

Preface

Bioseparations engineering refers to the systematic study of the scientific and engineering principles utilized for large-scale purification of biological products: biopharmaceuticals, biochemicals, foods, nutraceuticals and diagnostic reagents. Bioseparations engineering, both as an academic topic as well as an industrial practice has undergone significant growth and increase in importance in the past decade. Its entry into academia as a taught course took place as usually happens with any new topic: at the postgraduate level. It is now taught as a regular course in many undergraduate chemical and biomolecular engineering programs. It is also taught either as a separate course or indeed as a component of *bioprocess engineering* in almost all undergraduate and postgraduate programs in biotechnology.

Most projects start with some necessity and this book is no exception. In the year 1999, as a new faculty member at Oxford University I was assigned to teach the relatively new *C5A Bioprocess Engineering* and *C5B Separations* courses for undergraduate engineering students. Both these courses were expected to have significant *bioseparations engineering* content and the main challenge I faced at that time was the lack of a satisfactory undergraduate level text book. I had learnt *bioseparations engineering* in the early 90s reading the seminal book on this topic by Belter, Cussler and Hu (*Bioseparations: Downstream Processing for Biotechnology*, John Wiley and Sons). However, this book had been published in 1988 and by end of the millennium was slightly dated. I therefore started developing my own course notes and handouts. These have formed the building blocks of this book and so in a sense, I effectively started writing this book in 1999. This is intended to be an undergraduate level text book, suitable for a one semester course on bioseparations engineering.

Chapters 1 to 3 are intended to provide the reader with the basic biological and engineering prerequisites. Most bioseparation processes are carried out in a multi-step fashion, each step consisting of a discrete separation technique. These techniques have been classified into broad categories in the remaining chapters of the book, i.e. chapters 4 to 12.

The last paragraph of a preface is usually reserved for acknowledgements. I would like to thank my family members: my parents, my wife, my sister and parents in-law for their encouragement and unstinting support. My wife has been a constant source of moral and material support throughout this project. I am particularly grateful to her for painstakingly proof-reading the manuscript, making it better in the process. Without her help, it would have been very difficult to complete this book. I would like to acknowledge my McMaster colleagues Professors Carlos Filipe, Ronald Childs, Andrew Hrymak, Robert Pelton, Shiping Zhu and Don Woods for kind words of encouragement and support. Going international, I would like to thank Professor Tony Fane of the University of New South Wales, Australia and Professor Zhanfeng Cui of the University of Oxford, UK for their words of advice at the early stages of this project. Last but certainly not the least: I would like to acknowledge my graduate students Dharmesh Kanani and Lu Wang for their help with crosschecking the solutions to the numerical problems presented in this book.

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