

## PREFACE

The book, *Biomembrane Frontiers: Nanostructures, Models, and the Design of Life*, a volume in the *Handbook of Modern Biophysics* series, is based on a workshop held on the 20th and 21st of March 2008 at the University of California Davis. Unlike other meeting monographs, the book presents the exciting frontiers of biomembrane research for both expert and student colleagues interested in research at the interface of biology and physics.

The idea of the workshop originated from discussions about how to create an effective outreach for the NSF-NIRT joint project “Aerogel and Nanoporous Materials for Biomolecular Applications” between the Longo, Faller, and Risbud groups at UC Davis and the groups of Curt Frank at Stanford and Joe Satcher at Lawrence Livermore National Laboratory. In the project we interacted with researchers from diverse backgrounds and hoped to create an opportunity to foster a multi- and interdisciplinary exchange of ideas. Thus, the workshop idea was conceived.

The workshop brought together experts working on many different aspects of biological membranes: from theory and simulation, to supported model bilayers, and to clinical applications. Several material scientists working on the interactions of biological membranes with biological or nonbiological materials also participated. Such a diverse set of experts in one meeting is unusual, as the different communities of theorists and experimentalists working on model membranes and real biological systems are typically quite distinct and do not often interact. Very few, if any, conferences take up the challenge of embracing a broad range of research interests. The chapters of the volume reflect the dynamic synergism of the diverse research interests in biomembrane research and present invaluable, leading ideas to a broad community of researchers and students.

At the workshop, the lively discussion made clear that everybody learned from this unique interaction with colleagues from several disciplines. It was obvious that many aspects of membranes cut across a variety of disciplines and that only research using a combination of ideas and techniques can facilitate real progress.

Several of the speakers invited their graduate students to the workshop. A large number of local graduate students and faculty also participated. Indeed, the graduate students benefited from examining the common theme of membranes from many different perspectives. These students also presented impressive work during poster sessions. The workshop had more than 70 participants.

The book is arranged topically. It leads from theory to applications. After an introduction by Harden McConnell on the history of lipid complexes over the last century, several chapters on theoretical and computational descriptions of membranes follow. Even within this subgroup there is already great diversity. Studying membranes at many different time and length scales is important and requires a wide variety of theoretical approaches to address them. The next block of chapters deals with techniques and applications in model membranes of increasing complexity. In this area there is always the compromise between the simplicity necessary to understand the system in as much detail as possible and the complexity to mimic real biological membranes as realistically as possible. The final chapters address questions of biological and clinical importance involving real membranes.

The workshop and ultimately this book would not have been possible without the dedicated support of a number of people: these are, of course, first and foremost, the speakers and graduate student poster presenters at the workshop and the authors of the chapters. They volunteered their time and effort to make this workshop a success. Specifically, we would like to thank our graduate students Allison Dickey, Emel Goksu, Clark Henderson, Matthew Hoopes, Monica Lozano, Barbie Nellis, Mike Skaug, Juan Vanegas, and Chenyue Xing for their help in organizing and running the workshop. In particular, we would like to acknowledge the organizational talent of Jenny McDonald. Finally, we would like to thank the NSF-NIRT program and the Graduate Group in Biophysics at UC Davis for their financial support, and Springer Science+Business Media for the opportunity to publish this book.

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Biomembrane Frontiers

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