

Preface

Biomaterials are used in numerous in vivo applications, ranging from joint and dental implants to vascular grafts and heart valves. Recent advances in fields such as tissue engineering have expanded the scope of uses for biomaterials as an integral part of implant devices. Depending on particular aspects/specifications for each such application, chemical, mechanical, and electrical properties undoubtedly contribute to the performance of biomaterial/prosthetic devices. In all cases, however, success or failure of implants in vivo critically depends on the biological interactions (molecular, cellular, and tissue) at the implant/tissue interface. Advances in molecular biology and biochemistry, cell biology, developmental biology, wound-healing physiology, materials science and engineering, and novel laboratory techniques, as well as in advanced laboratory and clinical instrumentation, have provided incentives and capabilities for renewed and ever-increasing interest in the tissue/biomaterial interfacial milieu. These new approaches have the potential for elucidating the mechanisms of important physiological processes pertinent to new tissue formation and for enhancing integration of implants in the surrounding tissues. As scientists and engineers meet these challenges, they are opening new scientific frontiers and are making seminal contributions that steer the biomaterials/implant device field in new directions of great potential and promise.

Biological Interactions on Materials Surfaces was motivated by the need to bring to the attention of the scientific community the latest developments in current understanding of protein, cell, and tissue interactions with biomaterials (possessing both conventional as well as nanoscale features). In addition to discerning and judicious reviews, established and renowned experts provided insightful evaluation of the current state of the art in, and projected their opinions on the future of, their respective research areas. Multidisciplinary perspectives in the field are represented in contributions from authors from North America, Europe, and Asia.

The present book is intended to provide valuable insight for scientists, engineers, and medical researchers seeking not only to understand but also to control tissue–biomaterial interactions for the in vivo success of implant biomaterials/devices and tissue-engineering constructs. It is our hope that the scientific information presented in this book will also stimulate further research, resulting in important contributions toward development of the next generations of devices used to replace, augment, or perform the functions of diseased and damaged tissues and organs. Clinical applications of such knowledge will, undoubtedly, have a major impact on the health care and welfare of many patients.

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Responses

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