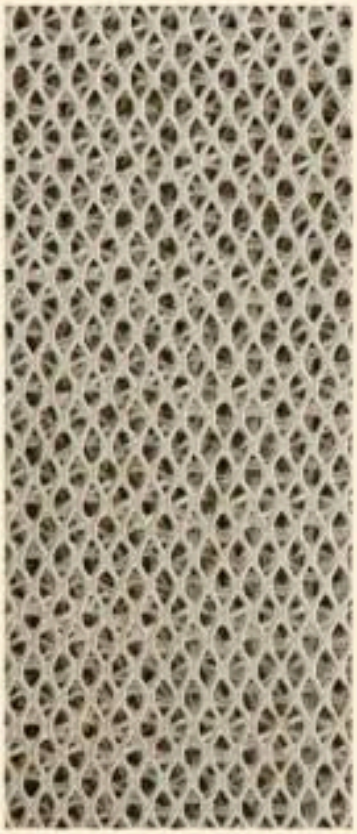

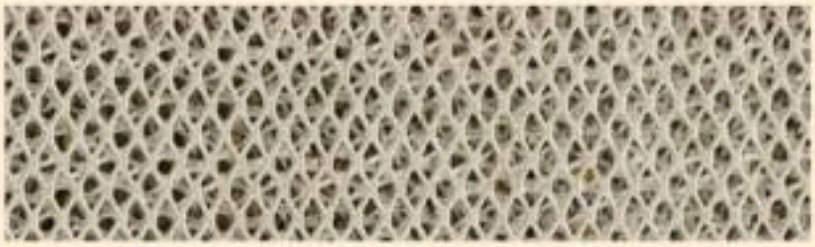

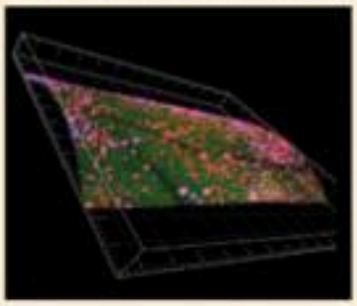

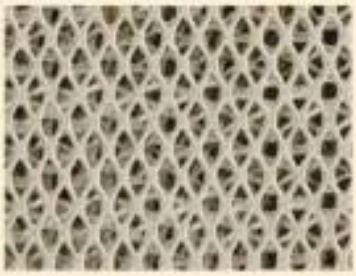

Membrane Technology and Environmental Applications

Edited by Tian C. Zhang, Rao Y. Surampalli, Saravanamuthu Vigneswaran, R. D. Tyagi, Say Leong Ong, and C. M. Kao

ASCE

EWRI ASCE ENVIRONMENTAL & WATER RESOURCES INSTITUTE

MEMBRANE TECHNOLOGY AND ENVIRONMENTAL APPLICATIONS

SPONSORED BY
Membrane Technology Task Committee of
the Environmental Council

Environmental and Water Resources Institute (EWRI)
of the American Society of Civil Engineers

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Published by the American Society of Civil Engineers

Library of Congress Cataloging-in-Publication Data

Membrane technology and environmental applications / sponsored by Membrane Technology Task Committee of the Environmental Council, Environmental and Water Resources Institute (EWRI) of the American Society of Civil Engineers ; edited by Tian C. Zhang ... [et al.].
p. cm.
Includes bibliographical references and index.
ISBN 978-0-7844-1227-5 (book) — ISBN 978-0-7844-7689-5 (ebook)
1. Membrane separation. 2. Water—Purification—Membrane filtration. 3. Gas separation membranes. I. Zhang, Tian C. II. Environmental and Water Resources Institute (U.S.). Membrane Technology Task Committee.
TP248.25.M46M455 2012
660'.28424—dc23

2012012729

Published by American Society of Civil Engineers
1801 Alexander Bell Drive
Reston, Virginia, 20191-4400
www.asce.org/pubs

ISBN 978-0-7844-1227-5 (paper)
ISBN 978-0-7844-7689-5 (e-book)
Manufactured in the United States of America.

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Preface

Membrane technology is a group of physicochemical separation techniques that use membranes as the key process component for the separation of material mixtures. Modern membrane technologies have their intrinsic properties (and thus, advantages) such as: a) their simplicity in concept and operation; b) high selectivity and permeability for different components; c) flexibility (easy to modularize, scale-up and control); d) compatibility in integrated systems and different environments; e) reduced use of treatment chemicals and generation of residuals; f) modifiable for low energy consumption; and g) no requirement for phase change (important for solutions that are sensitive to heating, such as food products and life-science materials). Membrane technology is one of the most direct, effective and feasible approaches to solving the global challenges that we are facing, such as increasing demand for food and water, resource depletion, and changing climate conditions.

The ASCE's Technical Committee on Hazardous, Toxic and Radioactive Waste has identified membrane technology as an important area for environmental applications and sustainable development, and thus, made an effort to work with the contributors to put this book together in the context of a) principles, processes, general applications, and research needs of membrane technology (see Chapters 1–4); b) environmental applications of membrane technologies (see Chapters 5–15); and 3) recent advances in membrane technology (Chapters 16–23). This structure reflects the fact that thousands of studies and applications of membrane technology are focused on these issues.

We hope that this book will be of interest to students, scientists, engineers, government officers, process managers and practicing professionals. As a reference, the book will provide them in-depth understanding of and comprehensive information on the principles of membrane technology, different environmental applications, recent advances, critical analysis of new membrane materials/processes, and directions toward future research and development of membrane technology.

The editors gratefully acknowledge the hard work and patience of all the authors who have contributed to this book. The views or opinions expressed in each chapter of this book are those of the authors and should not be construed as opinions of the organizations they work for. Special thanks go to Ms. Arlys Blakey at the University of Nebraska-Lincoln for her thoughtful comments and invaluable support during the development of this book.

—TCZ, RYS, SV, RDT, SLO, CMK