## Controlled and Living Polymerizations

Since Michael Szwarc's introduction of the term "living polymerization" about 50 years ago, the field of polymer chemistry has changed significantly. Many methods that allow control over the polymerization process have been added to the polymer chemist's toolbox since then, such as cationic ring-opening polymerization, group-transfer polymerization, and ring-opening metathesis polymerization, and most recently the different variants of controlled free-radical polymerization.

Controlled and living polymerizations have been discussed in various review articles, and a book entitled *Living and Controlled Polymerization* (Nova Science, 2006) already exists. It is therefore reasonable to ask whether we need yet another book on the subject. We do indeed, as I will explain below.

A glance at the table of contents shows that this book is quite different from the aforementioned volume. The present book, edited by Krzysztof Matyjaszewski and Axel Müller, who are internationally renowned experts in the field of living and controlled polymerization, starts off by describing the various polymerization methods. The first six chapters deal with anionic, cationic, and free-radical polymerizations, followed by transition-metal-catalyzed polymerization, living ring-opening polymerization of heterocycles and, lastly, ring-opening metathesis polymerization.

The long-established methods of ionic and ring-opening polymerization of heterocycles are, as expected, treated more systematically than the more recent polymerization techniques that follow, such as living coordinative polymerization, which is treated in Chapter 4. These chapters describe the developments of the last decade, including a great number of catalytically active complexes that allow the preparation of polyolefins with a high level of control (for narrow molecular weight distribution, end-group functionalization, synthesis of block copolymer structures, etc.). Some of the chapters have a distinct textbook-like character, whereas others will make for harder reading for newcomers to the field.

The publisher, Wiley, mentions in the description of the book that "some of the material is based on chapters taken from the four-volume work *Macromolecular Engineering*", but adds that the chapters are "completely updated and rewritten to reflect the focus of this monograph". Some of the chapters can indeed be recognized as coming from the four-volume work, but there are also many chapters that are new to this book. An example is the chapter on olefin metathesis polymerization by Bielawski and Grubbs. This chapter is ideal for those who want a quick introduction to the polymerization-related aspects of the method, without going into details such as are given in Grubbs' three-volume work on olefin metathesis.

The chapter on coordinative polymerization in the present volume also focuses much more on living polymerizations than does the discussion in the four-volume work mentioned above. The particularly well-written chapters on block copolymer morphology and industrial applications, giving a very interesting outline of the history of industrial block copolymer synthesis, are also not part of the four-volume work.

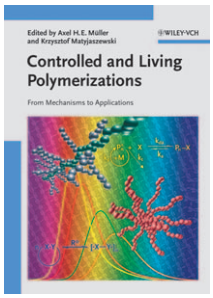
Many chapters in the present book deal, at least in part, with state-of-the-art research in the field of controlled polymerization, and are often too detailed for undergraduate students of polymer chemistry. Nonetheless, there are also many chapters of textbook quality that can be used in teaching.

The last four chapters build on the earlier chapters dealing with polymerization methods, and start with a description of ways to synthesize complex polymeric architectures such as stars, graft copolymers, and cyclic polymers. The description of dendrimers could have been left out, as their synthesis does not involve polymerizations. Nevertheless, these well-defined structures form a nice introduction to the less tightly defined hyperbranched polymers that are described at the end of the chapter.

The following chapter (Chapter 8) deals exclusively with block and graft copolymers, and could easily have been incorporated into the previous chapter on polymeric architectures. The space gained could have been used, for example, to look at quasi-chain-growth step-growth polymerizations, a modern field of polymer chemistry that is not mentioned in this book but is featured in the above-mentioned four-volume work by Matyjaszewski, Gnanou, and Leibler.

The chapter on block copolymer morphology is well suited to follow the description of polymeric architectures. In addition to describing the di-block copolymer phase diagram, as is typically treated in many polymer textbooks, this chapter also covers more complex tri-block and mikto-arm star terpolymers. Modern applications such as the formation of Janus particles and the aggregation behavior of complex polymeric architectures in solution are also described.

This book began with an introduction to polymerization methods and went on to describe copolymer architectures, visualization, and academic applications of well-defined copolymers, and finally ends with a very interesting chapter on industrial applications.




**Controlled and Living Polymerizations**
From Mechanisms to Applications. Edited by Axel H. E. Müller and Krzysztof Matyjaszewski. Wiley-VCH, Weinheim 2009. 612 pp., hardcover € 149.00.—ISBN 978-3527324927

The book is particularly suitable for readers who want to enter a modern field of polymer chemistry. It presents the basics, but also gives a snapshot of current research. It should appeal primarily to postgraduate students and research groups working in this area. Considered as a student textbook, it contains many parts that are well suited for undergraduate teaching or as a reference source for undergraduate students.

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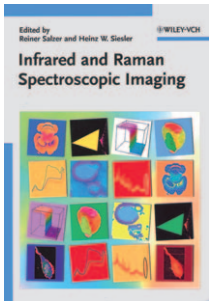


**Infrared and Raman Spectroscopic Imaging**
Edited by Reiner Salzer and Heinz W. Siesler. Wiley-VCH, Weinheim 2009. 510 pp., hardcover € 149.00.—ISBN 978-3527319930

## *Infrared and Raman Spectroscopic Imaging*

This monograph covers instrumental aspects and various applications of spatially resolved vibrational spectroscopy. Generally, these methods for chemical imaging do not require external staining agents, since they rely on intrinsic sample contrast by probing molecular vibrations. From the spatially and spectrally resolved data, false color images can be generated, in which spectral intensities are encoded in colors: this makes it possible to visualize the concentrations and spatial distributions of different functional groups and molecular species. In this way, the methods of infrared and Raman microspectroscopy, which combine microscopy with vibrational spectroscopy, can be universally applied in all areas of analytical chemistry where the spatial distribution of chemical components must be determined qualitatively, or even quantitatively. The many applications include biomedical diagnostics and the micro-scale analysis of polymers and pharmaceutical products.

Advances in instrumentation and software, in particular commercially available microspectrometer configurations in combination with multivariate data processing techniques, have led to a considerable growth of interest in and work on these methods during the last 10 to 15 years. Many groups in academia and industry are now working on the development of IR and Raman microscopy methods and on applications. Review articles and monographs published up to now have concentrated on partial aspects, such as instrumentation for FT-IR microspectroscopy or applications in biomedical diagnostics. This book fills a gap by covering all aspects comprehensively, ranging from instrumentation to data processing software and to many different applications in academic and industrial research.

An especially positive aspect of the book is the strong emphasis on practical relevance in the chapters. For example, the reader is provided with a good survey of the instrument manufacturers and their products. This information is particularly useful for laboratory and group leaders who are considering buying a (usually very expensive) IR and/or Raman microspectrometer.

Overall, there is a good balance between instrumentation and applications. This monograph is therefore recommended both to method developers and to applications practitioners in academic and industrial laboratories.

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