

Catalysis for the Conversion of Bio- mass and its Derivatives

The growing demand of diminishing fossil reserves renders the exploitation of renewable resources an increasingly urgent topic. In particular, biomass poses enormous potential as a sustainable feedstock for energy and materials. The technological progress in recent years, especially in the area of catalysis research, has brought us closer to finding solutions on this basis. To establish this new feedstock, various challenges in different associated fields have to be addressed in the future.

These challenges, which are concerned with the whole chain of added-value stages needed for the transition to a bio-based chemical industry, were addressed in the workshop “Molecular Engineering for the Conversion of Biomass-Derived Reactants to Fuels, Chemicals and Materials”, organized in 2010 by the Fritz Haber Institute of the Max Planck Society. The resulting interdisciplinary exchange between leading experts from academia and industry is summarized in the book *Catalysis for the Conversion of Biomass and Its Derivatives*, edited by Malte Behrens and Abhaya K. Datye.

The book gives a comprehensive overview of all aspects of the use of biomass as a feedstock, its potential for meeting future energy and materials needs, and the present state of progress. The authors cover their special fields in a clear form and layout and with appropriate depth, thus allowing an efficient exchange of knowledge between adjacent fields. In general, this highly complex topic cannot be discussed in great detail within a single book. However, the authors have successfully managed to give an overview of the numerous challenges associated with the utilization of biomass, by presenting selected aspects of the different fields.

The book contains 13 well-structured chapters that describe all facets of the value-added chain in a didactic and understandable form. The well-arranged table of contents is especially helpful for finding a desired topic. Chapters 1–3 give a general introduction to the topic of renewable resources, with special emphasis on the potential of biomass for the chemical industry with regard to switching to different raw materials sources. Other aspects discussed are the role of small startup companies in process development, how they relate to the established chemical industry, and the importance

of life-cycle assessment methods in biomass utilization.

Chapters 4–6 deal in detail with the production of biomass from plants, potential routes for its chemical transformation, and more specifically the conversion of cellulosic biomass in the aqueous phase by chemical and biotechnological processes. Chapters 7 and 8 discuss the numerous challenges associated with the analysis of biomass and of the compounds that can be derived from it.

Starting in Chapter 9, the authors focus on specific issues of reactor technology and various approaches based on heterogeneous or homogeneous catalysis. The last four chapters concentrate especially on topics concerned with the catalytic conversion of cellulose to various platform compounds, as well as to biofuels and chemicals. Particularly important aspects of this are the interaction of biogenic substrates with the surfaces of solid catalysts, and targeted conversion processes using tailored molecular catalysts of high selectivity.

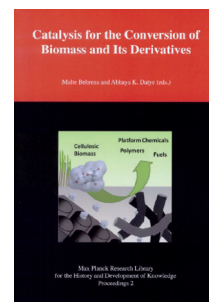
The intended audience of this book are mainly scientists and science-orientated laypersons who are involved in some way with the added-value chain of biomass utilization. Although the title of the book suggests a content addressed mainly to chemists, it is also suited for related disciplines, since it covers all basic aspects of the utilization and conversion of biomass.

In its content the book has advantages over comparable books, which are often narrowly focused on a particular aspect that is treated in great detail. Thus, this book is well suited for scientists with previous knowledge in the field of renewable resources who want to gain information beyond their own special field about current challenges in biomass utilization. It is less suited for scientists who expect detailed and complete information about their own field, since each chapter presents an overview of a particular aspect without going into great detail. It is especially this broad coverage that constitutes the strength of the book. It is recommended to specialist readers who seek information beyond their own field, dealing with all facets of biomass as a renewable and sustainable feedstock. Thus, the book is definitely an enrichment for every textbook collection.

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