1. Record Nr. UNINA9910824023303321

Autore	Heimann Robert B.
Titolo	Bioceramic coatings for medical implants : trends and techniques / / Robert B. Heimann and Hans D. Lehmann
Pubbl/distr/stampa	Weinheim, Germany : , : Wiley-VCH Verlag GmbH & Co., , 2015 ©2015
ISBN	3-527-68400-X 3-527-68402-6 3-527-68229-5
Descrizione fisica	1 online resource (492 p.)
Disciplina	610.289
Soggetti	Biomedical materials - Testing Biomedical materials - Research
Lingua di pubblicazione	Inglese
Formato	Materiale a stampa
Livello bibliografico	Monografia
Note generali	Description based upon print version of record.
Nota di bibliografia	Includes bibliographical references and index.
Nota di contenuto	Cover; Contents; Preface; Glossary; Chapter 1 Bioceramics - A Historical Perspective; 1.1 Alumina; 1.2 Zirconia; 1.3 Calcium Phosphates; References; Chapter 2 Socio-Economic Aspects and Scope of Bioceramic Materials and Biomedical Implants; 2.1 Types of Biomaterial; 2.2 The Growing Global and Regional Markets for Biomedical Implants; 2.2.1 A Worldwide Need for Implants; 2.2.2 Market Projections and Forecasts for Biomaterials and Biomedical Implants; 2.2.2.1 Biomaterials; 2.2.2.2 Large-Joint Reconstructive Implants (Hip and Knee); 2.2.2.3 Small Joints and Extremities Implants 2.2.2.4 Spinal Implants2.2.2.5 Dental Implants; 2.3 Role of Bioceramic Coatings in Arthroplasty; 2.4 Ceramic Femoral Ball Heads; 2.4.1 Mechanical and Functional Properties; 2.4.2 Manufacturing of Ceramic Femoral Ball Heads; 2.4.3 Discolouration of Zirconia by Ionising Radiation; References; Chapter 3 Fundamentals of Interaction of Bioceramics and Living Matter; 3.1 Principle of Biocompatibility; 3.2 Hierarchical Structure of Bone and Teeth; 3.2.1 Bone Structure; 3.2.2 Tooth Structure; 3.3 Bioceramic/Bone Interface; 3.3.1 Elasticity Mismatch; 3.3.2 Interfacial Loosening 3.4 Basic Aspects of Biomineralisation3.5 Interaction at a Cellular Level;

3.6 Interaction at a Tissue Level; 3.7 Advantages of Hydroxyapatite and Bioglass Coatings; 3.8 The Promise of Cytokines; References; Chapter 4 Structure and Properties of Bioceramics Used in Orthopaedic and Dental Implants; 4.1 Bioinert Ceramics; 4.1.1 Alumina; 4.1.2 Stabilised Zirconia; 4.1.2.1 Transformation Toughening of Zirconia Ceramics; 4.1.2.2 Mechanical Properties of Zirconia; 4.1.2.3 Biocompatibility and Hydrolytic Stability of Zirconia; 4.2 Bioactive Ceramics; 4.2.1 Surface-Active Bioglasses
4.2.2 Hydroxyapatite4.2.3 Transition Metal-Substituted Calcium Orthophosphates; 4.2.4 Resorbable Calcium Orthophosphates; 4.2.4.1 Tricalcium Phosphates; 4.2.4.2 Tetracalcium Phosphate; 4.2.4.3 Ca-PO4 Sheet Structures; 4.2.4.4 Highly Soluble Alkali-Containing Calcium Orthophosphates; 4.2.4.5 Other Resorbable Bioceramics; References; Chapter 5 Technology of Coating Deposition; 5.1 Overview; 5.2 Non-Thermal Deposition Methods; 5.2.1 Biomimetic Route; 5.2.1.1 General Aspects; 5.2.1.2 Chemistry of Biomimetic Precipitation
5.2.1.3 Biomimetic Calcium Phosphate Coatings Deposited on Various Substrates5.2.2 Sol-Gel Deposition; 5.2.2.1 Titania Films and Coatings; 5.2.2.2 Hydroxyapatite; 5.2.2.3 Other Types of Coating; 5.2.3 Dip and Spin Coating; 5.2.3.1 Dip Coating; 5.2.3.2 Spin Coating; 5.2.4 Electrochemical Deposition (ECD); 5.2.4.1 Electrochemical Reactions; 5.2.4.2 Acid-Base Reactions; 5.2.4.3 Precipitation Reactions; 5.2.5 Electrophoretic Deposition (EPD); 5.2.5.1 General Aspects; 5.2.5.2 Electrophoretic Deposition of Calcium Phosphate Coatings; 5.2.6 Thermal Substrate Deposition (Hydroprocessing)
5.2.7 Hydrothermal Coating Deposition

Sommario/riassunto

Reflecting the progress in recent years, this book provides in-depth information on the preparation, chemistry, and engineering of bioceramic coatings for medical implants. It is authored by two renowned experts with over 30 years of experience in industry and academia, who know the potentials and pitfalls of the techniques concerned.Following an introduction to the principles of biocompatibility, they present the structures and properties of various bioceramics from alumina to zirconia. The main part of the work focuses on coating technologies, such as chemical vapor deposition, sol-gel depos