

## Preface

Over the past decade we have witnessed significant advances in the field of biotechnology, mainly due to the development of novel applications of advanced technology that have arisen to meet the various challenges faced by the research community. This book aims to present recent dynamic advances in technology and R & D in the fields of bioprocessing and bioseparation.

I am indebted to the many authors and co-authors of the 26 chapters from both the academic and industrial sectors from all over the world who have agreed to share their experience and knowledge. Chapters 1 and 2 in Part I deal with the when to start and where to stop process development, and the various strategies in downstream processing. Chapters 3 and 4 in Part II cover process development and optimization for the production of antibodies, and the dynamics of cellular responses to recombinant protein overexpression in *Escherichia coli*. Part III covers preparative methods. Ion-exchange chromatography in biopharmaceutical manufacturing is dealt with Chapter 5. Chapters 6 and 7 deal with displacement chromatography of biomacromolecules and the purification of biomolecules by countercurrent chromatography. Continuous chromatography in downstream processing of compounds of biotechnological and natural origin, continuous annular chromatography, the principles of membrane separation processes, and affinity precipitation are explained in Chapters 8, 9, 10 and 11, respectively. Part IV covers specific bioprocesses and separation methods. Biological fuel cells are dealt with in Chapter 12, removal and analysis of contaminants and impurities in Chapter 13, high-throughput RNA interference as an emerging technology for functional genomics in Chapter 14, developing an antibody purification process in Chapter 15, the many ways to purify plasmid DNA in Chapter 16, and advanced fractionation and analysis for proteomics applications in Chapter 17. Chapters 18–23 make up Part V on safety, quality control, validation and regulatory considerations. Part VI on analytical methods and technologies contains Chapter 24 on the polymerase chain reaction, Chapter 25 on electrokinetic separations and Chapter 26 on capillary isoelectric focusing methods for charge-based analysis of biopharmaceuticals.

For comprehensive and up-to-date information the reader should refer to specialized review articles.

This book will be an invaluable companion for biotechnologists, pharmaceutical engineers and others who are involved in the manufacture of biologically active biotechnological products.

I wish to express my sincere thanks to Dr. Frank Weinreich for inviting me to edit this volume, and to Rainer Münz and his colleagues at Wiley-VCH for their enthusiasm and support throughout the production of this book.

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