Handbook Of Applied Solid State Spectroscopy

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Solid-State Spectroscopy Hans Kuzmany 2009-10-08 This text is an introductory compilation of basic concepts, methods and applications in the field of spectroscopy. It discusses new radiation sources such as lasers and synchrotrons and describes the linear response together with the basic principles and the technical background for various scattering experiments.
Experimental Techniques in Magnetism and Magnetic Materials S. B. Roy 2022-08-31 This book is written to introduce experimental magnetism in a comprehensive manner to advanced undergraduate, postgraduate, and doctoral students pursuing studies in physics, material sciences, and engineering. It is an excellent resource providing an overview of the various experimental techniques in magnetism and magnetic materials. The text is partitioned into three parts. Part I deals with a brief history of magnetism and magnetic materials along with their role in modern society. A concise account of their current technological applications is also provided. Part II focusses on the basic phenomena of magnetism. Part III consists of chapters discussing a variety of experimental practices needed to study the microscopic as well as macroscopic aspects of different kinds of magnetic phenomena and materials.
Electrical Control and Quantum Chaos with a High-Spin Nucleus in Silicon Serwan Asaad 2021-10-19 Nuclear spins are highly coherent quantum objects that were featured in early ideas and demonstrations of quantum information processing. In silicon, the high-fidelity coherent control of a single phosphorus (31-P) nuclear spin I=1/2 has demonstrated record-breaking coherence times, entanglement, and weak measurements. In this thesis, we demonstrate the coherent quantum control of a single antimony (123-Sb) donor atom, whose higher nuclear spin I = 7/2 corresponds to eight nuclear spin states. However, rather than conventional nuclear magnetic resonance (NMR), we employ nuclear electric resonance (NER) to drive nuclear spin transitions using localized electric fields produced within a silicon nanoelectronic device. This method exploits an idea first proposed in 1961 but never realized experimentally with a single nucleus, nor in a non-polar crystal such as silicon. We then present a realistic proposal to construct a chaotic driven top from the nuclear spin of 123-Sb. Signatures of chaos are expected to arise for experimentally realizable parameters of the system, allowing the study of the relation between quantum decoherence and classical chaos, and the observation of dynamical tunneling. These results show that high-spin quadrupolar nuclei could be deployed as chaotic models, strain sensors, hybrid spin-mechanical quantum systems, and quantum-computing elements using all-electrical controls.
A Student's Guide to Atomic Physics Mark Fox 2018-06-14 This concise and accessible book provides a detailed introduction to the fundamental principles of atomic physics at an undergraduate level. Concepts are explained in an intuitive way and the book assumes only a basic knowledge of quantum mechanics and electromagnetism. With a compact format specifically designed for students, the first part of the book covers the key principles of the subject, including the quantum theory of the hydrogen atom, radiative transitions, the shell model of multi-electron atoms, spin-orbit coupling, and the effects of external fields. The second part provides an introduction to the four key applications of atomic physics: lasers, cold atoms, solid-state spectroscopy and astrophysics. This highly pedagogical text includes worked examples and end of chapter problems to allow students to test their knowledge, as well as numerous diagrams of key concepts, making it perfect for undergraduate students looking for a succinct primer on the concepts and applications of atomic physics.
Handbook of Applied Solid State Spectroscopy D.R. Vij 2007-02-15 Solid-State spectroscopy is a burgeoning field with applications in many branches of science, including physics, chemistry, biosciences, surface science, and materials science. This handbook brings together in one volume information about various spectroscopic techniques that is currently scattered in the literature of these disciplines. This concise yet comprehensive volume covers theory and applications of a broad range of spectroscopies. It provides an overview of sixteen spectroscopic technique and self-contained chapters present up-to-date scientific and technical information and references with minimal overlap and redundancy.
Characterization of Semiconductor Heterostructures and Nanostructures Chiara Manfredotti 2013-04-11
Introduction to Applied Solid State Physics R. Dalven 2012-12-06 In addition to the topics discussed in the First Edition, this Second Edition contains introductory treatments of superconducting materials and of ferromagnetism. I think the book is now more balanced because it is divided perhaps 60% - 40% between devices (of all kinds) and materials (of all kinds). For the physicist interested in solid state applications, I suggest that this ratio is reasonable. I have also rewritten a number of sections in the interest of (hopefully) increased clarity. The aims remain those stated in the Preface to the First Edition; the book is a survey of the physics of a number of solid state devices and ma terials. Since my object is a discussion of the basic ideas in a number of fields, I have not tried to present the "state of the art," especially in semi

conductor devices. Applied solid state physics is too vast and rapidly changing to cover completely, and there are many references available to recent developments. For these reasons, I have not treated a number of interesting areas. Among the lacunae are superiattices, heterostructures, compound semiconductor devices, ballistic transistors, integrated optics, and light wave communications. (Suggested references to those subjects are given in an appendix.) I have tried to cover some of the recent revolutionary developments in superconducting materials.

Lithium-Related Batteries Ngoc Thanh Thuy Tran 2022-03-10 This book serves as a comprehensive treatment of the advanced microscopic properties of lithium- and sodium-based batteries. It focuses on the development of the quasiparticle framework and the successful syntheses of cathode/electrolyte/anode materials in these batteries. FEATURES Highlights lithium-ion and sodium-ion batteries as well as lithium sulfur-, aluminum-, and iron-related batteries Describes advanced battery materials and their fundamental properties Addresses challenges to improving battery performance Develops theoretical predictions and experimental observations under a unified quasiparticle framework Targets core issues such as stability and efficiencies Lithium-Related Batteries: Advances and Challenges will appeal to researchers and advanced students working in battery development, including those in the fields of materials, chemical, and energy engineering.

Festkörperspektroskopie Hans Kuzmany 2013-03-07 In dem vorliegenden Lehrbuch wird erstmals eine zusammenfassende Darstellung festkörperspektroskopischer Methoden und ihrer Verwendung zur Analyse der elektronischen und gitterdynamischen Struktur der Festkörper gegeben. Die Methoden erstrecken sich einerseits über den ganzen Bereich des elektromagnetischen Spektrums, betreffen andererseits aber auch die Spektroskopie mit Teilchen wie Elektronen, Neutronen, Positronen, Mymesonen, usw. Das Buch gibt damit erstmals eine grundlegende, stark diversifizierte und dem heutigen Stand der Untersuchungstechnik entsprechende Darstellung der Festkörperspektroskopie. Ziel des Lehrbuches ist es, dem Studenten und Leser allgemein einen einfachen und direkten Einstieg in die Methoden und Möglichkeiten einer modernen Festkörperspektroskopie zu vermitteln, der ihm die weitere Verfolgung wissenschaftlicher und technischer Arbeiten auf dem speziellen Fachgebiet ermöglicht.

Electronic Characterisation of Earth?Abundant Sulphides for Solar Photovoltaics Thomas James Whittles 2018-07-31 This book examines the electronic structure of earth-abundant and environmentally friendly materials for use as absorber layers within photovoltaic cells. The corroboration between high-quality photoemission measurements and density of states calculations yields valuable insights into why these materials have demonstrated poor device efficiencies in the vast literature cited. The book shows how the materials' underlying electronic structures affect their properties, and how the band positions make them unsuitable for use with established solar cell technologies. After explaining these poor efficiencies, the book offers alternative window layer materials to improve the use of these absorbers. The power of photoemission and interpretation of the data in terms of factors generally overlooked in the literature, such as the materials' oxidation and phase impurity, is demonstrated. Representing a unique reference guide, the book will be of considerable interest and value to members of the photoemission community engaged in solar cell research, and to a wider materials science audience as well.

Terahertz Metrology Mira Naftaly 2015-01-01 This new book describes modern terahertz (THz) systems and devices and presents practical techniques for accurate measurement with an emphasis on evaluating uncertainties and identifying sources of error. This is the first THz book on the market to address measurement methodologies and issues -- perfect for practitioners and aspiring practitioners wishing to learn good measurement practice and avoid pitfalls. This book provides a brief review of different THz systems and devices, followed by chapters detailing the measurement issues encountered in using each of the main types of THz systems, and a guide to performing measurements rigorously. Particular attention is given to evaluating uncertainties, and recognizing potential sources of errors. The main focus is on time-domain spectroscopy, by far the most widely used technique. Readers are also presented with examples of applications with the emphasis on utility, both in research and in industry.

Electrochemical Supercapacitors for Energy Storage and Delivery Aiping Yu 2017-12-19 Although recognized as an important component of all energy storage and conversion technologies, electrochemical supercapacitators (ES) still face development challenges in order to reach their full potential. A thorough examination of development in the technology during the past decade, Electrochemical Supercapacitors for Energy Storage and Delivery: Fundamentals and Applications provides a comprehensive introduction to the ES from technical and practical aspects and crystallization of the technology, detailing the basics of ES as well as its components and characterization techniques. The book illuminates the practical aspects of understanding and applying the technology within the industry and provides sufficient technical detail of newer materials being developed by experts in the field which may surface in the future. The book discusses the technical challenges and the practical limitations and their associated parameters in ES technology. It also covers the structure and options for device packaging and materials choices such as electrode materials, electrolyte, current collector, and sealants based on comparison of available data. Supplying an in depth understanding of the components, design, and characterization of electrochemical supercapacitors, the book has wide-ranging appeal to industry experts and those new to the field. It can be used as a reference to apply to current work and a resource to foster ideas for new devices that will further the technology as it becomes a larger part of main stream energy storage.

FTIR Microspectroscopy Noureddine Abidi 2021 Fourier Transform Infrared microspectroscopy (FTIR) was first developed by William Coblentz in 1905 for analytical purposes. It has been established as a powerful analytical method to analyze a wide range of materials. The most convenient way to analyze the molecular structure was to prepare KBr pellets with small amount of chemical species. Currently, the development of the Universal Attenuated Total Reflectance (UATR) allows the use of ZnSe-Diamond crystal to acquire FTIR spectra directly from the sample with no special preparation. These traditional FTIR analyses have been made with devices capable of performing single measurements, thus,

providing a single IR spectrum of the sample. Recent major technological development in FTIR instrumentation was development of microscopes and imaging systems. These devices are now capable of imaging larger sample area, providing not only spectroscopic information but also spatial distributional information. In addition, the development of Focal Point Array (FPA) has made FTIR imaging an emerging area of chemical imaging research. The aim of this book is to summarize in a single document the research work that is being performed using UATR and IR imaging in selected emerging applications in plant materials and biological samples. This book provides the readers new knowledge, updates information, emerging applications, and understanding of the potential use of FTIR Microspectroscopy.
STM and AFM Studies on (Bio)molecular Systems: Unravelling the Nanoworld Paolo Samori 2009-11-04 Still valid and useful after a decade, this work presents critical reviews of the present position and future trends in modern chemical research. It contains short and concise reports on chemistry, each written by world-renowned experts.
Quality Control Applications in the Pharmaceutical and Medical Device Manufacturing Industry Carrillo-Cedillo, Eugenia Gabriela 2022-03-18 Quality control in pharmaceutical products and medical devices is vital for users as failing to comply with national and international regulations can lead to accidents that could easily be avoided. For this reason, manufacturing a quality medical product will support patient safety. Microbiologists working in both the pharmaceutical and medical device industries face considerable challenges in keeping abreast of the myriad microbiological references available to them and the continuously evolving regulatory requirements. Quality Control Applications in the Pharmaceutical and Medical Device Manufacturing Industry presents the importance of quality control in pharmaceutical products and medical devices, which must have very high-quality standards to not cause problems to the health of patients. It reinforces and updates the knowledge of analytical, instrumental, and biological methods to demonstrate the correct quality control and good manufacturing practice for pharmaceutical products and medical devices. Covering topics such as pharmaceutical nano systems, machine learning, and software validation, this book is an essential resource for managers, engineers, supervisors, pharmacists, chemists, academicians, and researchers.
Functional Supramolecular Architectures Paolo Samorì 2014-06-13 A comprehensive overview of functional nanosystems based on organic and polymeric materials and their impact on current and future research and technology in the highly interdisciplinary field of materials science. As such, this handbook covers synthesis and fabrication methods, as well as properties and characterization of supramolecular architectures. Much of the contents are devoted to existing and emerging applications, such as organic solar cells, transistors, diodes, nanowires and molecular switches. The result is an indispensable resource for materials scientists, organic chemists, molecular physicists and electrochemists looking for a reliable reference on this hot topic.
Actinide Nanoparticle Research Stepan N. Kalmykov 2011-06-17 This is the first book to cover actinide nano research. It is of interest both for fundamental research into the chemistry and physics of f-block elements as well as for applied researchers such as those studying the long-term safety of nuclear waste disposal and developing remediation strategies. The authors cover important issues of the formation of actinide nano-particles, their properties and structure, environmental behavior of colloids and nanoparticles related to the safe disposal of nuclear wastes, modeling and advanced methods of characterization at the nano-scale.
Electron Paramagnetic Resonance Investigations of Biological Systems by Using Spin Labels, Spin Probes, and Intrinsic Metal Ions 2015-10-05 Electron Paramagnetic Resonance Investigations of Biological Systems by Using Spin Labels, Spin Probes, and Intrinsic Metal Ions Part A & B, are the latest volumes in the Methods in Enzymology series, continuing the legacy of this premier serial with quality chapters authored by leaders in the field. This volume covers research methods centered on the use of Electron Paramagnetic Resonance (EPR) techniques to study biological structure and function. Timely contribution that describes a rapidly changing field Leading researchers in the field Broad coverage: Instrumentation, basic theory, data analysis, and applications
Handbook of Luminescent Semiconductor Materials Leah Bergman 2016-04-19 Photoluminescence spectroscopy is an important approach for examining the optical interactions in semiconductors and optical devices with the goal of gaining insight into material properties. With contributions from researchers at the forefront of this field, Handbook of Luminescent Semiconductor Materials explores the use of this technique to study semiconductor materials in a variety of applications, including solid-state lighting, solar energy conversion, optical devices, and biological imaging. After introducing basic semiconductor theory and photoluminescence principles, the book focuses on the optical properties of wide-bandgap semiconductors, such as AlN, GaN, and ZnO. It then presents research on narrow-bandgap semiconductors and solid-state lighting. The book also covers the optical properties of semiconductors in the nanoscale regime, including quantum dots and nanocrystals. This handbook explains how photoluminescence spectroscopy is a powerful and practical analytical tool for revealing the fundamentals of light interaction and, thus, the optical properties of semiconductors. The book shows how luminescent semiconductors are used in lasers, photodiodes, infrared detectors, light-emitting diodes, solid-state lamps, solar energy, and biological imaging.
Nanomaterials in Clinical Therapeutics Mainak Mukhopadhyay 2022-09-01 NANOMATERIALS IN CLINICAL THERAPEUTICS In this rapidly developing field, the book focuses on the practical elements of nanomaterial creation, characterization, and development, as well as their usage in clinical research. Nanotechnology-based applications is a rapidly growing field encompassing a diverse range of disciplines that impact our daily lives. Nanotechnology is being used to carry out large-scale reactions in practically every field of biotechnology and healthcare. The incredible progress being made in these applications is particularly true for the healthcare sector, where they are used in cancer detection and treatment, medical implants, tissue engineering, and so forth. Expansions in this discipline are expected to continue in the future, resulting in the creation of a variety of life-saving medical technology and treatment procedures. The primary goal of this book is to disseminate information on nanotechnology’s applications in the biological sciences. A broad array of

nanotechnological approaches utilized in different biological applications are highlighted in the book's 17 chapters, including the employment of nanotechnology in drug delivery. The first three chapters provide an overview of the history and principles of nanotechnology. The synthesis, characterization, and applications of nanomaterials are covered in the next 10 chapters. The last four chapters discuss the use of nanomaterials in clinical research. Audience The book will be useful for researchers and graduate students in the many areas of science such as biomedicine, environmental biotechnology, bioprocess engineering, renewable energy, chemical engineering, nanotechnology, biotechnology, microbiology, etc.

Counterterrorist Detection Techniques of Explosives Jehuda Yinon 2011-10-13 The detection of hidden explosives has become an issue of utmost importance in recent years. While terrorism is not new to the international community, recent terrorist attacks have raised the issue of detection of explosives and have generated a great demand for rapid, sensitive and reliable methods for detecting hidden explosives. Counterterrorist Detection Techniques of Explosives covers recent advances in this area of research including vapor and trace detection techniques (chemiluminescence, mass spectrometry, ion mobility spectrometry, electrochemical methods and micromechanical sensors, such as microcantilevers) and bulk detection techniques (neutron techniques, nuclear quadrupole resonance, x-ray diffraction imaging, millimeter-wave imaging, terahertz imaging and laser techniques). This book will be of interest to any scientists involved in the design and application of security screening technologies including new sensors and detecting devices which will prevent the smuggling of bombs and explosives. * Covers latest advances in vapor and trace detection techniques and bulk detection techniques * Reviews both current techniques and those in advanced stages of development * Techniques that are described in detail, including its principles of operation, as well as its applications in the detection of explosives

Materials Characterization Techniques Sam Zhang 2008-12-22 Experts must be able to analyze and distinguish all materials, or combinations of materials, in use today—whether they be metals, ceramics, polymers, semiconductors, or composites. To understand a material's structure, how that structure determines its properties, and how that material will subsequently work in technological applications, researchers apply basic principles of chemistry, physics, and biology to address its scientific fundamentals, as well as how it is processed and engineered for use. Emphasizing practical applications and real-world case studies, Materials Characterization Techniques presents the principles of widely used, advanced surface and structural characterization techniques for quality assurance, contamination control, and process improvement. This useful volume: Explores scientific processes to characterize materials using modern technologies Provides analysis of materials' performance under specific use conditions Focuses on the interrelationships and interdependence between processing, structure, properties, and performance Details the sophisticated instruments involved in an interdisciplinary approach to understanding the wide range of mutually interacting processes, mechanisms, and materials Covers electron, X-ray-photoelectron, and UV spectroscopy; scanning-electron, atomic-force, transmission-electron, and laser-confocal-scanning-florescent microscopy, and gel electrophoresis chromatography Presents the fundamentals of vacuum, as well as X-ray diffraction principles Explaining appropriate uses and related technical requirements for characterization techniques, the authors omit lengthy and often intimidating derivations and formulations. Instead, they emphasize useful basic principles and applications of modern technologies used to characterize engineering materials, helping readers grasp micro- and nanoscale properties. This text will serve as a valuable guide for scientists and engineers involved in characterization and also as a powerful introduction to the field for advanced undergraduate and graduate students.

Practical Guide to Materials Characterization Khalid Sultan 2022-09-08 Practical Guide to Materials Characterization Practice-oriented resource providing a hands-on overview of the most relevant materials characterization techniques in chemistry, physics, engineering, and more Practical Guide to Materials Characterization focuses on the most widely used experimental approaches for structural, morphological, and spectroscopic characterization of materials, providing background, insights on the correct usage of the respective techniques, and the interpretation of the results. With a focus on practical applications, the work illustrates what to use and when, including real-life examples showing which characterization techniques are best suited for particular purposes. Furthermore, the work covers the practical elements of the analytical techniques used to characterize a wide range of functional materials (both in bulk as well as thin film form) in a simple but thorough manner. To aid in reader comprehension, Practical Guide to Materials Characterization is divided into eight distinct chapters. To set the stage, the first chapter of the book reviews the fundamentals of materials characterization that are necessary to understand and use the methods presented in the ensuing chapters. Among the techniques covered are X-ray diffraction, Raman spectroscopy, X-ray spectroscopy, electron microscopies, magnetic measurement techniques, infrared spectroscopy, and dielectric measurements. Specific sample topics covered in the remaining seven chapters include: Bragg's Law, the Von Laue Treatment, Laue's Equation, the Rotating Crystal Method, the Powder Method, orientation of single crystals, and structure of polycrystalline aggregates Classical theory of Raman scattering, quantum theory of Raman spectroscopy, high-pressure Raman spectroscopy, and surface enhanced Raman spectroscopy Basic principles of XAS, energy referencing, XPS spectra and its features, Auger Electron Spectroscopy (AES), and interaction of electrons with matter Magnetization measuring instruments, the SQUID magnetometer, and the advantages and disadvantages of vibrating sample magnetometer (VSM) With comprehensive and in-depth coverage of the subject, Practical Guide to Materials Characterization is a key resource for practicing professionals who wish to better understand key concepts in the field and seamlessly harness them in a myriad of applications across many different industries.

Vacuum Pramod K. Naik 2018-03-22 Vacuum plays an important role in science and technology. The study of interaction of charged particles, neutrals and radiation with each other and with solid surfaces requires a vacuum environment for

reliable investigations. Vacuum has contributed to major advancements made in nuclear science, space, metallurgy, electrical/electronic technology, chemical engineering, transportation, robotics and many other fields. This book is intended to assist students, scientists, technicians and engineers with understanding the basics of vacuum science and technology for application in their projects. The fundamental theories, concepts, devices, applications, and key inventions are discussed.

Electron Paramagnetic Resonance Bruce C Gilbert 2012-11-30 Specialist Periodical Reports provide systematic and critical review coverage in major areas of chemical research. Compiled by teams of leading authorities in the relevant subject, the series creates a unique service for the active research chemist with regular critical in-depth accounts of progress in particular areas of chemistry. Subject coverage of all volumes is very similar and publication is on an annual or biennial basis. As EPR continues to find new applications in virtually all areas of modern science, including physics, chemistry, biology and materials science, this series caters not only for experts in the field, but also those wishing to gain a general overview of EPR applications in a given area.

Nuclear Science Abstracts 1973

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)

Magnetic Nanoparticles Abdollah Hajalilou 2023-02-06 Learn how to make and use magnetic nanoparticles in energy research, electrical engineering, and medicine In Magnetic Nanoparticles: Synthesis, Characterization and Applications, a team of distinguished engineers and chemists delivers an insightful overview of magnetic materials with a focus on nano-sized particles. The book reviews the foundational concepts of magnetism before moving on to the synthesis of various magnetic nanoparticles and the functionalization of nanoparticles that enables their use in specific applications. The authors also highlight characterization techniques and the characteristics of nanostructured magnetic materials, like superconducting quantum interference device (SQUID) magnetometry. Advanced applications of magnetic nanoparticles in energy research, engineering, and medicine are also discussed, and explicit derivations and explanations in non-technical language help readers from diverse backgrounds understand the concepts contained within. Readers will also find: A thorough introduction to magnetic materials, including the theory and fundamentals of magnetization In-depth explorations of the types and characteristics of soft and hard magnetic materials Comprehensive discussions of the synthesis of nanostructured magnetic materials, including the importance of various preparation methods Expansive treatments of the surface modification of magnetic nanoparticles, including the technical resources employed in the process Perfect for materials scientists, applied physicists, and measurement and control engineers, Magnetic Nanoparticles: Synthesis, Characterization and Applications will also earn a place in the libraries of inorganic chemists.

Introduction to Applied Solid State Physics Richard Dalven 2012-12-06 The aim of this book is a discussion, at the introductory level, of some applications of solid state physics. The book evolved from notes written for a course offered three times in the Department of Physics of the University of California at Berkeley. The objects of the course were (a) to broaden the knowledge of graduate students in physics, especially those in solid state physics; (b) to provide a useful course covering the physics of a variety of solid state devices for students in several areas of physics; (c) to indicate some areas of research in applied solid state physics. To achieve these ends, this book is designed to be a survey of the physics of a number of solid state devices. As the italics indicate, the key words in this description are physics and survey. Physics is a key word because the book stresses the basic qualitative physics of the applications, in enough depth to explain the essentials of how a device works but not deeply enough to allow the reader to design one. The question emphasized is how the solid state physics of the application results in the basic useful property of the device. An example is how the physics of the tunnel diode results in a negative dynamic resistance. Specific circuit applications of devices are mentioned, but not emphasized, since expositions are available in the elec trical engineering textbooks given as references.

Modern Luminescence Spectroscopy of Minerals and Materials Michael Gaft 2015-11-29 The book is devoted to three types of laser-based spectroscopy of minerals, namely Laser-Induced Time-Resolved Luminescence, Laser-Induced Breakdown spectroscopy and Gated Raman Spectroscopy. This new edition presents the main new data, which have been received after the publication of the first edition ten years ago both by the authors and by other researchers. During this time, only the authors published more than 50 original papers devoted to laser-based spectroscopy of minerals. A lot

of new data have been accumulated, both in fundamental and applied aspects, which are presented in new edition.
X-Rays and Extreme Ultraviolet Radiation David Attwood 2017-02-16 With this fully updated second edition, readers will gain a detailed understanding of the physics and applications of modern X-ray and EUV radiation sources. Taking into account the most recent improvements in capabilities, coverage is expanded to include new chapters on free electron lasers (FELs), laser high harmonic generation (HHG), X-ray and EUV optics, and nanoscale imaging; a completely revised chapter on spatial and temporal coherence; and extensive discussion of the generation and applications of femtosecond and attosecond techniques. Readers will be guided step by step through the mathematics of each topic, with over 300 figures, 50 reference tables and 600 equations enabling easy understanding of key concepts. Homework problems, a solutions manual for instructors, and links to YouTube lectures accompany the book online. This is the 'go-to' guide for graduate students, researchers and industry practitioners interested in X-ray and EUV interaction with matter.
Neutron Scattering in Condensed Matter Physics Albert Furrer 2009-05-22 Neutron scattering has become a key technique for investigating the properties of materials on an atomic scale. The uniqueness of this method is based on the fact that the wavelength and energy of thermal neutrons ideally match interatomic distances and excitation energies in condensed matter, and thus neutron scattering is able to directly examine the static and dynamic properties of the material. In addition, neutrons carry a magnetic moment, which makes them a unique probe for detecting magnetic phenomena. In this important book, an introduction to the basic principles and instrumental aspects of neutron scattering is provided, and the most important phenomena and materials properties in condensed matter physics are described and exemplified by typical neutron scattering experiments, with emphasis on explaining how the relevant information can be extracted from the measurements.
Unimolecular and Supramolecular Electronics II Robert M. Metzger 2012-01-10 G. C. Solomon C. Herrmann M. A. Ratner Molecular Electronic Junction Transport: Some Pathways and Some Ideas R. M. Metzger D. L. Mattern Unimolecular Electronic Devices B. Branchi F. C. Simeone M. A. Rampi Active and Non-Active Large-Area Metal–Molecules–Metal Junctions C. Li A. Mishchenko T. Wandlowski Charge Transport in Single Molecular Junctions at the Solid/Liquid Interface K. W. Hipps Tunneling Spectroscopy of Organic Monolayers and Single Molecules N. Renaud M. Hliwa C. Joachim Single Molecule Logical Devices
Fabrication and Application of Nanomaterials S. Bandyopadhyay 2019-06-07 Publisher's Note: Products purchased from Third Party sellers are not guaranteed by the publisher for quality, authenticity, or access to any online entitlements included with the product. Nanomaterials principles, practices, and fabrication methods This advanced textbook offers comprehensive coverage of nanomaterials synthesis, characterization, and functionalization using solution-based approaches. Written from a chemical engineering perspective, Fabrication and Application of Nanomaterials illustrates each topic through concise theory, numerical problems, and recent case studies. Students, scientists, and engineers studying nanotechnology and the application of nanomaterials should find the text a highly useful reference. Coverage includes:•An introduction to nanomaterials•Nucleation, growth, and synthesis of metal nanoparticles•Functionalization of metal nanoparticles•Synthesis of polymer-based nanoparticles•Functionalization and properties of hydrogels•Characterization of metal nanoparticles•Applications in•Catalysis•Drug delivery and biomedicine •Water treatment and water management •Energy harvesting
X-Rays in Nanoscience Jinghua Guo 2011-09-22 An up-to-date overview of the different x-ray based methods in the hot fields of nanoscience and nanotechnology, including methods for imaging nanomaterials, as well as for probing the electronic structure of nanostructured materials in order to investigate their different properties. Written by authors at one of the world's top facilities working with these methods, this monograph presents and discusses techniques and applications in the fields of x-ray scattering, spectroscopy and microscope imaging. The resulting systematic collection of these advanced tools will benefit graduate students, postdocs as well as professional researchers.
Molecular Self-assembly in Nanoscience and Nanotechnology Ayben Kilislioglu 2017-05-10 Self-assembly is a common principle in molecular fabrication of natural and synthetic systems and has many important applications in the fields of nanoscience and nanotechnology. This book provides clear explanations of the principles of self-assembly with the limitations along with examples and research-based results with discussion for students, researchers, and professions.
Toward the Optimization of Low-temperature Solution-based Synthesis of ZnO Nanostructures for Device Applications Hatim Alnoor 2017-10-06 One-dimensional (1D) nanostructures (NSs) of Zinc Oxide (ZnO) such as nanorods (NRs) have recently attracted considerable research attention due to their potential for the development of optoelectronic devices such as ultraviolet (UV) photodetectors and light-emitting diodes (LEDs). The potential of ZnO NRs in all these applications, however, would require synthesis of high crystal quality ZnO NRs with precise control over the optical and electronic properties. It is known that the optical and electronic properties of ZnO NRs are mostly influenced by the presence of native (intrinsic) and impurities (extrinsic) defects. Therefore, understanding the nature of these intrinsic and extrinsic defects and their spatial distribution is critical for optimizing the optical and electronic properties of ZnO NRs. However, identifying the origin of such defects is a complicated matter, especially for NSs, where the information on anisotropy is usually lost due to the lack of coherent orientation. Thus, the aim of this thesis is towards the optimization of the lowtemperature solution-based synthesis of ZnO NRs for device applications. In this connection, we first started with investigating the effect of the precursor solution stirring durations on the deep level defects concentration and their spatial distribution along the ZnO NRs. Then, by choosing the optimal stirring time, we studied the influence of ZnO seeding layer precursor’s types, and its molar ratios on the density of interface defects. The findings of these investigations were used to demonstrate ZnO NRs-based heterojunction LEDs. The ability to tune the point defects along the NRs enabled us further to incorporate cobalt (Co) ions into the ZnO NRs crystal lattice, where these ions could occupy the vacancies or interstitial defects through substitutional or interstitial doping. Following this, high crystal quality vertically welloriented ZnO NRs have

been demonstrated by incorporating a small amount of Co into the ZnO crystal lattice. Finally, the influence of Co ions incorporation on the reduction of core-defects (CDs) in ZnO NRs was systematically examined using electron paramagnetic resonance (EPR).

Solid-State Spectroscopy Hans Kuzmany 2013-03-09 This text is an introductory compilation of basic concepts, methods and applications in the field of spectroscopy. It discusses new radiation sources such as lasers and synchrotrons and describes the linear response together with the basic principles and the technical background for various scattering experiments.

Substituted Coronenes for Molecular Electronics: from Supramolecular Structures to Single Molecules Peter Kowalzik 2010

Spectroscopic and Mechanistic Studies of Dinuclear Metallohydrolases and Their Biomimetic Complexes Lena Josefine Daumann 2014-05-28 Lena Daumanns's thesis describes structural and functional studies of the enzyme Glycerophosphodiesterase (GpdQ) from Enterobacter aerogenes. It also examines the properties of small mimics of this enzyme and related binuclear metallohydrolases such as the metallo-ß-lactamases to enhance our understanding of hydrolytic cleavage of important substrates like phosphoesters and ?-lactams. Overall, this project has led to a better understanding of the metal ion binding and active site structural features of the enzyme GpdQ. Daumann describes how she successfully immobilized phosphoesterase and related biomimetics on solid supports for potential applications in the area of bioremediation of organophosphate pesticides. Analysis shows that both the enzyme and biomimetics can be stored on the solid support without loss of activity. Furthermore, the author specroscopically and mechanistically characterized a number of Zn(II), Cd(II) and Co(II) complexes, some of which are among the most active biomimetics towards organophosphates reported to date. This thesis makes excellent reading for non-specialists because each chapter includes a short introduction section.