Natural Polymers Biopolymers Biomaterials And Their Composites Blends And Ipns Advances In Materials Science

Polymer Science and Nanotechnology: Fundamentals and Applications brings together the latest advances in polymer science and nanoscience. Sections explain the fundamentals of polymer science, including key aspects and methods in terms of molecular structure, synthesis, characterization, microstructure, phase structure and processing and properties before discussing the materials of particular interest and utility for novel applications, such as hydrogels, natural polymers, smart polymers and polymeric biomaterials. The second part of the book examines essential techniques in nanotechnology, with an emphasis on the utilization of advanced polymeric materials in the context of nanoscience. Throughout the book, chapters are prepared so that materials and products can be geared towards specific applications. Two chapters cover, in detail, major application areas, including fuel and solar cells, tissue engineering, drug and gene delivery, membranes, water treatment and oil recovery. Presents the latest applications of polymers and polymeric nanomaterials, across energy, biomedical, pharmaceutical, and environmental fields Contains detailed coverage of polymer nanocomposites, polymer nanoparticles, and hybrid polymer-metallic nanoparticles Supports an interdisciplinary approach, enabling readers from different disciplines to understand polymer science and nanotechnology and the interface between them

Natural Polymers, Biopolymers, Biomaterials, and Their Composites, Blends, and IPNs focuses on the recent advances in natural polymers, biopolymers, biomaterials, and their composites, blends, and IPNs. Biobased polymer blends and composites occupy a unique position in the dynamic world of new biomaterials. The growing need for lubricious coatings and surfaces in medical devices—an outcome of the move from invasive to noninvasive medicines/procedures—is playing a major role in the advancement of biomaterials technology. Natural polymers have attained their cutting-edge technology through various platforms, yet there is a lot of novel information about them that is discussed in the book. This important work covers topics such as chitosan composites for biomedical applications and wastewater treatment, coal biotechnology, biomedical and related applications of second generation polyamidoamines, silk fibers, PEG hydrogels, bamboo fiber reinforced PE composites, jute/polyester composites, magnetic biofoams, and many other interesting aspects of importance to polymer research today.

Biopolymer Science for Proteins and Peptides introduces all aspects of natural polymers based on structural proteins and peptides, presenting synthesis, structure, properties, proteins, materials design, and applications. The book begins by presenting the core concepts of polypeptide and protein materials, before discussing synthesis and structure in detail. The next part of the book describes physical properties, biological properties, and issues surrounding stability. Subsequent chapters offer in-depth coverage of both natural and structural protein sources, including collagen, silk, elastin, resilin, keratin, foot protein, and reflectin, and the materials that can be designed from them, such as films, fibers, textiles, microparticles, sponges and scaffolds, nanomaterials, blends, and composites. These materials are also analyzed against the available synthetic polymers. Finally, the text explores current applications and potential future developments. This is an essential resource for researchers and advanced students across a range of disciplines, including biopolymers, structural proteins, polymer science, materials science, biomaterials, biology, biotechnology, chemistry, engineering, and pharmaceutical science. In an industry setting, this is of great interest to scientists and R&D professionals working in industries with an interest in bio-based polymers for advanced applications. Explains how biopolymers from structural proteins and peptides can be developed into materials, such as films, fibers, textiles, microparticles, sponges and scaffolds, nanomaterials, blends, and polymer composites Provides the reader a solid understanding of the structure, synthesis, and properties Guides the reader from sources, including collagen, silk, elastin, resilin, keratin, and reflectin, to material design and cutting-edge applications

This book introduces various 3D printing systems, biomaterials, and cells for organ printing. In view of the latest applications of several 3D printing systems, their advantages and disadvantages are also discussed. A basic understanding of the entire spectrum of organ printing provides pragmatic insight into the mechanisms, methods, and applications of this discipline. Organ printing is being applied in the tissue engineering field with the purpose of developing tissue/organ constructs for the regeneration of both hard (bone, cartilage, osteochondral) and soft tissues (heart). There are other potential application areas including tissue/organ models, disease/cancer models, and models for physiology and pathology, where in vitro 3D multicellular structures developed by organ printing are valuable.

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.

Polymers are important and attractive biomaterials for researchers and clinical applications due to the ease of tailoring their chemical, physical and biological properties for target devices. Due to this versatility they are rapidly replacing other classes of biomaterials such as ceramics or metals. As a result, the demand for biomedical polymers has grown exponentially and supports a diverse and highly monetized research community. Currently worth $1.2bn in 2009 (up from $650m in 2000), biomedical polymers are expected to achieve a CAGR of 9.8% until 2015, supporting a current research community of approximately 28,000+. Summarizing the main advances in biopolymer development of the last decades, this work systematically covers both the physical science and biomedical engineering of the multidisciplinary field. Coverage extends across synthesis, characterization, design consideration and biomedical applications. The work supports scientists researching the formulation of novel polymers with desirable physical, chemical, biological, biomechanical and degradation properties for specific targeted biomedical applications. Combines chemistry, biology and engineering for expert and appropriate integration of design and engineering of polymeric biomaterials Physical, chemical, biological, biomechanical and degradation properties alongside currently deployed clinical applications of specific biomaterials aids use as single source reference on field. 15+ case studies provides in-depth analysis of currently used polymeric biomaterials, aiding design considerations for the future

This book introduces the most recent innovations in natural polymer applications in the food, construction, electronics, biomedical, pharmaceutical, and engineering industries. The authors provide perspectives from their respective range of industries covering classification, extraction, modification, and application of natural polymers from various sources in nature. They discuss the techniques used in analysis of natural polymers in various systems incorporating natural polymers as well as their intrinsic properties.

Biomaterials for Skin Repair and Regeneration examines a range of materials and technologies used for regenerating or repairing skin. With a strong focus on biomaterials and scaffolds, the book also examines the testing and evaluation pathway for human clinical trials. Beginning by introducing the fundamentals on skin tissue, the book goes on to describe contemporary technology used in skin repair as well as currently available biomaterials suitable for skin tissue repair and regeneration. Skin tissue engineering and the ideal requirements to take into account when developing skin biomaterials are discussed, followed by information on the individual materials used for skin repair and regeneration. As evaluation of biomaterials in animal models is mandatory before proceeding into human clinical trials, the book also examines the different animal models available. With a strong focus on materials, engineering, and application, this book is a valuable resource for materials scientists, skin biologists, and bioengineers with an interest in tissue engineering, regeneration, and repair of skin. Provides an understanding of basic skin biology Comprehensively examines a variety of biomaterial approaches Looks at animal models for the evaluation of biomaterial-based skin constructs

BioPolymers could be either natural polymers – polymer naturally occurring in Nature, such as cellulose or starch…, or biobased polymers that are artificially synthesized from natural resources. Since the late 1990s, the polymer industry has faced two serious problems: global warming and anticipation of limitation to the access to fossil resources. One solution consists in the use of sustainable resources instead of fossil-based resources. Hence, biomass feedstocks are a promising resource and biopolymers are one of the most dynamic polymer area. Additionally, biodegradability is a special functionality conferred to a material, bio-based or not. Very recently, facing the awareness of the volumes of plastic wastes, biodegradable polymers are gaining increasing attention from the market and industrial community. This special issue of Molecules deals with the current scientific and industrial challenges of Natural and Biobased Polymers, through the access of new biobased monomers, improved thermo-mechanical properties, and by substitution of harmful substances. This themed issue can be considered as collection of highlights within the field of Natural Polymers and Biobased Polymers which clearly demonstrate the increased interest in this field. We hope that this will inspire researchers to further develop this area and thus contribute to futures more sustainable society."

Biopolymers are attracting immense attention of late because of their diverse applications that can address growing environmental concerns and energy demands. The development of various biomaterials creates significant advancements in the medical field as well, and many biopolymers are used for the fabrication of biomaterials. Together, biopolymers and biomaterials create great potential for new materials, applications, and uses. This new volume, Biopolymers and Biomaterials, covers the science and application of biopolymers and biomaterials. It presents an array of different studies on biopolymers and biomaterials, along with their results, interpretation, and the conclusions arrived at through investigations. It includes biopolymer synthesis, their characterizations, and their potential applications. The book begins with an explanation of the different biopolymers used in the textile industry, their advantages and disadvantages, and their applications.

"This new volume, Natural Polymers: Perspectives and Applications for a Green Approach, covers the synthesis, characterizations, and properties of natural polymeric systems, including their morphology, structure, and dynamics. It also introduces the most recent innovations and applications of natural polymers and their composites in the food, construction, electronics, biomedical, pharmaceutical, and engineering industries. Natural polymers provide a striking substitute for various applications as compared to synthetic polymers obtained from petrochemicals because they are biocompatible, biodegradable, and easily available and fall within the budget of many industries. The applications of natural polymers in pharmaceutical industries are large in comparison to synthetic polymers and are also wide in scope in the food and cosmetic industries. This new volume provides the information needed to design new applications for natural polymers. This book is a valuable reference for researchers, academicians, chemists, pharmacists, researchers, scientists, industrialists dealing with applications of natural polymers and people working in field of natural polymers"--

Biopolymer-Based Formulations: Biomedical and Food Applications presents the latest advances in the synthesis and characterization of advanced biopolymeric formulations and their state-of-the-art applications across biomedicine and food science. Sections cover the fundamentals, applications, future trends, environmental, ethical and medical considerations, and biopolymeric

architectures that are organized in nano, micro and macro scales. The final section of the book focuses on novel applications and recent developments. This book is an essential resource for researchers, scientists and advanced students in biopolymer science, polymer science, polymer chemistry, polymer composites, plastics engineering, biomaterials, materials science, biomedical engineering, and more. It will also be of interest to R&D professionals, scientists and engineers across the plastics, food, biomedical and pharmaceutical industries. Provides in-depth coverage of methods for the characterization of the physical properties of biopolymeric architectures Supports a range of novel applications, including scaffolds, implant coatings, drug delivery, and nutraceutical encapsulation systems Includes the use of experimental data and mathematical modeling, thus enabling the reader to analyze and compare the properties of different polymeric gels

Natural Polymers, Biopolymers, Biomaterials, and Their Composites, Blends, and IPNsCRC Press

This book focuses on biodegradable polymers that are already in clinical use or under clinical development. Synthetic and natural polymers will be included. This excludes polymers that have been investigated and did not reach clinical development. The purpose of this book is to provide updated status of the polymers that are clinical use and those that are now being developed for clinical use and hopefully will reach the clinic during the next 5 years. The book provides information that of interest to academics and practicing researchers including chemists, biologists and bioengineers and users: physicians, pharmacists.

Biosynthetic Polymers for Medical Applications provides the latest information on biopolymers, the polymers that have been produced from living organisms and are biodegradable in nature. These advanced materials are becoming increasingly important for medical applications due to their favorable properties, such as degradability and biocompatibility. This important book provides readers with a thorough review of the fundamentals of biosynthetic polymers and their applications. Part One covers the fundamentals of biosynthetic polymers for medical applications, while Part Two explores biosynthetic polymer coatings and surface modification. Subsequent sections discuss biosynthetic polymers for tissue engineering applications and how to conduct polymers for medical applications. Comprehensively covers all major medical applications of biosynthetic polymers Provides an overview of non-degradable and biodegradable biosynthetic polymers and their medical uses Presents a specific focus on coatings and surface modifications, biosynthetic hydrogels, particulate systems for gene and drug delivery, and conjugated conducting polymers

This book contains a collection of different biodegradation research activities where biological processes take place. The book has two main sections: A) Polymers and Surfactants Biodegradation and B) Biodegradation: Microbial Behaviour.

This book is concerned with polymeric hydrogels, which are considered as one of the most promising types of new polymer-based materials. Each chapter in this book describes a selected class of polymeric hydrogels, such as superabsorbent hybrid nanohydrogels, conducting polymer hydrogels, polysaccharide-based or protein-based hydrogels, or gels based on synthetic polymers. In this way, the book also addresses some of the fascinating properties and applications of polymeric hydrogels: they are three-dimensional, hydrophilic, polymeric networks that can absorb, swell and retain large quantities of water or aqueous fluids. In combination with metal nanoparticles, nanofibrils or nanowhiskers, which may be embedded in the gels, they find widespread applications, ranging from agriculture, and waste water treatment, over electronics, to pharmaceutical and biomedical applications. Applications mentioned in this book include electro sensors, capacitors, electromechanical actuators, and even artificial muscles.

Fundamental Biomaterials: Polymers provides current information on findings and developments of biopolymers and their conversion from base materials to medical devices. Chapters analyze the types of polymers and discuss a range of biomedical applications. It is the first title in a three volume set, with each reviewing the most important and commonly used classes of biomaterials and providing comprehensive information on classification, materials properties, behavior, biocompatibility and applications. The book concludes with essential information on wear, lifetime prediction and cytotoxicity of biomaterials. This title will be of use to researchers and professionals in development stages, but will also help medical researchers understand and effectively communicate the requirements of a biomaterial for a specific application. Further, with the recent introduction of a number of interdisciplinary bio-related undergraduate and graduate programs, this book will be an appropriate reference volume for large number of students at undergraduate and post graduate levels. Provides current information on findings and developments of biopolymers and their conversion from base materials to medical devices Includes analyses of the types of polymers and a discussion of a range of biomedical applications Presents essential information on wear, lifetime prediction and cytotoxicity of biomaterials Explores both theoretical and practical aspects of polymers in biomaterials

This book focuses on the recent trends in micro- and nano-structured polymer systems, particularly natural polymers, biopolymers, biomaterials, and their composites, blends, and IPNs. This valuable volume covers the occurrence, synthesis, isolation, production, properties and applications, modification, as well as the relevant analysis techniques to reveal the structures and properties of polymer systems. Biobased polymer blends and composites occupy a unique position in the dynamic world of new biomaterials. The growing need for lubricious coatings and surfaces in medical devices—an outcome of the move from invasive to noninvasive medicines and procedures—is playing a major role in the advancement of biomaterials technology. Natural polymers have attained their cutting-edge technology through various platforms, and this book presents a multitude of information about them. Topics include biopolymer–synthetic systems, nanomaterial–polymer structures, multi-characterization techniques, polymer blends and composites, polymer gels and polyelectrolytes, and many other interesting aspects of interests to researchers. This book will be valuable to scientists, physicians, pharmacists, engineers, and other specialists in a variety of disciplines, both academic and industrial.

This book provides understanding of raw materials, manufacturing and biomedical applications of different polymeric and natural composites such as drug delivery, growth factor

delivery, orthopedics, dentistry and wound dressing.

This book contains 10 Chapters divided into three Sections. Section A covers synthesis of biopolymers. Lignocellulosic feedstock contains cellulose, hemicellulose, and lignin, which are used for synthesis of biopolymers. Polymer-coated noble metal nanoparticles are used in nanobiomedicine and fundamental biomaterials. Section B describes applications of biopolymers in biomedical, antimicrobial, industrial, nanotechnology, laser-based thin films, and regenerative medicines. Section C is dedicated for advancement and engineering in biopolymers for personal protective garments, equipments, membrane separation processes, purifications, and new generation of high-performance biomaterials. A new numerical-cum-graphical method called TI2BioP (Topological Indices to BioPolymers) has been developed to estimate topological indices (TIs) from two-dimensional (2D) graphical approaches for the natural biopolymers DNA, RNA, and proteins.

This book presents an experimental and computational account of the applications of biopolymers in the field of medicine. Biopolymers are macromolecules produced by living systems, such as proteins, polypeptides, nucleic acids, and polysaccharides. Their advantages over polymers produced using synthetic chemistry include: diversity, abundance, relatively low cost, and sustainability. This book explains techniques for the production of different biodevices, such as scaffolds, hydrogels, functional nanoparticles, microcapsules, and nanocapsules. Furthermore, developments in nanodrug delivery, gene therapy, and tissue engineering are described.

Biopolymers from Renewable Resources is a compilation of information on the diverse and useful polymers derived from agricultural, animal, and microbial sources. The volume provides insight into the diversity of polymers obtained directly from, or derived from, renewable resources. The beneficial aspects of utilizing polymers from renewable resources, when considering synthesis, pro cessing, disposal, biodegradability, and overall material life-cycle issues, suggests that this will continue to be an important and growing area of interest. The individual chapters provide information on synthesis, processing and properties for a variety of polyamides, polysaccharides, polyesters and polyphenols. The reader will have a single volume that provides a resource from which to gain initial insights into this diverse field and from which key references and contacts can be drawn. Aspects of biology, biotechnology, polymer synthesis, polymer processing and engineering, mechanical properties and biophysics are addressed to varying degrees for the specific biopolymers. The volume can be used as a reference book or as a teaching text. At the more practical level, the range of important materials derived from renewable resources is both extensive and impressive. Gels, additives, fibers, coatings and films are generated from a variety of the biopolymers reviewed in this volume. These polymers are used in commodity materials in our everyday lives, as well as in specialty products.

"This Ebook describes the applicability of diverse natural and synthetic biopolymers and their blends in drugs, vaccines and gene delivery. It would serve as a concise body of information on biopolymers for researchers, industries and students of pharmaceu"

Biomaterials have had a major impact on the practice of contemporary medicine and patient care. Growing into a major interdisciplinary effort involving chemists, biologists, engineers, and physicians, biomaterials development has enabled the creation of high-quality devices, implants, and drug carriers with greater biocompatibility and biofunctionality. The fast-paced research and increasing interest in finding new and improved biocompatible or biodegradable polymers has provided a wealth of new information, transforming this edition of Polymeric Biomaterials into a two-volume set. This volume, Polymeric Biomaterials: Structure and Function, contains 25 authoritative chapters written by experts from around the world. Contributors cover the following topics: The structure and properties of synthetic polymers including polyesters, polyphosphazenes, and elastomers The structure and properties of natural polymers such as mucoadhesives, chitin, lignin, and carbohydrate derivatives Blends and composites—for example, metal–polymer composites and biodegradable polymeric/ceramic composites Bioresorbable hybrid membranes, drug delivery systems, cell bioassay systems, electrospinning for regenerative medicine, and more Completely revised and expanded, this state-of-the-art reference presents recent developments in polymeric biomaterials: from their chemical, physical, and structural properties to polymer synthesis and processing techniques and current applications in the medical and pharmaceutical fields.

In the search for sustainable materials, natural polymers present an attractive alternative for many applications compared to their synthetic counterparts derived from petrochemicals. The two volume set, Natural Polymers, covers the synthesis, characterisation and applications of key natural polymeric systems including their morphology, structure, dynamics and properties. Volume one focuses on natural polymer composites, including both natural and protein fibres, and volume two on natural polymer nanocomposites. The first volume examines the characterization, life cycle assessment and new sources of natural fibres and their potential as a replacement for synthetic fibres in industrial applications. It then explores the important advancements in the field of wool, silk, spidersilk and mussel byssus fibres. The second volume looks at the properties and characterization of cellulose, chitosan, furanic, starch, wool and silk nanocomposites and the potential industrial applications of natural polymer nanocomposites. With contributions from leading researchers in natural polymers from around the globe, Natural Polymers provides a valuable reference for material scientists, polymer chemists and polymer engineers.

Covers polysaccharides and other important biomacromolecules, detailing their source, production, structures, properties, and current and potential application in biotechnology and medicine.

The articles included in this text highlight the important advances in polymer science that impact tissue engineering. The breadth of polymer science is well represented with the relevance of both polymer chemistry and morphology emphasized in terms of cell and tissue response.

This two volume set provides a valuable reference on natural polymer composites, including both natural and protein fibres, and natural polymer nanocomposites.

The book summarizes in a comprehensive manner many of the recent technical research accomplishments in the area of natural polymers. It discusses the various attempts reporting on solving this problem from the point of view of the chemistry and the structure of natural polymers, highlighting the drawbacks and advantages of each method and proposal. Based on

considerations of structure - property relations, it is possible to obtain fibers with improved strength by making use of their nanostructures and/or mesophase properties of natural polymers. The book is a unique book with contributions from the experts of the biomaterial area research. it covers all topics related to natural biomaterials such as natural rubber, cellulose, chitin, starch, hemicellulose, lignin, alginates, soy protein, casein and their bionanocomposites and applications. This book is a useful reference for scientists, academicians, research scholars and biotechnologists.

This book focuses on advances made in both materials science and scaffold development techniques, paying close attention to the latest and state-of-the-art research. Chapters delve into a sweeping variety of specific materials categories, from composite materials to bioactive ceramics, exploring how these materials are specifically designed for regenerative engineering applications. Also included are unique chapters on biologically-derived scaffolding, along with 3D printing technology for regenerative engineering. Features: Covers the latest developments in advanced materials for regenerative engineering and medicine. Each chapter is written by world class researchers in various aspects of this medical technology. Provides unique coverage of biologically derived scaffolding. Includes separate chapter on how 3D printing technology is related to regenerative engineering. Includes extensive references at the end of each chapter to enhance further study.

Biopolymers and Biodegradable Plastics are a hot issue across the Plastics industry, and for many of the industry sectors that use plastic, from packaging to medical devices and from the construction indusry to the automotive sector. This book brings together a number of key biopolymer and biodegradable plastics topics in one place for a broad audience of engineers and scientists, especially those designing with biopolymers and biodegradable plastics, or evaluating the options for switching from traditional plastics to biopolymers. Topics covered include preparation, fabrication, applications and recycling (including biodegradability and compostability). Applications in key areas such as films, coatings controlled release and tissue engineering are discussed. Dr Ebnesajjad provides readers with an in-depth reference for the plastics industry – material suppliers and processors, bio-polymer producers, bio-polymer processors and fabricators – and for industry sectors utilizing biopolymers – automotive, packaging, construction, wind turbine manufacturers, film manufacturers, adhesive and coating industries, medical device manufacturers, biomedical engineers, and the recycling industry. Essential information and practical guidance for engineers and scientists working with bioplastics, or evaluating a migration to bioplastics. Includes key published material on biopolymers, updated specifically for this Handbook, and new material including coverage of PLA and Tissue Engineering Scaffolds. Coverage of materials and applications together in one handbook enables engineers and scientists to make informed design decisions.

Hydrogels Based on Natural Polymers presents the latest research on natural polymer-based hydrogels, covering fundamentals, preparation methods, synthetic pathways, advanced properties, major application areas, and novel characterization techniques. The advantages and disadvantages of each natural polymer-based hydrogel are also discussed, enabling preparation tactics for specific properties and applications. Sections cover fundamentals, development, characteristics, structures and properties. Additional chapters cover presentation methods and properties based on natural polymers, including physical and chemical properties, stimuli-responsive properties, self-healing properties, and biological properties. The final section presents major applications areas, including the biomedical field, agriculture, water treatments, and the food industry. This is a highly valuable resource for academic researchers, scientists and advanced students working with hydrogels and natural polymers, as well as across the fields of polymer science, polymer chemistry, plastics engineering, biopolymers and biomaterials. The detailed information will also be of great interest to scientists and R&D professionals, product designers, technicians and engineers across industries. Provides systematic coverage of all aspects of hydrogels based on natural polymers, including fundamentals, preparation methods, properties and characterization Offers a balanced assessment of the specific properties and possibilities offered by different natural polymer-based hydrogels, drawing on innovative research Examines cutting-edge applications across biomedicine, agriculture, water treatments, and the food industry

Tailor-Made and Functionalized Biopolymer Systems: For Drug Delivery and Biomedical Applications covers the design and application of these functionalized and tailor-made biopolymers and biopolymer systems intended for drug delivery and biomedical applications. Various concepts, design protocols and biomedical applications of tailor-made biopolymer systems are covered, guiding the reader from theoretical knowledge to practical application. Authored by an array of experts from global institutions, this book offers an interdisciplinary approach to how tailor-made biopolymers lead to novel drug delivery and treatment solutions. This will be a useful reference to a broad audience, including biomedical engineers, materials scientists, pharmacologists and chemists. Provides a concise overview of tailor-made and functionalized biopolymer systems for biomedical applications Covers a range of modified biopolymers, biopolymeric composites and biopolymer-based systems in drug delivery, development of artificial organs, diagnostic applications, and more Describes characterization, synthesis and functionalization of biopolymers and biopolymers systems

Natural/Biofiber composites are emerging as a viable alternative to glass fiber composites, particularly in automotive, packaging, building, and consumer product industries, and becoming one of the fastest growing additives for thermoplastics. Natural Fibers, Biopolymers, and Biocomposites provides a clear understanding of the present state

Bionanocomposites in Tissue Engineering and Regenerative Medicine explores novel uses of these in tissue engineering and regenerative medicine. This book offers an interdisplinary approach, combining chemical, biomedical engineering, materials science and pharmacological aspects of the characterization, synthesis and application of bionanocomposites. Chapters cover a broad selection of bionanocomposites including chitosan, alginate and more, which are utilized in tissue engineering, wound healing, bone repair, drug formulation, cancer therapy, drug delivery, cartilage regeneration and dental implants. Additional sections of Bionanocomposites in Tissue Engineering and Regenerative Medicine discuss, in detail, the safety aspects and circular economy of bionanocomposites – offering an insight into the commercial and industrial aspects of these important materials. Bionanocomposites in Tissue Engineering and Regenerative Medicine will prove a highly useful text for for those in the fields of biomedical engineering, chemistry, pharmaceutics and materials science, both in academia and industrial R&D groups. Each bionanocomposite type is covered individually, providing specific and detailed information for each material Covers a range of tissue engineering and regenerative medicine applications, from dental and bone engineering to cancer therapy Offers an integrated approach, with contributions from authors across a variety of related disciplines, including biomedical

engineering, chemistry and materials science
This book provides the field with a much-needed fundamental overview of the science, addressing the chemistry of a broad range of biomaterial types, and their applications in the biomedical industry.
Since the introduction of FT-NMR spectroscopy around five decades ago, NMR has achieved significant advances in hardware and methodologies, accompanied with the enhancement of spectral resolution and signal sensitivity. Rapid developments in the polymers field mean that accurate and quantitative characterization of polymer structures and dynamics is the keystone for precisely regulating and controlling the physical and chemical properties of the polymer. This book specifically focuses on NMR investigation of complex polymers for the polymer community as well as NMR spectroscopists, and will push the development of both fields. It covers the latest advances, for example high field DNP and ultrafast MAS methodologies, and show how these novel NMR methods characterize various synthetic and natural polymers.
Composites from Renewable and Sustainable Materials consists of 16 chapters written by international subject matter experts investigating the characteristic and current application of materials from renewable and sustainable sources. The reader will develop a deeper understanding about the concepts related to renewable materials, biomaterials, natural fibers, biodegradable composites, starch, and recycled materials. This book will serve as the starting point for materials science researchers, engineers, and technologists from the diverse backgrounds in physics, chemistry, biology, materials science, and engineering who want to know and better understand the fundamental aspects and current applications of renewable and sustainable materials in several applications.