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Aims and Scope

The series *Topics in Current Chemistry* presents critical reviews of the present and future trends in modern chemical research. The scope includes all areas of chemical science, including the interfaces with related disciplines such as biology, medicine, and materials science.

The objective of each thematic volume is to give the non-specialist reader, whether at the university or in industry, a comprehensive overview of an area where new insights of interest to a larger scientific audience are emerging.

Thus each review within the volume critically surveys one aspect of that topic and places it within the context of the volume as a whole. The most significant developments of the last 5–10 years are presented, using selected examples to illustrate the principles discussed. A description of the laboratory procedures involved is often useful to the reader. The coverage is not exhaustive in data, but rather conceptual, concentrating on the methodological thinking that will allow the non-specialist reader to understand the information presented.

Discussion of possible future research directions in the area is welcome.

Review articles for the individual volumes are invited by the volume editors.

In references *Topics in Current Chemistry* is abbreviated *Top Curr Chem* and is cited as a journal.

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Preface

The field of microfluidics, or “lab on a chip”, is now regarded as one of the key sciences and technologies of miniaturization. It is advancing at a rapid pace and has been developed to demonstrate unprecedented abilities for practical applications in biology, chemistry and engineering in the past decade.

This volume entitled “Microfluidics: Technologies and Applications” presents the current status of selected areas of this broad discipline. It features 11 chapters in total written by authors from 10 leading groups all over the world. Its content covers a spectrum of topics pertaining to fundamentals, basic technologies and applications.

The first part is made up of seven chapters and deals with fundamentals and basic technologies: Shuichi Shoji and his colleague from Waseda University, Japan, give a general overview of the methods and devices of the flow control in microfluidics; Weijia Wen and his colleagues from Hong Kong University of Science and Technology describe the electrorheological fluid technology; scientists in University of Southampton, UK, Xunli Zhang and his colleagues focus on mixtures in micro channels, which is one of the most important phenomena in microfluidics. For the detection approach, Hongwei Gai and Edward S Yeung from Hunan University, China and Ames National Lab, US respectively, discuss the optical detection systems in more detail; Taek Dong Chung and his colleagues in Seoul University, Korea, give a comprehensive outline of biosensors; and Hsueh-Chia Chang and his colleagues from University of Notre Dame, US, describe a nanomembrane-based nucleic acid sensing platform. Then Xin Liu from University of Cambridge, UK, together with the editor’s group present the recent works of droplet, which is an another important mode in microfluidics besides the channel based one.

This volume is finalized with four reviews on applications: Steven A Soper and his colleagues from Louisiana State University, US, kindly contribute two chapters on applications of microfluidic technology on DNA and proteins respectively; in the chapter written by Danny van Noor and his colleagues in National University of Singapore write a chapter on the cell in microfluidics; and the last chapter is contributed by the editor’s group, Dalian Institute of Chemical Physics, CAS,

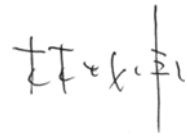
China, where the authors summarize the multicellular organism (*C.elegans*) study on the chips.

As the editor, I hope that the collection of above articles reflects the current status of this important field of microfluidics in a timely fashion, and this book becomes a helpful resource for readers, especially students, engineers, and even advanced non-specialist scientists who work outside of our field by providing a deep and thorough understanding of the mechanisms, technology and future promise of microfluidics for research and applications. I believe that the scope and the variety of topics covered in this volume will attract readers from different communities such as chemistry, physics, biology, medicine and engineering.

As the editor of this special review book, I would like to thank all of authors for their contributions with high quality articles and all of reviewers for their constructive comments, and to thank my colleague, Dr. Hua Xie, for her valuable help. I also appreciate the team at Springer for all the practical help and continuous support of this special issue.

Dalian, China

Bingcheng Lin

A handwritten signature in black ink, consisting of stylized Chinese characters, likely reading 'Lin Bingcheng'.

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