J|A|C|S
BOOK REVIEWS

Microwave Assisted Proteomics. By Jennie Rebecca Lill (Genentech Inc., South San Francisco, USA). Royal Society of Chemistry: Cambridge.2009. xii + 126 pp. $159. ISBN 978-0-85404-194-7.

Since the first reports in the 1980s, microwave heating has proven to be a valuable tool for the synthetic organic chemist. Reactions can be completed in minutes, and product yields can often be enhanced over conventional approaches. However, the application of microwave chemistry is not just limited to synthesis. There are an increasing number of reports of the use of microwave heating for applications in the biosciences, where again short reaction times are reported, often together with excellent selectivity or activity. Examples include enzyme catalysis, peptide synthesis, and proteomics. Although there have been some review articles and chapters on the topic in the primary literature and in edited books, until now there has not been a book focused solely on a bioscience-related aspect of microwave chemistry. *Microwave-Assisted Proteomics* brings together the scientific literature in the field and provides an introduction to the principles of microwave heating in the bioscience arena.

The book comprises 10 short chapters and is written in an informative way that is accessible to the novice while at the same time providing all the leading references to primary research articles in the field, from its inception to the end of 2008. The initial three chapters provide introductory material and an overview of the use of microwave heating in chemistry and the biosciences, covering a range of topics from the equipment available to the mechanisms by which microwave energy interacts with molecules. These chapters are brief and to-the-point. These are followed by three chapters that cover the applications of microwave heating in enzymatic and chemical digestions of proteins as well as acid digestion as a tool for protein quantitation, sequencing, and characterization. Each of these chapters has an introduction to the conventional approaches used before addressing microwave-assisted alternatives. Chapter 7 is an outline of the use of microwave heating for discovery and characterization of post-translational modifications, and Chapter 8 is an overview of other selected applications of microwave technology in the life sciences. These two chapters are significantly more "biological" than their predecessors. Lill introduces the reader to some fairly detailed techniques here and shows the versatility of microwave heating as a tool. A very short (two pages) epilog on the subject of whether "to microwave or not to microwave" follows, thus bringing the topics discussed in previous chapters together as well as offering some personal insights from the author.

Throughout the book, Lill compares conventional and microwave heating methods and does this very well. In the literature such comparisons are often made, but the conditions used conventionally can be very different from those in the microwave protocol. Some research papers read a great deal into the "microwave enhancement" seen. In this book, the author is careful to point out where nonidentical comparisons have been reported while at the same time outlining clearly both the advantages and disadvantages of using microwave heating.

I was excited to see in the Table of Contents that the final chapter comprises a series of protocols in microwave-assisted proteomics. However, on delving into them, I found the level of detail to be somewhat lacking. The selected protocols cover a broad range of applications and use a wide variety of apparatus. At times it is hard to know how transferrable and reproducible they are, and in a couple of instances, the type of microwave unit used is not specified at all. I think that a bit more attention to specifics would have greatly enhanced this chapter.

The book has a number of figures and schemes. Thankfully many of these are in color, thus greatly enhancing the information shown. Unfortunately a number of the images are of poor resolution, which detracts from their impact. This is particularly the case where images are reproduced from primary research articles.

Despite these minor points, I really liked the book overall. It provides an excellent introduction to the field, and each chapter is essentially self-contained and clearly written. I believe that the area of microwave-assisted bioscience is at a very exciting point and that, in this book, the author has been successful in her objective of inspiring interested researchers to incorporate microwave heating into their work. It will certainly be essential reading for students in my research group interested in bioscience applications. I could also see it on the desk of many academic and industrial chemists and in the science collections of libraries as well.

Nicholas E. Leadbeater, *University of Connecticut*

JA9091352

10.1021/ja9091352

Three-Dimensional Free-Radical Polymerization: Cross-Linked and Hyper-Branched Polymers. By G. V. Korolev (deceased) and Michael M. Mogilevich (St. Petersburg, Russia). Springer-Verlag: Berlin, Heidelberg. 2009. xvi + 270 pp. $319. ISBN 978-3-540-87566-6.

This book consists of two main sections comprising a total of nine chapters. Part I covers cross-linked systems formed with traditional and "living" free radical methods for typical chain-growth monomers, whereas Part II consists of just three chapters focused on the synthesis, properties, and methods of characterizing hyperbranched materials. The difference between the two sections, of course, is that the former involves insoluble materials whereas the latter concerns soluble polymers.

Each chapter delves deeply into both phenomenological descriptions and kinetic−mechanistic considerations. The real value of this approach is the level of understanding that results in terms of molecular structure and the effects of methods on the resulting properties. The first three chapters in Part I focus on microheterogeneous mechanisms, general kinetic features, and "living" methods of generating three-dimensional structures. Copolymerizations, calculations of critical conversions, and properties of the materials formed are described in the next three

Unsigned book reviews are by the Book Review Editor.

chapters. All provide extensive theoretical and mathematical analyses of the results and their implications on the generation of properties.

In Chapter 7 of Part II, the authors first compare step- and chain-growth methods of generating hyperbranched polymers and then investigate the methods used to form highly branched vinyl polymers via free radical methods. Although the majority of the book does involve free radical polymerization—either to produce the initial material employed or to cross-link and gel the matrix afterward—there are sections of the book that have little to do with chain-growth processes. For example, Chapter 8 covers the chemistry, properties, and applications of hyperbranched polyesters and polyester-amides as well as the main achievements and problems encountered using them. Although useful in terms of the compilation of information given and needs described, this chapter has little to do with the focus of the book. Chapter 9 is listed as an appendix but actually provides an excellent overview of the methods of studying the kinetics and structure development in free radical cross-linking polymerizations. As such, it is a valuable component of the book.

Overall, this monograph provides useful insight into the mechanism and kinetic effects on the free-radical formation of cross-linked and hyperbranched vinyl polymers, although digging out information that applies to a specific system of interest requires diligence and perseverance. The two major drawbacks, however, are that the references used as the basis for the book are almost exclusively found in the Russian literature, and the book is a translation from Russian into English that suffers from occasional language problems. Nonetheless, this is a highly focused reference book that should be included in the libraries of scientists working with such materials for insightful analysis as well as comparison with other literature.

Lon Jay Mathias, *University of Southern Mississippi*

JA9088428

10.1021/ja9088428

Surface Charging and Points of Zero Charge. By Marek Kosmulski (Technical University of Lublin, Poland). From the series, Surfactant Science Series, Vol. 145. Edited by Arthur T. Hubbard (Santa Barbara Science Project, CA). CRC Press (an imprint of Taylor & Francis Group): Boca Raton, FL. 2009. xxvii + 1064 pp. $159.96. ISBN 978-1-4200-5188-9.

In this reference book, Kosmulski reports the points of zero charge (PZC) and isoelectric points (IEP) for "well-defined, homogenous materials without surface coating". Materials are organized into the following classes: simple (hydr)oxides; aluminosilicates and clay materials; mixed oxides; salts; glasses; carbon; other well-defined inorganic materials; coatings; well-defined low-molecular-weight organic compounds; synthetic polymers; latexes; and natural high-molecular-weight organic compounds. Different specimens of the same or similar material are further organized into commercially available materials, home-synthesized materials, and natural materials. Available thermodynamic and crystallographic data for the materials presented are given in the appendix, which is followed by a very extensive reference section. A subject index completes the book.

JA909328W

10.1021/ja909328w