

A Transient Method For Characterizing Flow Regimes In A

This book, which is a result of a coordinated effort by 22 researchers from five different countries, addresses the methods of determining the local and global mechanical properties of a variety of materials: metals, plastics, rubber, and ceramics. The first chapter treats nanoindentation techniques comprehensively. Chapter 2 concerns polymer surface properties using nanoindentation techniques. Chapter 3 deals with the wear properties of dental composites. Chapter 4 compares the global and local properties of a lead-free solder. Chapter 5 discusses the methods of determining plastic zones at the crack tip. Fatigue resistance of a synthetic polymer under different loading conditions is dealt with in Chapter 6. Chapter 7 is a review of the methods used to measure fatigue crack growth resistance. Chapter 8 treats bulk and surface properties of coated materials, and the final chapter presents a method for determining elastic constants using a resonance technique. All in all, its depth of coverage makes it a must-have for research scholars, graduate students, and teachers.

Data Fusion and Data Mining for Power System Monitoring provides a comprehensive treatment of advanced data fusion and data mining techniques for

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power system monitoring with focus on use of synchronized phasor networks. Relevant statistical data mining techniques are given, and efficient methods to cluster and visualize data collected from multiple sensors are discussed. Both linear and nonlinear data-driven mining and fusion techniques are reviewed, with emphasis on the analysis and visualization of massive distributed data sets. Challenges involved in realistic monitoring, visualization, and analysis of observation data from actual events are also emphasized, supported by examples of relevant applications. Features Focuses on systematic illustration of data mining and fusion in power systems Covers issues of standards used in the power industry for data mining and data analytics Applications to a wide range of power networks are provided including distribution and transmission networks Provides holistic approach to the problem of data mining and data fusion using cutting-edge methodologies and technologies Includes applications to massive spatiotemporal data from simulations and actual events

Masters Theses in the Pure and Applied Sciences was first conceived, published, and disseminated by the Center for Information and Numerical Data Analysis and Synthesis (CINDAS)* at Purdue University in 1957, starting its coverage of theses with the academic year 1955. Beginning with Volume 13, the printing and dissemination phases of the

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activity were transferred to University Microfilms/Xerox of Ann Arbor, Michigan, with the thought that such an arrangement would be more beneficial to the academic and general scientific and technical community. After five years of this joint undertaking we had concluded that it was in the interest of all concerned if the printing and distribution of the volumes were handled by an international publishing house to assure improved service and broader dissemination. Hence, starting with Volume 18, Masters Theses in the Pure and Applied Sciences has been disseminated on a worldwide basis by Plenum Publishing Corporation of New York, and in the same year the coverage was broadened to include Canadian universities. All back issues can also be ordered from Plenum. We have reported in Volume 39 (thesis year 1994) a total of 13,953 thesis titles from 21 Canadian and 159 United States universities. We are sure that this broader base for these titles reported will greatly enhance the value of this important annual reference work. While Volume 39 reports theses submitted in 1994, on occasion, certain universities do report theses submitted in previous years but not reported at the time.

Two key words define the scope of this book: 'ultrasound' and 'colloids'. Historically, there has been little real communication between disciples of these two fields. Although there is a large body of

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literature devoted to ultrasound phenomenon in colloids, there is little recognition that such phenomena may be of real importance for both the development, and application, of Colloid Science. From the other side, colloid scientists have not embraced acoustics as an important tool for characterizing colloids. The lack of any serious dialogue between these scientific fields is the biggest motivation behind this book. For colloidal systems, ultrasound provides information on three important areas of particle characterization: Particle sizing, Rheology, and Electrokinetics. This book primarily targets scientists who consider colloids as their major object of interest. As such we emphasize those aspects of acoustics that are important for colloids, and thereby neglect many others. On the other hand, scientists working with ultrasound who are already familiar with the subject will find several important new developments.

Characterization Techniques for Perovskite Solar Cell Materials: Characterization of Recently Emerged Perovskite Solar Cell Materials to Provide an Understanding of the Fundamental Physics on the Nano Scale and Optimize the Operation of the Device Towards Stable and Low-Cost Photovoltaic Technology explores the characterization of nanocrystals of the perovskite film, related interfaces, and the overall impacts of these properties on device efficiency. Included is a

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collection of both main and research techniques for perovskite solar cells. For the first time, readers will have a complete reference of different characterization techniques, all housed in a work written by highly experienced experts. Explores various characterization techniques for perovskite solar cells and discusses both their strengths and weaknesses Discusses material synthesis and device fabrication of perovskite solar cells Includes a comparison throughout the work on how to distinguish one perovskite solar cell from another Written both for the novice and for the experienced scientist, this miniature encyclopedia concisely describes over one hundred materials methodologies, including evaluation, chemical analysis, and physical testing techniques. Each technique is presented in terms of its use, sample requirements, and the engineering principles behind its methodology. Real life industrial and academic applications are also described to give the reader an understanding of the significance and utilization of technique. There is also a discussion of the limitations of each technique.

Capacitance spectroscopy refers to techniques for characterizing the electrical properties of semiconductor materials, junctions, and interfaces, all from the dependence of device capacitance on frequency, time, temperature, and electric potential. This book includes 15 chapters written by world-

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recognized, leading experts in the field, academia, national institutions, and industry, divided into four sections: Physics, Instrumentation, Applications, and Emerging Techniques. The first section establishes the fundamental framework relating capacitance and its allied concepts of conductance, admittance, and impedance to the electrical and optical properties of semiconductors. The second section reviews the electronic principles of capacitance measurements used by commercial products, as well as custom apparatus. The third section details the implementation in various scientific fields and industries, such as photovoltaics and electronic and optoelectronic devices. The last section presents the latest advances in capacitance-based electrical characterization aimed at reaching nanometer-scale resolution.

The book focuses on advanced characterization methods for thin-film solar cells that have proven their relevance both for academic and corporate photovoltaic research and development. After an introduction to thin-film photovoltaics, highly experienced experts report on device and materials characterization methods such as electroluminescence analysis, capacitance spectroscopy, and various microscopy methods. In the final part of the book simulation techniques are presented which are used for ab-initio calculations of relevant semiconductors and for device simulations

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in 1D, 2D and 3D. Building on a proven concept, this new edition also covers thermography, transient optoelectronic methods, and absorption and photocurrent spectroscopy.

Most books on nondestructive evaluation (NDE) focus either on the theoretical background or on advanced applications. Bridging the gap between the two, *Ultrasonic and Electromagnetic NDE for Structure and Material Characterization: Engineering and Biomedical Applications* brings together the principles, equations, and applications of ultrasonic and electromagnetic NDE in a single, authoritative resource. This is also one of the first books to incorporate a number of popular NDE methods based on electromagnetic techniques. Combines Engineering and Biological Material Characterization Techniques in One Book The book begins with the relevant fundamentals of mechanics and electromagnetic theory, derives the basic equations, and then, step by step, covers state-of-the-art topics and applications of ultrasonic and electromagnetic NDE that are at the forefront of research. These include engineering, biological, and clinical applications such as structural health monitoring, acoustic microscopy, the characterization of biological cells, and terahertz imaging. Covers Numerous Applications of Ultrasonic and Electromagnetic Techniques—from the Traditional to the Advanced Written in plain language by some of

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the world's leading experts, the book includes worked-out examples and exercises that make this an outstanding resource for coursework. The coverage of traditional and advanced NDE applications also appeals to practicing engineers and researchers.

With its focus on the characterization of nanocomposites using such techniques as x-ray diffraction and spectrometry, light and electron microscopy, thermogravimetric analysis, as well as nuclear magnetic resonance and mass spectroscopy, this book helps to correctly interpret the recorded data. Each chapter introduces a particular characterization method, along with its foundations, and makes the user aware of its benefits, but also of its drawbacks. As a result, the reader will be able to reliably predict the microstructure of the synthesized polymer nanocomposite and its thermal and mechanical properties, and so assess its suitability for a particular application. Belongs on the shelf of every product engineer.

Nanomaterials Characterization Techniques, Volume Two, part of an ongoing series, offers a detailed analysis of the different types of spectroscopic methods currently being used in nanocharacterization. These include, for example, the Raman spectroscopic method for the characterization of carbon nanotubes (CNTs). This

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book outlines the different kinds of spectroscopic tools being used for the characterization of nanomaterials and discusses under what conditions each should be used. The book is intended to cover all the major spectroscopic techniques for nanocharacterization, making it an important resource for both the academic community at the research level and the industrial community involved in nanomanufacturing. Explores how spectroscopy and X-ray-based nanocharacterization techniques are applied in modern industry Analyzes all the major spectroscopy and X-ray-based nanocharacterization techniques, allowing the reader to choose the best for their situation Presents a method-orientated approach that explains how to successfully use each technique

Progress in Astronautics and Aeronautics, Volume 18: Thermophysics and Temperature Control of Spacecraft and Entry Vehicles is a selection of technical papers based on two American Institute of Aeronautics and Astronautics meetings, namely, The Thermophysics Specialist Conference, held in Monterey, California on September 13-15, 1965 and the Third Aerospace Sciences Conference, held in New York on January 1966. This book covers the most important problems of thermophysical research and technology. This volume is composed of six parts encompassing 42 chapters. Part I contains papers on the thermal radiation properties of solids,

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including measuring techniques for solar reflectance and infrared emittance determination, and a paper on radiative transfer. Part II deals with the lunar and planetary thermal environment and includes research papers on emissivities, reflectivities, and polarization by planetary atmospheres and planetary surfaces. Part III discusses the effects of the space environment on the optical properties of thermal control surfaces. This part also presents results of flight experiments with sensors of environmental effects and flight experience with thermal coatings of satellites. Part IV covers the thermophysical measurements of ablative materials and with the char layers formed during the actual vehicle entry period or during laboratory simulation tests. Part V looks into the two comparatively areas of thermophysics, namely, the thermal similitude (thermal modeling) and interface resistance of joints under space conditions. Part VI summarizes the practical experience in thermal design gained on spacecraft flights. Thermophysicists, space engineers and designers, and research workers who are interested in thermophysical technology will find this book invaluable.

A comprehensive introduction and up-to-date reference to SiC power semiconductor devices covering topics from material properties to applications Based on a number of breakthroughs in SiC material science and fabrication technology in

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the 1980s and 1990s, the first SiC Schottky barrier diodes (SBDs) were released as commercial products in 2001. The SiC SBD market has grown significantly since that time, and SBDs are now used in a variety of power systems, particularly switch-mode power supplies and motor controls. SiC power MOSFETs entered commercial production in 2011, providing rugged, high-efficiency switches for high-frequency power systems. In this wide-ranging book, the authors draw on their considerable experience to present both an introduction to SiC materials, devices, and applications and an in-depth reference for scientists and engineers working in this fast-moving field. Fundamentals of Silicon Carbide Technology covers basic properties of SiC materials, processing technology, theory and analysis of practical devices, and an overview of the most important systems applications. Specifically included are: A complete discussion of SiC material properties, bulk crystal growth, epitaxial growth, device fabrication technology, and characterization techniques. Device physics and operating equations for Schottky diodes, pin diodes, JBS/MPS diodes, JFETs, MOSFETs, BJTs, IGBTs, and thyristors. A survey of power electronics applications, including switch-mode power supplies, motor drives, power converters for electric vehicles, and converters for renewable energy sources. Coverage of special applications, including microwave devices, high-

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temperature electronics, and rugged sensors. Fully illustrated throughout, the text is written by recognized experts with over 45 years of combined experience in SiC research and development. This book is intended for graduate students and researchers in crystal growth, material science, and semiconductor device technology. The book is also useful for design engineers, application engineers, and product managers in areas such as power supplies, converter and inverter design, electric vehicle technology, high-temperature electronics, sensors, and smart grid technology.

Presenting contributions from renowned experts in the field, this book covers research and development in fundamental areas of heat exchangers, which include: design and theoretical development, experiments, numerical modeling and simulations.

This book is intended to be a useful reference source and guide to researchers, postgraduate students, and engineers in the fields of heat exchangers, cooling, and thermal management.

Since the introduction of FT-NMR spectroscopy around five decades ago, NMR has achieved significant advances in hardware and methodologies, accompanied with the enhancement of spectral resolution and signal sensitivity. Rapid developments in the polymers field mean that accurate and quantitative characterization of polymer structures and dynamics is the keystone for precisely

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regulating and controlling the physical and chemical properties of the polymer. This book specifically focuses on NMR investigation of complex polymers for the polymer community as well as NMR spectroscopists, and will push the development of both fields. It covers the latest advances, for example high field DNP and ultrafast MAS methodologies, and show how these novel NMR methods characterize various synthetic and natural polymers.

This book presents an overview of techniques that are available to characterize sedimentary aquifers. Groundwater flow and solute transport are strongly affected by aquifer heterogeneity. Improved aquifer characterization can allow for a better conceptual understanding of aquifer systems, which can lead to more accurate groundwater models and successful water management solutions, such as contaminant remediation and managed aquifer recharge systems. This book has an applied perspective in that it considers the practicality of techniques for actual groundwater management and development projects in terms of costs, technical resources and expertise required, and investigation time. A discussion of the geological causes, types, and scales of aquifer heterogeneity is first provided. Aquifer characterization methods are then discussed, followed by chapters on data upscaling, groundwater modelling, and geostatistics. This book is a must for

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every practitioner, graduate student, or researcher dealing with aquifer characterization .

Publisher Description

Semiconductor Material and Device Characterization John Wiley & Sons

"Surface Characterization" provides an authoritative guide to the wide range of powerful techniques that are used to characterize the surfaces of materials. Practical in approach, it not only describes the major analytical techniques but emphasizes how they can be used to solve a multitude of chemical and physical problems. A special feature of the book is that the various techniques are grouped according to the material property under investigation. These parts are preceded by an overview comparing the capabilities of the characterization methods available. Extensive data tables allow the reader to assess rapidly the strengths as well as the pitfalls inherent in each method. Chapters on chemical composition, optical and crystallographic properties, microtopography, surface processes, tribological, electrical and magnetic properties of surface films are featured. In addition, chapters specializing on applications within the life sciences on the microscopic scale and chemometrics are included. "Surface Characterization" is addressed to both academic and industrial audiences. Scientists and engineers working on the production and development of new materials will find it an

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invaluable reference source. Physicist, chemists, chemical engineers, material scientists and engineers from every area of materials research will benefit from the wealth of practical advice the book provides.

Rapid and continued developments in electronics, optics, computing, instrumentation, spectroscopy, and other branches of science and technology resulted in considerable improvements in various methodologies. Due to this revolution in methodology, it is now possible to solve problems which were previously considered difficult to solve. These new methods have led to a better characterization and understanding of foods. The aim of this book is to assemble, for handy reference, various emerging, state-of-the-art methodologies used for characterizing foods. Although the emphasis is on real foods, model food systems are also considered. Methods pertaining to interfaces (food emulsions, foams, and dispersions), fluorescence, ultrasonics, nuclear magnetic resonance, electron spin resonance, Fourier-transform infrared and near infrared spectroscopy, small-angle neutron scattering, dielectrics, microscopy, rheology, sensors, antibodies, flavor and aroma analysis are included. This book is an indispensable reference source for scientists, engineers, and technologists in industries, universities, and government laboratories who are

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involved in food research and/or development, and also for faculty, advanced undergraduate, graduate and postgraduate students from Food Science, Food Engineering, and Biochemistry departments. In addition, it will serve as a valuable reference for analytical chemists and surface and colloid scientists.

Announcing the sequel to the first ten volumes of The Porphyrin Handbook, which provided an authoritative treatise on the porphyrin system and dealt in fine detail with the synthesis, chemistry, spectroscopy, and applications of porphyrins. The ten latest volumes 11-20 address those major disciplinary areas not covered in the first, including biology and medical implications of porphyrin systems, the biosynthesis of porphyrins, chlorophylls and vitamin B12. Other areas include the multitude of genetically transmitted and drug induced diseases associated with errors in heme metabolism, the transformations of hemes into bile pigments, the organic syntheses of bilins, very recent work on phytochrome, and the pathways of degradation of chlorophyll in senescent plants. In addition, volumes 11-20 address every aspect of synthesis, chemistry, structure and spectroscopy of phthalocyanines which will appeal to scientists in fields ranging from mathematics through physics, chemistry and biochemistry, to biology and medicine. . By the same Editors as the successful first Porphyrin Handbook, published in 2000. . Consists of 61 chapters written by internationally recognized experts. . Clear, concise, and uniform presentation with many

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hundreds of figures, tables and structural formulae.

Including volume indices and cumulative index.

Gives a comprehensive and coherent account of the basic methods to characterize a solid through its interaction with an electromagnetic field.

Functional advanced biopolymers have received far less attention than renewable biomass (cellulose, rubber, etc.) used for energy production. Among the most advanced biopolymers known is chitosan. The term chitosan refers to a family of polysaccharides obtained by partial de-N-acetylation from chitin, one of the most abundant renewable resources in the biosphere.

Chitosan has been firmly established as having unique material properties as well as biological activities. Either in its native form or as a chemical derivative, chitosan is amenable to being processed—typically under mild conditions—into soft materials such as hydrogels, colloidal nanoparticles, or nanofibers. Given its multiple biological properties, including biodegradability, antimicrobial effects, gene transfectability, and metal adsorption—to name but a few—chitosan is regarded as a widely versatile building block in various sectors (e.g., agriculture, food, cosmetics, pharmacy) and for various applications (medical devices, metal adsorption, catalysis, etc.). This Special Issue presents an updated account addressing some of the major applications, including also chemical and enzymatic modifications of oligos and polymers. A better understanding of the properties that underpin the use of chitin and chitosan in different fields is key for boosting their more extensive industrial utilization, as well as to aid regulatory agencies

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in establishing specifications, guidelines, and standards for the different types of products and applications. Advancement of Optical Methods in Experimental Mechanics, Volume 3 of the Proceedings of the 2016 SEM Annual Conference & Exposition on Experimental and Applied Mechanics, the third volume of ten from the Conference, brings together contributions to this important area of research and engineering. The collection presents early findings and case studies on a wide range of optical methods ranging from traditional photoelasticity and interferometry to more recent DIC and DVC techniques, and includes papers in the following general technical research areas: Advances in Digital Image Correlation Challenging Applications of DIC Uncertainty Analysis & Improvements to DIC Accuracy Photoelasticity, Interferometry, & Moire Methods Applications of Stereovision Inverse Methods at High Strain Rates Inverse Methods in Plasticity Resistivity -- Carrier and doping density -- Contact resistance and Schottky barriers -- Series resistance, channel length and width, and threshold voltage -- Defects -- Oxide and interface trapped charges, oxide thickness -- Carrier lifetimes -- Mobility -- Charge-based and probe characterization -- Optical characterization -- Chemical and physical characterization -- Reliability and failure analysis.

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