

Ion Mobility Spectrometry – Mass Spectrometry

This book by Wilkins and

Trimpin deals with the rising star

among modern methods in mass

spectrometry. Although the method itself was developed several decades ago, ion mobility mass spectrometry (IM-MS) found its way into the repertoire of modern analytical methods only recently after commercial instrumentation became available. Since then, numerous applications of IM-MS have been developed, because it truly introduces a new dimension into mass spectrometry which is also the most rapidly growing analytical method worldwide. In a nutshell, in IM-MS ions are separated not only according to their masses but also according to their shapes. Thus, of two species with identical mass but different shapes, the more compact one ("potato") is more mobile and therefore travels faster than a more extended one ("cigar"). Possible applications range from distinguishing different electronic states of atomic ions to the differentiation of native and denatured proteins. Furthermore, IM-MS has rapidly developed as an important tool for the analysis of biological and synthetic

In this monograph, various facets of ion mobility are treated in 16 chapters written by well-respected authors in the field. The contributions are divided into three sections: fundamentals, instrumentation, and applications. The editors have achieved a very good balance of authors, methods, instrumentation, and applications, which is not always an easy task in a multi-author compilation, and is even more difficult in a rapidly developing field such as IM–MS.

macromolecules.

For chemists interested in the field as well as newcomers, the first chapters about fundamentals are certainly the most insightful. Chapter 1, by Bowers and co-authors, about the development of IM-MS, is very well written and informative, and guides the reader through the different steps of an IM-MS experiment. Unfortunately, the chapter has some deficiencies in the formulas, such as illdefined variables and random changes of variables and units, which culminates in the mathematical paradox V = 96 V (p. 17). Especially in view of the importance of this chapter as an introduction, it would profit from a critical overhaul in a second edition. Furthermore, the usefulness of the book for IM-MS users could have been increased by including, either in this or in one of the applications chapters, at least one concrete example of how the measured arrival times are converted into reduced mobilities and then into cross-sections.

In Chapter 2, Armentrout illustrates the power and beauty of IM–MS for distinguishing electronic states of atomic ions. In Chapter 3, Franzen and coauthors describe the use of gas jets for IM–MS separations—a fundamentally different instrumental approach compared to conventional IM–MS, which has significant potential that is still largely unexplored.

Chapters 4–9 deal with different types of instrumentation in IM–MS. Sometimes the information here is too detailed, whereas more general considerations are quite brief. Among these chapters, the one by Fernandez de la Mora must be particularly highlighted because it demonstrates the enormous amount of additional insight that IM–MS offers for the analysis of polymers.

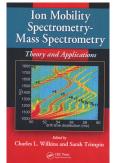
Chapters 8 and 9 by the co-editor Trimpin serve as an introduction to the last part of the volume, because in addition to the instrumental aspects they show various applications to polymers and also some examples of medium-sized molecules studied by IM-MS. The book is completed by seven chapters about specific applications of IM-MS for the multidimensional analysis of polymers, carbohydrates, and peptides, as well as insights into metabolomics applications, combinations of IM-MS with MALDI, and imaging techniques. Lastly, Chapter 16 by May and McLean nicely summarizes the value of IM-MS for the analysis of biomolecules, and also provides a formally redundant, but practically useful, short and pragmatic introduction to the principles of IM-MS, so that the reader may shortcut the basic chapters 1–3.

The book contains many pictures of multidimensional IM-MS separations. These cannot always be fully appreciated in black-and-white, and accordingly the book is accompanied by a CD-ROM with color figures.

In conclusion, this book is well suited for chemists, biochemists, and mass spectrometric experts. It outlines the scope of IM–MS and the current limitations. In particular, for newcomers the book is an investment which will pay off. As a corollary of that verdict, it follows that students are unlikely to profit from reading the book, due to the complexity of the phenomena and the still limited availability of the instrumentation. Accordingly students are not seen by the editors as their target readership. The editors' vision that "the volume could serve as a useful specialized textbook for an advanced course in IM–MS" is certainly true, but in all curricula that I am aware of, IM–MS is much too topical for a student class.

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