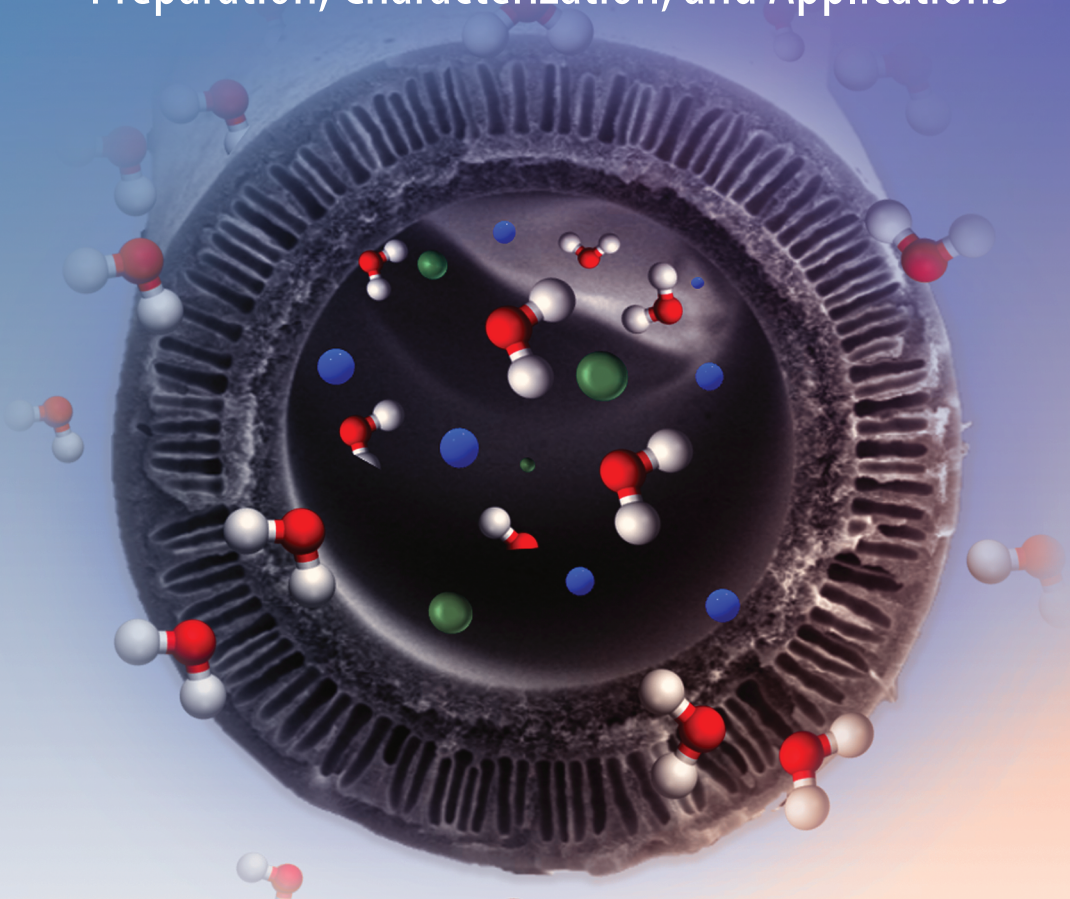
edited by

Alberto Figoli | Mir Saeed Seyed Dorraji
Francesco Galiano

Hollow Fibers and Nanofibers in Membrane Science

Preparation, Characterization, and Applications



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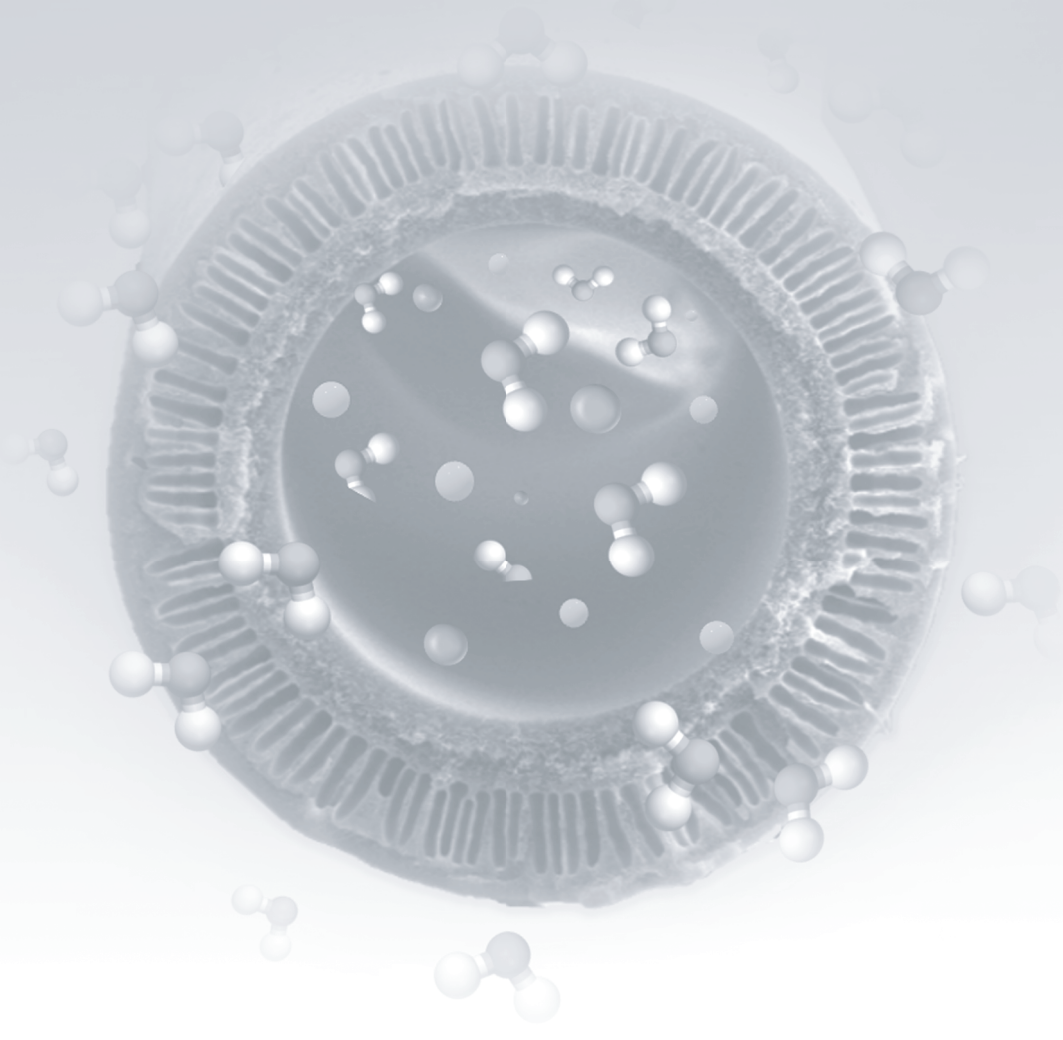

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JENNY STANFORD
PUBLISHING

Published by

Jenny Stanford Publishing Pte. Ltd.
101 Thomson Road
#06-01, United Square
Singapore 307591

Email: editorial@jennystanford.com
Web: www.jennystanford.com

British Library Cataloguing-in-Publication Data
A catalogue record for this book is available from the British Library.

Hollow Fibers and Nanofibers in Membrane Science: Preparation, Characterization, and Applications

ISBN 978-981-4968-03-4 (Hardcover)
ISBN 978-1-003-25663-2 (eBook)

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Preface

Membrane processes are highly efficient and reliable separation methods. They represent, more than ever, a key technology in several industrial applications including water treatment, gas separation, desalination, food processing, and medical applications.

The wide range of membrane configurations and modules, which are available nowadays, makes membranes a highly versatile and resilient technology able to respond to the different needs of the industry. In this framework, fiber-shaped membranes play a crucial role in separation-based operations, thanks to their specific properties, compared to their flat-sheet counterparts.

The principal objective of this book is to provide a comprehensive review on the state of the art of fiber technologies including the preparation, characterization, and fields of applications. Among the fiber-configuration membranes, hollow fibers are the most diffused geometry and, for this reason, they are discussed to a greater extent in this book.

Following a general introduction to hollow fiber membranes (Chapter 1), the first part of the book discusses the fundamental aspects of fiber preparation and characterization (Chapters 2–5). In particular, Chapter 3 deals with the preparation and characterization of polymeric nanofibers produced by the electrospinning processes, while Chapters 2, 4, and 5 deal with the preparation and characterization of polymeric, inorganic, and mixed matrix hollow fibers, respectively.

The second part of the book focuses on the various fields of application of fibers and their practical uses covering micro- and ultrafiltration processes in the agrofood sector (Chapter 6), reverse osmosis and nanofiltration (Chapter 7), membrane distillation and membrane contactors (Chapter 8), gas separation (Chapter 9), pervaporation (Chapter 10), and finally, biomedical applications (Chapter 11). Concrete examples are discussed throughout the various chapters highlighting the advantages and potential hurdles to the use of fibers in the different applications.

We hope that the present text will provide useful information to the readers interested in membrane science and technology and, in particular, new insights on the state of the art and future trends of fibers.

This book has been written with the precious support and participation of the authors, to whom goes our sincere gratitude and appreciation.

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March 2022