Nanocellulose Cellulose Nanofibers And Cellulose Nanocomposites Synthesis And Applications

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Nanocellulose Cellulose Nanofibers And Cellulose Nanocomposites Synthesis And Applications ***2024-04-29***

JOHNS ANNA

Fundamentals and Recent Advances in Nanocomposites Based on Polymers and Nanocellulose Walter de Gruyter GmbH & Co KG
This Handbook covers the fundamental aspects, experimental setup, synthesis, properties, and characterization of different nanocelluloses. It also explores the technology challenges of nanocelluloses and the emerging applications and the global markets of nanocelluloses-based systems. In particular, this book: · Covers the history of nanocelluloses, types and classifications, fabrication techniques, critical processing parameters, physical and chemical properties, surface functionalization, and other treatments to allow practical applications. · Covers all recent aspects of nanocelluloses technologies, from experimental set-up to industrial applications. · Includes new physical, chemical and biological techniques for nanocelluloses fabrication, in-depth treatment of their surface functionalization, and characterization. · Discusses the unique properties of nanocelluloses that can be obtained by modifying their diameter, morphology, composition and dispersion in other materials. · Discusses the properties and morphology of several kinds of dispersion in polymeric materials, such as micro/nanofiberlated cellulose, cellulose nanofibers, cellulose nanocrystals, amorphous cellulose nanoparticles, and hybrid cellulose nanomaterials. · Presents the different techniques for dispersion, and self-assembly of polymeric materials, critical parameters of synthesis, modelling and simulation, and characterization methods. · Highlights a wide range of emerging applications of nanocelluloses, e.g. drug delivery, tissue engineering, medical implants, medical diagnostics and therapy, biosensors, catalysis, energy harvesting, energy storage, water/waste treatment, papermaking, textiles, construction industry, automotive, aerospace and many more. · Provides an outlook on the opportunities and challenges for the fabrication and manufacturing of nanocelluloses in industry. · Provides an in-depth look at the nature of nanocelluloses in terms of their applicability for industrial uses. · Provides in-depth insight and review on most recent types of nanocelluloses-based systems of unique structures and compositions. · Highlights the challenges and interdisciplinary perspective of nanocelluloses-based systems in science, biology, engineering, medicine, and technology, incorporating both fundamentals and applications. - Demonstrates how cutting-edge developments in nanofibers translate into real-world innovations in a range of industry sectors. This Handbook is a valuable reference for materials scientists, biologists, physicians, chemical, biomedical, manufacturing and mechanical engineers working in R&D industry and academia, who want to learn more about how nanocelluloses-based systems are commercially applied.
Synthesis, Modification and Applications CRC Press
Introduction to cellulose nanocomposites; strategies for preparation of cellulose wiskers from microcrystalline cellulose as reinforcement in nanocomposites; self-assembly of cellulose nanocrystals: parabolic focal conic films; cellulose fibrils: isolation, characterization, and capability for technical applications; morphology of cellulose and its nanocomposites; useful insights into cellulose nanocomposites using raman spectroscopy; novel methods for interfacial modification of cellulose - reinforced composites; cellulose nanocrystals for thermoplastic reinforcement: effect of filler surface chemistry on composite properties; the structure and mechanical properties of cellulose nanocomposites prepared by twin screw extrusion; preparation and properties of biopolymer-based nanocomposites films using microcrystalline cellulose; nanocompusites based on cellulose microfibril; cellulose microfibers as reinforcing agents for structural materials; dispersion of soybean stock-based nanofiber in plastic matrix; polysulfone-cellulose nanocomposites; bacterial cellulose and its nanocomposites for biomedical applications.
Crystalline Nanocellulose - Preparation, Modification, and Properties John Wiley & Sons
Nanocellulose is a versatile material that has received much attention from scientists working in a broad range of application fields, such as automotive, composites, adsorbents, paints, coatings, medical implants, electronics, cosmetics, pulp and paper, tissue engineering, medical, packaging, and aerogels. Industrial Applications of Nanocellulose and Its Nanocomposites provides an extensive, up-to-date review of this fast-moving research field. The chapters cover a wide range of aspects, including synthesis, surface modification, and improvement of properties toward target applications. The main objectives of the book are to reflect on recent advancements in the design and fabrication of advanced nanocellulose and discuss important requirements for each application, as well as the challenges that might be faced. The book also includes an overview of the current economic perspectives and safety issues, as well as future

directions for nanocellulose-based materials. It will serve as a valuable reference resource for academic and industrial researchers, environmental chemists, nanotechnologists, chemical engineers, polymer chemists, materials scientists, and all those working in the manufacturing industries. Comprehensively covers a broad range of industrial applications. Includes case studies on economic perspectives, safety issues, and advanced development of nanocellulose-based products. Discusses nanocellulose production from biological waste.
Fabrication and Industrial Applications Frontiers Media SA
Cellulose is a linear biopolymer found naturally in plant cells such as wood and cotton. It is the worlds most abundant polymer in nature and possesses properties such as good biocompatibility, low cost, low density, high strength, and good mechanical properties. By mechanical or chemical treatment, the cellulose fibers can be converted into cellulose nanofibers (CNFs) or cellulose nanocrystals (CNCs) that possess outstanding properties compared with the original cellulosic fiber but also when compared with other materials normally used as reinforcements in composite materials such as Kevlar or steel wires. This review will describe the nanocellulose materials preparation techniques and cellulose sources, chemical modification both on the crystalline surface and during hydrolysis and its many properties and its use in biocomposite materials. Nanocellulose in its different forms shows an increasing interest in application areas such as packaging, paper and paperboard, food industry, medical and hygiene products, paints, cosmetics, and optical sensors.
New Green Nanomaterials Elsevier
Green materials and green nanotechnology have gained widespread interest over the last 15 years; first in academia, then in related industries in the last few years.The Handbook of Green Materials serves as reference literature for undergraduates and graduates studying materials science and engineering, composite materials, chemical engineering, bioengineering and materials physics; and for researchers, professional engineers and consultants from polymer or forest industries who encounter biobased nanomaterials, bionanocomposites, self- and direct-assembled nanostructures and green composite materials in their lines of work.This four-volume set contains material ranging from basic, background information on the fields discussed, to reports on the latest research and industrial activities, and finally the works by contributing authors who are prominent experts of the subjects they address in this set.The four volumes comprise of:The first volume explains the structure of cellulose; different sources of raw material; the isolation/separation processes of nanomaterials from different material sources; and properties and characteristics of cellulose nanofibers and nanocrystals (starch nanomaterials). Information on the different characterization methods and the most important properties of biobased nanomaterials are also covered. The industrial point of view regarding both the processability and access of these nanomaterials, as well as large scale manufacturing and their industrial application is discussed — particularly in relation to the case of the paper industry.The second volume expounds on different bionanocomposites based on cellulose nanofibers or nanocrystals and their preparation/manufacturing processes. It also provides information on different characterization methods and the most important properties of bionanocomposites, as well as techniques of modeling the mechanical properties of nanocomposites. This volume presents the industrial point of view regarding large scale manufacturing and their applications from the perspective of their medical uses in printed electronics and in adhesives.The third volume deals with the ability of bionanomaterials to self-assemble in either liquids or forming organized solid materials. The chemistry of cellulose nanomaterials and chemical modifications as well as different assembling techniques and used characterization methods, and the most important properties which can be achieved by self-assembly, are described. The chapters, for example, discuss subjects such as ultra-light biobased aerogels based on cellulose and chitin, thin films suitable as barrier layers, self-sensing nanomaterials, and membranes for water purification.The fourth volume reviews green composite materials — including green raw materials — such as biobased carbon fibers, regenerated cellulose fibers and thermoplastic and thermoset polymers (e.g. PLA, bio-based polyolefines, polysaccharide polymers, natural rubber, bio-based polyurethane, lignin polymer, and furfurylalchohol). The most important composite processing technologies are described, including: prepregs of green composites, compounding, liquid composite molding, foaming, and compression molding. Industrial applications, especially for green transportation and the electronics industry, are also described.This four-volume set is a must-have for anyone keen to acquire knowledge on novel bionanomaterials — including structure-property correlations, isolation and purification processes of nanofibers and nanocrystals, their important characteristics, processing technologies, industrial up-scaling and suitable industry applications. The handbook is a useful reference not only for teaching activities but also for researchers who are working in this field.
Cellulose Nanocomposites John Wiley & Sons
Most composites, particularly those made using thermoset resins, cannot be recycled or reused. As a result, most of them end up in landfills at the end of their useful life which is neither sustainable nor environment-friendly. Various laws enacted by Governments around the world and heightened global awareness about sustainability and global warming is changing this situation. Significant research is being conducted in developing and utilizing sustainable fibers and resins, mostly derived from plant, to fabricate 'Green' composites. The significant progress in the past 20 or so years in this field has led to the development of green composites with high strength or so called Advanced Green Composites. More interestingly, green composites have also acquired various different properties such as fire resistance, transparency, barrier to gases and others. The term 'advanced' which only included high strength and stiffness now includes all these special properties. The world is on the cusp of a major change, and once fully developed, such composites could be used in applications ranging from automobiles to sporting goods, from circuit boards to housing and from furniture to packaging. This book, by presenting the state-of-the-art developments in many aspects of advanced green composites adds significantly to the knowledge base that is critical for their success of expanding their use in applications never seen before. The chapters are written by world’s leading researchers and present in-depth information in a simple way. This provides readers and researchers the latest developments in the field of 'Green' resins (with ways of strengthening them), High Strength Green Fibers (including micro and nano-cellulose fibrils/fibers) and Green Composites in the first few chapters. The introductory chapter summarizes the consequences of using conventional, petroleum-based materials and the need for green composites as well as the progress being made in this field. After that the book delves in to Advanced

Green Composites in a broader sense and includes chapters on High Strength Green Composites, Self-healing Green Composites, Transparent Green Composites, All-cellulose composites, Toughened Green Composites, Green Biofoams, Bioinspired Shape Memory Composites, etc. The chapters are written by the experts who are highly respected in their fields.

Handbook of Nanocelluloses Nanocellulose, Cellulose Nanofibers and Cellulose NanocompositesSynthesis and ApplicationsNanocellulose, due to its nanosize, offers a large surface area with new functionalities. These open a wide range of possible properties, as well as smart applications, in many fields. The growing interest in renewability, biocompatibility, biodegradability, and unsurpassed physical and chemical properties of nanocellulose has resulted in increased academic and industrial interests towards development of nanocellulose-based materials and cellulose nanocomposites. However, there are still some issues to overcome, and the main challenges in the field are related to efficient preparation and isolation of nanosize cellulosic materials from their natural sources. This book reviews some vital issues and topics concerning the latest scientific and technological advances in nanocellulose, cellulose nanofibers and cellulose nanocomposites. Some subjects included are nanocellulose, covering synthesis, characterization and applications of nanocellulose, extraction of nanocellulose from natural sources and synthesis of bacterial nanocellulose for medical applications. Cellulose nanofibers are devoted to advances in production, derivatization and utilization of micro- and nanofibrillated cellulose. Cellulose nanocomposites, covering the production and characterization for smart applications of cellulose-based nanocomposite, cellulose composite-based electrospun nanofibers for high-tech applications and the application of peptide-nanocellulose as a biosensor for human neutrophil elastase are also discussed. This book will provide an essential source of information to readers in the exploration of possible applications of nanocellulose in the above-mentioned fields. Let us hope that it also will help in the generation of new ideas for new applications and product development. A book like this, covering the above-mentioned vital issues and topics, should be useful to chemists, scientists, research scholars, polymer engineers and researchers in the industry.Handbook of Nanocellulose and Cellulose Nanocomposites, 2 Volume Set Aimed at researchers involved in this emerging field in both academia and industry, this book is unique in its focus on cellulose nanofibers, especially nano-composites, nanomoities and other plant based-resins and their composites. Despite its concise presentation, this handbook and ready reference provides a complete overview, containing such important topics as electrospinning, isolation, characterization and deposition of metallic nanoparticles.

Nanocellulose and Nanohydrogel Matrices John Wiley & Sons Biological materials and their applications have drawn increasing attention among scientists. Cellulose is an abundant, renewable, biodegradable, economical, thermally stable, and light material, and it has found application in pharmaceuticals, coatings, food, textiles, laminates, sensors, actuators, flexible electronics, and flexible displays. Its nano form has extraordinary surface properties, such as higher surface area than cellulose; hence, nanocellulose can be used as a substitute for cellulose. Among many other sustainable, functional nanomaterials, nanocellulose is attracting growing interest in environmental remediation technologies because of its many unique properties and functionalities. Nanocellulose and Its Composites for Water Treatment Applications supplies insight into the application of nanocellulose and its nanocomposites for water purification and remediation. It covers different classes of nanocellulose—cellulose nanocrystal (CNC), microfibrillated cellulose (MFC), hairy cellulose nanocrystalloid (HCNC), and bacterial nanocellulose (BNC)—for their competency with other renewable and carbonaceous materials such as pectin, alginate, and CNTs. Future perspectives of nanocellulose and nanocomposites gleaned from different biodegradable origins are also discussed. This book delves into an updated description of the basic principles and developments in synthesis, characterization methods, properties (chemical, thermal, optical, structural, surface, and mechanical structure), property relationships, crystallization behavior, and degradability of biodegradable nanocomposites. The book also supplies vivid information about various cellulose nanomaterials and their applications in absorbing organic and inorganic toxins, membrane filtration of bacteria, viruses, and ionic impurities, photocatalytic dye removal, and sensing of water toxins. Features Details the synthesis and characterization methods of nanocellulose Illustrates the applications of nanocellulose and its nanocomposites Shows in-depth accounts of the various types of properties of nanocellulose and its composites Features emerging trends in the use of nanocellulose as adsorbents, sensors, membranes, and photocatalysis materials This book will be useful for academics, researchers, and engineers working in water treatment and purification.

Polylactic Acid-Based Nanocellulose and Cellulose Composites John Wiley & Sons

Nanocelluloses: Synthesis, Modification and Applications is a book that provides some recent enhancements of various types of nanocellulose, mainly bacterial nanocellulose, cellulose nanocrystals and nanofibrils, and their nanocomposites. Bioactive bacterial nanocellulose finds applications in biomedical applications, https://doi.org/10.3390/nano9101352. Grafting and cross-linking bacterial nanocellulose modification emerges as a good choice for improving the potential of bacterial nanocellulose in such biomedical applications as topical wound dressings and tissue-engineering scaffolds, https://doi.org/10.3390/nano9121668. On the other hand, bacterial nanocellulose can be used as paper additive for fluorescent paper, https://doi.org/10.3390/nano9091322, and for the reinforcement of paper made from recycled fibers, https://doi.org/10.3390/nano9010058. Nanocellulose membranes are used for up-to-date carbon capture applications, https://doi.org/10.3390/nano9060877. Nanocellulose has been applied as a novel component of membranes designed to address a large spectrum of filtration problems, https://doi.org/10.3390/nano9060867. Poly(vinyl alcohol) (PVA) and cellulose nanocrystals (CNC) in random composite mats prepared using the electrospinning method are widely characterized in a large range of physical chemical aspects, https://doi.org/10.3390/nano9050805. Similarly, physical chemical aspects are emphasized for carboxylated cellulose nanofibrils produced by ammonium persulfate oxidation combined with ultrasonic and mechanical treatment, https://doi.org/10.3390/nano8090640. It is extraordinary how nanocellulose can find application in such different fields. Along the same lines, the contributions in this book come from numerous different countries, confirming the great interest of the scientific community for nanocellulose.

Removal of Refractory Pollutants from Wastewater Treatment

Plants Springer
This book discusses new and innovative trends and techniques in the removal of toxic and or refractory pollutants through various environmental biotechnological processes from wastewater, both at the laboratory and industrial scale. It focuses primarily on environmentally-friendly technologies which respect the principles of sustainable development, including the advanced trends in remediation through an approach of environmental biotechnological processes from either industrial or sewage wastewater. Features: Examines the fate and occurrence of refractory pollutants in wastewater treatment plants (WWTPs) and the potential approaches for their removal. Highlights advanced remediation procedures involving various microbiological and biochemical processes. Assesses and compares the potential application of numerous existing treatment techniques and introduces new, emerging technologies. Removal of Refractory Pollutants from Wastewater Treatment Plants is suitable for practicing engineers, researchers, water utility managers, and students who seek an excellent introduction and basic knowledge in the principles of environmental bioremediation technologies.
Cellulose Nanoparticles Volume 1 CRC Press
Drs. Ullah and Yang hold patents related to cellulose material. All other Topic Editors declare no competing interests with regard to the Research Topic subject. This Research Topic is dedicated to Prof. Lina Zhang on the occasion of her 80th Birthday, in gratitude, esteem, and affection.
Cellulose Nanocrystals MDPI
"In this thesis the preparation and investigation of various novel nanocrystalline cellulose and their applications are examined. Nanocrystalline cellulose (NCC) is usually prepared from strong acid hydrolysis, and contains negatively charged sulfate half-ester groups. A novel type of nanocellulose was produced by periodate oxidation. For partial oxidation, three products were generated after the oxidized cellulose fibers were subjected to a hot-water treatment: fibrous cellulose, rod-like dialdehyde cellulose nanofibers which we refer to as sterically stabilized nanocrystalline cellulose (SNCC), and soluble dialdehyde modified cellulose (DAMC). These three products were separated by centrifugation and cosolvent addition. SNCC has similar dimensions as conventional NCC, but carries no charges and is sterically stabilized by protruding DAMC chains. Very few methods have been developed for preparation of positively charged nanocellulose. We prepared a hairy cationic nanocellulose (CNCC) by a two-step reaction. First dialdehyde modified cellulose (DAMC) fibers were prepared by periodate oxidation of cellulose fibers and subsequently DAMC fibers were cationized by a reaction between the aldehyde groups of the fibers and the amine groups of (2-hydrazinyl-2-oxoethyl)-trimethylazanium chloride (Girard's reagent T (GT)) to produce cationic dialdehyde modified cellulose (CDAMC) fibers. Subjecting the suspension of CDAMC fibers to a hot-water treatment at 60 °C, resulted in the formation of cationic rod-like nanocrystalline cellulose (CNCC). This is a simple and environmentally friendly method. Electrosterically stabilized nanocrystalline cellulose (ENCC) is another novel type of nanocrystalline cellulose we prepared. We take advantage of the rod-like structure of ENCC which has the dicarboxylated cellulose (DCC) chains protruding from both ends, providing electrosterical stability for ENCC particles, to chemically end-to-end assemble these particles into long nanocellulose fibers. It is the first chemically end-to-end assembly of nanocellulose fibers by a bottom-up route, and provides the possibility to assemble nanocellulose with desired aspect ratio. Finally, a novel biomaterial-based adsorbent aerogel was prepared by crosslinking bi-functional nanocrystalline cellulose (BNCC) and carboxymethylated chitosan through a Schiff base reaction. The maximum adsorption capacity of this aerogel for methylene blue was found to be 785 mg/g at room temperature. To the best of our knowledge, this is the highest removal capacity for any reusable adsorbent prepared from biomaterials. " --
Elsevier
Cellulose-Reinforced Nanofibre Composites: Production, Properties and Applications presents recent developments in, and applications of, nanocellulose as reinforcement in composite and nanocomposite materials. Written by leading experts, the book covers properties and applications of nanocellulose, including the production of nanocellulose from different biomass resources, the usefulness of nanocellulose as a reinforcement for polymer and paper, and major challenges for successful scale-up production in the future. The chapters draw on cutting-edge research on the use of nanosized cellulose reinforcements in polymer composites that result in advanced material characteristics and significant enhancements in physical, mechanical and thermal properties. The book presents an up-to-date review of the major innovations in the field of nanocellulose and provides a reference material for future research in biomass based composite materials, which is timely due to the sustainable, recyclable and eco-friendly demand for highly innovative materials made from biomass. This book is an ideal source of information for scientific and industrial researchers working in materials science. Gathers together a broad spectrum of research on nanocellulose, with emphasis on the outstanding reinforcing potential when nanocellulose is included into a polymer matrix or as an additive to paper Demonstrates systematic approaches and investigations from processing, design, characterization and applications of nanocellulose Presents a useful reference and technical guide for nanocomposite materials R&D sectors, university academics and postgraduate students (Masters and PhD) and industrialists working in material commercialization
Production, Properties, Applications, and Case Studies Woodhead Publishing
Cellulose nanocrystals are being used more frequently as processing and nanofabrication techniques have advanced considerably. Cellulose Nanocrystals includes topics including Extraction and Fabrication Methodologies, Scale-Up Strategies and Life Cycle Assessment, Surface Modification Strategies, Nanocomposites, and Characterization and Testing Protocols. This book will appeal to physical, chemical and biological scientists as well as engineers.
Nanocellulose, Cellulose Nanofibers and Cellulose Nanocomposites Elsevier
Nanocellulose Based Composites for Electronics presents recent developments in the synthesis and applications of nanocellulose composites in electronics, highlighting applications in various technologies. Chapters covers new trends and challenges in a wide range of electronic applications and devices. Significant properties, safety, sustainability, and environmental impacts of the electronic devices are included, along with the challenges of using nanocellulose-based composites in electronics. This book is an important reference for materials scientists and engineers configuring and designing processes for the synthesis and device fabrication of nanocellulose composites in electronics. Explores how to utilize nanocellulose fibers and nano-crystalline cellulose substances to synthesize materials with designed functionalities

Outlines the major production processes for nanocellulous composites Discusses the major challenges that need to be surmounted in order to effectively use nanocellulous composites for electronics

From Fundamentals to Advanced Materials John Wiley & Sons

Handbook of Nanomaterials for Industrial Applications explores the use of novel nanomaterials in the industrial arena. The book covers nanomaterials and the techniques that can play vital roles in many industrial procedures, such as increasing sensitivity, magnifying precision and improving production limits. In addition, the book stresses that these approaches tend to provide green, sustainable solutions for industrial developments. Finally, the legal, economical and toxicity aspects of nanomaterials are covered in detail, making this is a comprehensive, important resource for anyone wanting to learn more about how nanomaterials are changing the way we create products in modern industry. Demonstrates how cutting-edge developments in nanomaterials translate into real-world innovations in a range of industry sectors Explores how using nanomaterials can help engineers to create innovative consumer products Discusses the legal, economical and toxicity issues arising from the industrial applications of nanomaterials

Biotechnological and Biomedical Applications World Scientific

Nanocellulose Materials: Fabrication and Industrial Applications focuses on the practices, distribution and applications of cellulose at the nanoscale. The book delivers recent advancements, highlights new perspectives and generic approaches on the rational use of nanocellulose, and includes sustainability advantages over conventional sources towards green and sustainable industrial developments. The topics and sub-topics are framed to cover all key features of cellulose, from extraction to technological evolution. Nanocellulose has great potential due to its versatility and numerous applications, including the potential role of nanocellulose scaffold derivatives towards active involvement in the energy sector, chemical sensing, catalysis, food industry and anti-bacterial coatings towards land, agricultural and aquatic systems. Explores the whole spectrum of industrial scale fabrications and the utilization of nanocellulose as a sustainable material or as part of a sustainability agenda Discusses the environmental, legal, health and safety issues of nanocellulose Assesses the major challenges and opportunities for using nanocellulose at an industrial scale

Multifunctional Hairy Nanocrystalline Cellulose Walter de Gruyter GmbH & Co KG

Comprehensively introduces readers to the production, modifications, and applications of nanocellulose This book gives a thorough introduction to the structure, properties, surface modification, theory, mechanism of composites, and functional materials derived from nanocellulose. It also provides in-depth descriptions of plastics, composites, and functional nanomaterials specifically derived from cellulose nanocrystals, cellulose nanofibrils, and bacterial cellulose. It includes the most recent progress in developing a conceptual framework of nanocellulose, as well as its numerous applications in the design and manufacture of nanocomposites and functional nanomaterials. The book also looks at the relationship between structure and properties. Featuring contributions from many noted experts in the field, Nanocellulose: From Fundamentals to Advanced Materials examines the current status of nanocomposites based on nanocelluloses. It covers surface modification of nanocellulose in the nanocomposites development; reinforcing mechanism of cellulose nanocrystals in nanocomposites; and advanced materials based on self-organization of cellulose nanocrystals. The book studies the role of cellulose nanofibrils in nanocomposites, as well as a potential application based on colloidal properties of cellulose nanocrystals. It also offers strategies to explore biomedical applications of nanocellulose. - Provides comprehensive knowledge on the topic of nanocellulose, including the preparation, structure, properties, surface modification and strategy -Covers new reports on the application of nanocellulose -Summarizes three kinds of nanocellulose (cellulose nanocrystals, cellulose nanofibrils, and bacterial cellulose) and their production, modification, and applications Nanocellulose: From Fundamentals to Advanced Materials is a useful resource for specialist researchers of chemistry, materials, and nanotechnology science, as well as for researchers and students of the subject.

From Nanochemistry and Nanomanufacturing to Advanced Applications Elsevier

Nanocellulose, Cellulose Nanofibers and Cellulose NanocompositesSynthesis and Applications

Bacterial NanoCellulose John Wiley & Sons

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.