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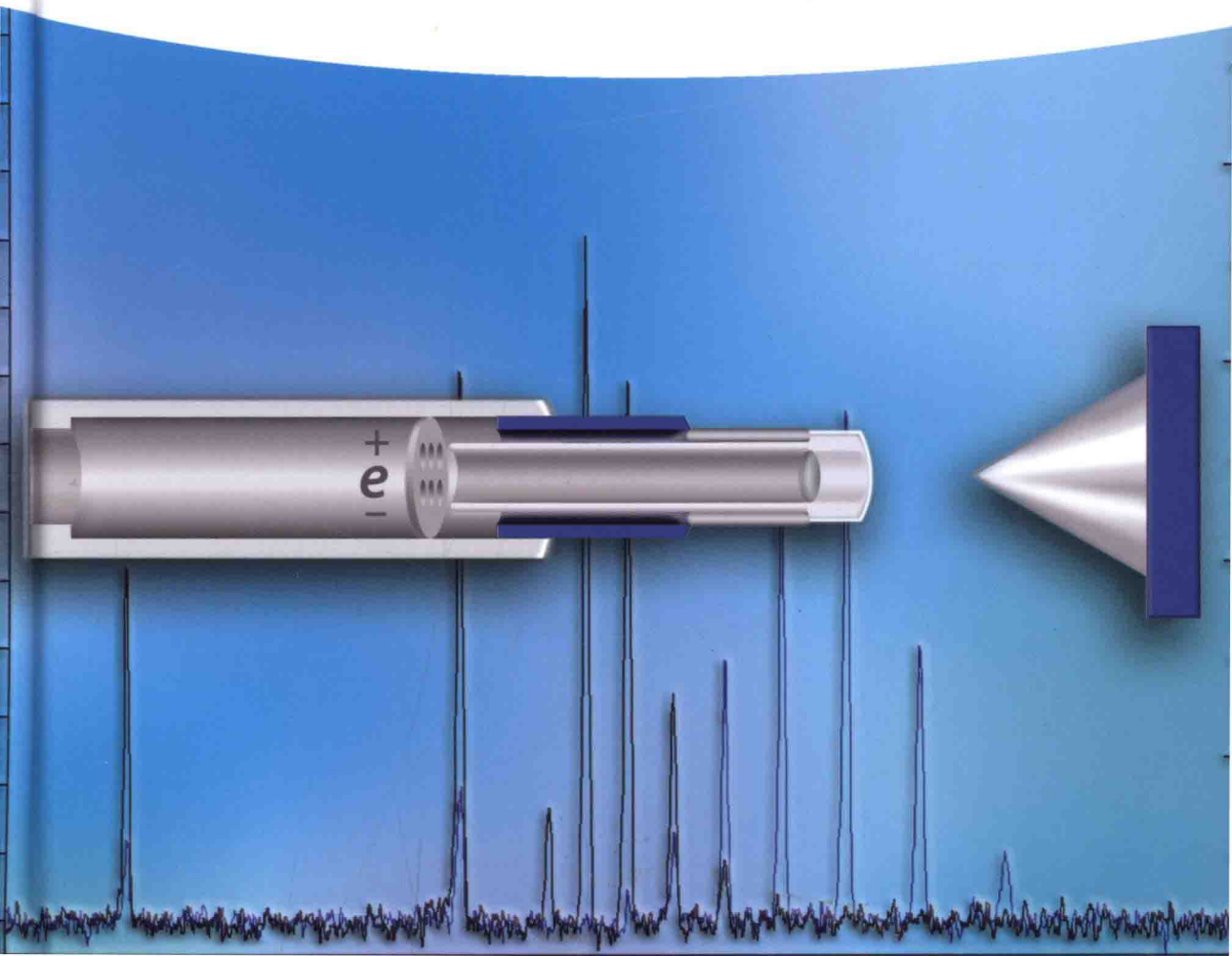
Yiyang Dong

Direct Analysis in Real Time Mass Spectrometry

Principles and Practices of DART-MS



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DART-MS is a relatively new, but very fast evolving technology. The book provides an introduction to the technique and includes a thorough discussion of the ionization mechanism as well as sampling and analyte enrichment strategies. Due to its versatility of the technique, DART-MS is an important analytical technique in many fields. The book includes applications in agro-products analysis, clinical and pharmacological analysis as well as environmental contaminants analysis.

Yiyang Dong *is director of Food Safety & Risk Assessment Laboratory and full professor of chemistry at Beijing University of Chemical Technology (BUCT) in Beijing, China. Having obtained his PhD from Peking University in 1998 and pursued a postdoctoral position in the University of Tokyo, Japan in 2011, he spent most of his career working for Chinese Academy of Inspection and Quarantine before taking up his present appointment at BUCT. He authored over 100 scientific publications in analytical and bio-analytical fields using capillary electrophoresis, liquid chromatography, microfluidics and biosensors with mass spectrometric identification. He is frequently invited as peer reviewer for journals such as Biosensors and Bioelectronics, Analyst, Analytical Methods, and Journal of Molecular Recognition.*

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Direct Analysis in Real Time Mass Spectrometry

I dedicate this book to my beloved parents, Yuante Tung and Shuchen Hsu.
I am best endowed with your love, goodness, honesty, wisdom, endeavors, and perseverance; for that, thank you so much.

Preface

All the authors who have contributed to this book have tried to describe that direct analysis in real time (DART), as a representative ambient ionization technique initiated by Penning ionization of atmosphere or electron emission from surfaces, has developed into a potential analytical tool from a mechanistic perspective for various applications.

In Chapter 1, the evolution of mass spectrometry and its role in contemporary analytical chemistry have been reviewed, desorption/ionization in mass spectrometry is discussed, and ambient ionization and DART are briefly introduced. In Chapter 2, the principle of DART and ionization mechanisms are well depicted.

In Chapter 3, to overcome DART limitations in terms of sample uniformity, ionization energy and efficiency, sample preparation and analyte-enrichment strategies are provided. In Chapter 4, parameters that influence DART-MS performance are summarized to optimize and quantitate analytes with improved sensitivity and accuracy. To further extend analytical capabilities, interfacing TLC, GC, HPLC, CE, SPR, and IMS with DART-MS has been realized and summarized in Chapter 5 systematically.

Abundant DART-MS applications for foods/agro-products, industrial chemicals, environmental contaminants, pharmaceuticals, clinical/pharmacological analysis, natural phytochemical research, and relevant DART-MS reports are comprehensively presented in Chapters 6–12, respectively. In Chapter 13, inherent limitations of DART-MS are thoroughly investigated. In addition, comparisons for DART with other ambient ion sources are made. Furthermore, some prospective applications, such as DART with high resolution MS, instrumental automation and miniaturization, surface scanning and imaging, and so on, are rather promising and encouraging.

I hope both analytical experts and novice investigators will find this book very useful, and acknowledge all the authors who have contributed to this book with great appreciation thereof.

Oct 8th, 2017
Beijing University of Chemical Technology
China

Yiyang Dong

About the Editor

Yiyang Dong, PhD

Yiyang Dong obtained his bachelor's degree in Chemistry in 1989 from the East China Normal University where he acquired knowledge in fundamental analytical chemistry and mass spectrometry; then he went on to pursue his postgraduate study at the Nankai University and got his master's degree in liquid chromatography. In 1995, he went to the Peking University to investigate capillary electrophoresis for chiral separation and obtained a doctorate of philosophy in separation science in 1998. He also carried out postdoctoral research at Prof. Kitamori's laboratory in the University of Tokyo, Japan, to study microfluidics and related miniaturized bioanalytical techniques and tried to hyphenate these frontier techniques with mass spectrometry (MS) for various analytical applications later.

In early 2012, Dong joined the Beijing University of Chemical Technology (BUCT) as a full professor of Chemistry through a talent program and set up a research laboratory for food safety analysis and risk assessment, where he developed mass spectrometric and several facile bioanalytical methodologies for fast identification of small molecular adulterants, additives, and functional ingredients in various food matrices. It was here that his interest in direct analysis in real time (DART) and other ambient ionization strategies began with a cooperatively gelivable investigator Professor Wei Yong from the Chinese Academy of Inspection and Quarantine (CAIQ).

This research interest continued when Dong's graduate students Tianyang Guo and Pingping Fang began to participate in relevant DART research projects. Recent years have witnessed a broad utilization of DART in various research fields to introduce DART with representative analytical applications; he is therefore pleased to be the editor of this book on MS and feels happy to share with the audience the state of the art.

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