

Preface

ELECTROSPINNING, previously also known as “electrostatic spinning,” was discovered a century ago, and it has become a popular technique to prepare nanofibers. Recent decades have seen a number of innovative developments in relation to both electrospinning and electrospun nanofiber. Many unique properties of electrospun nanofibers have been uncovered, making electrospinning distinctive from other nanofiber making methods. These research developments have greatly enriched our understanding on such a one-dimensional material and the technical principle. They offered technological solutions to obtain nanofibers of diverse morphologies, fibrous structures, and compositions for various research purposes.

We are very pleased to note that electrospun nanofibers have already been used in some practical niches. The development of needleless electrospinning has allowed the mass production of nanofibers. Tens of thousands of researchers have been involved in electrospinning related works, and the number of researchers grows increasingly with more and more applications of electrospun nanofibers in practice.

The purpose of this book is to provide a systematic introduction of electrospinning and electrospun nanofibers. It is written based on Professor Tong Lin’s syllabus to teach the nanotechnology majored students at Deakin University, Australia, and postgraduate students who attended the 2013 Donghua University Summer Courses in Shanghai, China. His lectures received enthusiastic responses, which formed one of the motivations to write this book. We hope the book can be used as a textbook for the undergraduate and postgraduate students who study

the fibers or materials-related subjects to broaden their professional knowledge.

The book also covers key research results on electrospinning and electrospun nanofibers published in literature through 2015. It also helps people from different backgrounds to rapidly understand this fiber-making technology and the interesting fibers.

The book consists of 10 chapters. Chapter 1 provides introductory information on the importance of nanofibers, their uniqueness, naturally occurring nanofibers, and all the nanofiber making techniques developed. Chapter 2 introduces history and fundamentals of electrospinning, fiber forming, and major parameters affecting the electrospinning process. Chapter 3 deals with the typical morphology and structure of electrospun nanofibers. Chapter 4 discusses main problems existing in electrospinning nanofibers and the approaches to improving fiber quality. Chapter 5 reviews various developments on needle-based electrospinning. Chapter 6 describes the development of needleless electrospinning for large scale nanofiber production. Chapter 7 details the approaches to controlling fiber deposition for making structured nanofibrous assemblies. Chapter 8 is about nanofiber yarns and their properties. Chapters 9 summarizes the applications of electrospun nanofibers in various fields. Chapter 10 introduces methods to prepare carbon, inorganic, and metal nanofibers based on electrospinning.

Due to the rapid progress in the electrospinning field and the limited time for the authors to write the book, some omissions may have occurred. We do apologize about this, and, if the reader finds any omissions, we would appreciate it if you could let the authors know. We promise we will add them to the later edition.