Cellulose Chitosan And Keratin Composite Materials

MORROW ELSA

Biomedical Composites Springer Nature
This book provides information about the sources, structure, and properties of keratin as well as its applications. The extraction from different biomass sources (e.g. feathers, hairs, nails, horn, hoof, and claws) as well as the characterization methods of these extracted materials are explained. The development of bioproducts from keratins is challenging and limited since they are neither soluble in polar solvents nor in non-polar solvents. Therefore, the utilization of different microorganisms for the degradation of keratin is also discussed. The main aim of this book is to highlight the unique features of keratin and to update readers with the possible prospects to develop various value-added products from keratins. The book is highly interesting to researchers working in industry and academia on bioproducts, tissue engineering, biocomposites, biofilm, and biofibers.
Green Composites CRC Press
Surface bio-contamination has become a severe problem that contributes to outbreaks of community acquired and nosocomial infections through contiguous fomite transmission of diseases. Every year, thousands of patients die due to nosocomial infections by pathogens. It is therefore essential to develop novel strategies to prevent or improve the treatment of biomaterial concomitant infections. The concept of antimicrobial materials is becoming increasingly important not only in the hospital and healthcare environments, but also for laboratories, home appliances, and certain industrial applications. Materials are now being developed to prevent the buildup, spread and transfer of harmful microbes, and to dynamically deactivate them. Drawing on research and examples from around the world, this book highlights the latest advances in, and applications of, antibacterial biomaterials for biomedical devices, and focuses on metals with antibacterial coatings/surfaces, antibacterial stainless steels and other commonly used antibacterial materials. It also discusses the role of innovative approaches and provides a comprehensive overview of cutting-edge research on the processing, properties and technologies involved in the development of antimicrobial applications. Given its scope, the book will be of interest to researchers and policymakers, as well as undergraduate and graduate students of biochemistry, microbiology, and environmental chemistry
Towards Advanced Functional Materials Woodhead Publishing
Antimicrobial polymers are materials that prevent microorganism growth and are needed for many everyday applications from food packaging and water treatment to medicine and healthcare. This new book covers different areas of antimicrobial materials based on polymers including chitosan, polymers with ammonium and phosphonium groups, polymer nanofibers, carbon-based polymer Nanocomposites, polymeric and non-polymeric metal complexes, and biomimetic materials. By combining the information of different materials as well as antimicrobial action modes and applications within one source, the book provides a general summary of the field. Polymeric Materials with Antimicrobial Activity starts with a general introduction to antimicrobial polymers and presents the most common types of microorganisms (bacteria, fungi, yeast and algae) along with the main areas of application of antimicrobial polymeric materials. Specific chapters then detail different polymer systems covering the fundamental issues of synthesis, characterization, physico-chemical properties and applications. With contributions from leading scientists the book is suitable for researchers in polymers, chemistry, biology and materials science interested in an overview of antimicrobial polymeric materials as well as the recent advances in their synthesis, properties and applications.
Advanced Biorefineries for Sustainable Production and Distribution Springer Nature
Biopolymer Membranes and Films: Health, Food, Environment, and Energy Applications presents the latest techniques for the design and preparation of biopolymer-based membranes and films, leading to a range of cutting-edge applications. The first part of the book introduces the fundamentals of biopolymers, two-dimensional systems, and the characterization of biopolymer membranes and films, considering physicochemical, mechanical and barrier properties. Subsequent sections are organized by application area, with each chapter explaining how biopolymer-based membranes or films can be developed for specific innovative uses across the health, food, environmental and energy sectors. This book is a valuable resource for researchers, scientists and advanced students involved in biopolymer science, polymer membranes and films, polymer chemistry and materials science, as well as for those in industry and academia who are looking to develop materials for advanced applications in the health, food science, environment or energy industries. Presents detailed coverage of a range of novel applications in key strategic areas across health, food, environment and energy Considers the difficulties associated with two-dimensional materials Assists the reader in selecting the best materials and properties for specific applications Helps researchers, scientists and engineers combine the enhanced properties of membranes and films with the sustainable characteristics of biopolymer-based materials
Polymeric Materials with Antimicrobial Activity Royal Society of Chemistry
The long-held tenets of the energy sector are being rewritten in the twenty-first century. The rise of unconventional oil and gas and of renewables is transforming our economies and improving our understanding of the distribution of the world’s energy resources and their impacts. A complete knowledge of the dynamics underpinning energy markets is necessary for decision-makers reconciling economic, energy, and environmental objectives. Those that anticipate global energy developments successfully can derive an advantage, while those that fail to do so risk making poor policy and investment decisions. Focused on solving the key challenges impeding the realization of advanced cellulosic biofuels and bioproducts in rural areas, Biomass and Biofuels: Advanced Biorefineries for Sustainable Production and Distribution provides comprehensive information on sustainable production of biomass feedstock, supply chain management of feedstocks to the biorefinery site, advanced conversion processes, and catalysts/biocatalysts for production of fuels and chemicals using conventional and integrated technologies. The book also presents detailed coverage of downstream processing, and ecological considerations for refineries processing lignocellulosic and algal biomass resources. Discussions of feedstock raw materials, methods for biomass conversion, and its effective integration to make biorefinery more sustainable – economically, environmentally, and socially – give you the tools to make informed decisions.
Keratin as a Protein Biopolymer The Electrochemical Society
Hybrid organic-inorganic materials and the rational design of their interfaces open up the access to a wide spectrum of functionalities not achievable with traditional concepts of materials science. This innovative class of materials has a major impact in many application domains such as optics, electronics, mechanics, energy storage, and conversion, protective coatings, catalysis, sensing, and nanomedicine. The properties of these materials do not only depend on the chemical structure, and the mutual interaction between their nano-scale building blocks, but are also strongly influenced by the interfaces they share. This handbook focuses on the most recent investigations concerning the design, control, and dynamics of hybrid organic-inorganic interfaces, covering: (i) characterization methods of interfaces, (ii) innovative computational approaches and simulation of interaction processes, (iii) in-situ studies of dynamic aspects controlling the formation of these interfaces, and (iv) the role of the interface for process optimization, devices, and applications in such areas as optics, electronics, energy, and medicine.
Chemical and Engineering Fundamentals and Industrial Applications CRC Press
The book introduces readers to the unique aspects of keratin and opportunities to develop various bioproducts and biomaterials from keratins. It discusses the structure, properties and specific

applications of keratins extracted from different sources. Applications include keratins as absorbents, reinforcements or matrices for composites, hydrogels and fibres.

Renewable Polymers and Polymer-Metal Oxide Composites Frontiers Media SA

The Handbook of Composites From Renewable Materials comprises a set of 8 individual volumes that brings an interdisciplinary perspective to accomplish a more detailed understanding of the interplay between the synthesis, structure, characterization, processing, applications and performance of these advanced materials. The handbook covers a multitude of natural polymers/ reinforcement/ fillers and biodegradable materials. Together, the 8 volumes total at least 5000 pages and offers a unique publication. This 8th volume of the Handbook is solely focused on the Nanocomposites: Advanced Applications. Some of the important topics include but not limited to: virgin and recycled polymers applied to advanced nanocomposites; biodegradable polymer-carbon nanotube composites for water and wastewater treatment; eco-friendly nanocomposites of chitosan with natural extracts, antimicrobial agents and nanometals; controllable generation of renewable nanofibrils from green materials and their application in nanocomposites; nanocellulose and nanocellulose composites; poly (lactic acid) biopolymer composites and nanocomposites for biomedical and biopackaging applications; impact of nanotechnology in water treatment: carbon nanotube and graphene; nanomaterials in energy generation; sustainable green nanocomposites from bacterial bioplastics for food packaging applications; PLA-nanocomposites: a promising material for future from renewable resources; bio-composites from renewable resources: preparation and applications of chitosan-clay nanocomposites; nano materials: an advanced and versatile nano additive for kraft and paper industries; composites and nanocomposites based on polylactic acid obtaining; cellulose-containing scaffolds fabricated by electrospinning: applications in tissue engineering and drug delivery; biopolymer-based nanocomposites for environmental applications; calcium phosphate nanocomposites for biomedical and dental applications: recent developments; chitosan-metal nanocomposites: synthesis, characterization and applications; multi-carboxyl functionalized nano-cellulose/nano-bentonite composite for the effective removal and recovery of metal ions; biomimetic gelatin nanocomposite as a scaffold for bone tissue repair; natural starches-blended ionotropically-gelled microparticles/beads for sustained drug release and ferrogels: smart materials for biomedical and remediation applications.

Biomedical Applications Springer

This book provides an overview of biocomposite chemistry, chemical modifications, characterization and applications in biomedicine, with emphasis on recent advances in the field. Authored by experts, the chapters discuss the design, development and selection of biomedical composites for a particular therapeutic application, as well as providing insight into the regulatory and clinical aspects of biomedical composite use. While this book is primarily intended for scientists from the fields of medical, pharmaceutical, biotechnological and biomedical engineering, it is also useful as an advanced text for students and research scholars.

Myriad Functionalities in Science and Technology Elsevier

The generation of tridimensional tissues, assembled from scaffolding materials populated with biologically functional cells, is the great challenge and hope of tissue bioengineering and regenerative medicine. The generation of biomaterials capable of harnessing the immune system has been particularly successful. This book provides a comprehensive view of how immune cells can be manipulated to suppresses inflammation, deliver vaccines, fight cancer cells, promote tissue regeneration or inhibit blood clotting and bacterial infections by functionally engineered biomaterials. However, long-lived polymers, such as those employed in orthopedic surgery or vascular stents, can often induce an immune reaction to their basic components. As a result, this book is also an important step towards coming to understand how to manipulate biomaterials to optimize their beneficial effects and downplay detrimental immune responses.

Green Synthesis and Applications Springer Nature

Functional advanced biopolymers have received far less attention than renewable biomass (cellulose, rubber, etc.) used for energy production. Among the most advanced biopolymers known is chitosan. The term chitosan refers to a family of polysaccharides obtained by partial de-N-acetylation from chitin, one of the most abundant renewable resources in the biosphere. Chitosan has been firmly established as having unique material properties as well as biological activities. Either in its native form or as a chemical derivative, chitosan is amenable to being processed—typically under mild conditions—into soft materials such as hydrogels, colloidal nanoparticles, or nanofibers. Given its multiple biological properties, including biodegradability, antimicrobial effects, gene transfectability, and metal adsorption—to name but a few—chitosan is regarded as a widely versatile building block in various sectors (e.g., agriculture, food, cosmetics, pharmacy) and for various applications (medical devices, metal adsorption, catalysis, etc.). This Special Issue presents an updated account addressing some of the major applications, including also chemical and enzymatic modifications of oligos and polymers. A better understanding of the properties that underpin the use of chitin and chitosan in different fields is key for boosting their more extensive industrial utilization, as well as to aid regulatory agencies in establishing specifications, guidelines, and standards for the different types of products and applications.

Advances and Challenges in Pharmaceutical Technology John Wiley & Sons

The Handbook of Composites From Renewable Materials comprises a set of 8 individual volumes that brings an interdisciplinary perspective to accomplish a more detailed understanding of the interplay between the synthesis, structure, characterization, processing, applications and performance of these advanced materials. The handbook covers a multitude of natural polymers/ reinforcement/ fillers and biodegradable materials. Together, the 8 volumes total at least 5000 pages and offers a unique publication. Volume 1 is solely focused on the Structure and Chemistry of renewable materials. Some of the important topics include but not limited to: carbon fibers from sustainable resources; polylactic acid composites and composite foams based on natural fibres; composites materials from other than cellulosic resources; microcrystalline cellulose and related polymer composites; tannin-based foam; renewable feedstock vanillin derived polymer and composites; silk biocomposites; bio-derived adhesives and matrix polymers; biomass based formaldehyde-free bio-resin ; isolation and characterization of water soluble polysaccharide; bio-based fillers; keratin based materials in biotechnology; structure of proteins adsorbed onto bioactive glasses for sustainable composite; effect of filler properties on the antioxidant response of starch composites; composite of chitosan and its derivate; magnetic biochar from discarded agricultural biomass; biodegradable polymers for protein and peptide conjugation; polyurethanes and polyurethane composites from bio-based / recycled components.

Hybrid Organic-Inorganic Interfaces Academic Press

Sustainability, defined as the way to meet the needs of the present generation without compromising the ability of future ones to meet their own, is one of the main challenges of modern society. Within this context, chemistry plays a significant role, and solvent nature as well as its environmental impact are pivotal issues frequently addressed. Ionic liquids, i.e. organic salts that have melting temperatures lower than 100 °C, have been frequently hailed as alternatives to conventional organic solvents. Their greenness has been mainly ascribed to their low vapor pressure and flammability. However, in addition to this, their high solubilizing ability and low miscibility with conventional organic solvents frequently allow for reducing the amount used, as well as for their recycling. Ionic liquids, especially the ones featured by aromatic cations, are frequently described as “polymeric supramolecular fluids” constructed through the establishment of feeble but cooperative supramolecular interactions like Coulomb and π-π interactions, as well as hydrogen bonds. In general, ionic liquids are also indicated as “designer solvents” as it is possible to tailor their features to specific applications by simply modifying their cation or anion structure. In this way, small changes in the ion’s structure can give rise to solvents showing very different properties. The above premises widely justify the growing interest in the properties and applications of ionic liquids, seen in recent literature (according to Scopus, more than 27,000 papers published in the last five years have “ionic liquids” as a keyword). Thanks to their properties, they have been variously used as solvent media, solvents for the obtainment of gel phases, components in the building of dye-sensitized solar cells, media for the preparation of thermochromic materials, etc. This Research Topic aims to present how structural features can determine not only the properties of ionic liquids, but also their possible employment. In this latter case, the interest arises from their ability to affect the outcome of a given reaction in terms of rate, yield, and nature of the products obtained for general use in the field of materials chemistry. This article collection is dedicated to Prof. Kenneth R. Seddon for his outstanding contribution to the formation and development of the ionic liquids community.

Perspectives and Applications Elsevier

The Handbook of Composites From Renewable Materials comprises a set of 8 individual volumes that brings an interdisciplinary perspective to accomplish a more detailed understanding of the interplay between the synthesis, structure, characterization, processing, applications and performance of these advanced materials. The handbook covers a multitude of natural polymers/ reinforcement/ fillers and biodegradable materials. Together, the 8 volumes total at least 5000 pages and offers a unique publication. This 6th volume Handbook is solely focused on Polymeric Composites. Some of the important topics include but not limited to: Keratin as renewable material for developing polymer composites; natural and synthetic matrices; hydrogels in tissue engineering; smart hydrogels: application in bioethanol production; principle renewable biopolymers; application of hydrogel biocomposites for multiple drug delivery; nontoxic holographic materials; bioplasticizer - epoxidized vegetable oils-based poly (lactic acid) blends and nanocomposites; preparation, characterization and adsorption properties of poly (DMAEA) – cross-linked starch gel copolymer in waste water treatments; study of chitosan crosslinking hydrogels for absorption of antifungal drugs using molecular modelling; pharmaceutical delivery systems composed of chitosan; eco-friendly polymers for food packaging; influence of surface modification on the thermal stability and percentage of crystallinity of natural abaca fiber; influence of the use of natural fibers in composite materials assessed on a life cycle perspective; plant polysaccharides-blended ionotropically-gelled alginate multiple-unit systems for sustained drug release; vegetable oil based polymer composites; applications of chitosan derivatives in wastewater treatment; novel lignin-based materials as a products for various applications; biopolymers from renewable resources and thermoplastic starch matrix as polymer units of multi-component polymer systems for advanced applications; chitosan composites: preparation and applications in removing water pollutants and recent advancements in biopolymer composites for addressing environmental issues.

Biological Macromolecules ConferenceSeries

This book includes chapters based on the potential uses of polysaccharides such as fibers in food and non-food applications. The complexity of their synthesis in plants, the highly multidisciplinary character of polysaccharide research, and the wide variety of applications from food to clothing to energy are addressed in this volume. The authors describe in detail how these latter grand challenges are of great importance in research, especially in the midst of enormous overpopulation and economic issues. Therefore, the volume contributes additional information to the chemical, nutritional, medical, and energy roles of these bio-based products, finding applications in diverse fields of their raw and composite forms. This volume is a useful resource for graduate students and contains themes for instructors and senior research leaders. Written by internationally renowned experts, it is aimed at workers in polymer laboratories, classrooms, and policy makers.

Journal of Materials Science and Engineering : Volume 7 Springer

There is an increasing movement of scientists and engineers who are dedicated to minimising the environmental impact of polymer composite production. Life cycle assessment is of paramount importance at every stage of a product’s life, from initial synthesis through to final disposal and a sustainable society needs environmentally safe materials and processing methods. With an internationally recognised team of contributors, Green Composites examines fibre reinforced polymer composite production and explains how environmental footprints can be diminished at every stage of the life cycle. The introductory chapters look at why we should consider green composites, their design and life cycle assessment. The properties of natural fibre sources such as cellulose and wood are then discussed. Chapter 6 examines recyclable synthetic fibre-thermoplastic composites as an alternative solution and polymers derived from natural sources are covered in Chapter 7. The factors that influence the properties of these natural composites and natural fibre thermoplastic composites are detailed in Chapters 8 and 9. The final four chapters consider clean processing, applications, recycling, degradation and reprocessing. Green composites is an essential guide for agricultural crop producers, government agricultural departments, automotive companies, composite producers and material scientists all dedicated to the promotion and practice of eco-friendly materials and production methods. Reviews fibre reinforced polymer composite production Explains how environmental footprints can be diminished at every stage of the life-cycle

Biomass and Biofuels Springer

This book describes the latest research on nanopolysaccharides in the development of functional materials, from their preparation, properties and functional modifications to the architecture of diverse functional materials. Polysaccharide-based nanoparticles, including nanocellulose, nanochitin, and nanostarch have attracted interest in the field of nanoscience, nanotechnology, and materials science that encompasses various industrial sectors, such as biomedicine, catalyst, coating, energy, optical materials, environmental materials, construction materials, and antibacterial materials. This book establishes a fundamental framework, highlighting the architecture strategies of typical functional systems based on nanopolysaccharides and integrated analysis of their significant influence and properties to various functional behaviors of materials, to help readers to fully understand the fundamental features of nanopolysaccharides and functional materials. Addressing the potential for practical applications, the book also covers the related industrial interests and reports on highly valued products from nanopolysaccharides, providing ideas for future studies in the area. Intended both for academics and professionals who are interested in nanopolysaccharides, it is also a valuable resource for postgraduate students, researchers, and engineers involved in R&D of natural polymers, nanotechnology, and functional materials.

Handbook of Composites from Renewable Materials, Nanocomposites CRC Press

Chitosan in Biomedical Applications provides a thorough insight into the complete chitosan chemistry, collection, chemical modifications, characterization and applications of chitosan in biomedical applications and healthcare fields. Chitosan, a biopolymer of natural origin, has been explored for its variety of applications in biomedical research, medical diagnostic aids and material science. It is the second most abundant natural biopolymer after cellulose, and considered as an

excellent excipient because of its non-toxic, stable, biodegradable properties. Several research innovations have been made on applications of chitosan in biomedical applications. The book explores key topics, such as molecular weight, degree of deacetylation, and molecular geometry, along with an emphasis on recent advances in the field written by academic, industry, and clinical researchers. Chitosan in Biomedical Applications will be of interest to those in biomedical fields including the biomaterials and tissue engineering community investigating and developing biomaterials for biomedical applications, particularly graduate students, young faculty and others exploring chitosan-based materials. Provides methodology for the design, development and selection of chitosan in biomedical applications for particular therapeutic applications Includes illustrations demonstrating the mechanism of biological interaction of chitosan Discusses the regulatory aspects and demonstrates the clinical efficacy of chitosan

Molten Salts and Ionic Liquids 16 BoD – Books on Demand

This book collects the articles published in the Special Issue “Polymeric Materials: Surfaces, Interfaces and Bioapplications”. It shows the advances in polymeric materials, which have tremendous applications in agricultural films, food packaging, dental restoration, antimicrobial systems, and tissue engineering. These polymeric materials are presented as films, coatings, particles, fibers, hydrogels, or networks. The potential to modify and modulate their surfaces or their content by different techniques, such as click chemistry, ozonation, breath figures, wrinkle formation, or electrospray, are also explained, taking into account the relationship between the structure and properties in the final application. Moreover, new trends in the development of such materials are presented, using more environmental friendly and safe methods, which, at the same time, have a high impact on our society.

Applications Recent Advances in Environmental Science from the Euro-Mediterranean and Surrounding Regions (2nd Edition)Proceedings of 2nd Euro-Mediterranean Conference for Environmental Integration (EMCEI-2), Tunisia 2019

Among the modern materials, the composites have a few decades of history. However, there has been a tremendous advancement of this class of material in science and technology. During recent decades, composite materials have steadily gained ground in nearly all sectors. The composite materials have been used in various industrial applications such as buildings and constructions, aerospace, automotive and sports equipment, consumer products etc. Nanotechnology is rapidly evolving, and science, engineering, and technology have merged to bring nanoscale materials that much closer to reality. It is one of the fastest growing areas for research. Nanocomposite materials are helping improve products that we use every day and creating new, exciting products for the future. Composites and nanocomposites composed of reinforcements, nano-reinforcements, and matrices are well-known engineering materials. Keeping in mind the advantages of composite and nanocomposite materials, this book covers fundamental effects, product development, properties, and applications of the materials including material chemistry, designing, and manufacturing. The book also summarizes the recent developments made in the area of advanced composite and nanocomposite materials. A number of critical issues and suggestions for future work are discussed, underscoring the roles of researchers for the efficient development of composites and nanocomposites through value additions to enhance their use.