Biomaterials Science: Processing, Properties and Applications III

Biomaterials Science: Processing, Properties and Applications III

Ceramic Transactions, Volume 242

Edited by Susmita Bose Amit Bandyopadhyay Roger Narayan



WILEY

Copyright © 2013 by The American Ceramic Society. All rights reserved.

Published by John Wiley & Sons, Inc., Hoboken, New Jersey. Published simultaneously in Canada.

No part of this publication may be reproduced, stored in a retrieval system, or transmitted in any form or by any means, electronic, mechanical, photocopying, recording, scanning, or otherwise, except as permitted under Section 107 or 108 of the 1976 United States Copyright Act, without either the prior written permission of the Publisher, or authorization through payment of the appropriate per-copy fee to the Copyright Clearance Center, Inc., 222 Rosewood Drive, Danvers, MA 01923, (978) 750-8400, fax (978) 750-4470, or on the web at www.copyright.com. Requests to the Publisher for permission should be addressed to the Permissions Department, John Wiley & Sons, Inc., 111 River Street, Hoboken, NJ 07030, (201) 748-6011, fax (201) 748-6008, or online at http://www.wiley.com/go/permission.

Limit of Liability/Disclaimer of Warranty: While the publisher and author have used their best efforts in preparing this book, they make no representations or warranties with respect to the accuracy or completeness of the contents of this book and specifically disclaim any implied warranties of merchantability or fitness for a particular purpose. No warranty may be created or extended by sales representatives or written sales materials. The advice and strategies contained herein may not be suitable for your situation. You should consult with a professional where appropriate. Neither the publisher nor author shall be liable for any loss of profit or any other commercial damages, including but not limited to special, incidental, consequential, or other damages.

For general information on our other products and services or for technical support, please contact our Customer Care Department within the United States at (800) 762-2974, outside the United States at (317) 572-3993 or fax (317) 572-4002.

Wiley also publishes its books in a variety of electronic formats. Some content that appears in print may not be available in electronic formats. For more information about Wiley products, visit our web site at www.wiley.com.

Library of Congress Cataloging-in-Publication Data is available.

ISBN: 978-1-118-75103-9

ISSN: 1042-1122

Printed in the United States of America.

10987654321

Contents

Preface	vii
Characterization of Calcium Phosphate Reinforced Ti-6Al-4V Composites for Load-Bearing Implants Jeffrey Wu, Stan Dittrick, Pavlo Rudenko, Susmita Bose, and Amit Bandyopadhyay	1
Characterization of Next-Generation Nickel-Titanium Rotary Endodontic Instruments William A. Brantley, Jie Liu, Scott R. Schricker, Fengyuan Zheng, John M. Nusstein, Masahiro lijima, William A.T. Clark, and Satish B. Alapati	11
Effect of Cold Work and Aging on a Cobalt-Nickel Based Alloy S. Cai, A. T. W. Barrow, R. Yang, and L. E. Kay	19
Surface Coating of Poly-D-L-Lactide/Nano-Hydroxyapatite Composite Scaffolds for Dexamethasone-Releasing Function and Wettability Enhancement Ling Chen, Chak Yin Tang, Harry Siu-lung Ku, Da Zhu Chen, and Chi Pong Tsui	29
Mechanical Behavior in Compression and Flexure of Bioactive Glass (13-93) Scaffolds Prepared by Robotic Deposition Xin Liu, Mohamed N. Rahaman, and Greg E. Hilmas	37
Phase Stability and Young's Modulus of Ti-Cr-Sn-Zr Alloys Yonosuke Murayama, Hiromasa Sakashita, Daichi Abe, Hisamichi Kimura, and Akihiko Chiba	47
Sol-Gel Preparation of Silica-Based Nano-Fibers for Biomedical Applications Song Chen, Hiroki Yoshihara, Nobutaka Hanagata, Yuki Shirosaki, Mark Blevins, Yuri Nakamura, Satoshi Hayakawa, Artemis Stamboulis, and Akiyoshi Osaka	55

Bioactive Rosette Nanotube Composites for Cartilage Applications Linlin Sun, Usha D. Hemraz, Hicham Fenniri, and Thomas J. Webster	63
Optical Properties of Dental Bioceramics Evaluated by Kubelka-Munk Model Humberto Naoyuki Yoshimura, Marcelo Mendes Pinto, Erick de Lima, and Paulo Francisco Cesar	71
Frequency Effect on Electrochemical Characteristics of MAO Coated Magnesium Alloy in Simulated Body Fluid Jing Zhang, Jiayang Liu, Yi Zhang, Weijie Zhang, Zaixin Feng, and Chengyun Ning	81
Influence of Tantalum and Tungsten Doping on Polarizability and Bioactivity of Hydroxyapatite Ceramics Jharana Dhal, Susmita Bose, and Amit Bandyopadhyay	93
Quantitative Evaluation of the Hydrophilic Properties of Polarized Hydroxyapatite Akiko Nagai, Naohiro Horiuchi, Kosuke Nozaki, Miho Nakamura, and Kimihiro Yamashita	103
Mechanisms of Platelet Activation by Biomaterials and Fluid Shear Flow Sri R. Madabhushi and Sriram Neelamegham	113
Processing and Bioactivity Evaluation of Ultrafine-Grained Titanium A. Thirugnanam, T. S. Sampath Kumar, and Uday Chakkingal	125
Controlling Biological Functionalization of Surfaces by Engineered Peptides Marketa Hnilova, Deniz Tanil Yucesoy, Mehmet Sarikaya, and Candan Tamerler	137
Author Index	151

Preface

This volume is a collection of 15 research papers from the Next Generation Biomaterials and Surface Properties of Biomaterials symposia, which took place during the Materials Science & Technology 2012 Conference & Exhibition (MS&T'12) in Pittsburgh, Pennsylvania on October 27–31, 2012.

These symposia focused on several key areas, including biomaterials for tissue engineering, ceramic biomaterials, metallic biomaterials, biomaterials for drug delivery, nanostructured biomaterials, biomedical coatings, and surface modification technologies.

We would like to thank the following symposium organizers for their valuable assistance: Kalpana Katti, North Dakota State University; Mukesh Kumar, Biomet Inc; Kajal Mallick, University of Warwick; Sharmila Mukhopadhyay, Wright State University; Vilupanur Ravi, California State Polytechnic University, Pomona; and Varshni Singh, Louisiana State University.

Thanks also to all of the authors, participants, and reviewers of this Ceramic Transactions proceedings issue.

We hope that this issue becomes a useful resource in the area of biomaterials research that not only contributes to the overall advancement of this field but also signifies the growing roles of The American Ceramic Society and its partner materials societies in this rapidly developing field.

Susmita Bose, Washington State University
Amit Bandyopadhyay, Washington State University
Roger Narayan, UNC/NCSU Joint Department of Biomedical Engineering