CONTENTS

Foreword (by Prof. Larry L. Hench) ix
Preface xi
Contributors xv
About the Editors xxi

SECTION I

1 FUNDAMENTALS OF BIOMATERIALS AND BIOCOMPATIBILITY 3
Bikramjit Basu and Shekhar Nath

2 FUNDAMENTALS OF HYDROXYAPATITE AND RELATED CALCIUM PHOSPHATES 19
Racquel Zapanta LeGeros, Atsuo Ito, Kunio Ishikawa, Toshiro Sakae, and John P. LeGeros

3 MATERIALS FOR ORTHOPEDIC APPLICATIONS 53
Shekhar Nath and Bikramjit Basu

4 THE MICRO MACROPOROUS BIPHASIC CALCIUM PHOSPHATE CONCEPT FOR BONE RECONSTRUCTION AND TISSUE ENGINEERING 101
Guy Daculsi, Franck Jegoux, and Pierre Layrolle

5 SCIENCE AND TECHNOLOGY INTEGRATED TITANIUM DENTAL IMPLANT SYSTEMS 143
Yoshiki Oshida and Elif Bahar Tuna
6 INJECTABLE HYDROGELS AS BIOMATERIALS 179
Lakshmi S. Nair, Cato T. Laurencin, and Mayank Tandon

7 NANOMATERIALS FOR IMPROVED ORTHOPEDIC AND BONE TISSUE ENGINEERING APPLICATIONS 205
Lijie Zhang, Sirinrath Sirivisoot, Ganesh Balasundaram, and Thomas J. Webster

SECTION II

8 INTRODUCTION TO PROCESSING OF BIOMATERIALS 245
Dhirendra S. Katti, Shaunak Pandya, Meghali Bora, and Rakesh Mahida

9 LASER PROCESSING OF ORTHOPEDIC BIOMATERIALS 277
Rajarshi Banerjee and Soumya Nag

10 FUNCTIONALLY GRADED ALL CERAMIC HIP JOINT 323
Omer Van der Biest, Guy Anné, Kim Vanmeensel, and Jef Vleugels

11 MEDICAL DEVICES BASED ON BIOINSPIRED CERAMICS 357
Pio González, Julián Martínez-Fernández, Antonio R. de Arellano-López, and Mrityunjay Singh

12 IONOMER GLASSES: DESIGN AND CHARACTERIZATION 411
Artemis Stamboulis and Fei Wang

13 DESIGNING NANOFIBROUS SCAFFOLDS FOR TISSUE ENGINEERING 435
Neha Arya, Poonam Sharma, and Dhirendra S. Katti

14 DESIGN OF SUPRAMACROPOROUS BIOMATERIALS VIA GELATION AT SUBZERO TEMPERATURES—CRYOGELATION 499
Fatima M. Plieva, Ashok Kumar, Igor Yu. Galaev, and Bo Mattiasson
# CONTENTS

## SECTION III

### 15 BIOMATERIAL APPLICATIONS
*Ashok Kumar, Akshay Srivastava, and Era Jain*  
535

### 16 CELL-BASED NANOCOMPOSITES AND BIOMOLECULES FOR BONE TISSUE ENGINEERING
*Michelle Ngiam, Susan Liao, Casey Chan, and S. Ramakrishna*  
551

### 17 ORTHOPEDIC INTERFACE TISSUE ENGINEERING: BUILDING THE BRIDGE TO INTEGRATED MUSCULOSKELETAL TISSUE SYSTEMS
*Helen H. Lu, Kristen L. Moffat, and Jeffrey P. Spalazzi*  
589

### 18 CELLS OF THE NERVOUS SYSTEM AND ELECTRICAL STIMULATION
*Carlos Atico Ariza and Surya K. Mallapragada*  
613

### 19 PLACENTAL UMBILICAL CORD BLOOD: A TRUE BLOOD SUBSTITUTE
*Niranjan Bhattacharya*  
643

### 20 SUPPORTED CELL MIMETIC MONOLAYERS AND THEIR BLOOD COMPATIBILITY
*K. Kaladhar and Chandra P. Sharma*  
663

### 21 TITANIUM NITRITE AND DIAMOND LIKE CARBON COATINGS FOR CARDIOVASCULAR APPLICATIONS
*C.V. Muraleedharan and G.S. Bhuvaneswuar*  
677

### INDEX
*  
707