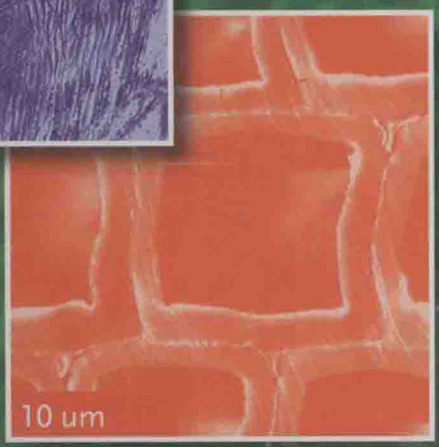
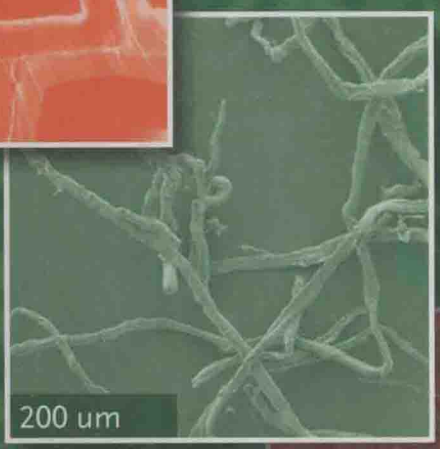
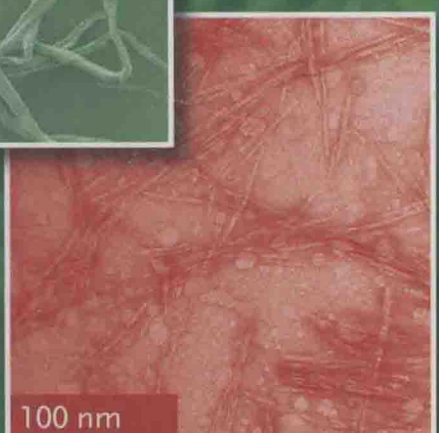
Characterization of Lignocellulosic Materials







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Preface

Lignocellulosic materials are a natural, abundant, and renewable resource essential to the functioning of industrial societies and critical to the development of a sustainable global economy. As wood and paper products, they have played an important role in the evolution of our civilization. Improvement of the qualities of such products and the efficiency of their manufacturing processes have often been hampered by the lack of understanding of the complex physical states, morphological features, and chemical compositions of the materials. Novel or improved methods for the characterization of lignocellulosic materials are needed.

As serious economic, sociopolitical, and environmental issues build up with the use of petrochemicals, lignocellulosic materials will be relied upon as the feedstock for the production of chemicals, fuels, and biocompatible materials. Significant progress has been made to use lignocellulosic materials as a feedstock for the production of fuel ethanol and as a reinforcing component in polymer composites. Effective and economical methods for such uses, however, remain to be developed, partly due to the difficulty encountered in the characterization of the structures of native lignocelluloses and lignocellulose-based materials.

This book was developed based on 8 presentations selected from the 2005 Pacifichem Symposium on Characterization, Photostabilization, and Usage of Lignocellulosic Materials, and 12 invited contributions from researchers renowned in the field of lignocellulosics' characterization and usage. It covers the recent advances in the characterization of wood, pulp fibers, and cellulose networks (papers). It also describes the analyses of native and modified lignocellulosic fibers and materials using advanced techniques such as time-of-flight secondary ion mass spectrometry, 2D heteronuclear single quantum correlation NMR, and Raman microscopy. Furthermore, it presents useful methods for the characterization of lignocellulose-reinforced composites and polymer blends.

It is anticipated that this book will provide references on the state-of-the-art characterization of lignocellulosic materials to both academic and industrial researchers who work in the fields of wood and paper, lignocellulose-based composites and polymer blends, and bio-based fuels and materials. It is also anticipated that this book will stimulate further efforts in the development of new processes and technologies to use lignocellulosic materials for the production of chemicals, fuels, and bio-based materials for years to come.

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Editor Biography

Dr. Thomas Q. Hu is a Principal Scientist at FPInnovations – Paprican Division and an Adjunct Professor in the Chemistry Department at the University of British Columbia (UBC). He received his B.Sc. (1983) in Polymer Science and Engineering from South China Institute of Technology, and his M.Sc. (1988) and Ph.D. (1993) in Synthetic Organic Chemistry from UBC. He joined Paprican in 1994 after a 2-year tenure at Paprican as an NSERC Canada Industrial Postdoctoral Fellow.

His area of expertise is in the application of advanced, next-generation chemistry to solve various long-standing technological problems in the pulp and paper industry. He has pioneered the work in the novel modification of lignin functional groups, the development of fiber-reactive radical scavengers for the photostabilization of lignocellulosic materials, and the bleaching of lignin-rich wood pulps with phosphorus-based chemicals. He has developed a number of novel processes for the bleaching and brightness stabilization of lignin-rich wood pulps. He has over 70 publications including one edited book on *Chemical Modification, Properties and Usage of Lignin*, five issued international patents and several pending US and Canadian patents. He has won a number of prestigious awards including the 2004 *Journal of Pulp and Paper Science* Best Paper Award and the 2005 Pulp and Paper Technical Association of Canada Douglas Atack Award for Best Mechanical Pulping Paper.

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