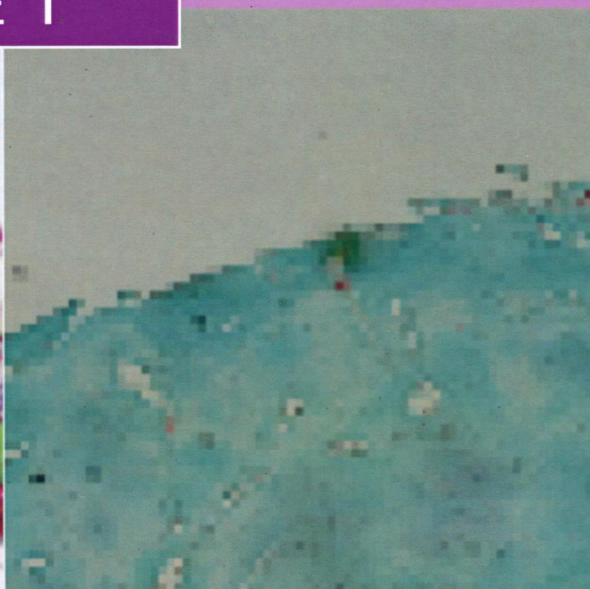


The Polymeric-Biomaterials 2-Volume Set, Third Edition

POLYMERIC BIOMATERIALS

Structure and Function

VOLUME 1



Founding Editor
Severian Dumitriu

Editor
Valentin Popa



CRC Press
Taylor & Francis Group

POLYMERIC BIOMATERIALS

Structure and Function

VOLUME 1

Founding Editor

Severian Dumitriu

Editor

Valentin Popa



CRC Press

Taylor & Francis Group

Boca Raton London New York

CRC Press is an imprint of the
Taylor & Francis Group, an **informa** business

CRC Press
Taylor & Francis Group
6000 Broken Sound Parkway NW, Suite 300
Boca Raton, FL 33487-2742

© 2013 by Taylor & Francis Group, LLC
CRC Press is an imprint of Taylor & Francis Group, an Informa business

No claim to original U.S. Government works

Printed in the United States of America on acid-free paper
Version Date: 20120726

International Standard Book Number: 978-1-4200-9470-1 (Hardback)

This book contains information obtained from authentic and highly regarded sources. Reasonable efforts have been made to publish reliable data and information, but the author and publisher cannot assume responsibility for the validity of all materials or the consequences of their use. The authors and publishers have attempted to trace the copyright holders of all material reproduced in this publication and apologize to copyright holders if permission to publish in this form has not been obtained. If any copyright material has not been acknowledged please write and let us know so we may rectify in any future reprint.

Except as permitted under U.S. Copyright Law, no part of this book may be reprinted, reproduced, transmitted, or utilized in any form by any electronic, mechanical, or other means, now known or hereafter invented, including photocopying, microfilming, and recording, or in any information storage or retrieval system, without written permission from the publishers.

For permission to photocopy or use material electronically from this work, please access www.copyright.com (<http://www.copyright.com/>) or contact the Copyright Clearance Center, Inc. (CCC), 222 Rosewood Drive, Danvers, MA 01923, 978-750-8400. CCC is a not-for-profit organization that provides licenses and registration for a variety of users. For organizations that have been granted a photocopy license by the CCC, a separate system of payment has been arranged.

Trademark Notice: Product or corporate names may be trademarks or registered trademarks, and are used only for identification and explanation without intent to infringe.

Library of Congress Cataloging-in-Publication Data

Polymeric biomaterials / editors, Severian Dumitriu and Valentin Popa.

p. ; cm.

Includes bibliographical references and index.

ISBN 978-1-4200-9470-1 (v. 1 : alk. paper) -- ISBN 978-1-4200-9468-8 (v. 2 : alk. paper)

I. Dumitriu, Severian, 1939- II. Popa, Valentin I.

[DNLM: 1. Polymers. 2. Biocompatible Materials--therapeutic use. 3. Regenerative Medicine--methods.

QT 37.5.P7]

610.28--dc23

2012029709

Visit the Taylor & Francis Web site at
<http://www.taylorandfrancis.com>

and the CRC Press Web site at
<http://www.crcpress.com>

Contents

Preface.....	ix
Acknowledgments.....	xi
Editors.....	xiii
Contributors.....	xv
Chapter 1 Synthesis and Fabrication of Polyesters as Biomaterials	1
<i>Philippe Lecomte and Christine Jérôme</i>	
Chapter 2 Hydrogels Formed by Cross-Linked Poly(Vinyl Alcohol).....	37
<i>Gaio Paradossi</i>	
Chapter 3 Development and Evaluation of Poly(Vinyl Alcohol) Hydrogels as a Component of Hybrid Artificial Tissues for Orthopedics Surgery Application	57
<i>Masanori Kobayashi</i>	
Chapter 4 Polyphosphazenes as Biomaterials.....	83
<i>Meng Deng, Cato T. Laurencin, Harry R. Allcock, and Sangamesh G. Kumbar</i>	
Chapter 5 Biodegradable Polymers as Drug Carrier Systems	135
<i>Abraham J. Domb and Wahid Khan</i>	
Chapter 6 Bioresorbable Hybrid Membranes for Bone Regeneration	177
<i>Akiko Obata and Toshihiro Kasuga</i>	
Chapter 7 Mucoadhesive Polymers: Basics, Strategies, and Future Trends	193
<i>Andreas Bernkop-Schnürch</i>	
Chapter 8 Biodegradable Polymeric/Ceramic Composite Scaffolds to Regenerate Bone Tissue	221
<i>Catherine Gkioni, Sander Leeuwenburgh, and John Jansen</i>	
Chapter 9 Amphiphilic Systems as Biomaterials Based on Chitin, Chitosan, and Their Derivatives	243
<i>Jacques Desbrieres</i>	
Chapter 10 Biomaterials of Natural Origin in Regenerative Medicine	271
<i>Vijay Kumar Nandagiri, Valeria Chiono, Piergiorgio Gentile, Franco Maria Montevercchi, and Gianluca Ciardelli</i>	

Chapter 11	Natural Polymers as Components of Blends for Biomedical Applications.....	309
	<i>Alina Sionkowska</i>	
Chapter 12	Metal–Polymer Composite Biomaterials	343
	<i>Takao Hanawa</i>	
Chapter 13	Evolution of Current and Future Concepts of Biocompatibility Testing.....	377
	<i>Menno L.W. Knetsch</i>	
Chapter 14	Biocompatibility of Elastomers.....	415
	<i>Dominique Chauvel-Lebret, Pascal Auroy, and Martine Bonnaure-Mallet</i>	
Chapter 15	Preparation and Applications of Modulated Surface Energy Biomaterials	495
	<i>Blanca Vázquez, Luis M. Rodríguez-Lorenzo, Gema Rodríguez-Crespo, Juan Parra, Mar Fernández, and Julio San Román</i>	
Chapter 16	Electrospinning for Regenerative Medicine.....	539
	<i>Toby D. Brown, Cedryck Vaquette, Dietmar W. Hutmacher, and Paul D. Dalton</i>	
Chapter 17	Polymeric Nanoparticles for Targeted Delivery of Bioactive Agents and Drugs	593
	<i>Cesare Errico, Alberto Dessy, Anna Maria Piras, and Federica Chiellini</i>	
Chapter 18	Polymeric Materials Obtained through Biocatalysis	617
	<i>Florin Dan Irimie, Csaba Paizs, and Monica Ioana Tosa</i>	
Chapter 19	Polymer-Based Colloidal Aggregates as a New Class of Drug Delivery Systems.....	659
	<i>Cesare Cametti</i>	
Chapter 20	Photoresponsive Polymers for Control of Cell Bioassay Systems.....	683
	<i>Kimio Sumaru, Shinji Sugiura, Toshiyuki Takagi, and Toshiyuki Kanamori</i>	
Chapter 21	Lignin in Biological Systems	709
	<i>Valentin I. Popa</i>	
Chapter 22	Carbohydrate-Derived Self-Crosslinkable In Situ Gelable Hydrogels for Modulation of Wound Healing	739
	<i>Lihui Weng, Christine Falabella, and Weiliam Chen</i>	

Chapter 23 Dental and Maxillofacial Surgery Applications of Polymers	783
<i>E.C. Combe</i>	
Chapter 24 Biomaterials as Platforms for Topical Administration of Therapeutic Agents in Cutaneous Wound Healing	837
<i>Rhiannon Braund and Natalie J. Medlicott</i>	
Chapter 25 Polymers for Artificial Joints	851
<i>Masayuki Kyomoto, Toru Moro, and Kazuhiko Ishihara</i>	
Index	885