
Contents

PART I Processing and Applications of Biodegradable Systems

Chapter 1 Biodegradable Polymers in Medicine	3
<i>Masakazu Suzuki and Yoshito Ikada</i>	
Chapter 2 Injectable Biodegradable Systems	13
<i>L. F. Boesel and Rui L. Reis</i>	
Chapter 3 Injectable Polymeric Scaffolds for Bone Tissue Engineering	29
<i>Manuela E. Gomes, Rui L. Reis, and Antonios G. Mikos</i>	
Chapter 4 Totally or Partially Biodegradable Self-Polymerizing Composites for Orthopedic Surgery and Dental Applications	39
<i>Blanca Vázquez, Gustavo A. Abraham, Carlos Elvira, and Julio San Román</i>	
Chapter 5 Fiber Bonding and Particle Aggregation as Promising Methodologies for the Fabrication of Biodegradable Scaffolds for Hard-Tissue Engineering	53
<i>Manuela E. Gomes, Patrícia B. Malafaya, and Rui L. Reis</i>	
Chapter 6 Design and Fabrication of Scaffolds via Solid Free-Form Fabrication	67
<i>Dietmar W. Hutmacher</i>	
Chapter 7 Biodegradable Composites for Biomedical Applications	91
<i>N. M. Neves, J. F. Mano, and Rui L. Reis</i>	
Chapter 8 Development of Bioactive Composites Based on Biodegradable Systems for Bone Replacement Applications	115
<i>I. B. Leonor, R. A. Sousa, and Rui L. Reis</i>	
Chapter 9 Mechanical Characterization of Biomaterials	127
<i>J. F. Mano, N. M. Neves, and Rui L. Reis</i>	

Chapter 10 Chitosan-Based Microcomposites — From Biodegradable Microparticles to Self-Curing Hydrogels.....	145
--	-----

Alberto Gallardo, María Rosa Aguilar, Carlos Elvira, Carlos Peniche, and Julio San Román

Chapter 11 Processing and Biomedical Applications of Degradable Polymeric Fibers.....	163
--	-----

K. Tuzlakoglu and Rui L. Reis

Chapter 12 Understanding the Enzymatic Degradation of Biodegradable Polymers and Strategies to Control Their Degradation Rate.....	177
---	-----

Helena S. Azevedo and Rui L. Reis

PART II Production of Biomimetic Coatings on the Surface of Degradable Polymers

Chapter 13 Bonelike Apatite Coatings Nucleated on Biodegradable Polymers as a Way to Induce Bone Mineralization: Current Developments and Future Trends.....	205
---	-----

A. L. Oliveira and Rui L. Reis

Chapter 14 Biomimetic Coatings, Proteins, and Biocatalysts: A New Approach to Tailor the Properties of Biodegradable Polymers.....	223
---	-----

I. B. Leonor, Helena S. Azevedo, Catarina M. Alves, and Rui L. Reis

PART III Systems for Controlled Release of Bioactive Agents

Chapter 15 Strategies for Delivering Bone and Cartilage Regenerating Factors.....	253
--	-----

Patrícia B. Malafaya, Gabriela A. Silva, and Rui L. Reis

Chapter 16 Resorbable Polymeric Delivery Systems Based on Physical Absorption/Diffusion versus Chemically Controlled Delivery Systems.....	281
---	-----

Julio San Román, Alberto Gallardo, Carlos Elvira, Blanca Vázquez, and Gustavo A. Abraham

Chapter 17 Enzyme Immobilization in Biodegradable Polymers for Biomedical Applications.....	301
--	-----

S. A. Costa, Helena S. Azevedo, and Rui L. Reis

Chapter 18 Use of Chemically Modified Chitosan and Other Natural-Origin Polymers in Tissue Engineering and Drug Delivery.....	325
--	-----

E. T. Baran and Rui L. Reis

PART IV Biocompatibility and Immunological Responses to Degradable Biomaterials

Chapter 19 Cytotoxicity Screening of Biodegradable Polymeric Systems.....	339
--	-----

Gabriela A. Silva, A. P. Marques, Manuela E. Gomes, O. P. Coutinho, and Rui L. Reis

Chapter 20 Natural-Origin Degradable Materials: The Barrier or the Passage through the Immune System?	355
--	-----

A. P. Marques, J. A. Hunt, and Rui L. Reis

Chapter 21 Mediation of the Cytokine Network in the Implantation of Orthopedic Devices.....	377
--	-----

A. P. Marques, J. A. Hunt, and Rui L. Reis

Chapter 22 Protein and Cell Interactions with Biodegradable Systems	399
--	-----

Catarina M. Alves and Rui L. Reis

Chapter 23 Surface Activation and Modification — A Way for Improving the Biocompatibility of Degradable Biomaterials	429
---	-----

I. Pashkuleva and Rui L. Reis

PART V Biodegradable Polymers for the Engineering and Regeneration of Different Tissues

Chapter 24 Bone and Articular Cartilage Tissue Engineering: The Biological Components	457
--	-----

A. J. Salgado, Manuela E. Gomes, O. P. Coutinho, and Rui L. Reis

Chapter 25 Tissue Engineering of the Liver.....	479
--	-----

Y. Murat Elcin

Chapter 26 Smart Biodegradable Hydrogels with Applications in Drug Delivery and Tissue Engineering	493
---	-----

Carlos Elvira, Gustavo A. Abraham, Alberto Gallardo, and Julio San Román

Chapter 27 Skin Tissue Engineering Part I — Review	509
---	-----

Dietmar W. Hutmacher, K. W. Ng, and H. L. Khor

Chapter 28 Skin Tissue Engineering Part II — The <i>In Vitro</i> Evaluation of Natural and Synthetic 3-D Matrices as Dermal Substrates	529
---	-----

K. W. Ng, H. L. Khor, and Dietmar W. Hutmacher

Chapter 29 Biodegradable Polymers for Guided Nerve Regeneration	549
--	-----

K. Tuzlakoglu and Rui L. Reis

Index	557
--------------------	-----

Part I

Processing and Applications of Biodegradable Systems