

## Chemische Verfahrenstechnik Skript

Biotechnology is one of the major technologies of the twenty-first century. Its wide-ranging, multi-disciplinary activities include recombinant DNA techniques, cloning and the application of microbiology to the production of goods from bread to antibiotics. In this new edition of the textbook *Basic Biotechnology*, biology and bioprocessing topics are uniquely combined to provide a complete overview of biotechnology. The fundamental principles that underpin all biotechnology are explained and a full range of examples are discussed to show how these principles are applied; from starting substrate to final product. A distinctive feature of this text are the discussions of the public perception of biotechnology and the business of biotechnology, which set the science in a broader context. This comprehensive textbook is essential reading for all students of biotechnology and applied microbiology, and for researchers in biotechnology industries.

The combustion of fossil fuels remains a key technology for the foreseeable future. It is therefore important that we understand the mechanisms of combustion and, in particular, the role of turbulence within this process. Combustion always takes place within a turbulent flow field for two reasons: turbulence increases the mixing process and enhances combustion, but at the same time combustion releases heat which generates flow instability through buoyancy, thus enhancing the transition to turbulence. The four chapters of this book present a thorough introduction to the field of turbulent combustion. After an overview of modeling approaches, the three remaining chapters consider the three distinct cases of premixed, non-premixed, and partially premixed combustion, respectively. This book will be of value to researchers and students of engineering and applied mathematics by demonstrating the current theories of turbulent combustion within a unified presentation of the field.

Fluidverfahrenstechnik Grundlagen, Methodik, Technik, Praxis John Wiley & Sons

1948 accompanied by *Ergänzungsheft 1-2: Neuerscheinungen ausserhalb des Buchhandels*.

Continuing the mission of the first two editions, *Food Emulsions: Principles, Practices, and Techniques*, Third Edition covers the fundamentals of emulsion science and demonstrates how this knowledge can be applied to control the appearance, stability, and texture of emulsion-based foods. Initially developed to fill the need for a single resource co

This book comes as part of a new series on Solar Energy R+D, including Biomass which is carried out by the European Community.. The commission of the European Communities' Directorate General (XII) for Science, Research and Development is currently implementing, on a cost-sharing basis, a solar energy R+D programme through contracts with European industry, research institutions and universities. This programme includes a very strong activity on Biomass. Besides general R+D work on all aspects of Biomass growth and utilization which is reported elsewhere in this series, the Commission is currently starting a new activity on Pilot Plants based on the use of Biomass for energy purposes, and in particular on methanol production from wood. The commission considers that the subject of methanol production from wood offers important prospects for application within the European Community and in other parts of the world, in particular some of the developing countries & The state of art in Europe in this field is still considered to be very high as a result of related work which was performed in Europe during ~world War II and the time before.

The Omnibook aims to present the main ideas of reactor design in a simple and direct way. It includes key formulas, brief explanations, practice exercises, problems from experience and it skims over the field touching on all sorts of reaction systems. Most important of all it tries to show the reader how to approach the problems of reactor design and what questions to ask. In effect it tries to show that a common strategy threads its way through all reactor problems, a strategy which involves three factors: identifying the flow pattern, knowing the kinetics, and developing the proper performance equation. It is this common strategy which is the heart of Chemical Reaction Engineering and identifies it as a distinct field of study.

A practice-oriented guide to assaying more than 100 of the most important enzymes, complete with the theoretical background and specific protocols for immediate use in the biochemical laboratory. Now expanded with a new section on metal ion determination.

There is increasing recognition that low-cost, high capacity processes for the conversion of biomass into fuels and chemicals are essential for expanding the utilization of carbon neutral processes, reducing dependency on fossil fuel resources, and increasing rural income. While much attention has focused on the use of biomass to produce ethanol via fermentation, high capacity processes are also required for the production of hydrocarbon fuels and chemicals from lignocellulosic biomass. In this context, this book provides an up-to-date overview of the thermochemical methods available for biomass conversion to liquid fuels and chemicals. In addition to traditional conversion technologies such as fast pyrolysis, new developments are considered, including catalytic routes for the production of liquid fuels from carbohydrates and the use of ionic liquids for lignocellulose utilization. The individual chapters, written by experts in the field, provide an introduction to each topic, as well as describing recent research developments.

This much-needed book presents a clear and very practice-oriented overview of thermal separation processes. An extensive introduction elucidates the physical and physicochemical fundamentals of different unit operations used to separate homogenous mixtures. This is followed by a concise text with numerous explanatory figures and tables referring to process and design, flowsheets, basic engineering and examples of separation process applications. Very helpful guidance in the form of process descriptions, calculation models and operation data is presented in an easy-to-understand manner thereby assisting the practicing engineer in the choosing and evaluation of separation processes and facilitating the modeling and design of innovative equipment. A comprehensive reference list provides further opportunity for the following up of special separation problems. Chemical and mechanical engineers, chemists, physicists and biotechnologists in research and development, plant design and environmental protection, as well as students in chemical engineering and natural sciences will find this all-embracing reference guide of tremendous value and practical use.

Modellbasierte prädiktive Regelungen dienen der Lösung anspruchsvoller Aufgaben der Mehrgrößenregelung mit Beschränkungen der Stell- und Regelgrößen. Sie werden in der Industrie in vielen Bereichen erfolgreich eingesetzt. Mit der MPC Toolbox™ des Programmsystems MATLAB®/Simulink® steht ein Werkzeug zur Verfügung, das sowohl in der industriellen Praxis als auch an Universitäten und Hochschulen verwendet wird. Das vorliegende Buch gibt eine Übersicht über die Grundideen und Anwendungsvorteile des MPC-Konzepts. Es zeigt, wie mit Hilfe der Toolbox MPC-Regelungen entworfen, eingestellt und simuliert werden können. Ausgewählte Beispiele aus dem Bereich der Verfahrenstechnik demonstrieren mögliche Vorgehensweisen und vertiefen das Verständnis. Das Buch richtet sich an in der Industrie tätige Ingenieure, die MPC-Regelungen planen, entwickeln und betreiben, aber auch an Studierende

technischer Fachdisziplinen, die in das Arbeitsgebiet MPC einsteigen wollen. Model Predictive Control (MPC) is used to solve challenging multivariable-constrained control problems. MPC systems are successfully applied in many different branches of industry. The MPC Toolbox™ of MATLAB®/Simulink® provides powerful tools for industrial MPC application, but also for education and research at technical universities. This book gives an overview of the basic ideas and advantages of the MPC concept. It shows how MPC systems can be designed, tuned, and simulated using the MPC Toolbox. Selected process engineering benchmark examples are used to demonstrate typical design approaches and help deepen the understanding of MPC technologies. The book is aimed at engineers in industry interested in the development and application of MPC systems, as well as students of different technical disciplines seeking an introduction into this field. This book gives an overview of the basic ideas and advantages of the MPC concept. It shows how MPC systems can be designed, tuned, and simulated using the MPC Toolbox. Selected process engineering benchmark examples are used to demonstrate typical design approaches and help deepen the understanding of MPC technologies. The book is aimed at engineers in industry interested in the development and application of MPC systems, as well as students of different technical disciplines seeking an introduction into this field.

Das Lehrwerk (Band 2 des Standardwerks von Stephan/Maying) stellt den Stoff wissenschaftlich streng und dabei stets sehr anschaulich dar. Zahlreiche praxisnahe Übungsaufgaben erleichtern das Verständnis. P. Stephan und K. Schaber haben die 15. Auflage bearbeitet und aktualisiert. So wurden zum besseren Verständnis der Phänomene des Phasenverhaltens die Phasendiagramme den Berechnungsmethoden der Gemischthermodynamik vorangestellt.

Außerdem neu: thermodynamische Grundlagen spontaner Phasenübergänge sowie ein Kapitel über Elektrolytlösungen. In recent years the development of new technologies has permitted the production of 'functional' or 'smart' textiles. These fabrics are capable of sensing changes in environmental conditions or body functions and are adequately responding to them. They are able to absorb substances from the skin or to release therapeutic or cosmetic compounds. For instance, they can be used in underwear with an integrated cardio-online system or as textiles with carrier molecules. The focal point of interest in biofunctional textiles lies currently on the use of textiles supporting therapy and prevention in dermatology. This volume collects information about new trends in the interaction between textiles and the skin, particularly the development of antimicrobial finished textiles. It presents a selection of papers which will contribute to further consolidate the dialogue between dermatologists, allergologists, biomaterial scientists and textile engineers. This book provides a solid foundation in the principles of heat and mass transfer and shows how to solve problems by applying modern methods. The basic theory is developed systematically, exploring in detail the solution methods to all important problems. The revised second edition incorporates state-of-the-art findings on heat and mass transfer correlations. The book will be useful not only to upper- and graduate-level students, but also to practicing scientists and engineers. Many worked-out examples and numerous exercises with their solutions will facilitate learning and understanding, and an appendix includes data on key properties of important substances.

Featuring a wide range of international case studies, Ethics, Technology, and Engineering presents a unique and systematic approach for engineering students to deal with the ethical issues that are increasingly inherent in engineering practice. Utilizes a systematic approach to ethical case analysis -- the ethical cycle -- which features a wide range of real-life international case studies including the Challenger Space Shuttle, the Herald of Free Enterprise and biofuels. Covers a broad range of topics, including ethics in design, risks, responsibility, sustainability, and emerging technologies Can be used in conjunction with the online ethics tool Agora (<http://www.ethicsandtechnology.com>) Provides engineering students with a clear introduction to the main ethical theories Includes an extensive glossary with key terms

This volume gives a detailed account into how renewables can be transformed into value-added products via homogeneous catalysis, especially via transition metal homogeneous catalysis. The most important catalytic reactions of oleochemicals, isoprenoids, carbohydrates, lignin, proteins and carbon dioxide are described. Special emphasis is placed on carbon-carbon linkage reactions (hydroformylations, dimerisations, telomerisations, metathesis, polymerisations etc.), hydrogenations, oxidations and other important homogeneous reactions (such as isomerisations, hydrosilylations etc.). Also, tandem reactions including isomerising hydroformylations are presented. Wherever possible, the authors have included mechanistic, kinetic, and technical aspects. The reader is therefore given a total overview of the status quo of homogeneous catalysis directed to the most important renewables.

This book starts by discussing the global flows of energy and materials and changes caused by human activities. It then examines the limitations of anthropogenic energy and material flows and the consequences for the development of human society. Different scenarios for lifestyle patterns are correlated with the future development of the global energy supply and climate. As it provides a process engineering approach to the Earth system and global development, readers should have a basic understanding of mathematics, physics, chemistry and biology. This second edition also reflects new developments since the original publication: increases in anthropogenic energy and material flows due to significant economic growth in certain parts of the world, and recent changes in energy policy and technological development countries, such as Germany (the Energiewende, or transition to renewable energy sources), where goals have been defined and measures initiated for a future energy supply without fossil and nuclear sources. As such, it offers a valuable resource for undergraduate and graduate students as well as practicing experts alike.

Adopting a didactic approach at an advanced, masters level, this concise textbook provides an array of questions & answers and features numerous industrial case studies and examples, with references for further, more detailed reading and to the latest peer-reviewed articles at the end of each chapter. A significant feature is the book's treatment of more recently developed catalytic processes and their applications in the pharmaceutical and fine chemical industries, with an indication of their present and future commercial impact. Written by a dedicated lecturer with a wealth of experience in industry, this is an invaluable tool for practicing chemical engineers and chemists who need to advance their education in this vibrant and expanding field.

This second edition of a bestselling textbook offers an instructive and comprehensive overview of our current knowledge of biocatalysis and enzyme technology. The book now contains about 40% more printed content. Three chapters are completely

new, while the others have been thoroughly updated, and a section with problems and solutions as well as new case studies have been added. Following an introduction to the history of enzyme applications, the text goes on to cover in depth enzyme mechanisms and kinetics, production, recovery, characterization and design by protein engineering. The authors treat a broad range of applications of soluble and immobilized biocatalysts, including wholecell systems, the use of non-aqueous reaction systems, applications in organic synthesis, bioreactor design and reaction engineering. Methods to estimate the sustainability, important internet resources and their evaluation, and legislation concerning the use of biocatalysts are also covered.

This book provides programmers with all the information they need to learn the latest release of Java 2 fast. Readers will learn how to create substantial Java programs, as well as how to use Java 2's new Abstract Windowing Toolkit, JavaBeans, Java Database Connectivity, and other significant enhancements in the programming environment. The book's quick no-nonsense approach will appeal to software developers, programmers, and web administrators who need to produce platform independent applications.

The second edition of this classic text book has been completely revised, updated, and extended to include chapters on biomimetic amination reactions, Wacker oxidation, and useful domino reactions. The first-class author team with long-standing experience in practical courses on organic chemistry covers a multitude of preparative procedures of reaction types and compound classes indispensable in modern organic synthesis. Throughout, the experiments are accompanied by the theoretical and mechanistic fundamentals, while the clearly structured sub-chapters provide concise background information, retrosynthetic analysis, information on isolation and purification, analytical data as well as current literature citations. Finally, in each case the synthesis is labeled with one of three levels of difficulty. An indispensable manual for students and lecturers in chemistry, organic chemists, as well as lab technicians and chemists in the pharmaceutical and agrochemical industries.

Authoritative guide to the principles, characteristics, engineering aspects, economics, and applications of disposables in the manufacture of biopharmaceuticals The revised and updated second edition of Single-Use Technology in Biopharmaceutical Manufacture offers a comprehensive examination of the most-commonly used disposables in the manufacture of biopharmaceuticals. The authors—*noted experts on the topic*—provide the essential information on the principles, characteristics, engineering aspects, economics, and applications. This authoritative guide contains the basic knowledge and information about disposable equipment. The author also discusses biopharmaceuticals' applications through the lens of case studies that clearly illustrate the role of manufacturing, quality assurance, and environmental influences. This updated second edition revises existing information with recent developments that have taken place since the first edition was published. The book also presents the latest advances in the field of single-use technology and explores topics including applying single-use devices for microorganisms, human mesenchymal stem cells, and T-cells. This important book:

- Contains an updated and end-to-end view of the development and manufacturing of single-use biologics
- Helps in the identification of appropriate disposables and relevant vendors
- Offers illustrative case studies that examine manufacturing, quality assurance, and environmental influences
- Includes updated coverage on cross-functional/transversal dependencies, significant improvements made by suppliers, and the successful application of the single-use technologies

Written for biopharmaceutical manufacturers, process developers, and biological and chemical engineers, *Single-Use Technology in Biopharmaceutical Manufacture, 2nd Edition* provides the information needed for professionals to come to an easier decision for or against disposable alternatives and to choose the appropriate system. This established text continues to provide a rigorous account of the principles and practice of experimental organic chemistry, taking students from their first day in the laboratory right through to research work. New to this edition, a microscale approach has been integrated into the entire text, alongside conventional manipulations, bringing it in line with current laboratory practice. Maintaining the unique structure of the previous edition, the first half of the book surveys all aspects of safe laboratory practice and the use of a wide range of purification and analytical techniques, particularly spectroscopic analysis. The second half contains easy-to-follow experimental procedures, each designed to illustrate an important reaction type of basic principle of organic chemistry. Tried and tested over the past decade, these experiments are graded according to their complexity and many of these have microscale equivalents. Of prime importance, all aspects of health and safety in the laboratory have been updated according to the latest guidelines and are highlighted throughout the text.

Expanding on the ideas first presented in Gerhard Ertl's acclaimed Baker Lectures at Cornell University, *Reactions at Solid Surfaces* comprises an authoritative, self-contained, book-length introduction to surface reactions for both professional chemists and students alike. Outlining our present understanding of the fundamental processes underlying reactions at solid surfaces, the book provides the reader with a complete view of how chemistry works at surfaces, and how to understand and probe the dynamics of surface reactions. Comparing traditional surface probes with more modern ones, and bringing together various disciplines in a cohesive manner, Gerhard Ertl's *Reactions at Solid Surfaces* serves well as a primary text for graduate students in introductory surface science or chemistry, as well as a self-teaching resource for professionals in surface science, chemical engineering, or nanoscience.

The rapid growth in biotechnology in recent years has led to an upsurge in interest in microbial technology amongst many biochemists, molecular biologists, geneticists, virologists, endocrinologists, and clinicians. Their objectives may be very diverse, ranging from the isolation of a stable enzyme from a hyperthermophile to the expression of a human protein by a recombinant yeasts or bacterium. Advance in microbial physiology have made possible a rational approach to optimization of product yield based on analysis of cultures, growth kinetics, and biochemical pathways. The application of statistical optimization methods, widely used in other fields, also has much to offer microbiology and biotechnology. The choice of material for this book has been influenced by both the need for practical information to enable the isolation, handling, and culture of organisms and the necessity to generate and analyse data enabling the development of a process. It therefore contains chapters covering the 'husbandry' of microbiology, the generation of data by chemical and physical analysis, and the interpretation of such data. Data interpretation is considered from two points of view. Kinetic

analyses of growth and product formation have frequently illuminated the development of fermentation processes. More recently, the analysis of the flux of metabolites through intermediate biochemical pathways has shown up important factors in metabolic engineering through the application of molecular biology techniques in microbial physiology. Applied Microbial Culture: A Practical Approach is a useful resource and guide to the successful culture of microorganisms in pure form, optimizing the culture conditions, and the scaling-up process to enable more detailed study.

Gene Cloning provides a basic introduction for students and researchers who have no previous experience of experiments with DNA, and assumes very little prior knowledge on the part of the reader. A three part structure addresses the basic principles of gene cloning, the application of cloning in gene analysis, and the role of gene cloning in research and biotechnology. The book is written in clear, jargon-free language, and is extensively illustrated with two-color line drawings.

The only up-to-date book on this important technology, Extrusion Processing Technology: Food and Non-Food Biomaterials bridges the gap between the principles of extrusion science and the practical "know how" of operational engineers and technicians. Written by internationally renowned experts with over forty years of experience between them, this valuable reference for food scientists, food engineers, chemical engineers, and students includes coverage of new, greener technologies as well as case studies to illustrate the practical, real-world application of the principles in various settings.

Updated and with approximately 25% new content, this textbook covers the latest developments, including instrumentation for microscopy and imaging, as well as current applications. The authors adopt a didactic approach, introducing infrared spectroscopy in a clear and well-structured way to provide students with a solid background in the principles and knowledge for efficiently using the method to obtain reliable results. Both beginners and experts will find up-to-date references for further reading. A must-have for advanced students (Master's and PhD) as well as those wanting to learn how the method works and how to work with it, including scientists from private and governmental labs.

Probing events that occur in a catalyst under working conditions is a very important topic in many fields of chemistry. In order to identify reaction intermediates and active sites in a working catalyst, the development of characterization techniques, the design and construction of appropriate in-situ cells and reactor probes are inevitable. Various types of spectroscopy, diffraction methods and scattering techniques can be used to achieve the ultimate goal of determining and understanding quantitative structure/composition-activity/selectivity relationships in catalysts. Therefore, such detailed knowledge about the active sites should enable scientists to design - in a rational way - new and efficient catalysts for sustainable production of bulk and fine chemicals as well as for the removal of harmful compounds in industrial catalytic processes. This book aims to give an overview of the different characterization techniques currently available for performing in-situ studies on catalytic materials. Both the possibilities and limitations are illustrated by many case studies. This is a unique book providing a comprehensive coverage of the latest developments in this very important and rapidly expanding field of catalysis.

The book provides an easy way to understand the fundamentals of heat transfer. The reader will acquire the ability to design and analyze heat exchangers. Without extensive derivation of the fundamentals, the latest correlations for heat transfer coefficients and their application are discussed. The following topics are presented - Steady state and transient heat conduction - Free and forced convection - Finned surfaces - Condensation and boiling - Radiation - Heat exchanger design - Problem-solving After introducing the basic terminology, the reader is made familiar with the different mechanisms of heat transfer. Their practical application is demonstrated in examples, which are available in the Internet as MathCad files for further use. Tables of material properties and formulas for their use in programs are included in the appendix. This book will serve as a valuable resource for both students and engineers in the industry. The author's experience indicates that students, after 40 lectures and exercises of 45 minutes based on this textbook, have proved capable of designing independently complex heat exchangers such as for cooling of rocket propulsion chambers, condensers and evaporators for heat pumps.

Bioprocess technology involves the combination of living matter (whole organism or enzymes) with nutrients under laboratory conditions to make a desired product within the pharmaceutical, food, cosmetics, biotechnology, fine chemicals and bulk chemicals sectors. Industry is under increasing pressure to develop new processes that are both environmentally friendly and cost-effective, and this can be achieved by taking a fresh look at process development; - namely by combining modern process modeling techniques with sustainability assessment methods. Development of Sustainable Bioprocesses: Modeling and Assessment describes methodologies and supporting case studies for the evolution and implementation of sustainable bioprocesses. Practical and industry-focused, the book begins with an introduction to the bioprocess industries and development procedures. Bioprocesses and bioproducts are then introduced, together with a description of the unit operations involved. Modeling procedures, a key feature of the book, are covered in chapter 3 prior to an overview of the key sustainability assessment methods in use (environmental, economic and societal). The second part of the book is devoted to case studies, which cover the development of bioprocesses in the pharmaceutical, food, fine chemicals, cosmetics and bulk chemicals industries. Some selected case studies include: citric acid, biopolymers, antibiotics, biopharmaceuticals. Supplementary material provides hands-on materials so that the techniques can be put into practice. These materials include a demo version of SuperPro Designer software (used in process engineering) and models of all featured case studies, excel sheets of assessment methods, Monte Carlo simulations and exercises. Previously available on CD-ROM, the supplementary material can now be accessed via <http://booksupport.wiley.com> by entering the author name, book title or isbn and clicking on the desired entry. This will then give a listing of all the content available for download. Please read any text files before downloading material.

Focused on the undergraduate audience, Chemical Reaction Engineering provides students with complete coverage of the fundamentals, including in-depth coverage of chemical kinetics. By introducing heterogeneous chemistry early in the book, the text gives students the knowledge they need to solve real chemistry and industrial problems. An emphasis on problem-solving and numerical techniques ensures students learn and practice the skills they will need later on, whether for industry or graduate work.

Research in the area of chemical and biochemical sensors and the development of respective applications is still growing rapidly. This book aims at instructing researcher and practitioners in both disciplines in a strictly systematic, interdisciplinary and practice-oriented way about the basic technology of chemical and biochemical sensors. This concise volume bridges the gap between the different "ways of thinking" in chemistry, physics and engineering. It provides a firm grounding for engineers, industrial and academic researcher in the field, for practitioners and novices as well as for advanced students.

Von Praktikern für Praktiker geschrieben, erläutert das vorliegende Werk die prozesstechnische Behandlung von Flüssigkeits- und Gasgemischen zur Reinigung, Auftrennung und Aufkonzentrierung der einzelnen Komponenten durch den Einsatz selektiver Trenntechniken: - Absorption - Rektifikation - Verdampfung - Kondensation - Extraktion - Adsorption - Chromatographie - Membrantechnik - Schmelzkristallisation - Trenntechnik mit überkritischen Fluiden Alle zum Verständnis der Unit-Operations notwendigen Grundlagen aus den Bereichen Thermodynamik, Wärme- und Stoffübertragung, Strömungslehre sowie zu Grenzflächenvorgängen sind in dem Buch enthalten.

Neu ist die umfassende Darstellung der Synthese fluidverfahrenstechnischer Prozesse von der Idee bis zur praktischen Anwendung. In diesem Zusammenhang werden Aspekte wie Miniplanttechnologie, Prozesssynthese und -simulation erläutert. Auch so wichtige Probleme wie Einbauten, Scale-up und Fouling werden angesprochen. Um all diesen Anforderungen dem aktuellen Stand der Technik entsprechend gerecht zu werden, haben bei dem Buch namhafte Autoren aus Industrie und Wissenschaft zusammengearbeitet. Aufgrund der breit gefächerten Thematik wendet sich das Buch gleichermaßen an Planungs- und Betriebsingenieure wie an Neueinsteiger und Hochschulabgänger, die Grundlagenwissen in die Praxis umsetzen wollen.

Incorporation of particular components with specialized properties allows one to tailor the end product's properties. For instance, the sensitivity, burning behavior, thermal or mechanical properties or stability of energetic materials can be affected and even controllably varied through incorporation of such ingredients. This book examines particle technologies as applied to energetic materials such as propellants and explosives, thus filling a void in the literature on this subject. Following an introduction covering general features of energetic materials, the first section of this book describes methods of manufacturing particulate energetic materials, including size reduction, crystallization, atomization, particle formation using supercritical fluids and microencapsulation, agglomeration phenomena, special considerations in mixing explosive particles and the production of nanoparticles. The second section discusses the characterization of particulate materials. Techniques and methods such as particle size analysis, morphology elucidation and the determination of chemical and thermal properties are presented. The wettability of powders and rheological behavior of suspensions and solids are also considered. Furthermore, methods of determining the performance of particular energetic materials are described. Each chapter deals with fundamentals and application possibilities of the various methods presented, with particular emphasis on issues applicable to particulate energetic materials. The book is thus equally relevant for chemists, physicists, material scientists, chemical and mechanical engineers and anyone interested or engaged in particle processing and characterization technologies.

[Copyright: a225156ed288c6992aaf960cbf2fc677](#)