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Biomaterials Regulating Cell Function and Tissue Development

Editors: Robert C. Thomson, David J. Mooney, Kevin E. Healy, Yoshito Ikada
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Biomaterials Regulating Cell Function and Tissue Development

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and Antonios G. Mikos
Frontmatter
[More information](#)

CONTENTS

Preface vii

Materials Research Society Symposium Proceedings viii

PART I: BIOMATERIALS IN TISSUE ENGINEERING

A New Approach to Cartilage Tissue Engineering Using
Human Dermal Fibroblasts Seeded on Three-Dimensional
Polymer Scaffolds 3
S.B. Nicoll, A. Wedrychowska, N.R. Smith, and R.S. Bhatnagar

Investigating Islet Immunoisolation Parameters Using
Microfabricated Membranes 7
T.A. Desai, D.J. Hansford, W.H. Chu, T. Huen, and M. Ferrari

Comparison of Release Profiles of Various Growth Factors
From Biodegradable Carriers 13
Y. Tabata, M. Yamamoto, and Y. Ikada

A Model for Oxygen Transport in Microencapsulated Islets 19
H. Iwata, Y.G. Park, and Y. Ikada

PART II: CONTROLLING CELL INTERACTIONS WITH
BIOMATERIAL CHEMISTRY OR SURFACE PROPERTIES

Modification of Fibroin Film With a Chimera Fibroin
Fragment for Improvement of Cell Adhesion 27
Yasushi Tamada

Positron Annihilation Lifetime Measurements in Collagen
Biopolymer 33
S. Siles, G. Moya, X.H. Li, J. Kansy, and P. Moser

PEG Cross-Linked Alginate Hydrogels With Controlled
Mechanical Properties 37
Petra Eiselt, Jon A. Rowley, and David J. Mooney

*Construction of Biomimetic Environments With a
Synthetic Peptide Analogue of Collagen 43
*Rajendra S. Bhatnagar, Jing Jing Qian, Anna Wedrychowska,
and Nancy Smith*

Materials Designed to Control and Examine the Function of
Single Cells 55
C.H. Thomas, J.B. Lhoest, D.G. Castner, C.D. McFarland, and K.E. Healy

*Invited Paper

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978-1-107-41371-9 - Materials Research Society Symposium Proceedings: Volume 530:
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Editors: Robert C. Thomson, David J. Mooney, Kevin E. Healy, Yoshito Ikada
and Antonios G. Mikos
Frontmatter
[More information](#)

Neuronal Outgrowth Guidance on Patterned Organic Films	59
<i>M.M. Matsuzawa, V. Krauthamer, and R.S. Potember</i>	
Development of a Flexible Cell Targeting System Based on Silica Nanoparticles	65
<i>T. Schiestel, H. Schirra, J. Gerwonn, C. Lesniak, A. Kalaghi-Nafchi, M. Sameti, G. Borchard, E. Haltner, C-M. Lehr, and H. Schmidt</i>	
Tailoring Polymer Surfaces for Controlled Cell Behavior	73
<i>A.M. Mayes, D.J. Irvine, and L.G. Griffith</i>	
 PART III: <u>ORTHOPEDIC APPLICATIONS OF CELL INTERACTIVE BIOMATERIALS</u>	
Cross-Linking Characteristics of an Injectable Poly(propylene fumarate)/β-Tricalcium Phosphate Paste and Mechanical Properties of the Cross-Linked Composite for Use as a Biodegradable Bone Cement	87
<i>S.J. Peter, P. Kim, A.W. Yasko, M.J. Yaszemski, and A.G. Mikos</i>	
Osteocompatibility of Photopolymerizable Anhydride Networks	93
<i>V.R. Shastri, R.P. Marini, R.F. Padera, S. Kirchain, P. Tarcha, and R. Langer</i>	
Biomolecular Surface Engineering of Materials for Controlling Bone Cell Adhesion and Spreading	99
<i>A. Rezanian and K.E. Healy</i>	
Proliferation of Human Osteoblastic Cells and Synthesis of Extracellular Bone Matrix on Biomaterials	105
<i>D.J. Schaefer, B. Munder, M. Voigt, and G.B. Stark</i>	
Surface Interaction of Inflammatory Species With Titanium and Titanium Oxide	111
<i>R. Suzuki, G. Hirata, J. McKittrick, and J.A. Frangos</i>	
Author Index	117
Subject Index	119

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PREFACE

The primary goal of tissue engineering is to create natural living tissue to restore normal mechanical, metabolic or aesthetic function to an individual. The appropriate design of biomaterials plays a key role in regulating cell behavior and tissue response and is a key part of tissue regeneration strategy. Consequently, the realm of tissue engineering has come to encompass many materials-based disciplines. This interdisciplinary nature is reflected in the diverse backgrounds of the contributors to this proceedings. The papers included in this publication represent a significant portion of the research efforts presented at the symposium on 'Biomaterials Regulating Cell Function and Tissue Development' held April 13–14 at the 1998 MRS Spring Meeting in San Francisco, California.

The symposium focused on the modification and characterization of both natural and synthetic materials to alter the human body's regenerative response. The symposium consisted of three sessions which have been conserved in the structure of this proceedings. The design, preclinical and clinical evaluation of biomaterials and biomaterial-cell constructs aimed at functional tissue reconstruction is the primary focus of Part I, Biomaterials in Tissue Engineering. Several excellent papers from both academic and corporate institutions are included in this section. Control of cell interactions by tailoring biomaterial chemistry or surface properties plays an important role in regulating cell function. Part II covers several aspects of this topic, which is a key capability in the development of both tissue regeneration strategies and *in vitro* model systems to study basic biological questions. This is exemplified in the approach taken by Professor A.M. Mayes (*Recipient of the Outstanding Young Investigator Award*) from MIT. Professor Mayes describes practical techniques to fabricate a surface layer of PEO star molecules, enabling a high density of functional groups which can be further modified with peptide ligands to promote specific interactions of cells with the biomaterial surface.

Another award finalist, S.J. Peter from Rice University (*Graduate Student Award Finalist*), discusses the development of a degradable, biocompatible polymer which may be cross-linked at the time of a surgical procedure without producing high local temperatures. The material was designed primarily for orthopedic use as a bone cement to avoid the problem of local, thermal damage to tissue associated with conventional bone cements. This paper constitutes one example of the topics covered in Part III of this proceedings, which focuses on the orthopedic applications of cell interactive biomaterials.

These proceedings are highlighted by several invited papers from both academic and corporate institutions. The contributions of researchers from the biomaterials industry reflects the growth of significant commercial efforts targeted specifically at living-tissue regeneration. The editors wish to thank the contributors to this symposium and the MRS staff for their efforts in the publication of this proceedings.

Robert C. Thomson
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