

Book Reviews

Inductively Coupled Plasma Mass Spectrometry. Edited by Akbar Montaser (George Washington University). Wiley-VCH: New York, 1998. 964 pages. \$125.00. ISBN 0-471-18620-1.

The editor, Akbar Montaser, has assembled eleven chapters written by individuals who have actively pursued research in inductively coupled plasma mass spectrometry (ICPMS). This work addresses both the results of fundamental research and practical applications. A highlight of the book is its coverage of the pertinent analytical aspects of the field.

The subject of sample preparation is often overlooked or is only considered to belong to the realm of methods development. However, an entire chapter (Chapter 2) is devoted to microwave-assisted sample preparation techniques. This sample digestion technique will probably continue to grow in popularity, thus making this an extremely important chapter. A very good discussion is provided on the role of mineral acids and variations on microwave digestions such as closed vessel, atmospheric pressure, and flow-through. Application of standard microwave digestion methods to several different matrices and analytes are described. A section is included on the application of the technique to the increasingly important area of environmental contaminant analysis.

Chapters are included on the use of mixed-gas/helium gas plasmas (Chapter 10) and microwave-induced plasmas (Chapter 11) as ionization sources for elemental mass spectrometry. These plasmas have gained interest due to the possibility of reduced spectral and matrix interferences in comparison to those encountered in ICPMS using Ar as the plasma gas. Both chapters do an excellent job of discussing the thermodynamic and analytical characteristics of these plasmas along with giving thorough background on the instrumentation. However, many of the spectral and matrix interferences addressed have been partially overcome by improvements made to ICPMS instrumentation in recent years.

A problem often encountered in analysis is having access to only a minute quantity of sample. This fact makes the topic of sample introduction of extreme importance to the analyst and the coverage in Chapter 3 is one of the book's many strong points. Techniques for introducing solids, liquids, and gases are reviewed along with the interfacing of separation techniques. The authors provide a thorough discussion of the operation, advantages, and disadvantages of the methodology. The physical processes involved in aerosol formation and transport to the plasma and techniques for probing these processes are included as a separate chapter (Chapter 5). A reader unfamiliar with sample introduction techniques must be aware that the information in the two chapters will go hand-in-hand since the analytical characteristics of ICPMS are greatly influenced by the physical processes occurring during sample introduction.

Chapter 4 is devoted to the radio frequency equipment and electronics required for inductively coupled plasmas. A relatively complete description is provided for radio frequency generator and matching networks commonly used in commercial instruments. This information will be of little use to those doing routine analysis. However, individuals of an inquisitive nature or perhaps those doing instrument design and trouble-shooting will find the information useful.

The book is organized to treat mass analyzers (Chapter 6) in a chapter separate from the ICP itself. Here one will find a description of the operating principles behind mass analyzers used for both low- and high-resolution mass measurements. The authors logically begin at the

plasma/mass spectrometer interface and, in turn, provide separate discussions of ion optics, vacuum pumping systems, mass filters, and detectors. Practically every mass filter ever developed is covered. However, the authors do not make a clear distinction between those that are commercially available and those that remain academic curiosities. The authors should be applauded for their coverage of the time-of-flight mass filter and the collision cell interface. Both will probably be highly utilized for elemental mass spectrometry in the future.

Chapter 8, Fundamental Considerations in ICPMS, provides an excellent discussion devoted entirely to the processes by which ions are formed in the ICP and sampled for subsequent transfer to the mass analyzer. Ion formation and transport processes have been the foundation of extensive research during this decade. As hinted at in this chapter, developments in these areas will probably provide new ways of minimizing ionization, chemical, and matrix interferences.

Overall this book provides a complete discussion of topics that should be of use to individuals performing research in ICPMS or those doing routine analysis. In general, the most important areas are addressed in great detail. The book would also serve well as a reference source for a graduate-level course pertaining to techniques used in elemental analysis. Since ICPMS has become a well-accepted technique for trace elemental analysis, this book can be considered a valuable information source to help keep abreast of this rapidly growing field.

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Luminescence of Solids. Edited by D. R. Vij. Plenum Press: New York, 1998. ISMB 0-306-45643-5.

Luminescence of Solids seems to be a good text for a graduate course or as a reference for researchers going into the field of luminescent materials. Each topic is well defined at the beginning of each Chapter in order to distinguish it from other types of luminescence discussed in the text. Covering one chapter per week would more than fill a typical one-semester course. Overall, the topics are wide-ranging and each is covered in sufficient detail. I particularly liked the Sonoluminescence and Mechanoluminescence Chapters, especially the picture of "multi-bubble light emission".

I was surprised to find no mention of the new GaN, AlGaIn, and AlGaAs semiconductor materials. These heterostructures have received a great deal of attention recently due to their interesting light emission properties. Further, I wish a Chapter on magneto-luminescence could have been included, as a lot of new data and scientific insight have been gleaned from this sort of investigation at the National High Magnetic Field Laboratory. Throughout the text, the references seem fairly thorough, providing students with enough guidance to start their own literature review.

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