Cellulose Chemistry and Properties Fibers Nanocelluloses and Advanced Materials Advances In Polymer Science

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Biermann's Handbook of Pulp and Paper: Raw Material and Pulp Making, Third Edition is a comprehensive reference for industry and academia covering the entire gamut of pulping technology. This book provides a thorough introduction to the entire technology of pulp manufacture; features chapters covering all aspects of pulping from wood handling at the mill site through pulping and bleaching and pulp drying. It also includes a discussion on bleaching chemicals, recovery of pulping spent liquors and regeneration of chemicals used and the manufacture of side products. The secondary fiber recovery and utilization and current advances like organosolv pulping and attempts to close the cycle in bleaching plants are also included. Hundreds of illustrations, charts, and tables help the reader grasp the concepts being presented. This book will provide professionals in the field with the most up-to-date and comprehensive information on the state-of-the-art techniques and aspects involved in pulp making. It has been updated, revised and extended. Alongside the traditional aspects of pulping and papermaking processes, this book also focuses on biotechnological methods, which is the distinguishing feature of this book. It includes wood-based products and chemicals, production of dissolving pulp, hexenuronic acid removal, alternative chemical recovery processes, forest products biorefinery. The most significant changes in the areas of raw material preparation and handling, pulping and recycled fiber have been included. A total of 11 new chapters have been added. This handbook is essential reading for all chemists and engineers in the paper and pulp industry. Provides comprehensive coverage on all aspects of pulp making Covers the latest science and technology in pulp making Includes traditional and biotechnological methods, a unique feature of this book Presents the environmental impact of pulp and papermaking industries Sets itself apart as a valuable reference that every pulp and papermaker/engineer/chemist will find extremely usefulA state-of-the-art review of cellulose chemistry and technology, covering structure and biosynthesis, cellulose modification, liquid crystals of cellulose derivatives and cellulose degradation. The book describes structures of cellulose fibers and new methods for fiber production, and includes methods of x-ray diffraction and model selection for characterization of cellulose and cellulose-solvent complexes, wettability, hornification and dry forming of cellulose fibers. The book also provides fundamentals of the chemistry and physics of cellulose. Cellulose is not only a major constituent of wood and natural textile fibers. It also serves as a polymeric starting material for products used in many areas of industry and every-day-life. The handbook, written by leading experts in the field, is divided in two volumes: In the first volume general information on cellulose structure and properties is given as well as the principles of homogeneous and heterogenous cellulose reactions and degradation pathways. Analytical methods for the characterization of cellulose are also described. The second volume of the book covers synthetic routes to the various
classes of cellulose derivatives. Structured according to the principles of organic chemistry the achievements of today's reaction theory are considered and supplemented by an extensive collection of working procedures. The third part deals with the latest developments and future trends in cellulose chemistry - from progress in cellulose processing to the supramolecular chemistry of new derivatives of cellulose. This extensive coverage makes the book a standard work for graduate students entering this fascinating field of research, but also chemists, biologists and engineers who are active in chemical processing of cellulose will find a wealth of information. This book presents emerging economical and environmentally friendly polymer composites that are free of the side effects observed in traditional composites. It focuses on eco-friendly composite materials using granulated cork, a by-product of the cork industry; cellulose pulp from the recycling of paper residues; hemp fibers; and a range of other environmentally friendly materials procured from various sources. The book presents the manufacturing methods, properties and characterization techniques of these eco-friendly composites. The respective chapters address classical and recent aspects of eco-friendly polymer composites and their chemistry, along with practical applications in the biomedical, pharmaceutical, automotive and other sectors. Topics addressed include the fundamentals, processing, properties, practicality, drawbacks and advantages of eco-friendly polymer composites. Featuring contributions by experts in the field with a variety of backgrounds and specialties, the book will appeal to researchers and students in the fields of materials science and environmental science. Moreover, it fills the gap between research work in the laboratory and practical applications in related industries. Natural Fibers, Plastics and Composites deals with plant and animal derived natural fibers, natural composite matrix materials and biocomposites, which are beginning to find their way into commercial applications in today's market. Some represent already commercial technologies or commercial developments and others represent significant recent research advances. The book reviews the sources, structures, properties and applications of the new materials. It serves as an introduction to a rapidly growing field of science and technology and it aims to support fundamental research, to assist scientists and designers in industry, and to facilitate materials science instruction in universities and colleges. Cellulose is not only a major constituent of wood and natural textile fibers. It also serves as a polymeric starting material for products used in many areas of industry and everyday-life. The book, written by leading experts in the field, is divided into volumes: In the first volume general information on cellulose structure and properties is given as well as the principles of homogeneous and heterogeneous cellulose reactions and degradation pathways. Analytical methods for the characterization of cellulose are also described. The second volume covers synthetic routes to the various classes of cellulose derivatives. Structured according to the principles of organic chemistry the achievements of today's reaction theory are considered and supplemented by an extensive collection of working procedures. It also deals with the latest developments and future trends in cellulose chemistry - from progress in cellulose processing to the supramolecular chemistry of new derivatives of cellulose. This extensive coverage makes the book a standard work for graduate students entering this fascinating field of research, but also chemists, biologists and engineers who are active in chemical processing of cellulose will find a wealth of information. Connects fiber chemistry and structure to properties that can be designed and engineered. Micro- and nanoscale, synthetic and natural polymer and non-polymer fibers explained with applications to industrial, electronic, biomedical and energy Information pertinent for fiber, textile, composite, polymer and materials specialists. This volume provides the basic chemical and mathematical theory needed to understand and modify the connections among the structure, formation and properties of many different types of manmade and natural fibers. At a fundamental level it explains how polymeric and non-polymeric fibers are organized, how such fibers are formed, both synthetically and biologically, and how primary and secondary properties, from basic flow to thermal and electrical qualities, are derived from molecular and submolecular organization, thus establishing the quantitative and predictive relationships needed for fiber engineering. The book goes on to show how fiber chemistry and modes of processing for dozens of materials such as silks, ceramics, glass and carbon can be used to control functional optical, conductive, thermal and other properties. Its discussion ranges over microscale and nanoscale fibers (nanofibers), covering methods such as spinning and electrospinning, as well as biological fiber generation through self-assembly. Technologies in this text apply to the analysis and design of fibers for industrial, electronic, optical, medical and energy storage applications. 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.

Cellulose is not only a major constituent of wood and natural textile fibers. It also serves as a polymeric starting material for products used in many areas of industry and every-day-life. The book, written by leading experts in the field, is divided into volumes: In the first volume general information on cellulose structure and properties is given as well as the principles of homogeneous and heterogeneous cellulose reactions and degradation pathways. Analytical methods for the characterization of cellulose are also described. The second volume covers synthetic routes to the various classes of cellulose derivatives. Structured according to the principles of organic chemistry the achievements of today’s reaction theory are considered and supplemented by an extensive collection of working procedures. It also deals with the latest developments and future trends in cellulose chemistry - from progress in cellulose processing to the supramolecular chemistry of new derivatives of cellulose. This extensive coverage makes the book a standard work for graduate students entering this fascinating field of research, but also chemists, biologists and engineers who are active in chemical processing of cellulose will find a wealth of information.

This monograph summarizes scientific achievements in the field of polysaccharide chemistry performed in the last decade. For the first time, the particular features of polysaccharide structure, physical-chemical properties and biochemical transformations in their interrelations are considered as well as the questions of polysaccharide modification along the whole hierarchical chain, including starch mono-, di-, oligo- and polysaccharides, chitin, chitozan and cellulose. Polysaccharide interactions with diverse solvents and low-molecular, macromolecular and high-molecular substances in solutions are scrutinized. Several aspects of mechanical-chemical modification of polysaccharides in solid state and in gel are observed. Modern concepts of enzyme degradation of polysaccharides and technologies of natural polymers processing are analyzed. The book is intended for wide range of readers: students, post graduates, engineers and scientists engaged in polymer chemistry, organic and physical chemistry. This book summarizes recent progress in cellulose chemistry. The last 10 years have witnessed important developments, because sustainability is a major concern. Biodegradable cellulose derivatives, in particular esters and ethers, are employed on a large scale. The recent developments in cellulose chemistry include unconventional methods for the synthesis of derivatives, introduction of novel solvents, e.g. ionic liquids, novel approaches to regioselective derivatization of cellulose, preparation of nano-particles and nano-composites for specific applications. These new developments are discussed comprehensively. This book is aimed at researchers and professionals working on cellulose and its derivatives. It fills an important gap in teaching, because most organic chemistry textbooks concentrate on the relatively simple chemistry of mono- and disaccharides. The chemistry and, more importantly, the applications of cellulose are only concisely mentioned. 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, cuprammonium 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. This book discusses recent advances in hydrogels, including their generation and applications and presents a compendium of fundamental concepts. It highlights the most important hydrogel materials, including physical hydrogels, chemical hydrogels, and nanohydrogels and explores the development of hydrogel-based novel materials that respond to external stimuli, such as temperature, pressure, pH, light, biochemicals or magnetism, which represent a new class of intelligent materials. With their multiple cooperative functions, hydrogel-based materials exhibit different potential applications ranging from biomedical engineering to water purification systems. This book covers key topics including superabsorbent polymer hydrogel; intelligent hydrogels for drug delivery; hydrogels from catechol-conjugated materials; nanomaterials loaded hydrogel; electrospinning of hydrogels; biopolymers-based hydrogels; injectable hydrogels; interpenetrating-polymer-network hydrogels: radiation- and sonochemical synthesis of micro/nano/macroscopic hydrogels; DNA-based hydrogels; and multifunctional applications of hydrogels. It will prove a valuable resource for researchers working in industry and academia alike. Vincent Bulone et al.: Cellulose sources and new understanding of synthesis in plants Thomas Heinze et al.: Cellulose structure and properties Thomas Rosenau, Antje Potthast, Ute Henniges et al.: Recent developments in cellulose aging (degradation / yellowing / chromophore formation) Sunkyu Park et al.: Cellulose crystallinity Lina Zhang et al.: Gelation and dissolution behavior of cellulose Yoshiyuki Nishio et al.: Cellulose and derivatives in liquid crystals Alessandro Gandini, Naceur Belgacem et al.: The surface and in-depth modification of cellulose fibers Emily D. Cranston et al.: Interfacial properties of cellulose Herbert Sixta, Michael Hummel et al. Cellulose Fibers Regenerated from Cellulose Solutions in Ionic Liquids Qi Zhou et al.: Cellulose-based biocomposites Orlando Rojas et al.: Films of cellulose nanocrystals and nanofibrils Pedro Fardim et al.: Functional cellulose particles Wadood Hamad et al.: Cellulose Composites Annual cotton production exceeds 25 million metric tons and accounts for more than 40 percent of the textile fiber consumed worldwide. A key textile fiber for over 5000 years, this complex carbohydrate is also one of the leading crops to benefit from genetic engineering. Cotton Fiber Chemistry and Technology offers a modern examination of cotton chemistry and physics, classification, production, and applications. The book focuses on providing the most up-to-date information on cotton fiber chemistry and properties. Written by leading authorities in cotton chemistry and science, the book details fiber biosynthesis, structure, chemical composition and reactions, physical properties and includes information on biotech, organic, and colored cotton. The final chapters examine worldwide production, consumption, markets, and trends in the cotton industry. They also address environmental, workplace, and consumer risks from exposure to processing chemicals and emissions. Tracing the conversion of cotton fibers from raw materials into marketable products, Cotton Fiber Chemistry and Technology offers a complete overview of the science, technology, and economic factors that impact cotton production and applications today. Enzymes Conjugated to Graphene, Volume 609 in the Methods in Enzymology series, highlights new advances in the field, with this new volume presenting interesting chapters on Enzyme immobilization, Detection of Urea, Enzyme immobilization Enzyme immobilization, PAMAM dendrimer modified reduced graphene oxide post functionalized by horseradish peroxidase for biosensing H2O2, HRP immobilized for LEV detection, Enzyme immobilization, Graphene biocatalysts, Enzyme immobilization, Interactions, Enzyme immobilization, GOD, Enzyme Immobilization, and Enzyme immobilization on functionalized graphene oxide nanosheets. Provides the authority and expertise of leading contributors from an international board of authors. Presents the latest release in the Methods of Enzymology series. Updated release includes the latest information on the enzymes conjugated to grapheneCellulose nanoparticles (CNP) are a class of bio-based nanoscale materials, which are of interest due to their unique structural features and properties such as biocompatibility, biodegradability, and renewability. They are promising candidates for applications including in biomedicine, pharmaceuticals, electronics, barrier films, nanocomposites, membranes, and supercapacitors. New resources, extraction procedures and treatments are currently
under development to satisfy increasing demands for cost-effective and sustainable methods of manufacturing new types of cellulose nanoparticle-based materials on an industrial scale. Cellulose Nanoparticles: Chemistry and Fundamentals covers the synthesis, characterization and processing of cellulose nanomaterials. It aims to address the recent progress in the production methodologies for cellulose nanoparticles, covering principal cellulose resources and the main processes used for isolation. Chapters cover the preparation and characterisation of cellulose nanocrystals and nanofibrils. Together with Volume 2, these books form a useful reference work for graduate students and researchers in chemistry, materials science, nanoscience and green nanotechnology. Cellulose is not only a major constituent of wood and natural textile fibers. It also serves as a polymeric starting material for products used in many areas of industry and every-day-life. The book, written by leading experts in the field, is divided in to volumes: In the first volume general information on cellulose structure and properties is given as well as the principles of homogeneous and heterogenous cellulose reactions and degradation pathways. Analytical methods for the characterization of cellulose are also described. The second volume covers synthetic routes to the various classes of cellulose derivatives. Structured according to the principles of organic chemistry the achievements of today's reaction theory are considered and supplemented by an extensive collection of working procedures. It also deals with the latest developments and future trends in cellulose chemistry - from progress in cellulose processing to the supramolecular chemistry of new derivatives of cellulose. This extensive coverage makes the book a standard work for graduate students entering this fascinating field of research, but also chemists, biologists and engineers who are active in chemical processing of cellulose will find a wealth of information. The Handbook of Fiber Chemistry, Third Edition provides complete coverage of scientific and technological principles for all major natural and synthetic fibers. Incorporating new scientific techniques, instruments, characterization, and processing methods, the book features important technological advances from the past decade, particularly in fiber production and novel applications. It contains the latest data and insight into the chemistry and structural properties made possible by these advances. Authored by leading experts in the field of fiber science, most chapters in this third edition of a bestseller are either new or extensively updated. Chapters on synthetic fibers detail their formation from monomers, while those on natural fibers cover extraction and purification methods. Each chapter encompasses definitions, morphology, and fine structure; properties, testing, processing methods, and equipment; and the conversion into marketable products. Taking into account the recent expansion and diversification of markets for various fibers, this book also offers a solid foundation in the principles used for developing new fibers, including biologically and electronically active fibers. The Handbook of Fiber Chemistry, Third Edition offers a better understanding of the structure–property relationships of fibers and fiber-related phenomena. It is an ideal volume for scientists, technologists, and engineers working to develop novel and innovative products and technologies using natural and synthetic fibers. This textbook introduces the industrial production and processing of natural resources. It is divided into six major topics (fats and oils, carbohydrates, lignin, terpenoids, other natural products, biorefinery), which are divided into a total of 20 chapters. Each chapter is self-contained and therefore a compact learning unit, which can be worked on by students in self-study or presented by lecturers. Clear illustrations, flow diagrams, apparatus drawings and photos facilitate the understanding of the subject matter. All chapters end with a succinct summary, the "Take Home Messages". Each chapter is supplemented by ten short test questions, which can be solved quickly after working through the chapter; the answers are at the end of the book. All chapters contain bibliographical references that focus on essential textbooks and reference works. As a prior knowledge, only basic knowledge of chemistry is required. The use of natural fibres as reinforcements in composites has grown in importance in recent years. Natural Fibre Composites summarises the wealth of significant recent research in this area. Chapters in part one introduce and explore the structure, properties, processing, and applications of natural fibre reinforcements, including those made from wood and cellulosic fibres. Part two describes and illustrates the processing of natural fibre composites. Chapters discuss ethical practices in the processing of green composites, manufacturing methods and compression and injection molding techniques for natural fibre composites, and thermoset matrix natural fibre-reinforced composites. Part three highlights and interprets the testing and properties of natural fibre composites including, non-destructive and high strain rate testing. The performance of natural fibre composites is examined under dynamic loading, the response of natural fibre composites to impact damage is appraised,
and the response of natural fibre composites in a marine environment assessed. Natural Fibre Composites is a technical guide for professionals requiring an understanding of natural fibre composite materials. It offers reviews, applications and evaluations of the subject for researchers and engineers. Introduces and explores the structure, properties, processing, and applications of natural fibre reinforcements, including those made from wood and cellulose fibres Highlights and interprets the testing and properties of natural fibre composites, including non-destructive and high strain rate testing Examines performance of natural fibre composites under dynamic loading, the response of natural fibre composites to impact damage, and the response of natural fibre composites in a marine environmentThis text details the principal concepts and developments in wood science, chemistry and technology. It includes new chapters on the chemical synthesis of cellulose and its technology, preservation of wood resources and the conservation of waterlogged wood.Cellulose is destined to play a major role in the emerging bioeconomy. Awareness of the environment and a depletion of fossil fuels are some of the driving forces for looking at forest biomaterials for an alternative source of energy, chemicals and materials. The importance of cellulose is widely recognized world-wide and as such the field of cellulose science is expanding exponentially. Cellulose, the most abundant biopolymer on earth, has unique properties which makes it an ideal starting point for transforming it into useful materials. To achieve this, a solid knowledge of cellulose is essential. As such this book on cellulose, the first in a series of three, is very timely. It deals with fundamental aspect of cellulose, giving the reader a good appreciation of the richness of cellulose properties. Book Cellulose - Fundamental Aspects is a good introduction to books Cellulose - Medical, Pharmaceutical and Electronic Applications and Cellulose - Biomass Conversion , in which applications of cellulose and its conversion to other materials are treated.Cellulose Nanoparticles: Chemistry and Fundamentals covers the synthesis, characterization and processing of cellulose nanomaterials. Nanomaterials contain some unique properties due to their nanometric size and surface functionalization. Nanomaterial functionalization also affects their compatibility to biocompatibility and toxicity behaviors. environment and living organism. This makes functionalized nanomaterials a material with huge scope and few challenges. This book provides detailed information about the nanomaterial functionalization and their application. Recent advancements, challenges and opportunities in the preparation and applications of functionalized nanomaterials are also highlighted. This book can serve as a reference book for scientific investigators, doctoral and post-doctoral scholars; undergrad and grad. This book is very useful for multidisciplinary researchers, industry personnel’s, journalists, and policy makers. Features: Covers all aspects of Nanomaterial functionalization and its applications Describes and methods of functionalized nanomaterials synthesis for different applications Discusses the challenges, recent findings, and cutting-edge global research trends on functionalization of nanomaterials and its applications It discusses the regulatory frameworks for the safe use of functionalized nanomaterials. It contains contributions from international experts from multiple disciplines.Because we are living in an era of Green Science and Technology, developments in the field of bio- and nano- polymer composite materials for advanced structural and medical applications is a rapidly emerging area and the subject of scientific attention. In light of the continuously deteriorating environmental conditions, researchers all over the world have focused an enormous amount of scientific research towards bio-based materials because of their cost effectiveness, eco-friendliness and renewability. This handbook deals with cellulose fibers and nano-fibers and covers the latest advances in bio- and nano- polymer composite materials. This rapidly expanding field is generating many exciting new materials with novel properties and promises to yield advanced applications in diverse fields. This book reviews vital issues and topics and will be of interest to academicians, research scholars, polymer engineers and researchers in industries working in the subject area. It will also be a valuable resource for undergraduate and postgraduate students at institutes of plastic engineering and other technical institutes.Biomass for Bioenergy and Biomaterials presents an overview of recent studies developed specifically for lignocellulose-based production of biofuels, biochemicals, and functional materials. The emphasis is on using sustainable chemistry and engineering to develop innovative materials and fuels for practical applications. Technological strategies for the physical processing or biological conversion of biomass for material production are also presented. FEATURES Offers a comprehensive view of biomass processing, biofuel production, life cycle assessment, techno-economic analysis, and biochemical and biomaterial production Presents details of innovative strategies to pretreat biomass Helps readers understand the underlying metabolic pathways and identify the
best engineering strategies for their native strain Highlights different strategies to make biomaterials from biomass Provides insight into the potential economic viability of the biomass-based process This book serves as an ideal reference for academic researchers and engineers working with renewable natural materials, the biorefining of lignocellulose, and biofuels. It can also be used as a comprehensive reference source for university students in metabolic, chemical, and environmental engineering. Because we are living in an era of Green Science and Technology, developments in the field of bio- and nano- polymer composite materials for advanced structural and medical applications is a rapidly emerging area and the subject of scientific attention. In light of the continuously deteriorating environmental conditions, researchers all over the world have focused an enormous amount of scientific research towards bio-based materials because of their cost effectiveness, eco-friendliness and renewability. This handbook deals with cellulose fibers and nano-fibers and covers the latest advances in bio- and nano- polymer composite materials. This rapidly expanding field is generating many exciting new materials with novel properties and promises to yield advanced applications in diverse fields. This book reviews vital issues and topics and will be of interest to academicians, research scholars, polymer engineers and researchers in industries working in the subject area. It will also be a valuable resource for undergraduate and postgraduate students at institutes of plastic engineering and other technical institutes. The objectives of this book are twofold: To provide a thorough examination of the materials science of cellulosic fibers with emphasis on the characterization of structure-property relations, and To advance knowledge of how to best analyze cellulosic fibrous networks and composites, and, ultimately, engineer 'novel' cellulose-based systems of superior performance and functionality. The book is structured in five chapters which provide a sequential treatment of the running theme: deformation mechanics and the physical, morphological and mechanical characterization of native cellulose fibers networks and composites. (Midwest).International Conference on Composite Materials Science and Technology (ICCMST 2018) Selected, peer reviewed papers from the 2018 International Conference on Composite Materials Science and Technology (ICCMST 2018), April 6-8, 2018, Bangkok, Thailand This book addresses both classic concepts and state-of-the-art technologies surrounding cellulose science and technology. Integrating nanoscience and applications in materials, energy, biotechnology, and more, the book appeals broadly to students and researchers in chemistry, materials, energy, and environmental science. • Includes contributions from leading cellulose scientists worldwide, with five Anselm Payen Cellulose Award winners and two Hayashi Jisuke Cellulose Award winners • Deals with a highly applicable and timely topic, considering the current activities in the fields of bioeconomies, biorefineries, and biomass utilization • Maximizes readership by combining fundamental science and application development Cellulose - Fundamental Aspects and Current Trends consists of 10 chapters written by international subject matter experts investigating the characteristics and current applications of this fascinating material. This book will help the reader to develop a deeper understanding about the concepts related to cellulose and the nanocellulose structure, modification, production, dissolution, and application. Biosynthesis mechanisms and medical applications of microbial cellulose are also discussed. This book will serve as the starting point for materials science researchers, engineers, and technologists from diverse backgrounds in physics, chemistry, biology, materials science, and engineering who want to know and better understand the unique characteristics of the most abundant biopolymer on earth. Cellulose represents the most widely spread organic polymer found in nature and it was used for a long time as a raw material for paper, textiles, film and flexible packing material. Due to its accessibility in huge amounts by photosynthesis process as a renewable material, cellulose is considered at present the answer to many problems connected with sustainable development. This explains the great scientific interest for this compound along with a lot of preoccupations to systematize the accumulated information in reviews and books. This book will present the aspects of cellulose obtaining in the correlation with its integration in a new concept of biorefining. Thus usual technological steps of pulp manufacture (pulping, bleaching) will be continued with chemistry characteristics of by-products and their utilization, fiber characterization for paper obtaining, cellulose derivatives and special products resulted in cellulose processing (beads and microspheres, micro-and nano-structures, fibers production, their antibacterial properties, optical functional film, and hydrogen). This extensive book should prove to be a very useful tool for scientists, students and postgraduates working in the field of pulp, paper and cellulose derivatives aiming at opening a new era for renewable resources processed by biorefining.