Cellulose Chitosan And Keratin Composite Materials

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.

This book includes over three hundred and seventy-five short papers presented during the second EMCEI, which was held in Sousse, Tunisia in October 2019. After the success of the first EMCEI in 2017, the second installment tackled emerging environmental issues together with new challenges, e.g. by focusing on innovative approaches that contribute to achieving a sustainable environment in the Mediterranean and surrounding regions and by highlighting to decision makers from related sectors the environmental considerations that should be integrated into their respective activities. Presenting a wide range of environmental topics and new findings relevant to a variety of problems in these regions, this volume will appeal to anyone working in the subject area and particularly to students interested in learning more about new advances in environmental research initiatives in view of the worsening environmental degradation of the Mediterranean and surrounding regions, which has made environmental and resource protection into an increasingly important issue hampering sustainable development and social welfare.

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.

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

Extraction from Waste Biomass and Applications
From Source to Biomedical Applications
Materials, Process Development and Drug Delivery Strategies
Keratin-based Materials

Biodegradable Green Composites
Cutting-Edge Enabling Technologies for Regenerative Medicine

The extracellular matrix (ECM) is an acellular three-dimensional network composed of proteins, glycoproteins, proteoglycans and exopolysaccharides. It primarily serves as a structural component in the tissues and organs of plants and animals, or forms biofilms in which bacterial cells are embedded. ECMs are highly dynamic structures that undergo continuous remodeling, and disruptions are frequently the result of pathological processes associated with severe diseases such as arteriosclerosis, neurodegenerative illness or cancer. In turn, bacterial biofilms are a source of concern for human health, as they are associated with resistance to antibiotics. Although exopolysaccharides are crucial for ECM formation and function, they have received considerably little attention to date. The respective chapters of this book comprehensively address such issues, and provide reviews on the structural, biochemical, molecular and biophysical properties of exopolysaccharides. These components are abundantly produced by virtually all taxa including bacteria, algae, plants, fungi, invertebrates and vertebrates. They include long unbranched homopolymers (cellulose, chitin/chitosan), linear copolymers (alginate, agarose), peptoglycans such as murein, heteropolymers like a variety of glycosaminoglycans (hyaluronan, dermatan, keratin, heparin, Pel), and branched heteropolymers such as pectin and hemicellulose. A separate chapter is dedicated to modern industrial and biomedical applications of exopolysaccharides and polysaccharide-based biocomposites. Their unique chemical, physical and mechanical properties have attracted considerable interest, inspired basic and applied research, and have already been harnessed to form structural biocomposite hybrids for tailor-made applications in regenerative medicine, bioengineering and biosensor design. Given its scope, this book provides a substantial source of basic and applied information for a wide range of scientists, as well as valuable textbook for graduate and advanced undergraduate students.

Advances and Challenges in Pharmaceutical Technology: Materials, Process Development and Drug Delivery Strategies examines recent advancements in pharmaceutical technology. The book discusses common formulation strategies, including the use of tools for statistical formulation optimization, Quality by design (QbD), process analytical technology, and the uses of various pharmaceutical biomaterials, including natural polymers, synthetic polymers, modified natural polymers, bioceramics, and other bioinorganics. In addition, the book covers rapid advancements in the field by providing a thorough understanding of pharmaceutical processes, formulation developments, explorations, and exploitation of various pharmaceutical biomaterials to formulate pharmaceutical dosage forms. Provides extensive information and analysis on recent advancements in the field of pharmaceutical technology Includes contributions from global leaders and experts in academia, industry and regulatory agencies Uses high quality illustrations, flow charts and tables to explain concepts and text to readers, along with practical examples and research case studies

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.

This book focuses on the key areas and issues related to natural fibers and their reinforced polymer composites. It begins with an introduction and classification of natural fibers and their different extraction methods, followed by characterization techniques. Further, this book gives solutions to improved adhesion between natural fibers and different polymer matrices via different chemical, physical, and biological treatment methods. Fabrication procedures and characterization techniques for development and testing of composites, including processing, development, and characterization, have been included as well. Applications of these composite materials for food packaging and structural and semi-structural applications are also explained. FEATURES Describes the extraction process of natural fibers with comparisons Covers the fundamental concepts for the characterization of natural fiber composites Includes a comparative study of different polymer matrices Provides insight about various fabrication methods Discusses diverse applications of these novel materials and the scope for commercialization and entrepreneurship This book is aimed at graduate students and researchers in materials, polymers, composites and characterization, textile engineering, chemical, civil, and mechanical engineering.

Processing, Characterization, Applications, and Advancements
A Sophisticated Multifunctional Material
Applications
Applications of Nanocomposite Materials in Drug Delivery
Properties, Durability and Applications
Journal of Materials Science and Engineering : Volume 7

Regenerated Cellulose Fibres

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.

Bionanocomposites for Food Packaging Applications provides fundamental information on recent developments in this important field of research. The book comprehensively summarizes recent technical research accomplishments in bionanocomposites for food packaging applications. It discusses various aspects of green and sustainable bionanocomposites from the point-of-view of chemistry and engineering. Key chapters include methods of fabrication, processing and advanced production techniques, characterization, PLA, PCL, PGA, Poly (butylene succinate), Chitosan, Starch, Cellulose, PHAs, PHB, Carrageenan, Lignin and Protein-based bionanocomposites for food packaging applications. In addition, the book highlights lifecycle analysis and impacts on health and the environment. Modern technologies for processing and strategies for improving performance, such as biodegradability and permeability, both of which are key factors to achieve environmentally friendly alternatives to more traditional plastic materials are also included. Covers all types of bionanocomposites for packaging Provides a comprehensive and up-to-date review on the latest research Addresses lifecycle analysis and impacts on the environmental and health Covers safety aspects and the circular economy

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

This is a comprehensive work by industrial and academic specialists proving up-to-date information on the chemistry, physics, process technology, applications and markets for man-made cellulosic fibres. It covers the properties and applications of viscose rayon, cupprammonium rayon and the new solvent-spun fibres as well as considering their relationships with the natural cellulosics such as cotton and the synthetic polymer fibres such as polyester. This overview of the only truly, naturally recyclable fibres and the latest manufacturing techniques that are being developed to produce them will be of interest to professionals in textile production, research and development, manufacturing chemists and textile technologists. The nonwovens and paper industries that use cellulose as a basic ingredient of their products will also find it valuable as will medical textiles producers and geotextiles engineers.

Biomedical Composites

Ionic Liquids: Properties and Applications

Advances in Biomedical Polymers and Composites

Biomaterials in Regenerative Medicine and the Immune System

Handbook of Composites from Renewable Materials, Nanocomposites

Handbook of Composites from Renewable Materials, Polymeric Composites

Extracellular Sugar-Based Biopolymers Matrices

Advances in Biomedical Polymers and Composites: Materials and Applications is a comprehensive guide to polymers and polymer composites for biomedical applications, bringing together detailed information on their preparation, properties, cutting-edge technologies, innovative materials and key application areas. Sections introduce polymers and composites in biomedical applications and cover characterization techniques, preparation and properties of composites and gel-based systems. Innovative technologies and instruments used in the fabrication of polymer composites for biomedical applications are then presented in detail, including 3D bioprinting, 4D printing, electrospinning, stimuli-responsive polymers and quantum dots. This is a valuable resource for anyone looking to gain a broader understanding of polymers and composites for biomedical applications. In addition, it is ideal for readers who want to conduct interdisciplinary research or explore new avenues for research and development. Provides broad, systematic and detailed coverage of preparation methods, properties, technologies, structures and applications Explores the state-of-the-art in biomedical polymers, including gene delivery, oleogels, bigels, 3D bioprinting, 4D printing and antiviral materials Offers analysis and comparison of experimental data on physical properties and explains environmental, ethical and medical guidelines

Applications of Nanocomposite in Drug Delivery discusses and explores the applications of nanocomposites in the area of drug delivery. Starting with a scientific understanding of drug delivery fundamentals, the book explores the utility of nanocomposites in the area of controlled, transdermal, osteo-articular tuberculosis and stimulus sensitive drug delivery applications. The book intricately details and discusses a variety of methods for their preparation, while also highlighting specific applications of nanocomposites in targeted drug delivery. Discusses nanocomposite and nanotechnology for drug delivery Outlines the mechanisms involved in targeted drug delivery using nanocomposites Includes synthesis methods for nanocomposites used in

controlled drug delivery Lists various applications of nanocomposites in drug delivery

Functional Polysaccharides for Biomedical Applications examines the fundamentals and properties of these natural materials and their potential biomedical applications. With an emphasis on therapeutic and sensing applications, the book also reviews how polysaccharides can be modified for tissue engineering applications. Sections discuss the basics of polysaccharides, give an overview of the potential applications, look at novel materials and technologies for use in tissue regeneration and therapeutics, and detail current biomedical applications. With a strong focus on materials, engineering and applications, this book is a valuable resource for those with an interest in harnessing the biomedical potential of natural polymers. Describes strategies for developing polysaccharides-based biomedical devices Illustrates concepts and encompasses scope for clinical development Provides advanced and comprehensive information on biomedical constructs

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.

Functional Polysaccharides for Biomedical Applications

Bacterial NanoCellulose

Biopolymer Membranes and Films

Wool Fiber Reinforced Polymer Composites

Polymeric Materials

Chitosan-Based Nanocomposite Materials

Handbook of Composites from Renewable Materials, Structure and Chemistry

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.

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.

Hybrid Polymer Composite Materials: Applications provides a clear understanding of the present state of-the-art and the growing utility of hybrid polymer composite materials. It

includes contributions from world renowned experts and discusses the combination of different kinds of materials procured from diverse resources. In addition, this volume from the four volume series provides deep insights on the potential of hybrid polymer composite materials for advanced applications. Provides a clear understanding of the present state-of-the-art and the growing utility of hybrid polymer composite materials Includes contributions from world renowned experts and discusses the combination of different kinds of materials procured from diverse resources Discusses their synthesis, chemistry, processing, fundamental properties, and applications Provides insights on the potential of hybrid polymer composite materials for advanced applications

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.

Physico-Chemical Properties and Recent Advances in Structural Designing

Chitosan for Biomaterials IV

Biomedical Applications

Perspectives and Applications

Chitin-Chitosan

Keratin as a Protein Biopolymer

Myriad Functionalities in Science and Technology

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 polysac 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, especia 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 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 a in polymer laboratories, classrooms, and policy makers.

This book comprehensively addresses surface modification of natural fibers to make them more effective, cost-efficient, and environmentally friendly. Topics include the elucidation of important aspects surrounding che green approaches for the surface modification of natural fibers, the use of recycled waste, properties of biodegradable polyesters, methods such as electrospinning, and applications of hybrid composite materials.

Wool Fiber Reinforced Polymer Composites is an in-depth and practical exploration of wool-based composites, covering everything from the morphology of wool fiber to the industrial applications of wool composites. W emerged in the top position for this role because of its unique characteristics. While fine wool is too costly for many such applications, coarse wool of greater than 35 microns fiber length is globally under-utilized. This pioneering book describes every form of wool composite, woven, nonwoven, felt and fiber, including different fabrication methods. In unique detail, the international team of expert contributors describe the morphology and properties of wool, methods for the chemical modification of wool, different forms of wool-polymer composites, and many exciting emerging applications. Provides technical details on a wide range of applications o fiber polymer composites, including in construction and medicine Draws on an interdisciplinary panel of experts from fields such as textiles, polymer science and chemistry to create a guide for readers of all backgroun Describes wool characterization techniques in detail

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 2019Springer Nature

Proceedings of 19th World Congress on Materials Science and Engineering 2018

Recent Advances in Environmental Science from the Euro-Mediterranean and Surrounding Regions (2nd Edition)

Hybrid Polymer Composite Materials

Polymer Based Bio-nanocomposites

Health, Food, Environment, and Energy Applications

Biological Macromolecules

Advanced Applications

This volume presents the recent developments on the biomedical applications of chitosan and its derivatives. Chitosan exhibits unique properties such as non-toxicity, biodegradability and biocompatibility. Since its chemical structure and properties can be easily modified, it can be an ideal candidate as a biomaterial. Consequently, chitosan and its derivatives are being developed in different forms such as nanoparticles, micelles, nanofibers, hydrogels, films and 3D porous materials for various biomedical applications, ranging from drug and gene delivery to tissue engineering and regenerative medicine. The

chapters of this volume focus on the potential use of chitosan and its derivatives as a hemostatic agent, tissue sealants, tissue engineering scaffolds, delivery carriers for bioactive molecules in bone tissue engineering and wound dressings. Some chapter’s deal with recent advancements of chitosan-based biomaterials as a drug, gene and transdermal drug delivery carrier. In addition, the volume focusses on the prospects of chitosan-based systems for the treatment of cancer, eye and other infectious diseases. The volume will be of interest to material scientists, chemists and biotechnologists by providing a better understanding of the physicochemical and biological characteristics of chitosan and its derivatives to develop more appropriate and innovative chitosan-based materials modified for unlimited practical applications in biomedical fields.

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.

This book gives a comprehensive overview of bionanocomposites, a class of materials that consist of a biopolymer matrix which is embedded with nanoparticles and natural fibres as reinforcement to produce novel material and achieve superior physico-chemical and mechanical properties. The book looks into the synthesis of various forms of nanoparticles, the fabrication methods, and the characterization of bionanocomposites. It also includes topics related to the sustainability and life prediction of bionanocomposites such as biodegradability, recycling, and re-use. An important aspect in the designing of bionanocomposites includes computational modeling, and the suitability of the bionanocomposites in various applications is presented. This book appeals to students, researchers, and scientists looking to gain fundamental knowledge, know about recent advancements in the research on bionanocomposites and their applications.

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.

Proceedings of 2nd Euro-Mediterranean Conference for Environmental Integration (EMCEI-2), Tunisia 2019

Towards Advanced Functional Materials

Advances and Challenges in Pharmaceutical Technology

Green Chemistry in Industry

Surfaces, Interfaces and Bioapplications

Molten Salts and Ionic Liquids 19

Nano Hydrogels

This book introduces the reader to important aspects of the nano-hydrogels. It covers the development of hydrogels and their biology, chemistry and properties. Focus is also given to innovative characterization techniques and advances in structural design, with special emphasis on molecular structure, dynamic behavior and structural modifications of hydrogels. This book serves as a consolidated reference work for the diverse aspects of hydrogels, creating a valuable resource for students and researchers in academia and industry.

Protein-Based Biopolymers: From Source to Biomedical Applications provides an overview on the development and application of protein biopolymers in

biomedicine. Protein polymers have garnered increasing focus in the development of biomedical materials, devices and therapeutics due to their intrinsic bioactivity, biocompatibility and biodegradability. This book comprehensively reviews the latest advances on the synthesis, characterization, properties and applications of protein-based biopolymers. Each chapter is dedicated to a single protein class, covering a broad range of proteins including silk, collagen, keratin, fibrin, and more. In addition, the book explores the biomedical potential of these polymers, from tissue engineering, to drug delivery and wound healing. This book offers a valuable resource for academics and researchers in the fields of materials science, biomedical engineering and R&D groups working in pharmaceutical and biomedical industries. Covers a range of protein-based biopolymers, including elastin, collagen, keratin, soy and more Guides the reader through the fabrication, characterization and properties of protein biopolymers Explores the biomedical potential of protein biopolymers, covering applications such as cancer therapy, tissue engineering and drug delivery

This book highlights the state-of-the-art research and discovery in the use of chitosan-based nanocomposites in biomedical applications, including the scope to which these novel materials have been incorporated by the community. It provides an exceptional insight into the strategies for the synthesis and chemical modifications of chitosan, characterization techniques, their use as anticancer agents, antimicrobial, antiviral, and antifungal agents, their role in the biomedical field, and applications in drug delivery, gene therapy, dentistry, orthopedics, etc. This book will also emphasize the challenges with previous signs of progress and way for further research, details relating to the current pioneering technology, and future perspectives with a multidisciplinary approach. Furthermore, it presents up-to-date information on the economics, toxicity, and regulations related to these novel materials.

June 11-13, 2018 Barcelona, Spain Key Topics : Materials Science and Engineering, Nanomaterials and Nanotechnology, Biomaterials and Medical Devices, Polymer Science and Technology, Ceramics and Composite Materials, Electronic, Optical and Magnetic Materials, Emerging Smart Materials, Materials for Energy and Environmental Sustainability, Physics and Chemistry of Materials, Metals, Mining, Metallurgy and Materials, Mechanics, Characterization Techniques and Equipments, Graphene and 2D Materials,

Chitosan in Biomedical Applications

Polysaccharide-based Fibers and Composites

Hybrid Organic-Inorganic Interfaces

Advanced Antimicrobial Materials and Applications

Polylactic Acid-Based Nanocellulose and Cellulose Composites

Natural Fiber Composites

Bioactivity and Biomedical Applications

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.

The first book dedicated to the potential applications and unique properties of bacterial cellulose (BC), this seminal work covers the basic science, technology, and economic impact of this bulk chemical as well as the companies and patents that are driving the field. It reviews the biosynthesis and properties of BC, including genetics and characterization; discusses the advancing technology as it relates to product development, bioreactors, and production; and analyzes the economic impact of BC on a diverse range of industry applications, including materials and biomaterials, biological and polymer sciences, and electromechanical engineering.

This book explores in depth the latest enabling technologies for regenerative medicine. The opening section examines advances in 3D bioprinting and the fabrication of electrospun and electrosprayed scaffolds. The potential applications of intelligent nanocomposites are then considered, covering, for example, graphene-based nanocomposites, intrinsically conductive polymer nanocomposites, and smart diagnostic contact lens systems. The third section is devoted to various drug delivery systems and strategies for regenerative medicine. Finally, a wide range of future enabling technologies are discussed. Examples include temperature-responsive cell culture surfaces, nanopatterned scaffolds for neural tissue engineering, and process system engineering methodologies for application in tissue development. This is one of two books to be based on contributions from leading experts that were delivered at the 2018 Asia University Symposium on Biomedical Engineering in Seoul, Korea – the companion book examines in depth novel biomaterials for regenerative medicine.

Chitin is the second most abundant biopolymer after cellulose and is a resourceful copious and cheap biomaterial discovered in 1859 owing to significant industrial and technological utility. Raw chitin-chitosan resembles keratin in its biological functions. Chitin chemistry vastly developed via innate unparalleled biological features and exceptional physicochemical characters. Chitosan endures assorted chemical/physical modifications easily at free proactive functionalities, yet intact bulk properties are achieved through processing, viz., film, membrane, composite, hybrid, nanofibre, nanoparticle, hydrogel and scaffolds. Rapidly lessen bioresources signify chitosan as an option due to renewable eco-friendliness and drive embryonic myriad applications in S

Protein-Based Biopolymers

Chemical and Engineering Fundamentals and Industrial Applications

Fabrication, Characterization and Biomedical Applications

Bionanocomposites for Food Packaging Applications

Materials and Applications

Advances in Chitin/Chitosan Characterization and Applications

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

Polylactic Acid-Based Nanocellulose and Cellulose Composites offers a comprehensive account of the methods for the synthesis, characterization, processing, and applications of these advanced materials. This book fills a gap in the literature as the only currently available book on this topic. This book: Describes the procedures for the extraction of cellulose materials from different sources and characterization methods adopted for analyzing their properties Covers properties, processing, and applications of PLA biocomposites made using the extracted cellulose Discusses the effect of reinforcement of cellulose on the biopolymer matrix and the enhancement of biopolymer properties Examines current status, challenges, and future outlook in biocomposite research and applications The book serves as a reference for researchers, scientists, and advanced students in polymer science and engineering and materials science who are interested in cellulose polymer composites and their applications.

The “greening” of industry processes, i.e. making them more sustainable, is a popular and often lucrative trend which has emerged over recent years. The 3rd volume of Green Chemical Processing considers sustainable chemistry in the context of corporate interests. The American Chemical Society’s 12 Principles of Green Chemistry are woven throughout this text as well as the series to which this book belongs.

Biological Macromolecules: Bioactivity and Biomedical Applications presents a comprehensive study of biomacromolecules and their potential use in various biomedical applications. Consisting of four sections, the book begins with an overview of the key sources, properties and functions of biomacromolecules, covering the foundational knowledge required for study on the topic. It then progresses to a discussion of the various bioactive components of biomacromolecules. Individual chapters explore a range of potential bioactivities, considering the use of biomacromolecules as nutraceuticals, antioxidants, antimicrobials, anticancer agents, and antidiabetics, among others. The third section of the book focuses on specific applications of biomacromolecules, ranging from drug delivery and wound management to tissue engineering and enzyme immobilization. This focus on the various practical uses of biological macromolecules provide an interdisciplinary assessment of their function in practice. The final section explores the key challenges and future perspectives on biological macromolecules in biomedicine. Covers a variety of different biomacromolecules, including carbohydrates, lipids, proteins, and nucleic acids in plants, fungi, animals, and microbiological resources Discusses a range of applicable areas where biomacromolecules play a significant role, such as drug delivery, wound management, and regenerative medicine Includes a detailed overview of biomacromolecule bioactivity and properties Features chapters on research challenges, evolving applications, and future perspectives