Multilayer Thin Films
Sequential Assembly of Nanocomposite Materials

Edited by Gero Decher and Joseph B. Schlenoff
Foreword by Jean-Marie Lehn
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Over the last ten years, scientists from varying backgrounds have rallied around a versatile new method for the synthesis of thin films. Because the layer-by-layer assembly method provides opportunities for creative design and application of function-specific films, the field has experienced an initial period of exponential growth. This book, the first on the topic, contains many insightful contributions from leaders in the field that will enable novices and experts to understand the promises and premises of multilayers.

Readers will instantly identify with a particular aspect of the technology, whether it is the design and synthesis of new polymeric or nanoparticulate building blocks, understanding the polymer physical chemistry of multilayers, or characterizing their optical, electrical or biological activities. The reasons for the intense interest in the field are also clearly evident: multilayers bridge the gap between monolayers and spun-on or dip-coated films, and they provide many of the aspects of control found in classical Langmuir-Blodget (LB) films, yet multilayers are more versatile, in many respects, and easier to create.

This book is an essential and welcome addition to the literature on thin films. Readers with interests in self-assembled systems, supramolecular chemistry, nanocomposites or polymers will find themselves fascinated by the diversity of topics herein. The message that multilayers are making significant inroads into numerous aspects of chemistry, physics and biology is made clear. The editors and authors are to be commended for creating a comprehensive yet readable volume.

Jean-Marie Lehn
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Preface

When a new field is growing exponentially, as judged by the number of publications, presentations and patents, when is the “right” time to assemble a volume of contributed chapters from some of the acknowledged leaders in the field? What if every potential contributor is incredibly busy, following up an ever-expanding plethora of ideas and experiments? It was in this harried atmosphere that our colleagues carved out the time to write their contributions. We are extremely grateful to them for gathering their thoughts and accomplishments into chapters.

The idea for this book came together following a very successful symposium at the ACS in San Francisco 2000, which we organized. No volume on the topic had yet been published, but there was already a large store of knowledge that had been created as groups had responded enthusiastically to the promise of the first few papers appearing in the early 90’s. Multilayers had gathered a great deal of momentum, flourishing in the more “informal” space of papers, preprints, talks and word-of-mouth. By 2000, the field had simply outgrown informality.

We had been riding the wave of this activity, enjoying a growing number of colleagues. We were fully aware of the infectious nature of multilayers research, which is like a good mystery novel – hard to put down once you start. We are honored to have been in the thick of things during the early years. Every experiment was significant and the results suggested several more experiments. This dizzying atmosphere pervades even today: ask any multilayerer!

We are pleased to have edited this book. Our object was not only to document what is known about multilayers, but also to promote the potential of these versatile thin films and to facilitate the adoption of the technology by others. The field is new. We are proud of its ability to catalyze interdisciplinary thought and action. In this regard, multilayers represent a model platform for promoting modern research. Also, the intellectual distance between concept and application is minimal. Commercial applications have already been realized.

We hope the message of abundant research opportunities is made loud and clear. It is easy to get started. Easy to get “hooked.” This book is essential in showing you how. We look forward to more elegant and complex multilayered architectures and functionalities, as well as significant expansion at the biological/biomedical interface.
Finally, we would like to express our thanks to Jean-Marie Lehn for his support in writing the foreword. His “big-picture” viewpoint is sincerely appreciated.

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