



BOOK REVIEW

Mass Spectrometry in Polymer Chemistry

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S. Weidner, Editors
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Over the past two decades, mass spectrometry has emerged as one of the most powerful analytical platforms available to synthetic polymer chemists. Several excellent books have been published in the past decade that address synthetic polymer mass spectrometry. In contrast to other works on the subject, the editors of *Mass Spectrometry in Polymer Chemistry* specifically note a need for a volume “dedicated to the needs of synthetic polymer chemists” as well as a general update on the current state-of-the-art in polymer mass spectrometry. The editors have assembled an impressive team of contributors to address these stated needs and have admirably achieved their goal.

The volume is divided into 14 chapters. Chapters 1 and 2 deal with the essentials of the mass analyzers and ionization methods, respectively, employed in polymer mass spectrometry. Chapter 2 by Anthony Gies has a very nice section, “New Trends” in ionization methods, which will be an excellent resource for the synthetic polymer chemist. The growing area of tandem mass spectrometry for the analysis of polymer structures is expertly reviewed by Scionti and Wesdemiotis in Chapter 3, and several clear examples are presented that should be quite helpful to the synthetic polymer chemist who is venturing into MS/MS of polymers for the first time. Chapter 4 by the Trimpin group provides a broad context of some of the developments in their laboratory, spanning matrix-assisted inlet ionization, ion mobility spectrometry for imaging of polymers, and electron-transfer dissociation for structural studies. Although less focused than the earlier chapters, there are some beautiful examples of laserspray ionization and surface imaging of polymers in this chapter. One of the most critical steps of polymer MALDI is the sample preparation stage, which is discussed in detail by Hanton and Owens in Chapter 5; this chapter should be required reading of every practitioner of polymer MALDI as its coverage is extensive and extremely practical. Mahoney and Weidner do a laudable effort of covering surface analysis and imaging of polymers in Chapter 6; their account is almost encyclopedic of this important application of polymer mass spectrometry.

The utility of hyphenated techniques coupled to mass spectrometry for polymer analysis is covered in Chapter 7 by Falkenhagen and Weidner with some notable examples of using size-exclusion chromatography, one of the eminent tools in polymer characterization, with mass spectrometry. The extremely important area of data processing and quantification of polymer molecular weight distributions is presented in detail in Chapter 8 by some of its foremost experts from the Polymers Division at NIST; this chapter will have great value to the typical polymer chemist. Copolymer characterization, an important and emerging area in polymer mass spectrometry, is covered by Crecelius and Schubert in Chapter 9.

Beginning with Chapter 10, a series of chapters is presented that truly highlight the efforts of the editors to make this volume distinct from other books on polymer mass spectrometry. Chapter 10 highlights how mass spectrometry is utilized in elucidating reaction mechanisms for radical-initiated polymerization reactions. This is a fascinating chapter that is extremely valuable for those of us who are more instrumentally minded. Likewise, Chapter 11 provides a critical evaluation of using mass spectrometry for elucidating reaction mechanisms for living/controlled radical polymerization. Other polymerization mechanisms also get their share of consideration in Chapter 12. In addition to the mechanisms leading to polymer formation, the process of polymer degradation studies by mass spectrometry is covered in Chapter 13. The book concludes with an outlook of the field of polymer mass spectrometry written by the editors in Chapter 14.

There is much to laud the editors for the production of this work. They have assembled many of the leaders in the field of polymer mass spectrometry to contribute to this volume, and each of the authors is to be commended for providing updated material to keep the volume current. In spite of having different authors for each contribution, the examples used are well-chosen and clear, and coherence in their presentation is noteworthy. The ordering for Chapters 3–7 is not quite clear; while the topics are critical for polymer mass spectrometry, their ordering is a bit perplexing. This is the only significant criticism, however, of the volume as a whole. It is correct that some of the chapters do indeed update the reader on areas covered in earlier books in the field of polymer mass spectrometry, which was one objective of the editors. It is the block of Chapters 10–13, however, which distinguish this volume from previous works. Indeed, judging from these four chapters, one must exclaim that the editors succeeded brilliantly in achieving their objective of covering polymer mass spectrometry in a manner that is of high utility for the polymer chemist. As the editors have so clearly achieved their stated goals, it is easy to be enthusiastic about this volume and to recommend it to anyone interested in polymer chemistry or mass spectrometry as a needed resource.