Inductively Coupled Plasma Mass Spectrometry. Edited by Akbar Montaser. Pp. xxix+964. Wiley. 1998. Price £96.50. ISBN 0-471-48620-1.

Especially during the past decade, inductively coupled plasma mass spectrometry (ICP-MS) has evolved from a delicate research tool into a well-established technique for trace and ultra-trace element determination, with a few thousand instruments used worldwide. Hence, it is to be expected that publication of a book authored by leading scientists in the field and entirely devoted to ICP-MS (and related subjects) will arouse great interest. The emphasis of this book is on the fundamentals and instrumentation of ICP-MS, although throughout many chapters 'real-life' applications are used to illustrate the capabilities and limitations of the technique. As is typical for a book to which many authors have contributed, there is some degree of overlap between different chapters, but this permits the reader to understand each chapter without consulting previous ones. Some of these chapters provide basic information, and may hence be of particular use to newcomers to the field, while others address more advanced topics and will hence allow the 'average' ICP-MS practitioner to obtain a more profound insight into the 'art and science' of ICP-MS and serve as a useful refresher for the expert.

The book comprises 11 chapters. The first chapter provides the reader with introductory information concerning the ICP discharge and its characteristics and the techniques for elemental analysis obtained by using such an ICP as an atomization, ionization and/or excitation source for optical emission, atomic fluorescence or mass spectrometry. A comprehensive table compares the figures of merit of eight present-day ICP-MS instruments. Chapter 2 deals with microwave-assisted acid digestion, which has become the most popular way of sample preparation for trace element analysis. The possibilities and limitations of different designs of microwave digestion equipment are discussed and the basic criteria that should be considered during development of a microwave dissolution procedure are addressed. The information concerning (i) acid chemistry, (ii) the risk of analyte losses due to precipitation or volatility and (iii) 'standard' (ASTM, EPA) microwave sample preparation methods may be of great interest for every analytical chemist involved in elemental analysis. In chapter 3, a comprehensive overview of instrumentation for, operating principles and performance of, and applications with (probably) all existing methods for the introduction of liquid, gaseous and solid samples into an ICP is given, while chapter 5 focuses on the more fundamental aspects of sample introduction. In the latter chapter, the key characteristics of a sample aerosol are introduced, various methods to determine its droplet size distribution are described and factors affecting the latter are discussed. For various experimental set-ups, the typical droplet sizes and transport properties are presented. Finally, information concerning the modeling of nebulizer systems is given. Chapter 4 deals with ICP generation. The basic components of a plasma generating system are introduced, the difference between a free-running oscillator and a crystal-controlled generator is explained and the function of an impedance matching network is described. The design of the induction coil and of the plasma torch and its effect on the instrument performance are discussed. Chapter 6 is an excellent source of information on instrumentation for low and high resolution ICP-MS. Instrument parts present in each ICP-MS device (interface, ion transfer optics, vacuum system and detection system) are covered and the basic operating principles of the quadrupole filter and the magnetic sector analyzer are addressed. Also, other mass analyzers, which have been more recently combined with the ICP as an ion source and for which the corresponding instrumentation has either become commercially available recently (time-of-flight ICP-MS, multi-collector ICP-MS) or is only/still in an experimental phase (*e.g.*, ion trap analyzer ICP-MS, ion cyclotron resonance ICP-MS), are discussed. Chapter 7 seems to be largely intended for newcomers to the field and discusses the influence of the operational parameters on the signal intensity and the occurrence of spectral interferences and matrix effects. An internet site, from which a spectral interference database can be downloaded, is referred to. The next chapter is entitled 'Fundamental Considerations in ICP-MS' and is a very readable chapter, providing a wealth of information concerning the properties of the ICP as an ion source and the sampling of ions from the ICP. Important topics, such as the origin of doubly charged and molecular ions, secondary discharges and space charge effects are discussed in a very clear manner. Chapter 9 provides an overview of 'novel' applications of ICP-MS. Although the authors indicate that this chapter is not intended as a comprehensive overview, because only selected applications are presented, it is very well referenced (>500 references)! In the first part of this chapter, attention is paid to different types of analysis (including, *e.g.*, the direct analysis of solid samples, isotopic analysis and elemental speciation). The second part describes applications from different fields: biology, geology, environmental and forensic sciences and industry. Also, applications using sector field ICP-MS and multi-component analysis for automated survey of ICP-MS spectra are addressed. In chapter 10, the benefits and drawbacks of alternate ICP discharges are extensively discussed. Fundamental properties, analytical characteristics and instrumental modifications required for successful operation are addressed for mixed gas, He and low pressure ICPs. The last chapter describes, in a rather technical way, the possibilities and limitations of mass spectrometry with microwave induced plasmas. Finally, the book is completed by a detailed subject index, which permits information concerning a specific topic to be found in a fast and easy way.

Conclusively, this volume is a remarkable piece of work and I am convinced that it deserves and will find a place on the bookshelf of every ICP-MS user.

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Glow Discharge Optical Emission Spectrometry. By Richard Payling, Delwyn Jones and Arne Bengtson. Pp. xli+846. Wiley. 1997. Price £175.00. ISBN 0-471-966835.

This is a large and comprehensive book on a relatively unfamiliar analytical technique of great economic importance for the rapid and accurate analysis of solid samples, both conducting and non-conducting, and for depth profile analysis. About half the book (Chapters 2–10) is devoted to the underlying principles of the technique and instrumentation and the rest is devoted to analytical applications and the associated practical problems. According to the preface, the book is intended for a very wide clientele—for scientists, engineers, tertiary students, for those not familiar with the technique, but who are keen to learn more about it, and for specialists in the field. No single book could fully satisfy the needs of such a wide range of readers.

There are 15 chapters, with about 80 main sections. Some 35 well established