

Bioadhesion and Biomimetics

From Nature to Applications

edited by

Havazelet Bianco-Peled

Maya Davidovich-Pinhas



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Preface

The term bioadhesion refers to the formation of interfacial bonds between two materials or surfaces, at least one of which is biological or biologically derived substance. An understanding of the fundamental mechanisms that govern bioadhesion is of great interest for researchers in various fields of science. One area of active research in this field focuses on natural adhesive materials produced by or extracted from plants, animals, fungi, and bacteria. Many of these bioadhesive materials act in Nature to permanently attach organisms such as plants, algae, and mussels to surfaces. Temporary bioadhesion events are also very common in Nature. These events typically involve adhesion organs allowing transient attachment of creatures such as frogs and geckos to surfaces. A second area of research in the field of bioadhesives focuses on biomimetic adhesives. These man-made materials aim to mimic the remarkable adherence capabilities of natural adhesives. To date, a variety of materials have been fabricated based on the lessons learned from Nature. Finally, studies in the field of biomedical engineering focus on bioadhesives applied as drug delivery vehicles or tissue adhesives. Bioadhesive drug delivery systems are mostly based on synthetic or natural polymers capable of bonding to mucosal surface. The term mucoadhesion may be used synonymously with bioadhesion to describe these systems. Tissue adhesives are useful in the surgical arena as a means to control bleeding and leaks of other body fluids.

Given the interdisciplinary nature of the discipline, this edited book has been designed to appeal to a broad spectrum of readers. It includes four sections addressing the latest developments relative to different aspects of Bioadhesion. The first section covers the principles and mechanisms governing the phenomena of bioadhesion and describes experimental means to measure it. The second section focuses on natural adhesives, including “wet” adhesives produced and secreted by algae, mussels and sand tube worms, and “dry” adhesion strategies utilized by geckos.

The third section deals with biomimetic adhesives and surfaces. Finally, the last section of this book is devoted to medical applications of adhesives.

This book gives a good background for any researcher dealing with the development of bioadhesives and we hope it would serve as a catalyst for further innovations in the field.

We would like to express our sincere thanks to our colleagues, the authors, who responded to our invitations and contributed to this edited book. Their collective expertise represents many years of industrial and academic experience in the field of Bioadhesion. We hope that this book would serve as a catalyst for further research and innovations as well as serve as a useful reference in the emerging field of bioadhesion.

**Havazelet Bianco-Peled
Maya Davidovich-Pinhas**