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KEY=BIOMINERALS - KIDD EDEN

Biomineralization Sourcebook

Characterization of Biominerals and Biomimetic Materials

CRC Press What does it mean to be at the forefront of a characterization technique? Novel implementation and research, finding new ways to visualize composites, and new techniques all play a role. Yet with the myriad of advances in the field, keeping up with new and advanced techniques, often from many different areas, has become a challenge. **Biomineralization Sourcebook: Characterization of Biominerals and Biomimetic Materials** emphasizes the interplay between multiple techniques at their current frontiers and explores how such studies may be carried out. The book addresses atomic and molecular structure: how it is described, detected, and assessed for importance. It then highlights additional measurements especially well-suited to looking at two- and three-dimensional systems with heterogeneous, if not hierarchical, structure. These systems enable particular aspects of biominerals and biomimetic models to be scrutinized. The text presents state-of-the-art methods to assess properties of the composite, and represents current approaches and aspirations to measuring entire biological working structures while retaining as much fine-grained biophysical information as possible. In all these chapters, authors showcase discoveries from their own programs. Along the way, the book takes you on a tour from microscopy's eighteenth century roots, to the recent literature and diverse research programs of the contributing investigators, to the multi-million dollar National Laboratory facilities that all play their roles to illuminate the ever-fascinating biominerals. A snapshot of the state of the art in a spectrum of experimental techniques applied to a common interdisciplinary goal, where the ability to use the more advanced techniques often requires funding for collaboration and travel, the book will deepen the appreciation for the massive interdisciplinary effort underway, educate researchers across the field, and motivate new collaborations.

Biomineralization Sourcebook

Characterization of Biominerals and Biomimetic Materials

Marine Biological Materials of Invertebrate Origin

Springer Nature The work is a source of modern knowledge on biomineralization, biomimetics and bioinspired materials science with respect to marine invertebrates. The author gives the most coherent analysis of the nature, origin and evolution of biocomposites and biopolymers isolated from and observed in the broad diversity of marine invertebrate organisms and within their unusual structural formations. The basic format is that of a major review article, with liberal use of references to original literature. There is a wealth of new and newly synthesized information, including dozens of previously unpublished images of unique marine creatures and structures from nano- to microscale including high-resolution scanning and transmission electron micrographs. The material is organized effectively along both biological (phyla) and functional lines. The classification of biological materials of marine origin is proposed and discussed. Much of the pertinent data is organized into tables, and extensive use is made of electron micrographs and line drawings. Several modern topics e.g. "biomineralization- demineralization-rem mineralization phenomena", or "phenomenon of multiphase biomineralization", are discussed in details. Traditionally, such current concepts as hierarchical organization of biocomposites and skeletal structures, structural bioscaffolds, biosculpturing, biomimetism and bioinspiration as tools for the design of innovative materials are critically analyzed from both biological and materials science point of view using numerous unique examples of marine origin. This monograph reviews the most relevant advances in the marine biomaterials research field, pointing out several approaches being introduced and explored by distinct laboratories.

Microstructure and Properties of Micro- and Nanoscale Materials, Films, and Coatings (NAP 2019)

Selected Articles from the International Conference on Nanomaterials: Applications and Properties, (NAP 2019)

Springer Nature This book presents the findings of experimental and theoretical (including first-principles molecular dynamics simulation) studies of nanostructured and nanocomposite metal-based materials, and nanoscale multilayer coatings fabricated by physical or chemical vapor deposition, magnetron sputtering, electrospark alloying, ionic layer absorption, contact melting, and high-current electron beam irradiation. It also discusses novel methods of nanocomposite formation, as well as the structure of the deposited films, coatings and other nanoscale materials, their elemental and phase composition, and their physical-mechanical, tribological, magnetic and electrical properties. Lastly, it explores the influence of a various surface modification methods, such as thermal annealing, pulsed laser modification, and thermomechanical and ultrasonic treatment, as well as different properties of nanostructured films.

Minerals Iatu sensu and Human Health

Benefits, Toxicity and Pathologies

Springer Nature This volume provides a comprehensive academic review of both positive and negative effects of minerals on human health and quality of life. The book adopts the concept of mineral Iatu sensu (mineral I.s.), which encompasses a broad spectrum of natural, inorganic, solid, and crystalline, of natural and inorganic chemical elements (metals and metalloids), of modified natural minerals, of biominerals, and of syntetic minerals, all products that branch across the disciplines of earth, soil, environmental, materials, nutrition, and health sciences. Using this broad framework, the authors are able to provide a multidisciplinary assessment on many types of minerals which can be essential, beneficial and hazardous to human health, covering applications in medical geology, medical hydrology or balneotherapy, pharmacology, chemistry, nutrition, and biophysics. The book performs historical analyses of the uses of minerals for therapeutic and cosmetic purposes to better understand current trends and developments in mineral research and human health. The book will be of interest to students, public health officials, environmental agencies and researchers from various disciplines, as well as scientific societies and organizations focusing on medical geology, health resort medicine (crenotherapy, hydrotherapy and climatotherapy), and on pharmaceutical, cosmetic and biomedical applications.

Analytical Chemistry for Cultural Heritage

Springer The series Topics in Current Chemistry Collections presents critical reviews from the journal Topics in Current Chemistry organized in topical volumes. The scope of coverage is all areas of chemical science including the interfaces with related disciplines such as biology, medicine and materials science. The goal of each thematic volume is to give the non-specialist reader, whether in academia or industry, a comprehensive insight into an area where new research is emerging which is of interest to a larger scientific audience. Each review within the volume critically surveys one aspect of that topic and places it within the context of the volume as a whole. The most significant developments of the last 5 to 10 years are presented using selected examples to illustrate the principles discussed. The coverage is not intended to be an exhaustive summary of the field or include large quantities of data, but should rather be conceptual, concentrating on the methodological thinking that will allow the non-specialist reader to understand the information presented. Contributions also offer an outlook on potential future developments in the field.

Analytical Geomicrobiology

Cambridge University Press A comprehensive handbook outlining state-of-the-art analytical techniques used in geomicrobiology, for advanced students, researchers and professional scientists.

Mediterranean Cold-Water Corals: Past, Present and Future

Understanding the Deep-Sea Realms of Coral

Springer What do we know about Mediterranean Cold (Deep)-Water coral ecosystems? In this book, specialists offer answers and insights with a series of chapters and short papers about the paleoecology, biology, physiology and ecology of the corals and other organisms that comprise these ecosystems. Structured on a temporal axis—Past, Present and Future—the reviews and selected study cases cover the cold and deep coral habitats known to date in the Mediterranean Basin. This book illustrates and explains the deep Mediterranean coral habitats that might have originated similar thriving ecosystems in today's Atlantic Ocean.

Monitoring and Evaluation of Biomaterials and their Performance In Vivo

Woodhead Publishing Monitoring and Evaluation of Biomaterials and Their Performance In Vivo provides essential information for scientists and researchers who need to assess and evaluate performance, monitor biological responses, gauge efficacy, and observe changes over time. Crucially, it also enables the optimization of design for future biomaterials and implants. This book presents readers with comprehensive coverage of the topic of in vivo monitoring of medical implants and biomaterials. Contains a specific focus on monitoring and evaluation of biomaterials in vivo Multi-faceted coverage of materials function and performance Focuses on a range of implants and subsequent bodily reactions

Physical Chemistry of Gas-Liquid Interfaces

Elsevier Physical Chemistry of Gas-Liquid Interfaces, the first volume in the Developments in Physical & Theoretical Chemistry series, addresses the physical chemistry of gas transport and reactions across liquid surfaces. Gas-liquid interfaces are all around us, especially within atmospheric systems such as sea spray aerosols, cloud droplets, and the surface of the ocean. Because the reaction environment at liquid surfaces is completely unlike bulk gas or bulk liquid, chemists must readjust their conceptual framework when entering this field. This book provides the necessary background in thermodynamics and computational and experimental techniques for scientists to obtain a thorough understanding of the physical chemistry of liquid surfaces in complex, real-world environments. Provides an interdisciplinary view of the chemical dynamics of liquid surfaces, making the content of specific use to physical chemists and atmospheric scientists Features 100 figures and illustrations to underscore key concepts and aid in retention for young scientists in industry and graduate students in the classroom Helps scientists who are transitioning to this field by offering the appropriate thermodynamic background and surveying the current state of research

Graphite and Precursors

CRC Press Humans first used carbon as chars from firewood in ritual paintings and primitive metallurgical processes. Natural forms of carbon have been known since antiquity, yet the knowledge of the carbon element in chemistry and its technical applications on a larger scale are a relatively recent development. The industrial revolution in Europe two centuries ago led the way to the numerous applications of these graphitic forms that are still used today. Graphite and Precursors features short tutorial articles on different topics related to the science and technology of carbons intended for engineers, students of Materials Science and scientists who are seeking a fundamental understanding without "reinventing the wheel." This first volume of the World of Carbon book series focuses on graphite and its precursors, including its origin and various implications. The basic properties of hexagonal graphite are developed, and several theoretical and experimental approaches explain why this crystalline solid is fascinating in solid state physics. Also featured are the numerous applications connected to thermal, mechanical and chemical graphites, as well as their various industrial uses in polycrystalline form. Finally, carbon precursors are introduced.

Natural Fibers, Plastics and Composites

Springer Science & Business Media

Chitosan-Based Hydrogels

Functions and Applications

CRC Press Due to their unique properties, chitosan-based materials have emerged as useful resources in a variety of medicines, drug controlled-release carriers, tissue engineering scaffolds, and immobilized enzymes. But many of these materials have yet to reach the commercial market. Therefore, more work must be completed to fill the gap between research and production. Exploring the state of the field, Chitosan-Based Hydrogels: Functions and Applications details the latest progress in the research and development of chitosan-based biomaterials. The book introduces the formation and chemical structure of chitosan-based hydrogels. It also discusses the relationship between their structure and functions, which provides a theoretical basis for the design of biomaterials. In addition, many real-world examples illustrate the potential application of chitosan-based hydrogels in various areas, including materials science, biotechnology, pharmaceuticals, regenerative medicine, and cell engineering. By examining the structure and functions of chitosan-based hydrogels in living systems, this book provides the foundation for future research. It encourages readers to contribute to further research and development of these unique biomaterials.

Microbial Products for Health, Environment and Agriculture

Springer Nature This edited volume discusses the role of various microbial products in healthcare, environment and agriculture. Several microbial products are directly involved in solving major health problems, agricultural and environmental issues. In healthcare sector, microbes are used as anti-tumor compounds, antibiotics, anti-parasitic agents, enzyme inhibitors and immunosuppressive agents. Microbial products are also used to degrade xenobiotic compounds and bio-surfactants, for biodegradation process. In agriculture, microbial products are used to enhance nutrient uptake, to promote plant growth, or to control plant diseases. The book presents several such applications of microbes in the ecosystems. The chapters are contributed from across the globe and contain up-to-date information. This book is of interest to teachers, researchers, microbiologists and ecologists. Also the book serves as additional reading material for undergraduate and graduate students of agriculture, forestry, ecology, soil science, and environmental sciences.

Biomaterials Fabrication and Processing Handbook

CRC Press Focusing on a lucrative and increasingly important area of biomedicine, the Biomaterials Fabrication and Processing Handbook brings together various biomaterials production and processing aspects, including tissue engineering scaffold materials, drug delivery systems, nanobiomaterials, and biosensors. With contributions from renowned international experts and extensive reference lists in each chapter, the volume provides detailed, practical information to produce and use biomaterials. The different facets of biomaterials technology are split into four sections in the book— Part I The development of new materials and devices capable of interacting specifically with biological tissues and the preparation of scaffolds using materials with appropriate composition and structure Part II The necessary materials to create a drug delivery system capable of controlled release and the incorporation of drug reservoirs into implantable devices for sustained controlled release Part III The significant role nanotechnology plays in the biomedical and biotechnology fields Part IV More biomaterials, including synthetic and natural degradable polymeric biomaterials, electroactive polymers as smart materials, and biomaterials for gastrointestinal and cartilage repair and reconstruction

Atomistic Modeling of Materials Failure

Springer Science & Business Media This is an introduction to molecular and atomistic modeling techniques applied to fracture and deformation of solids, focusing on a variety of brittle, ductile, geometrically confined and biological materials. The overview includes computational methods and techniques operating at the atomic scale, and describes how these techniques can be used to model cracks and other deformation mechanisms. The book aims to make new molecular modeling techniques available to a wider community.

Carbonates

Mineralogy and Chemistry

Walter de Gruyter GmbH & Co KG Volume 11 of Reviews in Mineralogy attempts to synthesize our present understanding of certain aspects of the mineralogy and chemistry of the rock-forming carbonates. This review follows, by ten years, a major assessment of (sedimentary) carbonate minerals by Lippmann (1973). There is only minor overlap of subject material, and I hope that this difference reflects fairly how this field has developed. In this volume, some of the papers are general (i.e., those addressing crystal chemistry and phase relations), and they provide overviews of a fundamental nature and are of interest to many. Others are more specialized in coverage and generally reflect the different approaches used in carbonate geochemistry. The final chapter introduces transmission electron microscopy, a relatively new and powerful technique for mineralogical research that has great potential in carbonate research.

Biological Adhesive Systems

From Nature to Technical and Medical Application

Springer Science & Business Media J. Herbert Waite Like many graduate students before and after me I was There are so many species about which nothing is known, mesmerized by a proposition expressed years earlier by and the curse of not knowing is apathy. Krogh (1929) - namely that "for many problems there is Bioadhesion is the adaptation featured in this book, an animal on which it can be most conveniently studied". and biology has many adhesive practitioners. Indeed, This opinion became known as the August Krogh Principle every living organism is adhesively assembled in the ciple and remains much discussed to this day, particu- most exquisite way. Clearly, speci? c adhesion needs to larly among comparative physiologists (Krebs, 1975). be distinguished from the opportunistic variety. I think The words "problems" and "animal" are key because of speci? c adhesion as the adhesion between cells in the they highlight the two fundamental and complementary same tissue, whereas opportunistic adhesion might be the foci of biological research: (1) expertise about an animal adhesion between pathogenic microbes and the urinary (zoo-centric), which is mostly observational and (2) a tract, or between a slug and the garden path. If oppor- mechanistic analysis of some problem in the animal's life nistic bioadhesion is our theme, then there are still many history or physiology (problem-centric), which is usually practitioners but the subset is somewhat more select than a hypothesis-driven investigation. before.

Sulfur Biogeochemistry

Past and Present

Geological Society of America

Characterization and Measurement of Magnetic Materials

Academic Press Correct and efficient measurements are vital to the understanding of materials properties and applications. This is especially so for magnetic materials for which in last twenty years, our understanding and use have changed dramatically. New or improved materials have been created and have reached the market. The Soft amorphous alloys, the Fe-based rare-earth magnets and the giant magnetorestrictive and magnetoresistive materials have all posed challenges to measurement. At the same time new digital measurement techniques have forced a change in laboratory and commercial measuring setups. A revision of measuring standards also occurred in the 1990s with the result that there is now a lack of up-to-date works on the measurement of magnetic materials. The basic objective of this work is to provide a comprehensive overview of the properties of the hard and soft magnetic materials relevant to applications and of thoroughly discussing the modern methodologies for employed in the measurement of these properties. The balance of these topics results in a complete text on the topic, which will be invaluable to researchers, students and practitioners in industry. It will be of significant interest not only to scientists working in the fields of power engineering and materials science but also to specialists in measurement who be able to easily find all the information they need. * Comprehensive overview of the properties of the hard and soft magnetic materials * Provides applications and discusses thoroughly the modern methodologies for employed in the measurement of these properties * Provides the latest up-to-date works on the measurement of magnetic materials

Nanotechnology in Biology and Medicine

Methods, Devices, and Applications

CRC Press The combination of biology and nanotechnology has led to a new generation of nanodevices that make it possible to characterize the chemical, mechanical, and other molecular properties, as well as discover novel phenomena and biological processes occurring at the molecular level. These advances provide science with a wide range of tools for biomedical applications in therapeutic, diagnostic, and preventive medicine. Nanotechnology in Biology and Medicine: Methods, Devices, and Applications integrates interdisciplinary research and recent advances in instrumentation and methods for applying nanotechnology to various areas in biology and medicine. Pioneers in the field describe the design and use of nanobiosensors with various analytical techniques for the detection and monitoring of specific biomolecules, including cancer cells. The text focuses on the design of novel bio-inspired materials, particularly for tissue engineering applications. Each chapter provides introductory material including a description of methods, protocols, instrumentation, and applications, as well as a collection of published data with an extensive list of references. An authoritative reference written for a broad audience, Nanotechnology in Biology and Medicine: Methods, Devices, and Applications provides a comprehensive forum that integrates interdisciplinary research to present the most recent advances in protocols, methods, instrumentation, and applications of nanotechnology in biology and medicine.

Whitaker's Book List

Handbook of Industrial Chemistry and Biotechnology

Springer Science & Business Media Substantially revising and updating the classic reference in the field, this handbook offers a valuable overview and myriad details on current chemical processes, products, and practices. No other source offers as much data on the chemistry, engineering, economics, and infrastructure of the industry. The Handbook serves a spectrum of individuals, from those who are directly involved in the chemical industry to others in related industries and activities. It provides not only the underlying science and technology for important industry sectors, but also broad coverage of critical supporting topics. Industrial processes and products can be much enhanced through observing the tenets and applying the methodologies found in chapters on Green Engineering and Chemistry (specifically, biomass conversion), Practical Catalysis, and Environmental Measurements; as well as expanded treatment of Safety, chemistry plant security, and Emergency Preparedness. Understanding these factors allows them to be part of the total process and helps achieve optimum results in, for example, process development, review, and modification. Important topics in the energy field, namely nuclear, coal, natural gas, and petroleum, are covered in individual chapters. Other new chapters include energy conversion, energy storage, emerging nanoscience and technology. Updated sections include more material on biomass conversion, as well as three chapters covering biotechnology topics, namely, Industrial Biotechnology, Industrial Enzymes, and Industrial Production of Therapeutic Proteins.

Glossary of Biotechnology for Food and Agriculture

Food & Agriculture Org This "Glossary of biotechnology for food and agriculture" is a revised, augmented version of the "Glosary of Biotechnology and Genetic Engineering" published by FAO in 1999. The preface of the previous edition clearly stated the reason for the immediate need to indertake a complete revision, namely, the swiftness of change in the sector, constant evolving terminology and difficulty to remain abreast of technological evolution.

Microbial Sulfur Metabolism

Springer Science & Business Media This revealing book details recent developments in the study of the relationship between sulfur and the microbial agents that affect its metabolism. In recent years, new methods have been applied to study the biochemistry and molecular biology of reactions of the global sulfur cycle, the microorganisms involved and their physiology, metabolism and ecology. These activities have uncovered fascinating new insights for the understanding of aerobic and anaerobic sulfur metabolism.

Introduction to Texture Analysis

Macrotexture, Microtexture, and Orientation Mapping, Second Edition

CRC Press The first edition of Introduction to Texture Analysis: Macrotexture, Microtexture, and Orientation Mapping broke new ground by collating seventy years worth of research in a convenient single-source format. Reflecting emerging methods and the evolution of the field, the second edition continues to provide comprehensive coverage of the concepts,

practices, and applications of techniques used to determine and characterize texture. Providing a clear focus on scientific principles, this reference keeps mathematics to a minimum in covering both traditional macrotexture analysis and more modern electron-microscopy-based microtexture analysis. The authors integrate the two techniques and address the subsequent need for a more detailed explanation of philosophy, practice, and analysis associated with texture analysis. The book is organized into three sections: Fundamental Issues addresses terminology associated with orientations and texture, in addition to their representation. It also covers the diffraction of radiation, a phenomenon that is the basis for almost all texture analysis. Macrotexture Analysis covers data acquisition, as well as representation and evaluation related to the well-established methods of macrotexture analysis. Microtexture Analysis provides experimental details of the transmission or scanning electron microscope-based techniques for microtexture analysis. It also describes how microtexture data are evaluated and represented and explores the innovative topics of orientation microscopy and mapping, and advanced issues concerning crystallographic aspects of interfaces and connectivity. Completely revised and updated, this second edition of a bestseller is a rare introductory-level guide to texture analysis. It illustrates approaches to orientation measurement and interpretation and elucidates the fundamental principles on which measurements are based. This book is an ideal tool to help you develop a working understanding of the practice and applications of texture.

Silk Biomaterials for Tissue Engineering and Regenerative Medicine

Elsevier Silk is increasingly being used as a biomaterial for tissue engineering applications, as well as sutures, due to its unique mechanical and chemical properties. *Silk Biomaterials for Tissue Engineering and Regenerative Medicine* discusses the properties of silk that make it useful for medical purposes and its applications in this area. Part one introduces silk biomaterials, discussing their fundamentals and how they are processed, and considering different types of silk biomaterials. Part two focuses on the properties and behavior of silk biomaterials and the implications of this for their applications in biomedicine. These chapters focus on topics including biodegradation, bio-response to silk sericin, and capillary growth behavior in porous silk films. Finally, part three discusses the applications of silk biomaterials for tissue engineering, regenerative medicine, and biomedicine, with chapters on the use of silk biomaterials for vertebral, dental, dermal, and cardiac tissue engineering. *Silk Biomaterials for Tissue Engineering and Regenerative Medicine* is an important resource for materials and tissue engineering scientists, R&D departments in industry and academia, and academics with an interest in the fields of biomaterials and tissue engineering. Discusses the properties and applications of silk for medical purposes Considers pharmaceutical and cosmeceutical applications

Polysaccharides

Bioactivity and Biotechnology

Springer This authoritative reference work presents comprehensive information about one of the most important and most wide-spread classes of (bio)organic compounds: the polysaccharides. The comprehensive and thoroughly up-to-date handbook presents the sources, identification, analysis, biosynthesis, biotechnology and applications of important polysaccharides like starches, cellulose, chitin, gum and microbial polysaccharides. Polysaccharides can exhibit complex structure and various functional activities. These bio macromolecules can therefore serve as raw materials for various different materials, e.g. rayon, cellulose acetate, celluloid and nitrocellulose; and they find multiple applications, for instance as surgical threads (chitin), as sources of energy, dietary fibers, as blood flow adjuvants, in cosmetics, emulsion stabilizers, film formers, binders, viscosity increasing agents or skin conditioning agents, as food additives in gums, chewing gum bases and as vaccines. Polysaccharides form the basis for useful products, like xanthan gum, dextran, welan gum, gellan gum, diutan gum and pullulan. Some of the polysaccharide-derived products have interesting and useful properties and show biological activities, such as immunomodulatory, antibacterial, anti-mutagenic, radioprotective, anti-oxidative, anti-ulcer, antidepressant, anti-septicaemic or anti-inflammatory activities. All these applications and properties of polysaccharides are for the first time compiled in a thorough and comprehensive overview in the present work. This reference work is organized thematically in four parts: Part I. Polysaccharides: Occurrence, Structure, Distribution and Biotechnology. Part II. Methods. Part III. Bioactive Polysaccharides. Part IV. Polysaccharides as Food. This reference work is edited by experienced experts, all chapters are written by well recognized international specialists. It is useful to all those working in the field of botany, phytochemistry, pharmacy, drug delivery, molecular biology, metabolomics, forestry, environment, conservation, biotechnology and NGOs working for forest protection.

Science of Microscopy

Springer Science & Business Media This fully corrected second impression of the classic 2006 text on microscopy runs to more than 1,000 pages and covers up-to-the-minute developments in the field. The two-volume work brings together a slew of experts who present comprehensive reviews of all the latest instruments and new versions of the older ones, as well as their associated operational techniques. The chapters draw attention to their principal areas of application. A huge range of subjects are benefiting from these new tools, including semiconductor physics, medicine, molecular biology, the nanoworld in general, magnetism, and ferroelectricity. This fascinating book will be an indispensable guide for a wide range of scientists in university laboratories as well as engineers and scientists in industrial R&D departments.

Handbook of Bioceramics and Biocomposites

Springer This handbook describes several current trends in the development of bioceramics and biocomposites for clinical use in the repair, remodelling, and regeneration of bone tissue. Comprehensive coverage of these materials allows fundamental aspects of the science and engineering to be seen in close relation to the clinical performance of dental and orthopaedic implants. Bioceramics and biocomposites appear to be the most dynamic area of materials development for both tissue engineering and implantable medical devices. Almost all medical specialties will continue to benefit from these developments, but especially dentistry and orthopaedics. In this Handbook, leading researchers describe the use of bionanomaterials to create new functionalities when interfaced with biological molecules or structures. Also described are technologies for bioceramics and biocomposites processing in order to fabricate medical devices for clinical use. Another important section of the book is dedicated to tissue regeneration with development of new matrices. A targeted or personalized treatment device reduces drug consumption and treatment expenses, resulting in benefits to the patient and cost reductions for public health systems. This authoritative reference on the state-of-the-art in the development and use of bioceramics and biocomposites can also serve as the basis of instructional course lectures for audiences ranging from advanced undergraduate students to post-graduates in materials science and engineering and biomedical engineering.

Bioprospecting of Plant Biodiversity for Industrial Molecules

John Wiley & Sons BIOPROSPECTING OF PLANT BIODIVERSITY FOR INDUSTRIAL MOLECULES A comprehensive collection of recent translational research on bioresource utilization and ecological sustainability Bioprospecting of Plant Biodiversity for Industrial Molecules provides an up-to-date overview of the ongoing search for biodiverse organic compounds for use in pharmaceuticals, bioceuticals, agriculture, and other commercial applications. Bringing together work from a panel of international contributors, this comprehensive monograph covers natural compounds of plants, endophyte enzymes and their applications in industry, plant bioprospecting in cosmetics, marine bioprospecting of seaweeds, and more. Providing global perspectives on bioprospecting of plant biodiversity, the authors present research on enzymes, mineral micro-nutrients, biopesticides, algal biomass, and other bioactive molecules. In-depth chapters assess the health impacts and ecological sustainability of the various biomolecules and identify existing and possible applications ranging from ecological restoration to production of essential oils and cosmetics. Other topics include, bio-energy crops as alternative fuel resources, the role of plants in phytoremediation of industrial waste, and the industrial applications of endophyte enzymes. This comprehensive resource: Includes a thorough introduction to plant biodiversity and bioprospecting Will further the knowledge of application of different plants and improve research investigation techniques. Summarizes novel approaches for researchers in food science, microbiology, biochemistry, and biotechnology Bioprospecting of Plant Biodiversity for Industrial Molecules is an indispensable compendium of biological research for scientists, researchers, graduate and postgraduate students, and academics in the areas of microbiology, food biotechnology, industrial microbiology, plant biotechnology, and microbial biotechnology.

Biomaterials and Fossils Through Time

Cambridge University Press Fossils are essential to the reconstruction of the evolution of life and episodes in Earth history. Fossil skeletal material serves as the repository of chemical data widely used in the reconstruction of the Earth's climate-ocean system at various time scales. Knowledge of biomineralization - the processes associated with the formation of mineralized biological structures - is essential to properly evaluate data derived from fossils. Additionally, knowledge of biomineralization is critical to the understanding of major events in the evolution of faunas, such as the original appearance of skeletons and some major extinction events. This is the first book to concentrate on aspects of biomineralization through Earth history. The book emphasizes skeletal formation and fossilization in a geologic framework in order to understand evolution, relationships between fossil groups, and the use of biomineral materials as geochemical proxies for understanding ancient oceans and climates. Approaching the subject from this viewpoint allows the authors to link the biotic, physical, and chemical realms. The focus is on shells and skeletons of calcareous organisms, although the broader impacts of these processes on other elements are also addressed, especially their roles in the global chemical cycles of carbon and silicon. The book explores the fine structures and mode of growth of the characteristic crystalline units, taking advantage of the most recent physical methodological advances. It is richly illustrated and will be of great interest to advanced students and researchers in paleontology, Earth history, evolution, sedimentary geology, geochemistry, and materials science.

Inorganic Nanoparticles

Synthesis, Applications, and Perspectives

CRC Press Among the various nanomaterials, inorganic nanoparticles are extremely important in modern technologies. They can be easily and cheaply synthesized and mass produced, and for this reason, they can also be more readily integrated into applications. *Inorganic Nanoparticles: Synthesis, Applications, and Perspectives* presents an overview of these special materials and explores the myriad ways in which they are used. It addresses a wide range of topics, including: Application of nanoparticles in magnetic storage media Use of metal and oxide nanoparticles to improve performance of oxide thin films as conducting media in commercial gas and vapor sensors Advances in semiconductors for light-emitting devices and other areas related to the energy sector, such as solar energy and energy storage devices (fuel cells, rechargeable batteries, etc.) The expanding role of nanosized particles in the field of catalysis, art conservation, and biomedicine The book's contributors address the growing global interest in the application of inorganic nanoparticles in various technological sectors. Discussing advances in materials, device fabrication, and large-scale production—all of which are urgently required to reduce global energy demands—they cover innovations in areas such as solid-state lighting, detailing how it still offers higher efficiency but higher costs, compared to conventional lighting. They also address the impact of nanotechnology in the biomedical field, focusing on topics such as quantum dots for bioimaging, nanoparticle-based cancer therapy, drug delivery, antibacterial agents, and more. Fills the informational gap on the wide range of applications for inorganic nanoparticles in areas including biomedicine, electronics, storage media, conservation of cultural heritage, optics, textiles, and cosmetics Assembling work from an array of experts at the top of their respective fields, this book delivers a useful analysis of the vast scope of existing and potential applications for inorganic nanoparticles. Versatile as either a professional research resource or textbook, this effective tool elucidates fundamentals and current advances associated with design, characterization, and application development of this promising and ever-evolving device.

Introduction to Geomicrobiology

John Wiley & Sons *Introduction to Geomicrobiology* is a timely and comprehensive overview of how microbial life has affected Earth's environment through time. It shows how the ubiquity of microorganisms, their high chemical reactivity, and their metabolic diversity make them a significant factor controlling the chemical composition of our planet. The following topics are covered: how microorganisms are classified, the physical constraints governing their growth, molecular approaches to studying microbial diversity, and life in extreme environments bioenergetics, microbial metabolic capabilities, and major biogeochemical pathways chemical reactivity of the cell surface, metal sorption, and the microbial role in contaminant mobility and bioremediation/biorecovery microbiological mineral formation and fossilization the function of microorganisms in mineral dissolution and oxidation, and the industrial and environmental ramifications of these processes elemental cycling in biofilms, formation of microbialites, and sediment diagenesis the events that led to the emergence of life, evolution of metabolic processes, and the diversification of the biosphere. Artwork from the book is available to instructors at www.blackwellpublishing.com/konhauser.

Lake Pavin

History, geology, biogeochemistry, and sedimentology of a deep meromictic maar lake

Springer This book represents the first multidisciplinary scientific work on a deep volcanic maar lake in comparison with other similar temperate lakes. The syntheses of the main characteristics of Lake Pavin are, for the first time, set in a firmer footing comparative approach, encompassing regional, national, European and international aquatic science contexts. It is a unique lake because of its permanently anoxic monimolimnion, and furthermore, because of its small surface area, its substantially low human influence, and by the fact that it does not have a river inflow. The book reflects the scientific research done on the general limnology, history, origin, volcanology and geological environment as well as on the geochemistry and biogeochemical cycles. Other chapters focus on the biology and microbial ecology whereas the sedimentology and paleolimnology are also given attention. This volume will be of special interest to researchers and advanced students, primarily in the fields of limnology, biogeochemistry, and aquatic ecology.

Sourcebook of Models for Biomedical Research

Springer Science & Business Media The collection of systems represented in this volume is a unique effort to reflect the diversity and utility of models used in biomedicine. That utility is based on the consideration that observations made in particular organisms will provide insight into the workings of other, more complex systems. This volume is therefore a comprehensive and extensive collection of these important medical parallels.

On Biomineralization

Oxford University Press Focusing on the basic principles of mineral formation by organisms, this comprehensive volume explores questions that relate to a wide variety of fields, from biology and biochemistry, to paleontology, geology, and medical research. Preserved fossils are used to date geological deposits and archaeological artifacts. Materials scientists investigate mineralized tissues to determine the design principles used by organisms to form strong materials. Many medical problems are also associated with normal and pathological mineralization. Lowenstam, the pioneer researcher in biomineralization, and Weiner discuss the basic principles of mineral formation by organisms and compare various mineralization processes. Reference tables listing all known cases in which organisms form minerals are included.

Encyclopedia of Geobiology

Springer The interplay between Geology and Biology has shaped the Earth from the early Precambrian, 4 billion years ago. Moving beyond the borders of the classical core disciplines, Geobiology strives to identify chains of cause-and-effect and synergisms between the geo- and the biospheres that have been driving the evolution of life in modern and ancient environments. Combining modern methods, geobiological information can be extracted not only from visible remains of organisms, but also from organic molecules, rock fabrics, minerals, isotopes and other tracers. An understanding of these processes and their signatures reveals enormous applied potentials with respect to issues of environment protection, public health, energy and resource management. The *Encyclopedia of Geobiology* has been designed to act as a key reference for students, researchers, teachers, and the informed public and to provide basic, but comprehensible knowledge on this rapidly expanding discipline that sits at the interface between modern geo- and biosciences.

Ingle's Endodontics

PMPH USA *Ingle's Endodontics*, 7th edition, is the most recent revision of the text that has been known as the "Bible of Endodontics" for half a century. The new edition, published in two volumes, continues the tradition of including the expertise of international leaders in the field. Eighty-six authors contributed cutting-edge knowledge and updates on topics that have formed the core of this book for years. New chapters reflect the ways in which the field of endodontics has evolved over the 50 years since the pioneer John I. Ingle authored *Endodontics*. *Ingle's Endodontics* will continue to be the standard against which all other endodontic texts will be measured. The 40 chapters are arranged in two volumes under three sections: *The Science of Endodontics*; *The Practice of Endodontics: Diagnosis, Clinical Decision Making, Management, Prognosis*; and *Interdisciplinary Endodontics*. With contributions from the world's experts in all phases of the specialty, *Ingle's Endodontics*, 7th edition promises to be an indispensable dentistry textbook, an essential part of every endodontist's library.

Modern Surface Technology

John Wiley & Sons This translation of a successful German title provides a broad and fundamental overview of current coating technology. Edited by experts from one of the largest research centers for this field in Germany, this valuable reference combines research and industrial perspectives, treated by authors from academia and industry alike. They discuss the potential of the many innovations introduced into industrial application in recent years, allowing materials scientists and engineers to find the appropriate solution for their own specific coating problems. Thus, with the aid of this book, it is possible to make coating technology an integral part of R&D, construction and production.