

### The Biofuels Handbook

As stated in the preface to *The Biofuels Handbook*, the work "... is written to assist the reader in understanding the options that are available for the production of fuels from biomass ...". Nine authors, including the editor, from the USA, Turkey, Trinidad and Tobago, India, and the United Kingdom have contributed to the book. Unfortunately, only the affiliations of the authors are given; thus, readers who want to know more about the authors' backgrounds and qualifications will have to resort to Google.

To write a fairly comprehensive handbook about biofuels is a challenging undertaking, considering the importance of fuels in general, the immense scientific output in this field (more than 60000 publications dealing with biofuels in 2011 alone!), and the complex interactions of science, economy, ecology, and politics in this area.

Nevertheless, the editor and authors clearly intended to present a comprehensive overview. Therefore, the book starts with chapters on conventional fuel sources (crude oil) and unconventional non-bio fuels sources such as coal, tar sand, and oil shales, followed by chapters on fuels from biomass and the concept of a refinery, and finally another chapter on biofuels. All this is in the first part of the book.

The second part is headed "Fuels from Cellulosic and Lignocellulosic Materials", but starts with two chapters on fuels from crops, followed by two chapters on fuels from wood. The third part deals with fuels from waste and fuels from landfills, but the final chapter is about the Fischer–Tropsch process.

This brief summary already indicates some problems. Although the areas covered might provide a comprehensive overview on biofuels, there is no clear structure, and the various chapters do not even adhere to the rudimentary structure that might have existed. For a book written by different authors, this is a recipe for redundancy and confusion. Some examples are listed here. There is an overview of biofuels on pages 87–100 and another very similar one on pages 169–178. On page 243 there begins a lengthy explanation of diesel fuels, despite the fact that there has already been a whole chapter on conventional diesel earlier. This is followed by a description of the Fischer–Tropsch process (still under the completely misleading heading "Hydrocarbon Fuels—Diesel Range"), despite there being a whole chapter on that topic later in the book. First-generation biodiesel and bioethanol fuels are not made from cellulosic material, but they are in that chapter.

There are two chapters on landfill gas. Why is the more general chapter "Use of ..." placed after the more specialized one on "Production of Fuels from ...", and why do both chapters deal with aspects such as gas collection? Since one part of the book describes fuels from cellulosic materials, why is there a separate part on waste? Isn't biogenic waste mostly lignocellulose? The answer is yes, and accordingly there is a chapter on wood waste in the waste part—confusing! And a final example: Why is the chapter on Fischer–Tropsch in the waste part, when this process can be used with natural gas, syngas from coal or wood, or whatever?

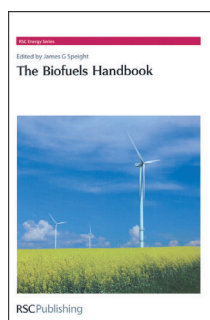
Clearly, the authors have not bothered to read each others' chapters, and the editor has not coerced them into consistency. But even within single chapters there is no order: the chapter on petroleum products starts with natural gas, which is not a petroleum product at all. Quite surprisingly, in one of the landfill chapters there is a description of fuel cells. Of course, the hydrogen that is present in landfill gas can be used in a fuel cell, but isn't that a general technique that would be better explained in the overview?

This all makes the book almost impossible to read as a whole, and the contents pages do not allow one to quickly find specific topics. Where should I look for biogas? In the general bio-refinery part? In fuels from crops? In fuels from waste? (The answer is: small parts can be found in all these locations).

The subject index offers some help. For example, fuel cells are indeed listed under "Landfill gas, fuel cells", and laudably also have an index entry of their own. There is also a glossary, but I admit that I have difficulties with it. Call me elitist if you like, but I do not want anybody to read a scientific biofuels handbook who needs a glossary to know what an "acid" is, or a "catalyst", or a "hydrocarbon". On the other hand, the glossary entry "Jatropha" describes not the genus *Jatropha* but the species *Jatropha curcas*. In the glossary this appears to be a trivial mistake, but as "jatropha" is not in the index, I could not find it in the book to decide whether this mistake matters or not.

It is quite difficult for a single reviewer to judge the scientific merits of a variety of essentially unconnected chapters with such a wide range. Therefore, I restrict myself to a single observation: Neither the chapter on bio-refineries nor that on the Fischer–Tropsch process cites the top reference work on the subject concerned (*Biorefineries—Industrial Processes and Products*, edited by Kamm, Gruber, and Kamm, Wiley-VCH, 2010), and the contributions of Steynberg and Davis on the Fischer–Tropsch process in the Elsevier series *Studies in Surface Science and Catalysis*).

In conclusion, *The Biofuels Handbook* is not the handbook on the subject that I would recom-



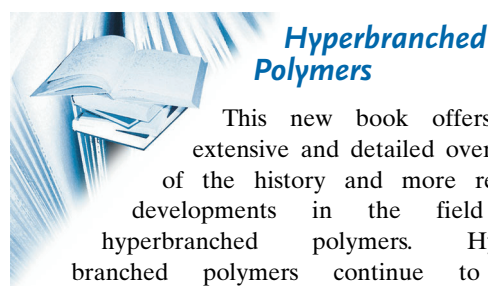
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mend. It is a rather unsorted collection of chapters on various aspects, with varying depth and quality. If you want to read just one book on biofuels, instead try *Biomass to Biofuels: Strategies for Global Industries*, edited by H. P. Blaschek et al. (John Wiley & Sons, 2010). If you want more, there are better books on each of the areas covered by the *The Biofuels Handbook*.

Mark Rüschen gen. Klaas

Department of Technology, Chemistry of Renewables  
Emden–Leer University of Applied Sciences  
(Germany)

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### Hyperbranched Polymers

This new book offers an extensive and detailed overview of the history and more recent developments in the field of hyperbranched polymers. Hyperbranched polymers continue to be materials of topical interest and this text offers both a very useful introduction to those new to the subject and detailed and stimulating discussions for those with more experience in the field of hyperbranched polymers.

The breadth of the subject matter encompassed by the title *Hyperbranched Polymers* has grown in complexity, much as the structure of a hyperbranched polymer grows and this text describes in detail all of the major classes of synthetic strategies exploited to produce hyperbranched polymers including the step-growth polycondensation/polyaddition mechanisms and the vinyl chain-growth mechanisms. In addition to the expected chapters on polymer synthesis an informative chapter on the kinetic theory of hyperbranched polymerization is

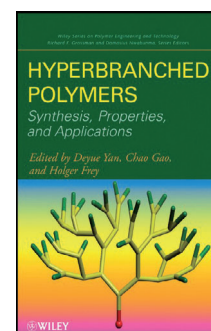
included. The final two chapters on the emerging applications of hyperbranched polymers are particularly timely and give a vision towards the commercial future of these polymers.

This book also makes a valiant attempt at dealing with the somewhat nebulous definition of a hyperbranched polymer and the inevitably vast range of architectures that fall under this definition. In the past twenty years or so the field of hyperbranched polymers has broadened from the classical, highly branched structure in which each monomer introduces the possibility of a branch point to include a multitude of architectures which are hybrids of hyperbranched structures containing linear unbranched segments. Two excellent chapters by Knauss (“Convergent Synthesis of Hyperbranched Polymers and Related Process”) and Guan (“Hyperbranched and Dendritic Polyolefins Prepared by Transition Metal Catalyzed Polymerization”) address these hybrid materials to a certain extent and there is some discussion of the Strathclyde route to (hyper)branched polymers in Chapter 7 but there are other related synthetic strategies which could have been included. Indeed discussion of the long-chain, hyperbranched polymers could easily have occupied another 50 pages or more. Perhaps the authors decided that this material is too peripheral to the core subject and maybe the range of architectural structures is simply too diverse for a single book but if so, wider referencing may have been desirable.

To conclude, this book is an excellent new addition to the field, with informative and up-to-date material to support both the teaching of the subject at undergraduate level and to stimulate new avenues of research.

Lian Hutchings

Department of Chemistry  
Durham University (UK)



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