

modern techniques in applied molecular spectroscopy

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Modern Techniques in Applied Molecular Spectroscopy

Dieses praxisorientierte Handbuch ist besonders für Neulinge auf dem Gebiet der Molekülspektroskopie gedacht. Es vermittelt das notwendige Grundwissen, um moderne Techniken im Laboralltag anwenden zu können, und zeigt, wie die Resultate geeignet auszuwerten sind. (04/98)

Laser Spectroscopy

Keeping abreast of the latest techniques and applications, this new edition of the standard reference and graduate text on laser spectroscopy has been completely revised and expanded. While the general concept is unchanged, the new edition features a broad array of new material. This new edition has been completely revised, especially the chapters on non linear spectroscopy, ion trapping, ultra short laser pulses and new developments. Fifty new figures illustrate the newest developments and results. The author is one of the most renowned experts in this area and no other book with this broad scope is available.

Atomic and Molecular Spectroscopy

A wide-ranging review of modern spectroscopic techniques such as X-ray, photoelectron, optical and laser spectroscopy, and radiofrequency and microwave techniques. On the fundamental side the book focuses on physical principles and the impact of spectroscopy on our understanding of the building blocks of matter, while in the area of applications particular attention is given to those in chemical analysis, photochemistry, surface characterisation, environmental and medical diagnostics, remote sensing and astrophysics. The Fourth Edition also provides the reader with an update on laser cooling and trapping, Bose-Einstein condensation, ultra-fast spectroscopy, high-power laser/matter interaction, satellite-based astronomy and spectroscopic aspects of laser medicine.

Handbook of Infrared Spectroscopy of Ultrathin Films

Because of the rapid increase in commercially available Fourier transform infrared spectrometers and computers over the past ten years, it has now become feasible to use IR spectrometry to characterize very thin films at extended interfaces. At the same time, interest in thin films has grown tremendously because of applications in microelectronics, sensors, catalysis, and nanotechnology. The Handbook of Infrared Spectroscopy of Ultrathin Films provides a practical guide to experimental methods, up-to-date theory, and considerable reference data, critical for scientists who want to measure and interpret IR spectra of ultrathin films. This authoritative volume also: Offers information needed to effectively apply IR spectroscopy to the analysis and evaluation of thin and ultrathin films on flat and rough surfaces and on powders at solid-gaseous, solid-liquid, liquid-gaseous, liquid-liquid, and solid-solid interfaces. Provides full discussion of theory underlying techniques Describes experimental methods in detail, including optimum conditions for recording spectra and the interpretation of spectra Gives detailed information on equipment, accessories, and techniques Provides IR spectroscopic data tables as appendixes, including the first compilation of published data on longitudinal frequencies of different substances Covers new approaches, such as Surface Enhanced IR spectroscopy (SEIR), time-resolved FTIR spectroscopy, high-resolution microspectroscopy and using synchrotron radiation

Process Analytical Technology

Process Analytical Technology explores the concepts of PAT and its application in the chemical and pharmaceutical industry from the point of view of the analytical chemist. In this new edition all of the original chapters have been updated and revised, and new chapters covering the important topics of sampling, NMR, fluorescence, and acoustic chemometrics have been added. Coverage includes: Implementation of Process Analytical Technologies UV-Visible Spectroscopy for On-line Analysis Infrared Spectroscopy for Process Analytical Applications Process Raman Spectroscopy Process NMR Spectroscopy: Technology and On-line Applications Fluorescent Sensing and Process Analytical Applications Chemometrics in Process Analytical Technology (PAT) On-Line PAT Applications of Spectroscopy in the Pharmaceutical Industry Future Trends for PAT for Increased Process Understanding and Growing Applications in Biomanufacturing NIR Chemical Imaging This volume is an important starting point for anyone wanting to implement PAT and is intended not only to assist a newcomer to the field but also to provide up-to-date information for those who practice process analytical chemistry and PAT. It is relevant for chemists, chemical and process engineers, and analytical chemists working on process development, scale-up and production in the pharmaceutical, fine and specialty chemicals industries, as well as for academic chemistry, chemical engineering, chemometrics and pharmaceutical science research groups focussing on PAT. Review from the First Edition "The book provides an excellent first port of call for anyone seeking material and discussions to understand the area better. It deserves to be found in every library that serves those who are active in the field of Process Analytical Technology."—Current Engineering Practice

Molecular Spectroscopy: Modern Research

Molecular Spectroscopy: Modern Research, Volume III is a collection of papers presented at the 40th Annual Molecular Spectroscopy Symposium, held at the Ohio State University. The contributors of this seven-chapter text cover the significant advances in molecular spectroscopic research and their application in chemistry. Chapters 1 and 2 discuss first the higher-order vibration-rotation interactions in molecules and then present formulas and an insight into the direction being taken in theoretical pursuits. Chapter 3 provides an extensive compilation of published intensity and collision broadening ...

Infrared Spectroscopy

Provides an introduction to those needing to use infrared spectroscopy for the first time, explaining the fundamental aspects of this technique, how to obtain a spectrum and how to analyse infrared data covering a wide range of applications. Includes instrumental and sampling techniques Covers biological and industrial applications Includes suitable questions and problems in each chapter to assist in the analysis and interpretation of representative infrared spectra Part of the ANTS (Analytical Techniques in the Sciences) Series.

Molecular Spectroscopy—Experiment and Theory

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.

Laser Spectroscopy 2

Keeping abreast of the latest techniques and applications, this new edition of the standard reference and graduate text on laser spectroscopy has been completely revised and expanded. While the general concept is unchanged, the new edition features a broad array of new material, e.g., ultrafast lasers (atto- and femto-second lasers), coherent matter waves, Doppler-free Fourier spectroscopy, interference spectroscopy, quantum optics and gravitational waves and still more applications in chemical analysis, medical diagnostics, and engineering.

Nonthermal Plasma Chemistry and Physics

In addition to introducing the basics of plasma physics, Nonthermal Plasma Chemistry and Physics is a comprehensive presentation of recent developments in the rapidly growing field of nonthermal plasma chemistry. The book offers a detailed discussion of the fundamentals of plasma chemical reactions and modeling, nonthermal plasma sources, relevant diagnostic techniques, and selected applications. Elucidating interconnections and trends, the book focuses on basic principles and illustrations across a broad field of applications. Expert contributors address environmental aspects of plasma chemistry. The book also includes selected plasma conditions and specific applications in volume plasma chemistry and treatment of material surfaces such as plasma etching in microelectronics, chemical modification of polymer surfaces and deposition of functional thin films. Designed for students of plasma physics, Nonthermal Plasma Chemistry and Physics is a concise resource also for specialists in this and related fields of research.

Handbook of Spectroscopy

This second, thoroughly revised, updated and enlarged edition provides a straightforward introduction to spectroscopy, showing what it can do and how it does it, together with a clear, integrated and objective account of the wealth of information that may be derived from spectra. It also features new chapters on spectroscopy in nano-dimensions, nano-optics, and polymer analysis. Clearly structured into sixteen sections, it covers everything from spectroscopy in nanodimensions to medicinal applications, spanning a wide range of the electromagnetic spectrum and the physical processes involved, from nuclear phenomena to molecular rotation processes. In addition, data tables provide a comparison of different methods in a standardized form, allowing readers to save valuable time in the decision process by avoiding wrong turns, and also help in selecting the instrumentation and performing the experiments. These four volumes are a must-have companion for daily use in every lab.

Ageing of Composites

Ageing of composites is a highly topical subject given the increasing use of composites in structural applications in many industries. Ageing of composites addresses many of the uncertainties about the long-term performance of composites and how they age under conditions encountered in service. The first part of the book reviews processes and modelling of composite ageing including physical and chemical ageing of polymeric composites, ageing of glass-ceramic matrix composites, chemical ageing mechanisms, stress corrosion cracking, thermo-oxidative ageing, spectroscopy of ageing composites, modelling physical and accelerated ageing and ageing of silicon carbide composites. Part two examines ageing of composites in transport applications including aircraft, vehicles and ships. Part three reviews ageing of composites in non-transport applications such as implants in medical devices, oil and gas refining, construction, chemical processing and underwater applications. With its distinguished editor and international team of contributors, Ageing of composites is a valuable reference guide for composite manufacturers and developers. It also serves as a source of information for material scientists, designers and engineers in industries that use composites, including transport, chemical processing and medical engineering. Addresses many of the uncertainties about the long-term performance

of composites and how they age under conditions encountered in service Reviews processes and modelling of composite ageing including chemical ageing mechanisms and stress corrosion cracking Discusses ageing of composites in both transport and non-transport applications ranging from aircraft to implants in medical devices

Vibrational Spectroscopy of Biological and Polymeric Materials

Used primarily for characterizing polymers and biological systems, vibrational spectroscopy continues to uncover structural information pertinent to a growing number of applications. *Vibrational Spectroscopy of Biological and Polymeric Materials* compiles the latest developments in advanced infrared and Raman spectroscopic techniques that are applicable to both polymeric materials and biological compounds. It also presents instrumentation and experimental details that can be used by polymer chemists and biochemists in the design of their own experiments. The text starts by describing the application of static and dynamic FT-IR spectroscopies to liquid crystalline polyurethanes, including a clear exposition of the theory behind the experiments. It discusses the measurement of static and dynamic linear dichroism and stress or strain in both single and multiple fiber composite materials. The book explains the roles of vibrational spectroscopy and the Langmuir-Blodgett technique in the study and preparation of high-quality ultrathin materials. Chapters rich in both theoretical and experimental details describe two-dimensional correlation spectroscopy and vibrational circular dichroism. Biomedically-oriented chapters describe the advances in IR imaging of tissues made possible by focal-plane arrays; as well as the use of ligand-gated FT-IR difference spectroscopy in neuropharmacology, particularly in identifying ligands and modes of action for the large number of membrane receptors recently identified in the human genome. The final chapter discusses the application of time-resolved FT-IR spectroscopy to biological materials, providing a detailed guide to the use of commercial step-scan instrumentation for examining sub-millisecond mechanistic details of photobiological processes. Written by eminent experts in these fields, *Vibrational Spectroscopy of Biological and Polymeric Materials* is an ideal and practical reference for the broad spectrum of researchers interested in the analysis and integration of biological and polymeric materials.

Corrosion Science

Corrosion studies have attracted considerable interest in the areas of materials chemistry and industrial chemistry, as it affects the direct and indirect costs of industry, leading to huge economic setbacks due to the need for repair, maintenance, and even shutdowns due corrosion damage. This new volume is a comprehensive resource that presents new and up-to-date, theoretical, and experimental corrosion inhibition studies. *Corrosion Science: Theoretical and Practical Applications* provides an introduction and overview of corrosion science and presents theoretical and experimental studies to mitigate damage from corrosion. Taking an interdisciplinary perspective, this volume is a rich resource of studies and experiments toward solutions that are cost-effective, environmentally friendly, and low in maintenance. The chapters cover an array of topics on the study of corrosion science, exploring different types of materials and various methods of corrosion inhibition. Topics include the use of oil and plant extracts, the application of density functional theory to study anticorrosive effects, the use of infrared spectroscopy, the introduction of new hybrid sol-gel coatings, an atomistic simulation method, a dynamic electrochemical impedance spectroscopy (DEIS) technique, and much more. This book offers important information on the mechanisms of corrosion science in theory and practice as well as a wealth of corrosion prevention and protection methods.

Polymer Surface Characterization

This fully updated edition provides a broad approach to the surface analysis of polymers being of high technological interest. Modern analytical techniques, potential applications and recent advances in instrumental apparatus are discussed. The self-consistent chapters are devoted to techniques from photoelectron spectroscopy to electron microscopies and wettability.

Green Industrial Applications of Ionic Liquids

This book contains the lecture notes for the NATO Advanced Research Workshop on th Green Industrial Applications of Ionic Liquids held April 12th_16 , 2000 in Heraklion, Crete, Greece. This was the first international meeting devoted to research in the area of ionic liquids (salts with melting points below 100 0c), and was intended to explore the promise of ionic liquids as well as to set a research agenda for the field. It was the first international meeting dedicated to the study and application of ionic

liquids as solvents, and forty-one scientists and engineers from academia, industry, and government research laboratories (as well as six industry observers and four student assistants) met to discuss the current and future status of the application of ionic liquids to new green industrial technologies. It was immediately clear that the number of organic chemists and engineers working in the field needed to be increased. It was also clear that the declining interest in high temperature molten salts and subsequent increase in low melting ionic liquid solvents had not yet taken hold in Eastern Europe. Participants from NATO Partner Countries contributed significant expertise in high temperature molten salts and were able to take back a new awareness and interest in ionic liquid solvents.

Global Optimization in Action

In science, engineering and economics, decision problems are frequently modelled by optimizing the value of a (primary) objective function under stated feasibility constraints. In many cases of practical relevance, the optimization problem structure does not warrant the global optimality of local solutions; hence, it is natural to search for the globally best solution(s). *Global Optimization in Action* provides a comprehensive discussion of adaptive partition strategies to solve global optimization problems under very general structural requirements. A unified approach to numerous known algorithms makes possible straightforward generalizations and extensions, leading to efficient computer-based implementations. A considerable part of the book is devoted to applications, including some generic problems from numerical analysis, and several case studies in environmental systems analysis and management. The book is essentially self-contained and is based on the author's research, in cooperation (on applications) with a number of colleagues. Audience: Professors, students, researchers and other professionals in the fields of operations research, management science, industrial and applied mathematics, computer science, engineering, economics and the environmental sciences.

Molecular Spectroscopy

Molecular Spectroscopy: Modern Research explores the advances in several phases of research in molecular spectroscopy. This eight-chapter book commemorates the 25th anniversary of the annual Columbus Symposium on Molecular Structure and Spectroscopy, held in September, 1970. This book highlights the spectroscopic studies of molecular species in the gas phase and in matrices. Representative articles are also included that cover the applications of molecular studies in a wide variety of areas such as biophysics, astrophysical problems, and energy transfer processes. Other chapters describe the progress achieved in the technology of high resolution spectroscopy and the techniques and terminology of Lamb-dip spectroscopy. A comprehensive bibliography is included for most of the subjects discussed and this text concludes with tables of standard data listing secondary wavelength standards, fundamental constants, atomic masses, and conversion factors of interest to spectroscopists. Spectroscopists, chemists, and researchers will find this work invaluable.

Application of Polarization Modulation Infrared Reflection Absorption Spectroscopy in Electrochemistry

This book describes the physical basis of polarization modulation infrared reflection-absorption spectroscopy and its application in electrochemical studies. It provides a concise yet comprehensive review of the research done in this field in the last 20 years. Electrochemical methods are used to determine the rate and mechanism of charge transfer reactions between an electrode and species adsorbed or diffusing to its surface. In the past two decades PM-IRRAS has grown to be one of the most important vibrational spectroscopy techniques applied to investigate structural changes taking place at the electrochemical interface. The monograph presents foundations of this technique and reviews in situ studies of redox-inactive and redox-active films adsorbed on electrode surfaces. It also discusses experimental conditions required in electrochemical and spectroscopic studies and presents practical solutions to perform efficient experiments. As such, it offers an invaluable resource for graduate and postgraduate students, as well as for all researchers in academic and industrial laboratories.

Optical Properties of Materials and Their Applications

Provides a semi-quantitative approach to recent developments in the study of optical properties of condensed matter systems. Featuring contributions by noted experts in the field of electronic and optoelectronic materials and photonics, this book looks at the optical properties of materials as well as their physical processes and various classes. Taking a semi-quantitative approach to the subject, it presents a summary of the basic concepts, reviews recent developments in the study of optical

properties of materials and offers many examples and applications. *Optical Properties of Materials and Their Applications*, 2nd Edition starts by identifying the processes that should be described in detail and follows with the relevant classes of materials. In addition to featuring four new chapters on optoelectronic properties of organic semiconductors, recent advances in electroluminescence, perovskites, and ellipsometry, the book covers: optical properties of disordered condensed matter and glasses; concept of excitons; photoluminescence, photoinduced changes, and electroluminescence in noncrystalline semiconductors; and photoinduced bond breaking and volume change in chalcogenide glasses. Also included are chapters on: nonlinear optical properties of photonic glasses; kinetics of the persistent photoconductivity in crystalline III-V semiconductors; and transparent white OLEDs. In addition, readers will learn about excitonic processes in quantum wells; optoelectronic properties and applications of quantum dots; and more. Covers all of the fundamentals and applications of optical properties of materials Includes theory, experimental techniques, and current and developing applications Includes four new chapters on optoelectronic properties of organic semiconductors, recent advances in electroluminescence, perovskites, and ellipsometry Appropriate for materials scientists, chemists, physicists and electrical engineers involved in development of electronic materials Written by internationally respected professionals working in physics and electrical engineering departments and government laboratories *Optical Properties of Materials and Their Applications*, 2nd Edition is an ideal book for senior undergraduate and postgraduate students, and teaching and research professionals in the fields of physics, chemistry, chemical engineering, materials science, and materials engineering.

Terahertz Science and Technology for Military and Security Applications

The inherent advantages and potential payoffs of the terahertz (THz) regime for military and security applications serve as an important driver for interest in new THz-related science and technology. In particular, the very rapid growth in more recent years is arguably most closely linked to the potential payoffs of THz sensing and imaging (THz-S&I). This book presents some of the leading fundamental research efforts towards the realization of practical THz-S&I capabilities for military and security applications. Relevant subjects include theoretical prediction and/or measurement of THz spectroscopic phenomenon in solid-state materials such as high explosives (e.g. HMX, PETN, RDX, TNT, etc.), carbon-fiber composites, biological agents (e.g. DNA, RNA, proteins, amino acids) and organic-semiconductor nanostructures. Individual papers also address the effective utilization of state-of-the-art THz-frequency technology in military and security relevant scenarios such as standoff S&I, screening of packages and personnel, and perimeter defense. Technical papers introduce novel devices and/or concepts that enhance THz source and detector performance, enabling completely new types of sensor functionality at THz frequency (e.g. detection at nanoscale/molecular levels), and defining new and innovative sensing modalities (e.g. remote personnel identification) for defense and security. Therefore, the collective research presented here represents a valuable source of information on the evolving field of THz-S&I for military and security applications.

Handbook of Food Analysis Instruments

Explore the Pros and Cons of Food Analysis Instruments The identification, speciation, and determination of components, additives, and contaminants in raw materials and products will always be a critical task in food processing and manufacturing. With contributions from leading scientists, many of whom actually developed or refined each technique or

Handbook of Wood Chemistry and Wood Composites

The degradable nature of high-performance, wood-based materials is an attractive advantage when considering environmental factors such as sustainability, recycling, and energy/resource conservation. The *Handbook of Wood Chemistry and Wood Composites* provides an excellent guide to the latest concepts and technologies in wood chemistry and bio-based composites. The book analyzes the chemical composition and physical properties of wood cellulose and its response to natural processes of degradation. It describes safe and effective chemical modifications to strengthen wood against biological, chemical, and mechanical degradation without using toxic, leachable, or corrosive chemicals. Expert researchers provide insightful analyses of the types of chemical modifications applied to polymer cell walls in wood, emphasizing the mechanisms of reaction involved and resulting changes in performance properties. These include modifications that increase water repellency, fire retardancy, and resistance to ultraviolet light, heat, moisture, mold, and other biological organisms. The text also explores modifications that increase mechanical strength, such as lumen fill, monomer polymer

penetration, and plasticization. The Handbook of Wood Chemistry and Wood Composites concludes with the latest applications, such as adhesives, geotextiles, and sorbents, and future trends in the use of wood-based composites in terms of sustainable agriculture, biodegradability and recycling, and economics. Incorporating over 30 years of teaching experience, the esteemed editor of this handbook is well-attuned to educational demands as well as industry standards and research trends.

Failure Analysis of Paints and Coatings

Entirely devoted to the failure analysis of coatings and paints – an “excellent reference to a select market”. Latest edition contains new material on surface preparation, transfer of salt to steel from contaminated abrasive, effect of peak density on coating performance, on galvanizing, silane-modified coatings, polyurea coatings, polyaspartics, and powder coatings and on dry spray. Balances scientific background and practical advice, giving both the theory and applications in a slim, easily readable form. Includes case studies of laboratory tests. Written by an author with over 25 years of experience in the paint and coatings industry.

Nanostructured Thin Films and Surfaces

The book series Nanomaterials for the Life Sciences, provides an in-depth overview of all nanomaterial types and their uses in the life sciences. Each volume is dedicated to a specific material class and covers fundamentals, synthesis and characterization strategies, structure-property relationships and biomedical applications. The series brings nanomaterials to the Life Scientists and life science to the Materials Scientists so that synergies are seen and developed to the fullest. Written by international experts of various facets of this exciting field of research, the series is aimed at scientists of the following disciplines: biology, chemistry, materials science, physics, bioengineering, and medicine, together with cell biology, biomedical engineering, pharmaceutical chemistry, and toxicology, both in academia and fundamental research as well as in pharmaceutical companies. VOLUME 5 - Nanostructured Thin Films and Surfaces

Photoacoustic IR Spectroscopy

This invaluable and up-to-date source on instruments and applications covers everything needed to employ a technique for investigating various gases and materials, including biomaterials. It includes the latest developments in light sources, signal recovery and numerical methods. There is no other single publication that reviews the entire subject of photoacoustic infrared spectroscopy in such detail. Physicists, chemists, and spectroscopists in both academic and industrial laboratories, polymer and organic chemists, analysts in industry, forensic and government laboratories, and materials scientists will find this book to be a vital resource.

Fourier Transform Infrared Spectrometry

A bestselling classic reference, now expanded and updated to cover the latest instrumentation, methods, and applications The Second Edition of Fourier Transform Infrared Spectrometry brings this core reference up to date on the uses of FT-IR spectrometers today. The book starts with an in-depth description of the theory and current instrumentation of FT-IR spectrometry, with full chapters devoted to signal-to-noise ratio and photometric accuracy. Many diverse types of sampling techniques and data processing routines, most of which can be performed on even the less expensive instruments, are then described. Extensively updated, the Second Edition: * Discusses improvements in optical components * Features a full chapter on FT Raman Spectrometry * Contains new chapters that focus on different ways of measuring spectra by FT-IR spectrometry, including fourteen chapters on such techniques as microspectroscopy, internal and external reflection, and emission and photoacoustic spectrometry * Includes a new chapter introducing the theory of vibrational spectrometry * Organizes material according to sampling techniques Designed to help practitioners using FT-IR capitalize on the plethora of techniques for modern FT-IR spectrometry and plan their experimental procedures correctly, this is a practical, hands-on reference for chemists and analysts. It's also a great resource for students who need to understand the theory, instrumentation, and applications of FT-IR.

Terahertz Frequency Detection and Identification of Materials and Objects

Want an overview of where the technology of terahertz detection has been going? Here it is. The technology has largely been developed around expensive and bulky femtosecond laser systems but,

as described in this book, advances in semiconductor superlattice technology are leading to compact "electronic" sources such as the quantum cascade laser, two-terminal "Gunn" type oscillators and even a THz frequency amplifier. These advances towards electronic (as opposed to optical) THz systems mean that the technology will become portable and much less costly.

Mass Spectrometry

Provides a comprehensive description of mass spectrometry basics, applications, and perspectives. Mass spectrometry is a modern analytical technique, allowing for fast and ultrasensitive detection and identification of chemical species. It can serve for analysis of narcotics, counterfeit medicines, components of explosives, but also in clinical chemistry, forensic research and anti-doping analysis, for identification of clinically relevant molecules as biomarkers of various diseases. This book describes everything readers need to know about mass spectrometry—from the instrumentation to the theory and applications. It looks at all aspects of mass spectrometry, including inorganic, organic, forensic, and biological MS (paying special attention to various methodologies and data interpretation). It also contains a list of key terms for easier and faster understanding of the material by newcomers to the subject and test questions to assist lecturers. Knowing how crucial it is for young researchers to fully understand both the power of mass spectrometry and the importance of other complementary methodologies, *Mass Spectrometry: An Applied Approach* teaches that it should be used in conjunction with other techniques such as NMR, pharmacological tests, structural identification, molecular biology, in order to reveal the true function(s) of the identified molecule. Provides a description of mass spectrometry basics, applications and perspectives of the technique. Oriented to a broad audience with limited or basic knowledge in mass spectrometry instrumentation, theory, and its applications in order to enhance their competence in this field. Covers all aspects of mass spectrometry, including inorganic, organic, forensic, and biological MS with special attention to application of various methodologies and data interpretation. Includes a list of key terms, and test questions, for easier and faster understanding of the material. *Mass Spectrometry: An Applied Approach* is highly recommended for advanced students, young scientists, and anyone involved in a field that utilizes the technique.

Food Colorants

Drawing on the expertise of internationally known, interdisciplinary scientists and researchers, *Food Colorants: Chemical and Functional Properties* provides an integrative image of the scientific characteristics, functionality, and applications of color molecules as pigments in food science and technology, as well as their impact on health. The book emphasizes the structure-function relationships of pigment molecules to explain biosynthesis, modifications and degradation during storage and processing, and the effect of these changes on quality and safety. Understanding the rate and nature of degradation assists in selecting optimum processing parameters. Beginning with an overview of the physics and biochemistry of color, the book focuses on the mechanics of pigment stability and bioavailability, and antioxidant and pro-oxidant action. It reviews the influence of pigments on health and metabolism, incorporating results of in vivo and in vitro studies. It addresses the occurrence of pigment in food matrices and their stability during processing and storage. Conventional technologies as well as new, environmentally friendly methods are presented along with recent advances in biotechnology to produce colorants. There is also a chapter on novel approaches to the biosynthesis of colorants by microalgae, microorganisms, and genetic engineering. Contributions give significant attention to analytical methods and recent advances in detecting both natural and synthetic colorants, their quality, quantity, and degradation during processing and storage. The book rounds out its comprehensive coverage with a look at quality and safety risk assessments and international regulations, as well as lists of formerly and newly approved colorants and additives. Peer reviewed contributions and critical evaluations ensure a concise, systematic presentation of the relationships between the chemical nature and functional properties of various natural and synthetic pigments used to color food.

Recent Trends in Nanotechnology for Sustainable Living and Environment

This book presents the select proceedings of International Conference on Nanotechnology for Sustainable Living and Environment (ICON-NSLE 2022). It covers the latest trends in nanotechnology and its applications in various sectors such as energy, environment, food technology, and biomedicine. Various topics covered in this book are nanomaterial preparation and characterization, nanobiotechnology, nanodevices, waste to wealth, pollution abatement, renewable energy, advanced materials, sensors

and portable electronics, biomedical applications, food preservation, etc. This book is useful for researchers and professionals working in the area of nanotechnology and environment sustainability.

Introduction to THz Wave Photonics

Terahertz (THz) radiation, which is electromagnetic radiation in a frequency interval from 0.3 to 10 THz (1 mm–30 μ m wavelength), is the next frontier in science and technology. This band occupies a large portion of the electromagnetic spectrum between the infrared and microwave bands. Basic research, new initiatives, and developments in advanced sensing and imaging technology with regard to the THz band remain unexplored compared to the relatively well-developed science and technology in the microwave and optical frequencies. Historically, THz technologies were used mainly within the astronomy community for studying the background of cosmic far-infrared radiation, and by the laser-fusion community for the diagnostics of plasmas. Since the first demonstration of THz wave time-domain spectroscopy in the late 1980s, there has been a series of significant advances (particularly in recent years) as more intense THz sources and higher sensitivity detectors provide new opportunities for understanding the basic science in the THz frequency range.

Analytical Instrumentation Handbook

Compiled by the editor of Dekker's distinguished Chromatographic Science series, this reader-friendly reference is as a unique and stand-alone guide for anyone requiring clear instruction on the most frequently utilized analytical instrumentation techniques. More than just a catalog of commercially available instruments, the chapters are written

Infrared and Raman Spectroscopy in Forensic Science

This book will provide a survey of the major areas in which information derived from vibrational spectroscopy investigations and studies have contributed to the benefit of forensic science, either in a complementary or a unique way. This is highlighted by examples taken from real case studies and analyses of forensic relevance, which provide a focus for current and future applications and developments.

Investigation of Molecular Structure

This book combines in one concise volume the diverse work of several similar books in the market. Each chapter is self-contained and designed to serve the needs of graduates and undergraduates in physics, biochemistry and chemistry. Numerous illustrations accompany the material and more than 60 problems in molecular physics are worked out. Tedious mathematics that obscures the essence of physics is avoided. Though mainly theoretical, many important experimental aspects are included and discussed. It aims at teaching, and not commenting on scientific knowledge. An essential compendium, it can be used both as a textbook and a reference. The main features covered include: Quantum-mechanical treatment of molecular physics; theoretical treatment of molecular spectra and experimental techniques in spectroscopy; interatomic interactions, potentials, molecular stability, energy levels, bonds, rotational and vibrational states, anharmonicity, polarization; theoretical consideration of real molecules. Resonance methods (NMR, NQR, EPR and ENDOR. Theory, experimental apparatus, techniques, numerical results, applications and utility thereof).

Molecular Physics

This book highlights the versatility of graphene focusing on the background of graphene, its overall structure, superior properties, fabrication routes, characterization techniques, graphene composites/derivatives, and potential applications. A remarkable surge in interest for graphene and its applications has resulted in a substantial increase in the number of publications in terms of reviews and scientific articles, books and patents. Therefore, this book essentially addresses a wide range of graphene research and provides a great resource for beginners, students in sciences or engineering, researchers, professionals, and materials scientists.

Graphene

A concise, robust introduction to the various topics covered by the discipline of forensic chemistry. The Forensic Chemistry Handbook focuses on topics in each of the major chemistry-related areas of forensic science. With chapter authors that span the forensic chemistry field, this book exposes readers

to the state of the art on subjects such as serology (including blood, semen, and saliva), DNA/molecular biology, explosives and ballistics, toxicology, pharmacology, instrumental analysis, arson investigation, and various other types of chemical residue analysis. In addition, the Forensic Chemistry Handbook: Covers forensic chemistry in a clear, concise, and authoritative way Brings together in one volume the key topics in forensics where chemistry plays an important role, such as blood analysis, drug analysis, urine analysis, and DNA analysis Explains how to use analytical instruments to analyze crime scene evidence Contains numerous charts, illustrations, graphs, and tables to give quick access to pertinent information Media focus on high-profile trials like those of Scott Peterson or Kobe Bryant have peaked a growing interest in the fascinating subject of forensic chemistry. For those readers who want to understand the mechanisms of reactions used in laboratories to piece together crime scenes—and to fully grasp the chemistry behind it—this book is a must-have.

Forensic Chemistry Handbook

Wood has played a major role throughout human history. Strong and versatile, the earliest humans used wood to make shelters, cook food, construct tools, build boats, and make weapons. Recently, scientists, politicians, and economists have renewed their interest in wood because of its unique properties, aesthetics, availability, abundance, and perhaps most important of all, its renewability. However, wood will not reach its highest use potential until we fully describe it, understand the mechanisms that control its performance properties, and, finally, are able to manipulate those properties to give us the desired performance we seek. The Handbook of Wood Chemistry and Wood Composites analyzes the chemical composition and physical properties of wood cellulose and its response to natural processes of degradation. It describes safe and effective chemical modifications to strengthen wood against biological, chemical, and mechanical degradation without using toxic, leachable, or corrosive chemicals. Expert researchers provide insightful analyses of the types of chemical modifications applied to polymer cell walls in wood. They emphasize the mechanisms of reaction involved and resulting changes in performance properties including modifications that increase water repellency, fire retardancy, and resistance to ultraviolet light, heat, moisture, mold, and other biological organisms. The text also explores modifications that increase mechanical strength, such as lumen fill, monomer polymer penetration, and plasticization. The Handbook of Wood Chemistry and Wood Composites concludes with the latest applications, such as adhesives, geotextiles, and sorbents, and future trends in the use of wood-based composites in terms of sustainable agriculture, biodegradability and recycling, and economics. Incorporating decades of teaching experience, the editor of this handbook is well-attuned to educational demands as well as industry standards and research trends.

Handbook of Vibrational Spectroscopy

Handbook of Wood Chemistry and Wood Composites, Second Edition

Atomic and Molecular Spectroscopy: Basic Concepts and ...

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