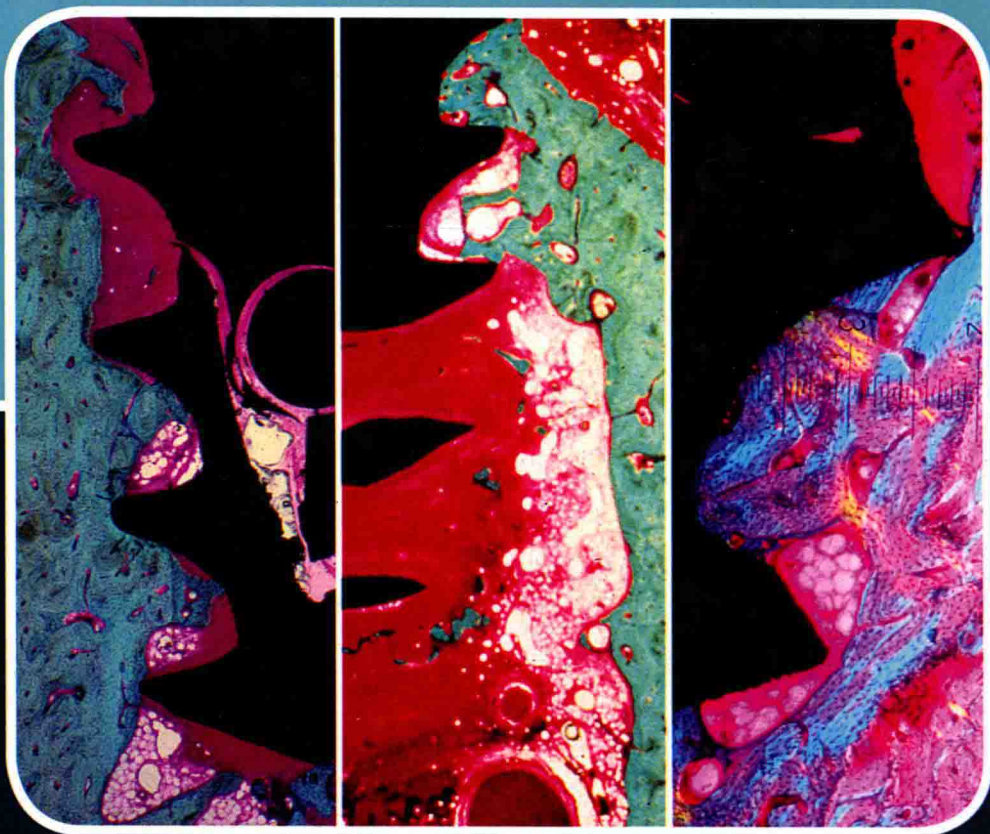


Handbook of Oral Biomaterials

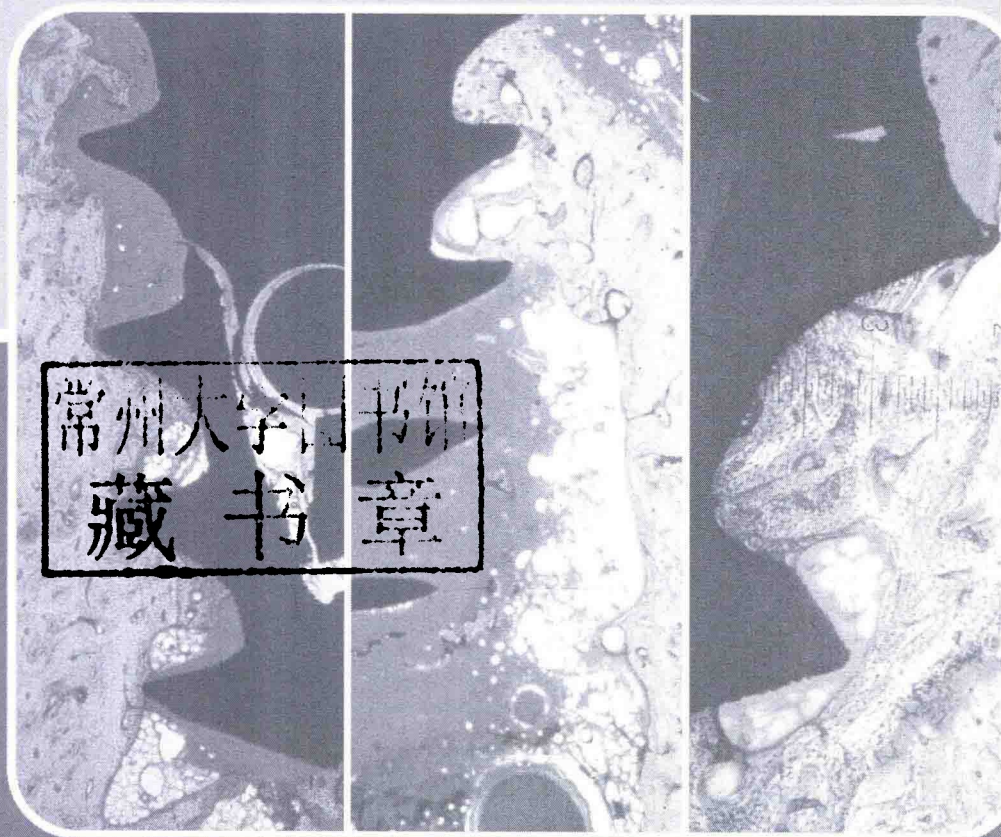


edited by
Jukka P. Matinlinna



Handbook of Oral Biomaterials

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Preface

Congratulations and my most humble thanks to you, our reader! I believe that this reading and learning experience with *Handbook of Oral Biomaterials* is something unique in our scientific community. We, the contributors, wish you to enjoy these 19 brand new and unforeseen chapters that introduce you to and facilitate your understanding of oral biomaterials. *Handbook of Oral Biomaterials* provides you with the latest updates and advances in dental materials and dental biomaterials. This book lays special emphasis on materials used in implant dentistry, but it also covers other clinically vital aspects and indications of dental biomaterials.

What is contemporary dentistry, then? My definition that all my undergraduate and postgraduate students in Hong Kong, since 2008, have heard is that "dentistry is all about adhesion, biochemistry, biocompatibility, biofilms, bioinformatics, biology, biomaterials, biomechanics, biomineralization and beyond." In this book we come across these disciplines, at least concisely.

The initiative for this book came from the Singapore publisher Mr. Stanford Chong of Pan Stanford Publishing Pte Ltd., who contacted me sometime in late 2011. Mr. Chong had paid attention to the serious and continuous lack of a proper updated textbook on titanium and zirconia as materials in dentistry. This invaluable observation was remarkable, as titanium and zirconia are growingly materials of choice in various disciplines in dentistry: implant dentistry, oral and maxillofacial surgery, prosthodontics, endodontics, etc. Hence, special emphasis on these contemporary materials of choice in dentistry was born and now sees daylight.

The chapters aim at going easily and directly to business, without compromising the context. Given this, we may not go deep into details of the physicochemical phenomena behind (but we do take a concise and clinically adequate glance), but then we refer to some other sources. We all may agree that there is a continuous need for a comprehensive but, at the same time, crystallized, easy-to-digest information package for undergraduate and postgraduate students, researchers, mentors, facilitators, clinicians, tutors, and teachers.

This book aims at adding value, with its novelty and updates, to the existing clinical textbooks and textbooks on materials science. Basic sciences are included, as appropriate, to support clinical dental sciences. All the chapters also provide our readers with appropriate and recent references to discover the topics deeper and thus deepen their understanding.

Do we cover *all* dental materials, dental biomaterials, and materials in dental technology in *Handbook of Oral Biomaterials*, then? I am confident that we cover or at least introduce, in addition to some procedures in operative dentistry, restorative materials, and dental cements, ceramic materials, polymers, metal and alloys, bioactive glasses, modern resin composite materials, surface-conditioning approaches, primers and their monomeric components, and modeling approaches. We don't discuss dental instruments, burs, or procedures at dental laboratories—how important they of course are. We refer again to some other existing textbooks by our colleagues. Please, let me know, if I am wrong in saying this, and drop a few lines (or more): jpmat@hku.hk.

Handbook of Oral Biomaterials, with its total 649 pages, is constructed on a principle that certain concepts are handled time after time in different contexts in the book in its 19 chapters. This is why, for example, *adhesion* as a vital dental phenomenon is covered in several contexts and occasions throughout the book. There are some other topics dealt following this principle as well. We believe that this effectively facilitates learning. *Handbook of Oral Biomaterials* is probably the first dental textbook to include a chapter on dental informatics and digital dentistry (Chapter 18). We, the contributors, are building up tomorrow's dentistry. We present the whole "dental chain" from etching enamel and dentin and primer systems (Chapter 1) to mineralization processes (Chapter 2), primers and coupling agents (Chapters 1 and 11), biological activity (Chapter 9), and biocompatibility (Chapter 5), ending with restorative materials (Chapters 3 and 6). Metals, alloys, polymers, waxes, and, in particular, acrylic materials find an easy-to-access platform in Chapter 3. We also go for explaining surface treatments and gaining an understanding of why it is significant (Chapter 11). In addition, the role of biomechanical aspects is covered in Chapters 3, 4, and 17. The oral and maxillofacial world is illuminated in Chapter 13, and periodontal guided tissue generation is dealt with in Chapter 19.

Resin composite-based materials are widely discussed in Chapters 3, 6, and 7. Whilst titanium is discussed in Chapters 9, 10, and 13, bioactive coatings on titanium are summarized in Chapter 12. Glasses in various chemical compositions finding promising applications in dentistry are exhibited in Chapters 7 and 8. Ceramic materials in dentistry, in particular alumina and zirconia, are widely discussed in Chapters 3 and 14–16. Virtually any material in dentistry and dental technology is introduced, at least to a certain extent, in Chapter 3, in addition to clinically important material properties.

As this is the dawn, the first edition, we are obviously collecting the readers' experience and remarks for the content. I am indebted to our Dean, Chair Professor Edward C. M. Lo (University of Hong Kong, People's Republic of China) for his support, Professor Jukka H. Meurman (University of Helsinki, Finland), Professor Nabil Samman (University of Hong Kong, People's Republic of China), and Professor Mohamed Ibrahim Abu Hassan (Universiti Teknologi MARA, Shah Alam, Malaysia) for their reviews of the manuscript and comments on the back cover of this book. With the chapter contributors, we have been a tremendous seamless team, scattered geographically all over the world (from Australia, Belgium, Brazil, Canada, Egypt, Finland, Hong Kong SAR of the People's Republic of China, Japan, Malaysia, Pakistan, Switzerland, UK, and USA), working toward this final outcome. I am deeply grateful to every one of you for your invaluable input and support. Thank you so much from the bottom of my heart, my colleagues and friends Aki, Alex, Alvaro, Ammar, Andre, Andy, Bart, Besim, Christie, Jack, James, Jan, Kirsten, Klaus, Kumiko, Leena, Maisoon, Marcia, Marleen, Mohammad Ahmad, Mohamed-Nur, Moustafa, Nader, Paul, Pekka, Richard, Roger, Susanne, Takashi, Will, Yo, Zeeshan, and Zohaib. Dr. Christie Y. K. Lung (University of Hong Kong) is warmly acknowledged for drawing numerous figures in Chapter 3.

In addition, I want to express my deepest gratitude to Mr. Stanford Chong for accepting the manuscript of *Handbook of Oral Biomaterials* for publication and to his editorial and production team. I am deeply grateful to my dear, sweet daughter, Salli, who timely reminded me of my years-old dream to one day edit a textbook and encouraged me to go for it. Thank you for the initiation, interest, and endless support. Most of all, I am indebted to my dear wife, Suzie, for her dental expertise, unconditional love, never-ending support, partnership, inspiration, and faith in me during this book project.

It is not only for her never-ending technical support in my text creation and editing but also for the time I had to use. Suzie, having you in my life as my partner is God's true blessing.

Dr. Jukka Pekka Matinlinna

Pok Fu Lam, Hong Kong SAR,

People's Republic of China

April 2014

Disclaimer

The material in this textbook, *Handbook of Oral Biomaterials*, whether related to dentistry, medicine, or any other topic, should be verified as to its accuracy, currency, and preciseness by the reader.

It should in no way replace any advice given by a dental or medical professional or any other professional.

None of the information provided here should be a substitute for additional reading advice, experience, or other relevant information in any topic discussed in this book.

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