

Handbook Of Sol Gel Science And Technology Processing Characterization And Applications

A benchmark publication, the first edition of the Phosphor Handbook set the standard for references in this field. Completely revised and updated, this second edition explores new and emerging fields such as nanophosphors, nanomaterials, UV phosphors, quantum cutters, plasma display phosphors, sol-gel and other wet phosphor preparation techniques, preparation through combustion, bioluminescence phosphors and devices, and new laser materials such as OLED. It also contains new chapters on the applications of phosphors in solid state lighting, photoionization of luminescent centers in insulating phosphors, and recent developments in halide-based scintillators. The handbook provides a comprehensive description of phosphors with an emphasis on practical phosphors and their uses in various kinds of technological applications. It covers the fundamentals, namely the basic principles of luminescence, the principle phosphor materials, and their optical properties. The authors describe phosphors used in lamps, cathode-ray tubes, x-ray, and ionizing radiation detection. They cover common measurement methodology used to characterize phosphor properties, discuss a number of related items, and conclude with the history of phosphor technology and industry.

Since Dr. Dislich of Germany prepared a glass lens by the sol-gel method around 1970, sol-gel science and technology has continued to develop. Since then this field has seen remarkable technical developments as well as a broadening of the applications of sol-gel science and technology. There is a growing need for a comprehensive reference that treats both the fundamentals and the applications, and this is the aim of "Handbook of Sol-Gel Science and Technology." The primary purpose of sol-gel science and technology is to produce materials, active and non-active including optical, electronic, chemical, sensor, bio- and structural materials. This means that sol-gel science and technology is related to all kinds of manufacturing industries. Thus Volume 1, "Sol-Gel Processing," is devoted to general aspects of processing. Newly developed materials such as organic-inorganic hybrids, photonic crystals, ferroelectric coatings, photocatalysts will be covered. Topics in this volume include: Volume 2, "Characterization of Sol-Gel Materials and Products," highlights the important fact that useful materials are only produced when characterization is tied to processing. Furthermore, characterization is essential to the understanding of nanostructured materials, and sol-gel technology is a most important technology in this new field. Since nanomaterials display their functional property based on their nano- and micro-structure, "characterization" is very important. Topics found in Volume 2 include: Sol-gel technology is a versatile technology, making it possible to produce a wide variety of materials and to provide existing substances with novel properties. This technology was applied to producing novel materials, for example organic-inorganic hybrids, and it was also applied to producing materials based on high temperature superconducting oxides. "Applications of Sol-Gel Technology," (Volume 3), will cover applications such as: The sol-gel method is a powerful route of synthesis used worldwide. It produces bulk, nano- and mesostructured sol-gel materials, which can encapsulate metallic and magnetic nanoparticles, non-linear azochromophores, perovskites, organic dyes, biological molecules, etc. This can have interesting applications for catalysis, photocatalysis; drug delivery for treatment of neurodegenerative diseases such as cancer, Parkinson's and Alzheimer's. In this book, valuable contributions related to novel materials synthesized by the sol-gel route are provided. The effect of the sol-gel method to synthesize these materials with potential properties is described, and how the variation of the parameters during the synthesis influences their design and allows to adjust their properties according to the desired application it discusses.

Aerogels are the lightest solids known. Up to 1000 times lighter than glass and with a density as low as only four times that of air, they show very high thermal, electrical and acoustic insulation values and hold many entries in Guinness World Records. Originally based on silica, R&D efforts have extended this class of materials to non-silicate inorganic oxides, natural and synthetic organic polymers, carbon, metal and ceramic materials, etc. Composite systems involving polymer-crosslinked aerogels and interpenetrating hybrid networks have been developed and exhibit remarkable mechanical strength and flexibility. Even more exotic aerogels based on clays, chalcogenides, phosphides, quantum dots, and biopolymers such as chitosan are opening new applications for the construction, transportation, energy, defense and healthcare industries. Applications in electronics, chemistry, mechanics, engineering, energy production and storage, sensors, medicine, nanotechnology, military and aerospace, oil and gas recovery, thermal insulation and household uses are being developed with an estimated annual market growth rate of around 70% until 2015. The Aerogels Handbook summarizes state-of-the-art developments and processing of inorganic, organic, and composite aerogels, including the most important methods of synthesis, characterization as well as their typical applications and their possible market impact. Readers will find an exhaustive overview of all aerogel materials known today, their fabrication, upscaling aspects, physical and chemical properties, and most recent advances towards applications and commercial products, some of which are commercially available today. Key Features: •Edited and written by recognized worldwide leaders in the field •Appeals to a broad audience of materials scientists, chemists, and engineers in academic research and industrial R&D •Covers inorganic, organic, and composite aerogels •Describes military, aerospace, building industry, household, environmental, energy, and biomedical applications among others

The Sol to Gel Transition

Nanoparticle Technology Handbook

Springer Handbook of Aerogels

Handbook of sol-gel science and technology. 3. Applications of sol-gel technology

Processing and Characterization

Phosphor Handbook

With this handbook, the distinguished team of editors has combined the expertise of leading nanomaterials scientists to provide the latest overview of this field. They cover the whole spectrum of nanomaterials, ranging from theory, synthesis, properties, characterization to application, including such new developments as quantum dots, nanoparticles, nanoporous materials, nanowires, nanotubes, and nanostructured polymers. The result is recommended reading for everybody working in nanoscience: Newcomers to the field can acquaint themselves with this exciting subject, while specialists will find answers to all their questions as well as helpful suggestions for further research.

A two-volume reference set for all ceramicists, both in research and working in industry The only definitive reference covering the entire field of advanced ceramics from fundamental science and processing to application Contributions from over 50 leading researchers from around the world This new Handbook will be an essential resource for ceramicists. It includes contributions from leading researchers around the world, and includes sections on: Basic Science of Advanced Ceramic, Functional Ceramics (electro-ceramics and optoelectro-ceramics) and engineering ceramics. Contributions from over 50 leading researchers from around the world This comprehensive three-volume handbook brings together a review of the current state together with the latest developments in sol-gel technology to put forward new ideas. The first volume, dedicated to synthesis and shaping, gives an in-depth overview of the wet-chemical processes that constitute the core of the sol-gel method and presents the various pathways for the successful synthesis of inorganic and hybrid organic-inorganic materials, bio- and bio-inspired materials, powders, particles and fibers as well as sol-gel derived thin films, coatings and surfaces. The second volume deals with the mechanical, optical, electrical and magnetic properties of sol-gel derived materials and the methods for their characterization such as diffraction methods and nuclear magnetic resonance, infrared and Raman spectroscopies. The third volume concentrates on the various applications in the fields of membrane science, catalysis, energy research, biomaterials science, biomedicine, photonics and electronics.

Corrosion of Aluminium highlights the practical and general aspects of the corrosion of aluminium alloys with many illustrations and references. In addition to that, the first chapter allows the reader who is not very familiar with aluminium to understand the metallurgical, chemical and physical features of the aluminium alloys. The author Christian Vargel, has adopted a practitioner approach, based on the expertise and experience gained from a 40 year career in aluminium corrosion This approach is most suitable for assessing the corrosion resistance of aluminium- an assessment which is one of the main conditions for the development of many uses of aluminium in transport, construction, power transmission etc. 600 bibliographic references provide a comprehensive guide to over 100 years of related study Providing practical applications to the reader across many industries Accessible to both the beginner and the expert

Handbook of Ceramic Composites

Handbook of Sol-gel Science and Technology

processing, characterization and applications. 4 vol

Recent Applications in Sol-Gel Synthesis

Topics in Fundamental Research and Applications (4 Volume Set)

Sol-Gel Science

This book presents a broad, general introduction to the processing of Sol-Gel technologies. This updated volume serves as a general handbook for researchers and students entering the field. This new edition provides updates in fields that have undergone rapid developments, such as Ceramics, Catalysis, Chromatography, biomaterials, glass science, and optics. It provides a simple, compact resource that can also be used in graduate-level materials science courses.

Sol-Gel-Optics encompasses numerous schemes for fabricating optical materials from gels – materials such as bulk optics, optical waveguides, doped oxides for laser and nonlinear optics, gradient refractive index (GRIN) optics, chemical sensors, environmental sensors, and `smart` windows. Sol-Gel-Optics: Processing and Applications provides in-depth coverage of the synthesis and fabrication of these materials and discusses the optics related to microporous, amorphous, crystalline and composite materials. The reader will also find in this book detailed descriptions of new developments in silica optics, bulk optics, waveguides and thin films. Various applications to sensor and device technology are highlighted. For researchers and students looking for novel optical materials, processing methods or device ideas, Sol-Gel-Optics: Processing and Applications surveys a wide array of promising new avenues for further investigation and for innovative applications. (This book is the first in a new subseries entitled ` Electronic Materials: Science and Technology).

This book provides an in-depth introduction to the sol to gel transition in inorganic and hybrid organic-inorganic systems, one of the most important chemical-physical transitions and the basis of the sol-gel process. Familiarity with the fundamental chemistry and physics of this transition is essential for students in chemistry and materials science through academic and industry researchers working on sol-gel-related applications. The book features a didactic approach, using simple and clear language to explain the sol to gel transition and the accompanying processes. The text is also suitable for use in short courses and workshops for graduate students as well as professionals.

This essential handbook provides comprehensive coverage of the current state-of-the-art in inorganic, organic, and composite aerogels, from synthesis and characterization through the latest applications and their possible market impact. Built on the successful Aerogels Handbook published in 2011, this book has been extensively revised and updated to reflect the changes in this fast-growing field. Aerogels are the lightest solids known to man. Up to 1000 times lighter than glass and with a density only four times that of air, they possess exceedingly high thermal, electrical, and acoustic insulation properties, and hold many entries in Guinness World Records. Originally based on silica, R&D efforts have extended this class of materials to incorporate non-silicate inorganic oxides, natural and synthetic organic polymers, carbon, metal, and ceramic materials. Composite systems involving polymer-crosslinked aerogels and interpenetrating hybrid networks have been developed and exhibit remarkable mechanical strength and flexibility. Even more exotic aerogels based on clays, chalcogenides, phosphides, quantum dots, and biopolymers such as chitosan are opening new applications for the construction, transportation, energy, defense and healthcare industries. Applications in electronics, chemistry, mechanics, engineering, energy production and storage, sensors, medicine, nanotechnology, military and aerospace, oil and gas recovery, thermal insulation, and household uses are being developed. Readers of this fully updated and expanded edition will find an exhaustive source for all aerogel materials known today, their fabrication, up scaling aspects, physical and chemical properties, and the most recent advances towards applications and commercial use. This key reference represents essential reading for a combined audience of graduate students, practicing academics, and industry researchers.

Biological and Biomedical Coatings Handbook

Handbook of Modern Coating Technologies

Processing and Applications

1D Oxide Nanostructures Obtained by Sol-Gel and Hydrothermal Methods

Processing, Characterization and Applications

Applications and Development

Since Dr. Dislich of Germany prepared a glass lens by the sol-gel method around 1970, sol-gel science and technology has continued to develop. Since then this field has seen remarkable technical developments as well as a broadening of the applications of sol-gel science and technology. There is a growing need for a comprehensive reference that treats both the fundamentals and the applications, and this is the aim of Handbook of Sol-Gel Science and Technology. The primary purpose of sol-gel science and technology is to produce materials, active and non-active including optical, electronic, chemical, sensor, bio- and structural materials. This means that sol-gel science and technology is related to all kinds of manufacturing industries. Thus Volume 1, Sol-Gel Processing, is devoted to general aspects of processing. Newly developed materials such as organic-inorganic hybrids, photonic crystals, ferroelectric coatings, photocatalysts will be covered. Topics in this volume include: Synthesis and reaction of sol-gel precursors. Preparation of bulk glass and ceramics. Processing of porous materials based on self-organization. Synthesis of organic-inorganic hybrid materials. Coating of plastics. Special processes used in sol-gel formation of aerogel and preparation of ultrahigh-temperature ceramic (UHTC)-based materials. Fluorescent glasses, ultraviolet photosensors, and photocatalysts have been discussed in detail by the experts in the field. The usefulness of sol-gel materials as active GRIN, as textile finisher, and as leather modifier with water-repellent and oil-resistant properties would be an incentive for researchers keen to pursue the field.

This book provides comprehensive coverage of nanocomposite materials obtained by the sol-gel method, from synthesis to applications and including design tools for combining different properties. Sol-gel nanocomposites are of great interest in meeting processing and application requirements for the development of multifunctional materials. These materials are already commercialized for a number of applications from scratch-resistant and anti-adhesive coatings to optical materials with active and passive properties. Biomedical applications, holographic recordings, fuel cells and hydrogen storage, resists and catalysts are among the potential uses. The novel mechanical, optical and electronic properties of nanocomposite materials depend not only on the individual component materials, but also on their morphology and nanoscale interfacial characteristics. Sol-gel is a highly versatile method for obtaining both the matrix and the filler of the nanocomposite and for chemically adjusting the interface to optimize structure and properties. Although nanocomposites are widely discussed in the literature, the focus has been mainly on polymer nanocomposites. This book addresses nanocomposites based on inorganic or hybrid organic-inorganic matrices, with an emphasis on the scientific principles which are the basis for nanocomposite sol-gel synthesis and applications. A didactic approach is followed, with different topics developed from a fundamental point of view together with key examples and case studies. First comprehensive treatment of nanocomposites obtained by sol-gel methods Focuses on nanocomposites with inorganic and hybrid organic-inorganic matrices Describes design tools to optimize structure and properties for various applications Covers synthesis, processing, characterization, and modeling Uses first principles to describe the influence of interfacial characteristics on materials properties Presents case studies for both films and bulk applications Provides examples of products on the market, with descriptions of the scientific principles at the base of their success Includes contributions from recognized leaders in this multidisciplinary area.

Synthesis, Characterization, and Applications

The Sol-Gel Handbook, 3 Volume Set

Handbook of Advanced Ceramics

Materials, Applications, Processing and Properties

Sol-gel Based Nanoceramic Materials: Preparation, Properties and Applications

Handbook of Solid Phase Microextraction

Fibres usually experience tensile loads whether they are used for apparel or technical structures. Their form, which is long and fine, makes them some of the strongest materials available as well as very flexible. This book provides a concise and authoritative overview of tensile behaviour of a wide range of both natural and synthetic fibres used both in textiles and high performance materials. After preliminary chapters that introduce the reader to tensile properties, failure and testing of fibres, the book is split into two parts. Part one examines tensile properties and failure of natural fibres, such as cotton, hemp, wool and silk. Part two discusses the tensile properties and failure of synthetic fibres ranging from polyamide, polyester and polyethylene fibres to carbon fibres. Many chapters also provide a general background to the fibre, including the manufacture, microstructure, factors that affect tensile properties as well as methods to improve tensile failure. With its distinguished editor and array of international contributors, Handbook of tensile properties of textile and technical fibres is an important reference for fibre scientists, textile technologists and engineers, as well as those in academia. Provides an overview of tensile behaviour of a wide range of both natural and synthetic fibres Examines tensile characteristics, tensile failure of textiles fibres and factors that affect tensile properties Discusses microstructures and each type of fibre from manufacture to finished product

Handbook of Modern Coating Technologies: Application and Development reviews recent applications and developments of modern coating technologies. The topics in this volume consist of role of antibacterial coatings in the development of biomaterials, insights of technologies for self-healing organic coatings, sensor applications, application of technologies for self-healing organic coatings, protective coatings for wood, applications of optical coatings on spectral selective structures, application of natural antimicrobial coating for controlling foodborne pathogens on meat and fresh produce, efficacy of antimicrobial coating in reducing pathogens on meat composite membrane fabrication, characterization, and applications, development of nanostructured HVOF coatings on high strength steel components for turbine blades, nanoscale multilayered composite coating, applications of sol-gel coatings, application of graphene in protective coating industry, application of coatings in outdoor high-voltage installations, defects and doping effects in thin films of transparent and conductive oxides, and functional coatings for lab-on-a-chip systems based on phospholipid polymers.

Versatility, extended compositional ranges, better homogeneity, lesser energy consumption, and requirement of nonexpensive equipments have boosted the use of sol-gel process on top of the popularity in the synthesis of nanosystems. The sol-gel technique has not only revolutionized oxide ceramics industry and/or material science but has also extended widely into multidimensional applications. The book Recent Applications in Sol-Gel Synthesis comprises 14 chapters that deal mainly with the application-oriented aspects of the technique. Sol-gel prepared metal oxide (MO) nanostructures like nanospheres, nanorods, nanoflakes, nanotubes, and nanoribbons have been employed in biomedical applications involving drug deliveries, mimicking of natural bone, and antimicrobial activities. The possibility of controlling grain size in sol-gel prepared materials is highlighted. ID oxide nanostructures exhibit interesting optical and electrical properties, due to their confined morphology. In addition, a well-defined geometry can be associated with chemically active species. For example, the pure SiO2 nanotubes presented a slight photocatalytic activity while the Pt-doped SiO2 tubular materials act as microreactors in catalytic reactions. In the case of titania and titanate nanotubes, large specific surface area and pore volume, ion-exchange ability, enhanced light absorption, and fast electron-transport capability have attracted significant research interest. The chemical and physical modifications (microwave assisted hydrothermal methods) discussed here improve the formation kinetics of the nanotubes. The ZnO nanorods/tubes were prepared as random particles or as large areas of small, oriented 1D ZnO nanostructures on a variety of substrates. In the latter case a sol-gel layer is deposited on the substrate prior to the hydrothermal preparation. Using appropriate dopants, coatings of ZnO nanorods with controlled electrical behavior can be obtained.

Written in a versatile, contemporary style that will benefit both novice and expert alike, Biological and Biomedical Coatings Handbook, Two-Volume Set covers the state of the art in the development and implementation of advanced thin films and coatings in the biological field. Consisting of two volumes-Processing and Characterization and Applications-this handbook details the latest understanding of advances in the design and performance of biological and biomedical coatings, covering a vast array of material types, including bio-ceramics, polymers, glass, chitosan, and nanomaterials. Contributors delve into a wide range of novel materials (i. Non-hydroxy sol-gel process, 2. Sorogels, and 3. UV irradiation). Volume 2, Characterization of Sol-Gel Materials and Products, highlights the important fact that useful materials are only produced when characterization is tied to processing. Furthermore, characterization is essential to the understanding of nanostructured materials, and sol-gel technology is a most important technology in this new field.

Synthesis, fabrication, and characterization of nanocoatings: The sol-gel method and electrophoretic deposition Thermal and plasma spraying Hydroxyapatite and organically modified coatings Bioceramics and bioactive glass-based coatings Hydrothermal crystallization and self-healing effects Physical and chemical vapor deposition Layered assembled photocatalyst films With chapters authored by world experts at the forefront of research in their respective areas, this timely set provides searing insights and practical information to explore a subject that is fundamental to the success of biotechnological pursuits.

Synthesis, Characterization and Applications, 3-Volume Set

Chemistry and Applications

Processing, Characterization and Applications, V. I – Sol-Gel Processing/Hiroemitsu Kozuka, Editor, V. II – Characterization of Sol-Gel Materials and Products/Rui M. Almeida, Editor, V. III – Applications of Sol-Gel Technology/Sumio Sakka, Editor

Sol-Gel Optics

Organic and Carbon Gels

Handbook of Sol-Gel Science and Technology

The relatively new technique of solid phase microextraction (SPME) is an important tool to prepare samples both in the lab and on-site. SPME is a "green" technology because it eliminates organic solvents from analytical laboratory and can be used in environmental, food and fragrance, and forensic and drug analysis. This handbook offers a thorough background of the theory and practical implementation of SPME. SPME protocols are presented outlining each stage of the method and providing useful tips and potential pitfalls. In addition, devices and fiber coatings, automated SPME systems, SPME method development, and In Vivo applications are discussed. This handbook is essential for its discussion of the latest SPME developments as well as its in depth information on the history, theory, and practical application of the method. Practical application of Solid Phase Microextraction methods including detailed steps Provides history of extraction methods to better understand the process Suitable for all levels, from beginning student to experienced practitioner

This book summarizes recent research and development in the field of nanostructured ceramics and their composites. It presents selected examples of ceramic materials with special electrical, catalytic and optical properties and exceptional mechanical characteristics. A special focus is on sol-gel based and organic-inorganic hybrid nanoceramic materials. The book highlights examples for preparation techniques including scale-up, properties of smart ceramic composites, and applications including e.g. waste water treatment, heavy metal removal, sensors, electronic devices and fuel cells. Recent challenges are addressed and potential solutions are suggested for these. This book hence addresses chemists, materials scientists, and engineers, working with nanoceramic materials and on their applications.

This completely updated and expanded second edition stands as a comprehensive knowledgebase on both the fundamentals and applications of this important materials processing method. The diverse, international team of contributing authors of this reference clarify in extensive detail properties and applications of sol-gel science and technology as it pertains to the production of substances, active and non-active, including optical, electronic, chemical, sensor, bio- and structural materials. Essential to a wide range of manufacturing industries, the compilation divides into the three complementary sections: Sol-Gel Processing, devoted to general aspects of processing and recently developed materials such as organic-inorganic hybrids, photonic crystals, ferroelectric coatings, and photocatalysts; Characterization of Sol-Gel Materials and Products, presenting contributions that highlight the notion that useful materials are only produced when characterization is tied to processing, such as determination of structure by NMR, in-situ characterization of the sol-gel reaction process, determination of microstructure of oxide gels, characterization of porous structure of gels by the surface measurements, and characterization of organic-inorganic hybrid; and Applications of Sol-Gel Technology, covering applications such as the sol-gel method used in processing of bulk silica glasses, bulk porous gels prepared by sol-gel method, application of sol-gel method to fabrication of glass and ceramic fibres, reflective and antireflective coating films, application of sol-gel method to formation of photocatalytic coating films, and application of sol-gel method to bioactive coating films. The comprehensive scope and integrated treatment of topics make this reference volume ideal for R&D scientists and engineers across a wide range of disciplines and professional interests.

This valuable handbook has been compiled by internationally renowned researchers in the field. Each chapter is focused on a specific composite system or a class of composites, presenting a detailed description of processing, properties, and applications.

Physical Chemistry for the Life Sciences

Introduction to Sol-Gel Processing

Sol-Gel Method

Food Biochemistry and Technology

Handbook of Organic-Inorganic Hybrid Materials and Nanocomposites: Nanocomposites

Aerogels Handbook

Sol-Gel Science: The Physics and Chemistry of Sol-Gel Processing presents the physical and chemical principles of the sol-gel process. The book emphasizes the science behind sol-gel processing with a chapter devoted to applications. The first chapter introduces basic terminology, provides a brief historical sketch, and identifies some excellent texts for background reading. Chapters 2 and 3 discuss the mechanisms of hydrolysis and condensation for nonsilicate and silicate systems. Chapter 4 deals with stabilization and gelation of sols. Chapter 5 reviews theories of gelation and examines the predicted and observed changes in the properties of a sol in the vicinity of the gel point. Chapter 6 describes the changes in structure and properties that occur during aging of a gel in its pore liquor (or some other liquid). The discussion of drying is divided into two parts, with the theory concentrated in Chapter 7 and the phenomenology in Chapter 8. The structure of dried gels is explored in Chapter 9. Chapter 10 shows the possibility of using the gel as a substrate for chemical reactions or of modifying the bulk composition of the resulting ceramic by performing a surface reaction (such as nitridation) on the gel. Chapter 11 reviews the theory and practice of sintering, describing the mechanisms that govern densification of amorphous and crystalline materials, and showing the advantages of avoiding crystallization before sintering is complete. The properties of gel-derived and conventional ceramics are discussed in Chapter 12. The preparation of films is such an important aspect of sol-gel technology that the fundamentals of film formation are treated at length in Chapter 13. Films and other applications are briefly reviewed in Chapter 14. Materials scientists and researchers in the field of sol-gel processing will find the book invaluable.

Nanoparticle technology, which handles the preparation, processing, application and characterisation of nanoparticles, is a new and revolutionary technology. It becomes the core of nanotechnology as an extension of the conventional Fine Particle / Powder Technology. Nanoparticle technology plays an important role in the implementation of nanotechnology in many engineering and industrial fields including electronic devices, advanced ceramics, new batteries, engineered catalysts, functional paint and ink, Drug Delivery System, biotechnology, etc.; and makes use of the unique properties of the nanoparticles which are completely different from those of the bulk materials. This new handbook is the first to explain complete aspects of nanoparticles with many application examples showing their advantages and advanced development. There are handbooks which briefly mention the nanosized particles or their related applications, but no handbook describing the complete aspects of nanoparticles has been published so far. The handbook elucidates the basic properties of nanoparticles and various nanostructural materials with their characterisation methods in the first part. It also introduces more than 40 examples of practical and potential uses of nanoparticles in the later part dealing with applications. It is intended to give readers a clear picture of nanoparticles as well as new ideas or hints on their applications to create new materials or to improve the performance of the advanced functional materials developed with the nanoparticles. * Introduces all aspects of nanoparticle technology, from the fundamentals to applications. * Includes basic information on the preparation through to the characterization of nanoparticles from various viewpoints * Includes information on nanostructures, which play an important role in practical applications.

Handbook of Waterborne Coatings comprehensively reviews recent developments in the field of waterborne coatings. Crucial aspects associated with coating research are presented, with close attention paid to the essential aspects that are necessary to understand the properties of novel materials and their use in coating materials. The work introduces the reader to progress in the field, also outlining applications, methods and techniques of synthesis and characterization that are demonstrated throughout. In addition, insights into ongoing research, current trends and challenges are previewed. Topics chosen ensure that new scholars or advanced learners will find the book an essential resource. Serves as a reference guide to recent developments in waterborne coatings for industrialists, scientists and engineers involved in the field of coatings Presents coverage of the unique application methods for waterborne coatings and when those methods should be used Provides foundational information on waterborne coatings and discusses current market trends that impact the field

Peter Atkins and Julio de Paula offer a fully integrated approach to the study of physical chemistry and biology.

Sol-Gel Science and Technology

Handbook of Sol-gel Science and Technology: Applications of sol-gel technology

HANDBOOK of sol-gel science and technology

Chapter 11.1.2. Sol-Gel Process and Applications

Handbook of Tensile Properties of Textile and Technical Fibres

Sol-Gel Nanocomposites

Sol-Gel processing methods, first used historically for decorative and constructional materials, were extensively developed in the last century for applications such as glasses, ceramics, catalysts, coatings, composites and fibres. Today they are reaching their full potential, enabling the preparation of new generations of advanced materials not easily accessible by other methods yet using mild, low-energy conditions. The topic is therefore increasingly included in advanced undergraduate, MSc and PhD programmes in the areas of chemistry, physics and materials science. This concise introductory text, written at the advanced undergraduate/first-year postgraduate level, is also suitable as an introduction to the development, mechanisms, chemistry, characterisation methods and applications of the technique. It provides readers with an extensive yet concise grounding in the theory of each area of the subject and details the real and potential applications and the future prospects of sol-gel chemistry.

This expert volume provides specialized coverage of the current state of the art in carbon gels. Carbon gels represent a promising class of materials with added value applications and many assets, like the ability to accurately tailor their structure, porosity, and surface composition and easily dope them with numerous species. The ability to obtain them in custom shapes, such as powder, beads, monoliths, or impregnated scaffolds opens the way towards numerous applications, including catalysis, adsorption, and electrochemical energy storage, among others. Nevertheless, it remains a crucial question as to which design synthesis and manufacturing processes are viable from an economic and environmental point of view. The book represents the perspectives of renowned specialists in the field, specially invited to conduct a one-day workshop devoted to carbon gels as part of the 19th International Sol-Gel Conference, SOL-GEL 2017, held on September 3rd, 2017 in Liège, Belgium. Addressing properties and synthesis through applications and industry outlook, this book represents essential reading for advanced graduate students through practicing researchers interested in these exciting materials.

Sol-Gel Science and Technology covers optical, electronic and magnetic, chemical, mechanical, biomedical and biotechnological materials. Concerning the microstructures, the sol-gel method applies to porous materials, dense materials like glasses and ceramics, organic-inorganic hybrids and nanocomposites. The four volumes of this reference treat four areas that are timely, important and seeing great research activity: -Sol-gel prepared ferroelectrics and related materials. -Sol-gel processing of titanium oxides: photocatalyst and other applications. -Sol-gel processing of porous materials: application to catalysts, enzymes, chemical analysis, sensors, and membranes. The goal of these four volumes is to disseminate the recent research results published in recent issues of

Journal of Sol-Gel Science and Technology, which is a unique journal devoted to Sol-Gel.

The Physics and Chemistry of Sol-Gel Processing

Design and Synthesis of New Materials with Interesting Physical, Chemical and Biological Properties

The Sol-Gel Handbook

From Laboratory Synthesis to Applications

Handbook of Food Science and Technology 3

Sol-Gel Materials