# Preface

The technique of microencapsulation was introduced approximately eight decades ago, and its potential application in cell therapy was described almost 50 years later. The technique offers a wide range of applications in both industry and medicine. Cell microencapsulation comes under the broader field of bioencapsulation and in most cases involves the immobilization of therapeutic cells in polymeric scaffolds or semipermeable hydrogel capsules that provide the cells with a favorable protective environment allowing the exchange of nutrients and oxygen and protecting them from the host's immune system by blocking the entry of antibodies and cytotoxic immune cells. Thus, the technology has been widely used in various efforts to develop transplantable bioartificial organs without the need to immunosuppress transplant recipients, to expand donor cell sources, and in cancer cell therapy. More recently, this technique has received attention for applications in stem cell therapy, and the encapsulation of bacterial cells and other cell types for drug delivery. In stem cell therapy, cell microencapsulation has the potential to be used for the restriction of migratory mesenchymal stromal cells within a defective target tissue/organ to induce tissue repair.

The purpose of this book is to provide a unique forum to review the promise of cell microencapsulation in a broad sense that encompasses various cell types that have been encapsulated for different purposes, the different approaches/devices used for microencapsulation, the biomaterials used in cell microencapsulation, the challenges to the technology, and the current status of its application in different clinical situations. To achieve this purpose, the book is divided into five parts. Part I is the introductory part of the book that discusses historical developments of the technology and the current challenges facing it, as well as the various applications of cell microencapsulation. Part II discusses the main approaches and devices currently used in cell microencapsulation while Part III presents an overview of the various polymeric materials currently in use for cell microencapsulation, procedures for assessment of the quality of microcapsules used for cell encapsulation, and the enabling technologies to either monitor or enhance encapsulated cell function. In Part IV, specific examples of the methods used to encapsulate various cell types are discussed while Part V provides an overview of the different clinical situations in which cell microencapsulation has been applied.

*Cell Microencapsulation* is intended to be a reference handbook for researchers, engineers, clinicians, and other health-care professionals, as well as food technologists, who will find in the book detailed descriptions of methods for the microencapsulation of specific cell types and their current or potential clinical and industrial applications. The book also includes detailed information about the design and manufacture of different devices including large-scale production devices for use in cell microencapsulation. Furthermore, individuals or family members of individuals afflicted with certain diseases for which cell microencapsulation has potential application will find the book to be a good source of information as they research new therapeutic options in cell therapy for those disease states. In addition, entrepreneurs/investors and the scientists that work with them in Biotechnology will find this book to be a great resource for assessment of the promise of the cell microencapsulation technology to enable them make informed decisions about where to make rewarding investments.

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