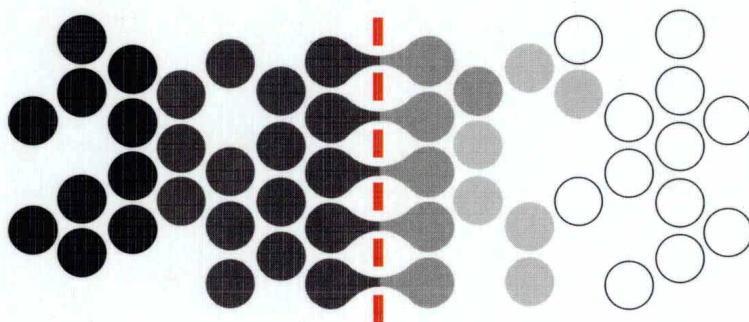


Membrane Science and Technology Series, 8



**NEW INSIGHTS INTO MEMBRANE SCIENCE
AND TECHNOLOGY: POLYMERIC AND
BIOFUNCTIONAL MEMBRANES**

**Edited by
D. Bhattacharyya
and
D.A. Butterfield**

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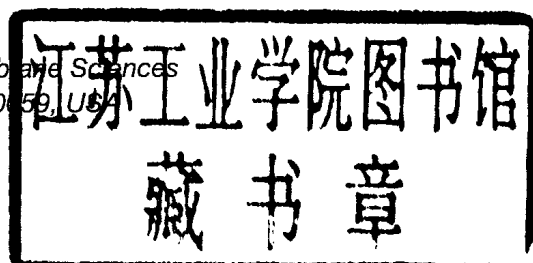
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TO:

Bhattacharyya: Gloria and Anita, my wife and daughter, for their support and understanding; my graduate students, for making teaching and research life to be very exciting.

Butterfield: Marcia and Nyasha, my wife and daughter, who have been so inspirational, encouraging, and loving.

Preface

Membrane techniques provide a broad science and technology base with applications ranging from water purification to chemical/biomolecule synthesis, material recovery, medical devices, to nano-domain interaction- based sensors and highly selective separations. Although there are several books in the traditional membrane field, there is a great need for a highly comprehensive book containing advances in both synthetic and biofunctional/biomimetic membranes including non-invasive characterization to biomedical devices. Over the years the membrane field has advanced from the development of thin-film composite membranes for desalination to recognition-based separation and reactions by taking advantage of biomolecular interactions in the nano-domain. This refereed book covers materials from highly respected researchers with topics ranging from membrane transport models to non-invasive characterization, functionalized material, biomedical devices, to sensors and environmental applications. Nineteen chapters in this special book are invited, refereed papers, and mostly based on the 2001 North American Membrane Society Annual Meeting held in Lexington, KY, organized and hosted by the University of Kentucky Center of Membrane Sciences.

The book is divided into two sections. Section I, is subdivided into three areas, Advances in Membrane Transport/Fouling, Imaging Techniques, and Contacting Devices. Section II deals with Functional Membranes and Materials for Biocatalysis, Separation, and Analysis and is further subdivided into three areas ranging from biofunctional membranes to sensors. Authors and co-authors are from various fields including chemistry, chemical engineering, mechanical engineering, biomedical engineering, biotechnology, and environmental engineering. This book is highly multidisciplinary in nature and should be highly valuable to scientists and engineers involved in activities ranging from separations/reactions, to advanced biofunctional materials, to contactor designs, to the general field of membrane science and technology. Students and faculty members around the world should find this to be an excellent reference book for courses ranging from traditional separation, to bioscience/engineering, to formal membrane courses.

Each chapter of this book was peer-reviewed, and we would like to give special thanks to the reviewers for this book, including various authors and co-authors of the chapters, and Drs. Kloos (Osmonics Corporation) and Hestekin (Argonne National Lab). Thanks also go to the NAMS Board of Directors, and in particular to NAMS presidents Drs. Pushpinder Puri and Glenn Lipscomb for their encouragement of the book. Mollie Fraim of the University of Kentucky

Center of Membrane Sciences did an extraordinary amount of work with us to bring this book to fruition, and we would like to express our sincere appreciation and thanks to Ms. Fraim. The editors would also like to thank Mike Lundin (chemical engineering student) for his hard work in putting the book in right format.

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About the Editors

Dibakar Bhattacharyya (DB) is the University of Kentucky Alumni Professor of Chemical Engineering and a Fellow of the American Institute of Chemical Engineers. He obtained his B.S. (Jadavpur University) and M.S. (Northwestern University, Evanston, IL) in Chemical Engineering, and his Ph.D. in Environmental Engineering from the Illinois Institute of Technology. He is the Co-Founder of the Center for Membrane Sciences at the University of Kentucky. He and his students have advanced passive membrane applications to functionalized poly-ligand membranes for high capacity metal capture to site-specific biocatalysis for organic degradation to membrane-based nanoparticle synthesis for dechlorination reactions. He has published over 140 refereed journal articles and book chapters, and has recently received three U.S. Patents (two on Functionalized Membranes for Toxic Metal Capture, and one on hazardous waste destruction technology). Dr. Bhattacharyya has mentored many graduate and undergraduate students in the area of water and wastewater related research and membrane separation. For his research, Dr. Bhattacharyya has received funding from U.S. EPA, DoD, NSF, NIEHS-SBRP, Dow Chemical, Glaxo SmithKline, Eastman Chemical Co., Daramic, Inc., etc. He has received a number of awards for his research and educational accomplishments, including the Larry K. Cecil AIChE Environmental Division Award, the Kentucky Academy of Sciences Distinguished Scientist Award, Henry M. Lutes Award for Outstanding Undergraduate Engineering Educator, AIChE Outstanding Student Chapter Counselor Awards, and the University of Kentucky Great Teacher (1984 and 1996) Awards.

D. Allan Butterfield received his B.A. in Chemistry from the University of Maine in 1968. Following three years of teaching African chemistry and mathematics in Zimbabwe, he entered Duke University, receiving the Ph.D. in Physical Chemistry in 1974. A NIH Postdoctoral Fellowship at the Duke University Neuroscience Program followed. Dr. Butterfield joined the Chemistry Department at the University of Kentucky soon after and was quickly promoted to Full Professor in 1983. In 1986, he and several others, but principally Professor Dibakar Bhattacharyya, formed the University of Kentucky Center of Membrane Sciences, and Professor Butterfield has been Director from its inception. Continuous federal funding from NIH, NSF, and DoD has supported his research on membrane structure and function in neurodegenerative disorders and on applications of biofunctional membranes to important societal problems. He and his students have published over 260 refereed papers. Professor Butterfield received the Southern Chemist Award from the American Chemical Society. He has directed the graduate careers of over 50 Ph.D. and M.S. students, and in 1998 Professor Butterfield received the Presidential Award for Excellence for Science, Mathematics, and Engineering Mentoring from President Clinton in the White House. This award was his efforts to increase the number of female and Appalachian Ph.D. students in Chemistry, both groups being highly under represented in this discipline. In 2002, the University of Kentucky Board of Trustees appointed Dr. Butterfield the Alumni Professor of Chemistry.

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