five sections dealing with the topics of predictive microbiology for safe foods; food allergens, contaminants, and toxins; preservation of foods; food packaging; and food safety laws.

Behaviors and Persistence of Nanomaterials in Biomedical Applications

Domenico Cassano 2018-06-01

In the last two decades, several promising engineered nanomaterials that combine therapeutic features and imaging functionalities have been presented, but very few have arrived on the market. The purpose of this book is to collect and comprehensively discuss the advances in this current and exciting topic in

order to promote and enhance its growth. In the first part, a general introduction about the main features of both organic and inorganic nanomaterials is provided. Then, the most promising and innovative applications for cancer treatment and diagnostic are introduced. In the second part, an analysis of the nanomaterials in the market for healthcare applications is presented. The issue of unwanted accumulation of metals in organisms after the designed action is then discussed. Finally, the most recent progresses in the design of nanomaterials that are able to escape from organisms after the selected action are comprehensively described, and the perspectives of this exciting field provided.

Emerging Technologies for Food Quality and Food Safety Evaluation - Yong-Jin Cho
2011-03-09

Even though the perception of food quality may depend on its hedonic and often subjective attributes, it is essential to quantitatively

evaluate its quality and safety. Fortunately, the advent of sophisticated systems, including nondestructive testing techniques, has made it possible to definitively evaluate food quality.

Reflecting these advances,
[Handbook of Biophotonics, Volume 3](#) - Jürgen Popp 2012-05-14

This new handbook covers the world of biophotonics not only geographically -- with the editors coming from different continents -- but also in terms of content, since the authors come from the whole spectrum of biophotonic basic and applied research. Designed to set the standard for the scientific community, these three volumes break new ground by providing readers with the physics basics as well as the biological and medical background, together with detailed reports on recent technical advances. The Handbook also adopts an application-related approach, starting with the application and then citing the various tools to solve the scientific task, making it of particular

value to medical doctors. Divided into several sections, the first part offers introductory chapters on the different fields of research, with subsequent parts focusing on the applications and techniques in various fields of industry and research. The result is a handy source for scientists seeking the basics in a condensed form, and equally a reference for quickly gathering the knowledge from neighboring disciplines. Absolutely invaluable for biophotonic scientists in their daily work.

Surface Enhanced Raman Spectroscopy: Biosensing and Diagnostic Technique for Healthcare Applications - Swati Jain 2021-12-28

Surface enhanced Raman spectroscopy (SERS) is a technique applied in multidisciplinary research. Its use has tremendously grown in the last 40 years owing to improved nanofabrication, biomolecules extraction and sensitive signal acquisition techniques. This book focuses on the underlying principles of SERS by emphasizing on basic concepts and background information

about the subject. Chapters explain the physics of Raman spectroscopy while also indicating its relevance to designing protocols and methodologies for biosensing and imaging. The book gives updated and recent details on colloids and nanostructures, their fabrication, surface engineering and immobilization methods, all in context to SERS based biosensing. Key Features: - Covers basic knowledge and new research about surface enhanced Raman spectroscopy (SERS) - Provides a complete framework on SERS based biosensing with concise chapters - Focuses on different active molecules critical to SERS and associated developed nanoassemblies - Presents information about ongoing research on SERS imaging applications - Highlights bottlenecks of SERS technique in biosensing - Includes references for further reading This book serves as a reference book for researchers and academicians and will also provide a reasonable understanding on the topic of SERS to

newcomers irrespective of their background in a simple manner. The book is of interest to all readers within the scientific community involved with Raman spectroscopy, including chemists, physicists, biologists, material scientists as well as biomedical engineers.

Handbook of Photonics for Biomedical Science - Valery V. Tuchin 2010-05-18

The Handbook of Photonics for Biomedical Science analyzes achievements, new trends, and perspectives of photonics in its application to biomedicine. With contributions from world-renowned experts in the field, the handbook describes advanced biophotonics methods and techniques intensively developed in recent years. Addressing the latest problems in biomedical optics and biophotonics, the book discusses optical and terahertz spectroscopy and imaging methods for biomedical diagnostics based on the interaction of coherent, polarized, and acoustically modulated radiation with tissues and cells. It covers modalities of

nonlinear spectroscopic microscopies, photonic technologies for therapy and surgery, and nanoparticle photonic technologies for cancer treatment and UV radiation protection. The text also elucidates the advanced spectroscopy and imaging of normal and pathological tissues. This comprehensive handbook represents the next step in contemporary biophotonics advances. By collecting recently published information scattered in the literature, the book enables researchers, engineers, and medical doctors to become familiar with major, state-of-the-art results in biophotonics science and technology.

Handbook of Microbial Nanotechnology - Chaudhery Mustansar Hussain 2022-03-13
Handbook of Microbial Nanotechnology is a collection of the most recent scientific advancements in the fundamental application of microbial nanotechnology across various sectors. This comprehensive handbook highlights the vast subject areas of microbial nanotechnology and its potential applications in

food, pharmacology, water, environmental remediation, etc. This book will serve as an excellent reference handbook for researchers and students in the food sciences, materials sciences, biotechnology, microbiology and in the pharmaceutical fields. Microbial nanotechnology is taking part in creating development and innovation in various sectors. Despite the participation of microbial nanotechnology in modern development, there are some hindrances. The lack of information, the possibility of adverse impacts on the environment, human health, safety and sustainability are still a challenge. This handbook addresses these challenges. Offers up-to-date, scientific information on the integration of microbiology and nanotechnology Explores how nanotechnology can improve the detection of trace chemical contaminants, viruses and bacteria in food and other industry applications Provides readers with a fundamental understanding of microbial nanotechnology and

its challenges Includes real-time applications with case studies to illustrate how microbial nanotechnology influences modern sciences and technologies

Advances in Noninvasive Food Analysis -

Muhammad Kashif Iqbal Khan 2019-10-16

To ensure food quality and safety food, professionals need a knowledge of food composition and characteristics. The analysis of food product is required for quality management throughout the developmental process including the raw materials and ingredients, but food analysis adds processing cost for food industry and consumes time for government agencies. Advances in Noninvasive Food Analysis explores the potential and recent advances in non-invasive food analysis techniques used to ensure food quality and safety. Such cost-reducing and time-saving non-destructive food analysis techniques covered include, Infrared, Raman Spectroscopy, and Nuclear Magnetic Resonance. The book also covers data processing and

modelling. Features: Covers the advent of non-invasive, non-destructive methods of food analysis Presents such techniques as near and mid infrared, Raman Spectroscopy, and Nuclear Magnetic Resonance Describes the growing role of nanotechnology in non-invasive food analysis Includes image analysis and data processing and modelling required to sort out the data The prime for this book are food professionals working in industry, control authorities and research organizations that ensure food quality and safety as well as libraries of universities with substantial food science programs, food companies and food producers with research and development departments. Also available in the Contemporary Food Engineering series: Advances in Food Bioproducts, Fermentation Engineering and Bioprocessing Technologies , edited by Monica Lizeth Chavez Gonzalez, Nagamani Balagurusamy, Christobal N. Aguilar (ISBN 9781138544222) Advances in Vinegar Production, edited by Argyro Bekatorou (ISBN

9780815365990) Innovative Technologies in Seafood Processing, edited by Yesim Ozogul (ISBN 9780815366447)

Handbook of Research on Food Processing and Preservation Technologies - Preeti Birwal
2021-11-25

The Handbook of Research on Food Processing and Preservation Technologies is a rich 5-volume collection that illustrates various design, development, and applications of novel and innovative strategies for food processing and preservation. The roles and applications of minimal processing techniques (such as ozone treatment, vacuum drying, osmotic dehydration, dense phase carbon dioxide treatment, pulsed electric field, and high-pressure assisted freezing) are discussed, along with a wide range of other applications. The handbook also explores some exciting computer-aided techniques emerging in the food processing sector, such as robotics, radio frequency identification (RFID), three-dimensional food

printing, artificial intelligence, etc. Some emphasis has also been given on nondestructive quality evaluation techniques (such as image processing, terahertz spectroscopy imaging technique, near infrared, Fourier transform infrared spectroscopy technique, etc.) for food quality and safety evaluation. The significant roles of food properties in the design of specific foods and edible films have been elucidated as well. Volume 3: Computer-Aided Food Processing and Quality Evaluation Techniques of the multi-volume set reports on a number of applications of computer-aided techniques for quality evaluation and to secure food quality. The chapter authors present emerging nonthermal approaches for food processing and preservation including a detailed discussion on color measurement techniques, RFID, 3D-food printing, potential of robotics, artificial intelligence, terahertz spectroscopy imaging technique, instrumentation techniques and transducers, food labeling as marketing and

quality assurance tool, detection of pesticides, mathematical simulation of moisture sorption in food products, numerical methods and modeling techniques, concept of phase change materials, and dielectric properties of animal source foods. Other volumes in the set include: Volume 1: Nonthermal and Innovative Food Processing Methods Volume 2: Nonthermal Food Preservation and Novel Processing Strategies Volume 3: Computer-Aided Food Processing and Quality Evaluation Techniques Volume 4: Design and Development of Specific Foods, Packaging Systems, and Food Safety Volume 5: Emerging Techniques for Food Processing, Quality, and Safety Assurance Along with the other volumes, Handbook of Research on Food Processing and Preservation Technologies provides an abundance of valuable information and will be an excellent reference for researchers, scientists, students, growers, traders, processors, industries, and others. *Nanotechnology Characterization Tools for*

Biosensing and Medical Diagnosis - Challa S.S.R. Kumar 2018-05-02

Eighth volume of a 40 volume series on nanoscience and nanotechnology, edited by the renowned scientist Challa S.S.R. Kumar. This handbook gives a comprehensive overview about Nanotechnology Characterization Tools for Biosensing and Medical Diagnosis. Modern applications and state-of-the-art techniques are covered and make this volume an essential reading for research scientists in academia and industry.

Surface-Enhanced Raman Spectroscopy - Marek Prochazka 2019-03-30

This book gives an overview of recent developments in RS and SERS for sensing and biosensing considering also limitations, possibilities and prospects of this technique. Raman scattering (RS) is a widely used vibrational technique providing highly specific molecular spectral patterns. A severe limitation for the application of this spectroscopic

technique lies in the low cross section of RS. Surface-enhanced Raman scattering (SERS) spectroscopy overcomes this problem by 6-11 orders of magnitude enhancement compared with the standard RS for molecules in the close vicinity of certain rough metal surfaces. Thus, SERS combines molecular fingerprint specificity with potential single-molecule sensitivity. Due to the recent development of new SERS-active substrates, labeling and derivatization chemistry as well as new instrumentations, SERS became a very promising tool for many varied applications, including bioanalytical studies and sensing. Both intrinsic and extrinsic SERS biosensing schemes have been employed to detect and identify small molecules, nucleic acids and proteins, and also for cellular and in vivo sensing.

Surface Enhanced Raman Spectroscopy - Sebastian Schlücker 2010-12-28

Covering everything from the basic theoretical and practical knowledge to new exciting developments in the field with a focus on

analytical and life science applications, this monograph shows how to apply surface-enhanced Raman scattering (SERS) for solving real world problems. From the contents: * Theory and practice of SERS * Analytical applications * SERS combined with other analytical techniques * Biophysical applications * Life science applications including various microscopies Aimed at analytical, surface and medicinal chemists, spectroscopists, biophysicists and materials scientists. Includes a Foreword by the renowned Raman spectroscopist Professor Wolfgang Kiefer, the former Editor-in-Chief of the Journal of Raman Spectroscopy.

Comprehensive Nanoscience and Nanotechnology - 2019-01-02

Comprehensive Nanoscience and Technology, Second Edition allows researchers to navigate a very diverse, interdisciplinary and rapidly-changing field with up-to-date, comprehensive and authoritative coverage of every aspect of

modern nanoscience and nanotechnology. Presents new chapters on the latest developments in the field Covers topics not discussed to this degree of detail in other works, such as biological devices and applications of nanotechnology Compiled and written by top international authorities in the field

Raman Spectroscopy Applied to Earth Sciences and Cultural Heritage - J. Dubessy
2012-11-20

Spectroscopic methods such as Raman are used to investigate the structure and dynamics of matter. They are essential for the study of the different types of mineral or organic materials produced at the Earth's surface or interior. As a result of technological improvements in gratings, detectors, filters and personal computers in the last decade, many micro-Raman spectrometers have become plug-and-play instruments, very easy to use and available at a lower cost than the early Raman microprobes. Thus, many laboratories in Earth

Sciences and Cultural Heritage are equipped with these new spectrometers. Commercial, portable Raman spectrometers working in the field have also contributed to the spread of Raman spectroscopy. Poor levels of education in terms of Raman spectroscopy in undergraduate courses in Earth Sciences make it difficult for individuals to obtain information of the highest quality relevant to Earth sciences and Cultural Heritage. This volume is, therefore, timely. Four main topics are addressed: Theory; Methodology, including the instrumentation; Experimental aspects; and Application.

Nanobiotechnology - Alok Dhawan 2018-03-26

This book combines the contributions from the experts of material science, molecular biology, toxicology bio-organic and bio-inorganic chemistry, toxicologists and environmental and food technology etc. to fathom the full scope of current and future of developments in the area of Nanobiotechnology. Provides brief overview of nanobiotechnology for general readers who are

not familiar with the research fields and presents a strong overview of most of the critical areas in field This book can also be used as text book for graduate students as an essential reference material, and as an reading material for general readers having a curiosity in Nanobiotechnology.

Vibrational Spectroscopy in Diagnosis and Screening - IOS Press (Firm) 2012-06-15

In recent years there has been a tremendous growth in the use of vibrational spectroscopic methods for diagnosis and screening. These applications range from diagnosis of disease states in humans, such as cancer, to rapid identification and screening of microorganisms. The growth in such types of studies has been possible thanks to advances in instrumentation and associated computational and mathematical tools for data processing and analysis. This volume of Advances in Biomedical Spectroscopy contains chapters from leading experts who discuss the latest advances in the application of

Fourier transform infrared (FTIR), Near infrared (NIR), Terahertz and Raman spectroscopy for diagnosis and screening in fields ranging from medicine, dentistry, forensics and aquatic science. Many of the chapters provide information on sample preparation, data acquisition and data interpretation that would be particularly valuable for new users of these techniques including established scientists and graduate students in both academia and industry.

Surface-Enhanced Raman Scattering - Zhong-Qun Tian 2010-06-14

Surface-Enhanced Raman Spectroscopy: Principles, Experiments, and Applications is a comprehensive, up to date, and balanced treatment of the theoretical and practical aspects of Surface-Enhanced Raman Scattering (SERS), a useful branch of spectroscopy for several areas of science. This book describes the basic principles of SERS, including SERS mechanisms, performing SERS measurements,

and interpreting data. Also emphasized are applications in electrochemistry; catalysis; surface processing and corrosion; Self-Assemble-Layer and L-B Films; polymer science; biology; medicine and drug analysis; sensors; fuel cells; forensics; and archaeology. It is an essential guide for student and professional analytical chemists.

Metal Nanoparticles and Clusters - Francis Leonard Deepak 2017-11-17

This book covers the continually expanding field of metal nanoparticles and clusters, in particular their size-dependent properties and quantum phenomena. The approaches to the organization of atoms that form clusters and nanoparticles have been advancing rapidly in recent times. These advancements are described through a combination of experimental and computational approaches and are covered in detail by the authors. Recent highlights of the various emerging properties and applications ranging from plasmonics to catalysis are showcased.

Magnetic Nanoparticles - Evgeny Katz

2020-03-05

The present book covers all research areas related to magnetic nanoparticles, magnetic nanorods, and other magnetic nanospecies, their preparation, characterization, and various applications, specifically emphasizing biomedical applications. The chapters written by the leading experts cover different subareas of the science and technology related to various magnetic nanospecies—providing broad coverage of this multifaceted area and its applications. The different topics addressed in this book will be of great interest to the interdisciplinary community active in the area of nanoscience and nanotechnology. It is hoped that this collection and its various chapters will be important and beneficial for researchers and students working in various areas related to bionanotechnology, materials science, biosensor applications, medicine, and many others. Furthermore, this book is aimed at attracting young scientists and

introducing them to this field, in addition to providing newcomers with an enormous collection of literature references.

Nondestructive Quality Assessment Techniques for Fresh Fruits and Vegetables

- Pankaj B. Pathare 2022-12-19

This book describes the various techniques for nondestructive quality assessment of fruits and vegetables. It covers the methods, measurements, operation principles, procedures, data analysis, and applications for implementing these techniques. The book presents the details of nondestructive approaches focusing on the present-day trends and existing future opportunities in the fresh food supply chain. First, it overviews different nondestructive techniques in food quality detection. Then it presents nondestructive methods: monochrome computer vision, imaging techniques, biospeckle laser technique, Fourier Transform Infrared (FTIR) Spectroscopy, hyperspectral imaging, Raman spectroscopy, near infrared (NIR)

spectroscopy, X-ray computed tomography, ultrasound, acoustic emission, chemometrics, electronic nose and tongue. Selected applications of each method are also introduced. As a result, readers gain a better understanding of how to use nondestructive methods and technologies to detect the quality of fresh fruits and vegetables. With a wide range of interesting topics, the book will benefit readers including postharvest & food scientists/technologists, industry personnel and researchers involved in fresh produce quality detection. The book can also serve as a readily accessible reference material for postgraduate students.

Nanotechnology Applications in Health and Environmental Sciences - Necdet Saglam

2021-06-10

Nanoscience and nanotechnologies are leading to a major point to our understanding of nature. Nanotechnology can be generally defined as creation and use of nano-sized systems, devices, and structures which have special functions or

properties because of their small size. This volume on Nanotechnology Applications in Health and Environmental Sciences focuses on biotechnological and environmental applications of nanomaterials. It covers popular and various nanomedical topics such as oncology, genetics, and reconstructive medicine. Additionally, many chapters give leading-edge information on nano-sensor applications and usage in specific disciplines. Also, two chapters on novel subjects have been included on Lantibiotics and microbiota. This book should be useful for nanotechnologists, microbiologists, and researchers interested in nanomedicine and nano-biotechnology, as well as environmental nanotechnology.

Remote Compositional Analysis - Janice L. Bishop 2019-11-28

Comprehensive overview of the spectroscopic, mineralogical, and geochemical techniques used in planetary remote sensing.

Molecular Spectroscopy—Experiment and

Theory - Andrzej Koleżyński 2018-10-10

This book reviews various aspects of molecular spectroscopy and its application in materials science, chemistry, physics, medicine, the arts and the earth sciences. Written by an international group of recognized experts, it examines how complementary applications of diverse spectroscopic methods can be used to study the structure and properties of different materials. The chapters cover the whole spectrum of topics related to theoretical and computational methods, as well as the practical application of spectroscopic techniques to study the structure and dynamics of molecular systems, solid-state crystalline and amorphous materials, surfaces and interfaces, and biological systems. As such, the book offers an invaluable resource for all researchers and postgraduate students interested in the latest developments in the theory, experimentation, measurement and application of various advanced spectroscopic methods for the study of materials.

Nanomaterials for Food Applications - 2018-11-16

Nanomaterials for Food Applications highlights recent developments in nanotechnologies, covering the different food areas where these novel products or technologies can be applied. The book covers five major themes, showing how nanotechnology is used in food, the use of ingredients in nanoform to improve bioavailability or nanoencapsulation technologies, nanotechnologies for food processing, nanosensors for food quality and safety, nanotechnologies for food packaging, and methods to evaluate potential risks and regulatory issues. This is an important research reference that will be of great value to academic and industrial readers, as topics of importance, both at a research level and for commercial applications, are covered. Regulatory agencies will also be interested in the latest developments covered in the book as they will help set the foundation for further regulations. Demonstrates

how nanotechnology can improve food quality and safety Shows how nanotechnology is used to create more effective food processing techniques Discusses the regulatory issues surrounding the use of nanomaterials in food to ensure they are used safely and responsibly

Smart Nanodevices for Point-of-Care

Applications - Suvadhan Kanchi 2022-06-23

Smart Nanodevices for Point-of-Care

Applications examines the latest trends on the capabilities of nanomaterials for point-of-care (PoC) diagnostics and explains how these materials can help to strengthen, miniaturize, and improve the quality of diagnostic devices. A thorough explanation of all-in-one nanosmart devices is included, incorporating all of the applications and fundamentals of these smart devices. This book provides practical information on the following: novel and effective smart materials, better-quality health management, effective management of a disease, potential point-of-care devices, and mobile nanosensors.

Additional Features Includes in-depth research based collation of the latest trends of smart devices Provides practical information on all-in-one nanosmart devices Explains how nanomaterials can help to strengthen and improve the quality of diagnostic devices Emphasizes the development of smart nanodevices, especially the miniaturization aspect

Biosensors Based on Nanomaterials and Nanodevices - Jun Li 2017-12-19

Biosensors Based on Nanomaterials and Nanodevices links interdisciplinary research from leading experts to provide graduate students, academics, researchers, and industry professionals alike with a comprehensive source for key advancements and future trends in nanostructured biosensor development. It describes the concepts, principles, materials, device fabrications, functions, system integrations, and applications of various types of biosensors based on signal transduction

mechanisms, including fluorescence, photonic crystal, surface-enhanced Raman scattering, electrochemistry, electro-luminescence, field-effect transistor, and magnetic effect. The book: Explains how to utilize the unique properties of nanomaterials to construct nanostructured biosensors to achieve enhanced performance Features examples of biosensors based on both typical and emerging nanomaterials, such as gold nanoparticles, quantum dots, graphene, graphene oxides, magnetic nanoparticles, carbon nanotubes, inorganic nanowires/nanorods, plasmonic nanostructures, and photonic crystals Demonstrates the broad applications of nanostructured biosensors in environmental monitoring, food safety, industrial quality assurance, and in vitro and in vivo health diagnosis Inspires new ideas for tackling multiscale and multidisciplinary issues in developing high-performance biosensors for complex practical biomedical problems Focusing on the connection between nanomaterials

research and biosensor development, Biosensors Based on Nanomaterials and Nanodevices illustrates the exciting possibilities and critical challenges of biosensors based on nanomaterials and nanodevices for future health monitoring, disease diagnosis, therapeutic treatments, and beyond.

Advanced Materials and Techniques for Biosensors and Bioanalytical Applications -

Pranab Goswami 2020-11-01

Bioanalytical science and its technological subdomain, biosensors, are ever-evolving subjects, striving for rapid improvement in terms of performance and expanding the target range to meet the vast societal and market demands. The key performance factors for a biosensor that drive the research are selectivity, sensitivity, response time, accuracy, and reproducibility, with additional requirements of its portability and inexpensive nature. These performance factors are largely governed by the materials and techniques being used in these bioanalytical

platforms. The selection of materials to meet these requirements is critical, as their interaction or involvement with the biological recognition elements should initiate or improve these performance factors. The technique discussed primarily applies to transducers involved in converting a biochemical signal to optical or electrical signals. Over the years, the emergence of novel materials and techniques has drastically improved the performance of these bioanalytical systems, enabling them to expand their analytical horizon. These advanced materials and techniques are central to modern bioanalytical and biosensor research. *Advanced Materials and Techniques for Biosensors and Bioanalytical Applications* provides a comprehensive review of the subject, including a knowledge platform for both academics and researchers. Considering biosensors as a central theme to this book, an outline on this subject with background principles has been included, with a scope of extending the utility of the book

to coursework in graduate and postgraduate schools. Features:

- Basic principles on different classes of biosensors, recent advances and applications
- Smart materials for biosensors and other rapid, portable detection devices
- Metal nanoparticles and nanocrystals for analytical applications
- Carbon-based nanoparticles and quantum dots for sensing applications
- Nanozymes as potential catalysts for sensing applications
- Bioelectrochemiluminescence and photoelectrochemical-based biosensors
- Paper electronics and paper-based biosensors
- Microbial biosensors: artificial intelligence, genetic engineering, and synthetic biology
- Biofuel cells as a signal transduction platform
- FET-based biosensors, including ISFET and BioFET

This book serves as a reference for scientific investigators and a textbook for a graduate-level course in biosensors and advanced bioanalytical techniques.

Plasmonic Sensors and their Applications - Adil

Denizli 2021-11-22

Plasmonic Sensors and their Applications A practically-focused reference and guide on the use of plasmonic sensing as a faster and cheaper alternative to conventional sensing platforms Plasmons, the collective oscillations of electrons occurring at the interface between any two materials, are sensitive to changes in dielectric properties near metal surfaces. Plasmonic sensors enable the real-time study of unique surface properties by monitoring the effect of the material interaction at the sensor surface. Plasmonic sensing techniques offer fast, label-free analysis, and hold advantages over labelling techniques such as ELISA (enzyme-linked immunosorbent assay). Plasmonic Sensors and their Applications examines the development and use of highly sensitive and selective plasmonic sensing platforms in chemistry, biotechnology, and medicine. Contributions by an international panel of experts provide timely and in-depth coverage of both real-world

applications and academic research in the dynamic field. The authors describe advances in nanotechnology, polymer chemistry, and biomedicine, explore new and emerging applications of plasmonic sensing, discuss future trends and potential research directions, and more. This authoritative volume: Demonstrates why plasmonic sensing is a profitable method for easy and label-free analysis in real-time Covers a variety of applications of plasmonic sensors, such as disease diagnostics, vitamin detection, and detection of chemical and biological warfare agents Includes a brief introduction to the history and development of plasmonic sensors Provides concise theory and background for every application covered in the text Plasmonic Sensors and their Applications is an invaluable resource for analytical chemists, biochemists, biotechnologists, protein and surface chemists, and advanced students of biotechnology. **Laser Spectroscopy and Laser Imaging** - Helmut H. Telle 2018-04-17

"a very valuable book for graduate students and researchers in the field of Laser Spectroscopy, which I can fully recommend" —Wolfgang Demtröder, Kaiserslautern University of Technology How would it be possible to provide a coherent picture of this field given all the techniques available today? The authors have taken on this daunting task in this impressive, groundbreaking text. Readers will benefit from the broad overview of basic concepts, focusing on practical scientific and real-life applications of laser spectroscopic analysis and imaging. Chapters follow a consistent structure, beginning with a succinct summary of key principles and concepts, followed by an overview of applications, advantages and pitfalls, and finally a brief discussion of seminal advances and current developments. The examples used in this text span physics and chemistry to environmental science, biology, and medicine. Focuses on practical use in the laboratory and real-world applications Covers the basic

concepts, common experimental setups Highlights advantages and caveats of the techniques Concludes each chapter with a snapshot of cutting-edge advances This book is appropriate for anyone in the physical sciences, biology, or medicine looking for an introduction to laser spectroscopic and imaging methodologies. Helmut H. Telle is a full professor at the Instituto Pluridisciplinar, Universidad Complutense de Madrid, Spain. Ángel González Ureña is head of the Department of Molecular Beams and Lasers, Instituto Pluridisciplinar, Universidad Complutense de Madrid, Spain.

[Biomolecular Imaging and Spectroscopy with Metal and Semiconductor Nanoparticles](#) - Douglas A. Stuart 2003

Advances in Nutraceuticals and Functional Foods - Sreerag Gopi 2022-05-19

This book examines the rapidly growing field of functional foods in the prevention and

management of chronic and infectious diseases. Chapters explore the varied sources, biochemical properties, metabolics, health benefits, and safety of bioactive ingredients of nutraceutical and functional food products. Special emphasis is given to linking the molecular and chemical structures of biologically active components in foods to their nutritional and pharmacological effects on human health and wellness. In addition to discussing scientific and clinical rationales for different sources of functional foods, the book also explains in detail scientific methodologies used to investigate the functionality, effectiveness, and safety of bioactive ingredients in food. The chapter authors discuss advanced nanocarriers for nutraceuticals based on structured lipids and nonlipids, nanoparticulate approaches for improved nutrient bioavailability, adulteration and safety issues, nanodelivery systems, microencapsulation, and more. The book discusses some particular health benefits

from nutrition nutraceuticals, including probiotic dairy and non-dairy products and bioactive proteins and peptides as functional foods. The volume also gives an overview of emerging trends, growth patterns, and new opportunities in the field of nutraceuticals and functional foods.

Fluorescence Spectroscopy - Otto S. Wolfbeis
2012-12-06

"Provides analytical chemists and biomedical scientists with an excellent summary of progress...This is a book that can be recommended to all analytical scientists interested in fluorimetry." (Analytical Chimica Acta) "This is a useful overview and gives the nonspecialist a feeling for the advantages and limitations of the methods. Overall this book is a worthwhile read and a good source of references." (TRAC) The book is divided into chapters on new methods, new applications, fluorescence immunoassays, fluorometric analysis and fluorescence spectroscopy in

biomedical sciences. Specific topics are fluorescence spectroscopy using synchrotron radiation, picosecond fluorescence spectroscopy, fluorescence microscopy, fluorescence scattering by synthetic polymers, fluorescence immunoassays, fluorescence for environmental monitoring, fluorescence in flow injection analysis, hydro-geological studies, fluorescence of proteins, lipids and membranes, cell fluorescence, calcium transients.

MICAI 2008: Advances in Artificial

Intelligence - Alexander Gelbukh 2008-10-07

The Mexican International Conference on Artificial Intelligence (MICAI), a yearly international conference series organized by the Mexican Society for Artificial Intelligence (SMIA), is a major international AI forum and the main event in the academic life of the country's growing AI community. In 2008 Mexico celebrates the 50th anniversary of development of computer science in the country: in 1958 the first computer was installed at the

National Autonomous University of Mexico (UNAM). Nowadays, computer science is the country's fastest growing research area. The proceedings of the previous MICAI events were published by Springer in its Lecture Notes in Artificial Intelligence (LNAI) series, vol. 1793, 2313, 2972, 3789, 4293, and 4827. Since its foundation in 2000, the conference has been growing in popularity, and improving in quality. This volume contains the papers presented at the oral session of the 7th Mexican International Conference on Artificial Intelligence, MICAI 2008, held October 27-31, 2008, in Atizapán de Zaragoza, Mexico. The conference received for evaluation 363 submissions by 1,032 authors from 43 countries (see Tables 1 and 2). This volume contains revised versions of 94 papers by 308 authors from 28 countries selected according to the results of an international reviewing process. Thus the acceptance rate was 25.9%. The book is structured into 20 thematic fields representative of the main current areas of

interest for the AI community, plus a section of invited papers:

Raman Spectroscopy and Applications -

Khan Maaz 2017-02-15

Raman spectroscopy has a number of applications in various fields including material science, physics, chemistry, biology, geology, and medicine. This book illustrates necessary insight and guidance in the field of Raman spectroscopy with detailed figures and explanations. This presents deep understanding of new techniques from basic introduction to the advance level for scientists and engineers. The chapters cover all major aspects of Raman spectroscopy and its application in material characterization with special emphasis on both the theoretical and experimental aspects. This book is aimed to provide solid foundation of Raman spectroscopy to the students, scientists, and engineers working in various fields as mentioned above.

Organic Semiconductor Lasers and Tailored

Nanostructures for Raman Spectroscopy -

Liu, Xin 2015-06-19

Biomolecular and Bioanalytical Techniques -

Vasudevan Ramesh 2019-03-08

An essential guide to biomolecular and bioanalytical techniques and their applications Biomolecular and Bioanalytical Techniques offers an introduction to, and a basic understanding of, a wide range of biophysical techniques. The text takes an interdisciplinary approach with contributions from a panel of distinguished experts. With a focus on research, the text comprehensively covers a broad selection of topics drawn from contemporary research in the fields of chemistry and biology. Each of the internationally reputed authors has contributed a single chapter on a specific technique. The chapters cover the specific technique's background, theory, principles, technique, methodology, protocol and applications. The text explores the use of a

variety of analytical tools to characterise biological samples. The contributors explain how to identify and quantify biochemically important molecules, including small molecules as well as biological macromolecules such as enzymes, antibodies, proteins, peptides and nucleic acids. This book is filled with essential knowledge and explores the skills needed to carry out the research and development roles in academic and industrial laboratories. A technique-focused book that bridges the gap between an introductory text and a book on advanced

research methods Provides the necessary background and skills needed to advance the research methods Features a structured approach within each chapter Demonstrates an interdisciplinary approach that serves to develop independent thinking Written for students in chemistry, biological, medical, pharmaceutical, forensic and biophysical sciences, Biomolecular and Bioanalytical Techniques is an in-depth review of the most current biomolecular and bioanalytical techniques in the field.