

**POLYSACCHARIDES IN MEDICINAL AND PHARMACEUTICAL APPLICATIONS**, Valentin Popa (Ed.), iSmithers – A Smithers Group Company, ISBN 978-1-84735-437-2, 408 pp.

In line with the current focus on sustainable economy, polysaccharides have received special attention due to the diversity of their sources, their non-toxicity, biodegradability and biocompatibility, but also due to the fact that they are renewable sources capable of chemical modifications. The book provides a comprehensive overview of research regarding the use of polysaccharides in the medical and pharmaceutical field.

The first chapter, *Configurations, Structures and Morphologies of Cellulose*, presents an overview of the structure, morphology, sources and physico-chemical properties of cellulose. Particular importance is given to micro- and nano-structured cellulose materials, due to their applicability as additives in pharmaceutical formulations, as biocompatible hydrogels or as scaffold materials in tissue engineering.

In Chapter 2, *Hemicelluloses in Pharmacy and Medicine*, the sources and the chemical structure of hemicelluloses, together with their most interesting applications, are presented. The most important properties of hemicelluloses, including the controllable biological activity, biodegradability and their ability to form hydrogels, are also included in this chapter.

The current applications of fungal exopolysaccharides are summarised in Chapter 3, *Fungal Exopolysaccharides*. The unique properties of some bioactive fungal exopolysaccharides, which make possible their use as immunomodulators, antitumor agents, and effective agents in the treatment of microbial infections and in lowering blood pressure or cholesterol in humans, are presented in this chapter. These properties are correlated with the structure, depending on the microorganisms that synthesised the exopolysaccharides and the conditions of production. The heteropolysaccharides, which are complex compounds made up from different sugar monomers, some of which may be negatively charged, are also discussed here.

Chapter 4, *Pullulan for Biomedical Uses*, is an overview of the structure, rheological properties of pullulan solutions and films, their biological properties and some derivatives in solution. The chemical modifications of pullulan, such as carboxymethylation and sulfation, are also mentioned in this chapter. The possibility of developing different systems based on micro- and nano-hydrogels, films and multilayer formation for drug delivery is also minutely presented in this chapter.

The use of cellulose in the medical field for membranes in dialysis or blood purification is presented in Chapter 5, *Cellulose and Its Use for Blood Purification*.

*Immunomodulatory Effects of Botanical Polysaccharides* (Chapter 6) presents the significant therapeutic potential of polysaccharides extracted from mushrooms, algae and higher plants and the future development of novel compounds with medical value. The antioxidant, mitogenic and antiviral activity, the adjuvant effects, antitumor properties and effects on the leucocyte function of these plant-derived polysaccharides are also included in this chapter.

In Chapter 7, *Pharmaceutical Applications of Cyclodextrins*, extensive information regarding the physico-chemical properties of cyclodextrins and their potential for pharmaceutical applications are summarized. Their ability to form inclusion compounds with various substances and their high capacity to entrap different active principles are only some interesting aspects focused upon in this chapter, which increase their potential for being used in the pharmaceutical field.

In *Bioactivity of Chondroitin Sulfate* (Chapter 8), the authors discuss some details about the biological functions of chondroitin sulfate at the cellular level in treating arthritis. This chapter also presents biomaterials containing chondroitin sulfate and its role in improving their biological activity. These materials can be used as scaffolds in cartilage tissue engineering, in wound healing for tissue regeneration or heart valve engineering.

At present, many polysaccharides are used to serve pharmaceutical needs as carriers for controlled drug release. A lot of examples of micro- and nano-carriers based on polysaccharides applied in various fields, such as ophthalmic, respiratory, renal, cardiovascular, digestive, immunologic diseases, cancer therapy,

neurologic and endocrine pathology, are summarized in Chapter 9, *Micro- and Nanoparticles Based on Polysaccharides for Drug Release Applications*.

Finally, in Chapter 10, *Carbohydrate-Containing Dendrimers in Biomedical Applications*, the involvement of dendrimers based on carbohydrates in drug and gene delivery, synthetic vaccines and the prevention of pathological processes caused by bacteria and viruses is presented.

Covering all aspects, the book is a useful instrument for postgraduate students or scientists from the academic and industrial community working with polysaccharides and their possible applications. This book will be appreciated due to the overview on the use of polysaccharides and their derivatives in the top fields, such as medicine and pharmacy.

Dana Mihaela SUFLET

**HANDBOOK OF WOOD CHEMISTRY AND WOOD COMPOSITES**, Roger M. Rowell (Ed.), Second Edition, CRC Press, Taylor & Francis Group, LLC, ISBN 978-1-4398-5380-1, 2012, 687 pp.

The book presents comprehensive and critical concepts, as well as the future trends in wood chemistry and wood composites, by compiling contributions of international experts in the field. The volume is structured in four main parts, each of them having a variable number of chapters.

Chapter 1 – *Wood and Society* (C. D. Risbrudt) – provides a comprehensive survey on the role of wood in human history, taking into account the environment, sustainability, recycling, energy, sequestering carbon, and the depletion of resources. All implications, such as economic, social, political and environmental, refer especially to America.

The first part – **Structure and Chemistry** – contains two chapters:

Chapter 2 – *Structure and Function of Wood* (A. C. Wiedenhoef) – reviews the basic biological structure of wood and provides a basis for interpreting its properties in an engineering context. The structure of wood is presented on a decreasing scale to better understand its strengths and limitations.

Chapter 3 – *Cell Wall Chemistry* (R. M. Rowell, R. Pettersen and M. A. Tshabalala) – discusses in details the chemical composition of wood and bark in softwood and hardwood, and also presents complete chemical analysis accounts for all the components.

The second part – **Properties** – contains the following chapters:

Chapter 4 – *Moisture Properties* (R. M. Rowell) – presents valuable information regarding the moisture contents of wood, the distribution of moisture and its effect on different properties of wood, as well as the swelling and shrinking of wood.

Chapter 5 – *Biological Properties of Wood* (R. E. Ibach) – is focused on biological organisms (such as bacteria, mold, stain, decay fungi, insects, marine borers) and their mechanism of degradation, and describes the most important prevention and protection measures.

Chapter 6 – *Thermal Properties, Combustion, and Fire Retardancy of Wood* (R. M. Rowell and M. A. Diertenberger) – refers to the chemistry of pyrolysis and combustion of wood and its components, as well as fire retardant treatments for wood and the ways to test their efficiency.

Chapter 7 – *Weathering of Wood and Wood Composites* (P. D. Evans) – emphasizes some of the more recent research on the weathering and protection of wood and particularly wood composites.

Chapter 8 – *Surface Characterization* (M. A. Tshabalala, J. Jakes, M. R. VanLandingham, S. Wang and J. Peltonen) – presents the most important methods for characterizing the surface properties of wood, such as the microscopic (Confocal Laser Scanning Microscopy, Scanning Electron Microscopy, Atomic Force Microscopy and Nanoindentation), spectroscopic (Molecular Spectroscopy, Electron Spectroscopy and Mass Spectroscopy) and thermodynamic (Contact Angle Analysis, Inverse Gas Chromatography and Total Surface Energy) methods.

The third section – **Wood Composites** – includes five chapters:

Chapter 9 – *Wood Adhesion and Adhesives* (C. R. Frihart) – discusses some of the fundamental aspects regarding the chemistry of adhesives, together with examples of application, setting and the performance of adhesives.

Chapter 10 – *Wood Composites* (M. A. Irle, M. C. Barbu, R. Reh, L. Bergland and R. M. Rowell) – provides a brief overview of the manufacturing technologies used to make wood-based panel (WBP) products.

Chapter 11 – *Chemistry of Wood Strength* (J. E. Winandy and R. M. Rowell) – describes a theoretical model in order to explain the relationship between the mechanical properties and the chemical components of wood, which was further used to describe the effects of altered composition on the mechanical properties.

Chapter 12 – *Fiber Webs* (R. M. Rowell) – discusses about the production of a wide variety of low-density, three-dimensional webs, mats, fiber-molded products by using wood fibers, taking into account their testing protocols and applications.

Chapter 13 – *Wood/Nonwood Thermoplastic Composites* (C. M. Clemons, R. M. Rowell, D. Plackett and B. K. Segerholm) – investigates the processing and the properties of wood thermoplastics, nonwood fibers in thermoplastic composites, bioplastics and polylactide fiber composites.

The fourth and last section – **Property Improvements** – includes the chapters:

Chapter 14 – *Heat Treatment* (R. M. Rowell, I. Andersone and B. Andersone) – refers to the heat treatments of wood and the most important industrial processes in obtaining the commercial heat-treated products.

Chapter 15 – *Chemical Modification of Wood* (R.M. Rowell) – presents several approaches to wood chemical modification depending on the specific property and performance and also, the two most important commercial products.

Chapter 16 – *Lumen Modifications* (R. E. Ibach and R. M. Rowell) – discusses the processing, the properties and the application of wood-polymer composites.

Chapter 17 – *Plasma Treatment of Wood* (W. Viöl, G. Avramidis and H. Militz) – describes a novel technology in the field of wood surface modification and the applications limited to plasmas that can be used for the treatment of suitable wood for industrial implementation.

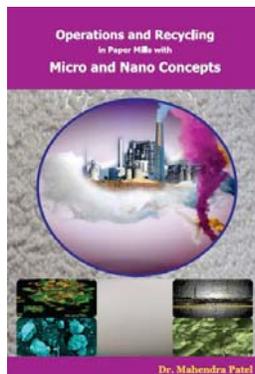
Chapter 18 – *Sustainability of Wood and Other Biomass* (R. M. Rowell) – evaluates the modern concept of the sustainability and the critical elements involved in a sustainable future.

This book is a valuable source of information on the complex subject of wood science. The volume is recommended to all scientists and engineers involved in research and to teachers, graduate and undergraduate students interested in polymer physics, polymer engineering, material science and engineering, fiber science, and chemical engineering.

Diana Ciolacu

**OPERATIONS AND RECYCLING IN PAPER MILLS WITH MICRO AND NANO CONCEPTS**, Mahendra Patel, Industrypaper, New Delhi, ISBN 978-81-923542-3-1, 2012, 500 pp.

The main contents in this book are:



### **Harsh Environments in Operations**

Operational problems due to the harsh environments – abrasion, corrosion, fouling, scaling, pitch, stickies, DCS (dissolved and colloidal substances), NPE (nonprocess elements), chemicals, thermal treatment etc. With an increasing need for recycling water to achieve zero-liquid discharge, use of more and more recycled fibre and recycling of chemicals, these problems are bound to increase further and the operations of pulp and paper mills are going to be more and more difficult with time.

### **Formation and Control**

This book discusses separately the causes of formation and control of each of the above-mentioned harsh environments (Chapters 2-15). You will be able to reduce your maintenance cost and frequent shut-down on following the solution measures, suggested in this book.

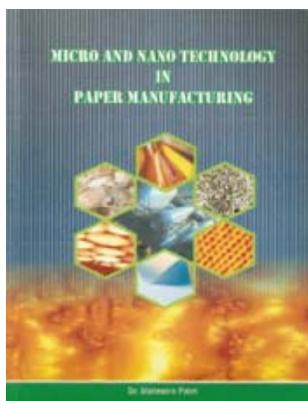
### **Nano Concepts**

If you are looking for insight into nano concepts in paper manufacturing, many novel concepts are introduced, specially on the formation and prevention of scaling, leading to corrosion. Commencement of corrosion is attributed to the nano particles.

### **Recycling: Reducing water consumption**

The last few chapters are on recycling (Chapters 16-21); recycling of water, water closure; different technologies and strategies for reducing water consumption to achieve minimum liquid discharge are discussed with specific examples of steps taken by progressive mills. Some of the strategies and technologies discussed in this book can probably help reduce water consumption. For details visit: [www.industrypaper.net](http://www.industrypaper.net)

**MICRO AND NANOTECHNOLOGY IN PAPER MANUFACTURING**, Mahendra Patel, ISBN 978-81-923542-2-4, 2010, 37 chapters, 530 pp.



This book explains for the first time authentically the applications of nanotechnology in pulp and paper manufacturing. Many existing processes and technologies are explained to have bearings on micro- and nanophenomena and concepts. On reading this book, you will be astonished and will attempt to initiate interpreting and applying everything in terms of micro- and nanotechnology. The author invites interactive discussions to further knowledge on nanotechnology.

### **Nanotechnology and Concepts**

It is high time that you understand what is nanotechnology and its scope in pulp and paper manufacturing, get acquainted with the definitions, scope in the industry and different concepts/ mechanisms concerned with micro- to nanotechnology (Chapters 1-10).

### **Nano Concepts in Raw Materials**

Wood, trees (genetically modified lignin-deficient trees), agro-residues and recycled fibre (stickies etc) have bearing on microstructures.

### **Nano Concepts in Fibreline**

Mechanisms in modern pulping and bleaching (ECF/TCF) technologies are explained in terms of micro- and nanophenomena (Chapters 15, 16).

### **Nano Concepts in Wet-end and Paper-making**

Microparticle and micropolymer technologies for better retention and drainage properties at the wet end are the first application of nanotechnology. Micro- and nanosize high-performance engineered minerals and oxides imparting superior optical, surface and printability properties to the paper, are cited. It covers also paper machinery manufacturing, namely rolls and fabrics with a micro- and a nanobase (Chapters 17-20).

### **Coating, Packaging, Specialty Papers and Printing**

Section 3 covers nanotechnology in coating, packaging, printing and in specialty papers. The production of intelligent wood and composites and packaging materials for security, counterfeiting, safety and antimicrobial purposes is discussed. New types of antibacterial paper, tissue paper and newsprint have recently been produced using nanotechnology (Chapters 21-26).

### **Nanotechnology in Energy and Environment**

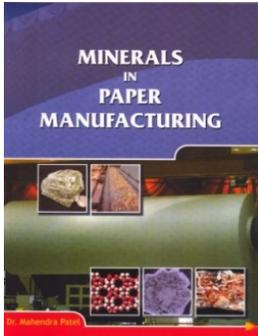
Section 4 covers nanotechnology in production techniques, environmental and in energy issues, including pulp mill as a biorefinery, wind and solar energy (Chapters 27, 28).

### **Production Technologies and Systems**

Topics covered here include R&D, economics, roadmap, electron microscopy, X-ray spectrometry, STM, AFM, microtechniques with online quality measurements using microsensors and future of nanotechnology (Chapters 29-37).

For details visit: [www.industrypaper.net](http://www.industrypaper.net)

**MINERALS IN PAPER MANUFACTURING**, Mahendra Patel, ISBN 978-81-923542-1-7, 2008, 32 chapters, 350 pp.



#### **Achieving 30-35% filler/pigment-loading in paper**

The cost of minerals (fillers) is as low as one fourth of fibre. Therefore, increasing mineral content in paper and board means reduced cost of manufacturing. Processes with troubleshooting on increasing addition of fillers and pigments up to 30-35% (50% in board) or more are discussed and solutions are provided in this book.

#### **Range of Mineral Fillers**

New filler and coating pigments, available now, are thoroughly reviewed, along with mineral beneficiation, properties, structure of minerals and applications, highlighting the stock preparation and coating. Topics encompass fillers and pigments of kaolin, talc, titania, calcium carbonate-PCC and GCC, aluminium hydroxide, silica, baryte, gypsum, pyrophyllite, wallastonite, zeolite, nonmineral fillers, along with compatible chemicals and additives, citing qualities and production in many countries with production technologies.

#### **High Performance Minerals**

A section of this book discusses the “High performance minerals” and finally the related test procedures.

For details visit: [www.industrypaper.net](http://www.industrypaper.net)