

1. Record Nr.	UNINA9910583028003321
Autore	Subramani Karthikeyan
Titolo	Emerging Nanotechnologies in Dentistry : Processes, Materials and Applications
Pubbl/distr/stampa	Saint Louis : , : Elsevier, , 2017 ©2018
ISBN	0-12-812291-9
Edizione	[2nd ed.]
Descrizione fisica	1 online resource (497 pages)
Altri autori (Persone)	AhmedWaqar
Disciplina	617.6
Soggetti	Dentistry - Technological innovations Nanotechnology
Lingua di pubblicazione	Inglese
Formato	Materiale a stampa
Livello bibliografico	Monografia
Nota di contenuto	Front Cover -- Emerging Nanotechnologies in Dentistry -- Copyright Page -- Dedication -- Contents -- List of Contributors -- Foreword -- Acknowledgments -- 1 Nanotechnology and its applications in dentistry-An introduction -- 1.1 Introduction -- 1.2 Nanotechnology Approaches -- 1.3 Nanotechnology to Nanomanufacturing -- 1.3.1 Top-Down Approach -- 1.3.2 Bottom-Up Approach -- 1.4 Nanodentistry -- 1.5 Future Directions and Conclusions -- References -- 2 Nanoparticles for dental materials: Synthesis, analysis, and applications -- 2.1 Introduction: Why Use Nanoparticles? -- 2.2 Synthesis of Nanoparticles -- 2.2.1 Synthesis by Mechanical Attrition -- 2.2.2 Synthesis Through Sol-Gel Process -- 2.2.2.1 Functionalization of oxide nanoparticles -- 2.2.3 Synthesis of Silsesquioxane Nanoparticles -- 2.2.4 Synthesis of Polymer-Templated Nanoparticles -- 2.3 Examples of Dental Materials Using Nanoparticles -- 2.3.1 Nanocomposites Containing Oxide Nanoparticles -- 2.3.1.1 Nanofill composites -- 2.3.1.2 Nanohybrid composites -- 2.3.2 Silsesquioxane-Based Composites -- 2.3.3 Calcium Phosphate and Calcium Fluoride Nanoparticles-Based Composites -- 2.3.4 Nanoparticles in Glass Ionomer Systems -- 2.3.5 Nanotechnology in Dental Adhesives -- 2.4 Selected Properties of Dental Materials Containing Nanoparticles -- 2.4.1 Optical Properties -- 2.4.2 Wear Properties -- 2.4.3 From B.D. Craig, S.B. Mitra, G.A. Kobussen, M.C. Doruff, H.L. Lechuga, M.R.

Atkinson, Polish Retention Comparison of ... -- 2.5 Clinical Experience With Dental Materials Containing Nanoparticles -- 2.6 Conclusions -- References -- 3 Antimicrobial nanoparticles in restorative composites -- 3.1 Introduction -- 3.2 Antibacterial Restorative Composites -- 3.2.1 Filler Phase Modification -- 3.2.1.1 Released antibacterial agents -- 3.2.1.2 Nonreleased antibacterial agents -- 3.2.2 Matrix Phase Modification.

3.2.2.1 Released antibacterial agents -- 3.2.2.2 Nonreleased antibacterial agents -- 3.3 Antimicrobial Macromolecules -- 3.3.1 Polycationic Disinfectants -- 3.3.2 Polyethyleneimine -- 3.4 Nanoparticles -- 3.4.1 Polyethyleneimine Nanoparticles -- 3.4.1.1 Synthesis -- 3.4.1.2 Characterization -- 3.4.1.3 Incorporation of polyethyleneimine nanoparticles -- 3.5 Conclusions -- References -- 4 Nanotechnology in operative dentistry: A perspective approach of history, mechanical behavior, and clinical application -- 4.1 Introduction -- 4.2 Historical Review: Nanotechnology Applications in Operative Dentistry -- 4.3 Biomimetics -- 4.4 Nanotechnology in CAD/CAM -- 4.5 Fillers in Composite Resins -- 4.6 SEM and EDS Evaluations -- 4.7 Filler Weight Content (wt%) -- 4.8 Water Sorption -- 4.9 Mechanical Behavior -- 4.9.1 Compressive Strength -- 4.9.2 Diametral Tensile Strength -- 4.9.3 Flexural Strength and Flexural Modulus -- 4.9.4 Microhardness -- 4.9.5 Nanohardness -- 4.9.6 Wear Resistance -- 4.10 Clinical Application -- 4.11 Conclusions -- Acknowledgments -- References -- 5 Impact of nanotechnology on dental implants -- 5.1 Introduction -- 5.2 Nanoscale Surface Modifications -- 5.3 Interactions of Surface Dental Implants With Blood -- 5.4 Interactions Between Surfaces and MSCs -- 5.4.1 Origin of MSCs -- 5.4.2 Migration, Adhesion, and Proliferation -- 5.4.3 Differentiation -- 5.5 Tissue Integration -- 5.6 Conclusion -- Acknowledgments -- References -- 6 Titanium surface modification techniques for dental implants-From microscale to nanoscale -- 6.1 Introduction -- 6.2 Titanium Surface Modification Methods -- 6.2.1 Mechanical Modification of Titanium Surface -- 6.2.2 Physicochemical Modification of Titanium Surface -- 6.2.3 Biochemical Modification of Titanium Surface -- 6.2.3.1 Osteoinductive biomolecular cues.

6.2.3.2 Microscale and nanoscale coating of hydroxyapatite/calcium phosphate/alumina -- 6.2.3.3 Organic nanoscale self-assembled monolayers (SAMs) -- 6.2.3.4 Hydrogels on titanium surface -- 6.2.3.5 Antibacterial titanium surfaces -- 6.2.4 Physical Modification of Titanium Surface -- 6.3 Recent Techniques -- 6.3.1 Discrete Crystalline Deposition (DCD) -- 6.3.2 Laser Ablation -- 6.3.3 Titanium Oxide Blasted and Acid-Etched Implants -- 6.3.4 Photofunctionalization -- 6.4 Limitations & Conclusion -- Acknowledgments -- References -- 7 Titanium nanotubes as carriers of osteogenic growth factors and antibacterial drugs for applications in dental implantology -- 7.1 Introduction -- 7.2 Titanium Nanotubes -- 7.3 TiO₂ Nanotubes for Implant Fabrication -- 7.4 Functionalization of TiO₂ Nanotubes with Growth Factors and Antibacterial/Antiinflammatory Drugs -- 7.5 Recent Advancements -- 7.6 Conclusions -- References -- 8 Cellular responses to nanoscale surface modifications of titanium implants for dentistry and bone tissue engineering appl... -- 8.1 Introduction -- 8.2 Nanotopography Generated from Surface Modification of Ti Implants -- 8.2.1 Surface Modification of Ti Implants With Inorganic Materials/Nanoparticles -- 8.2.2 Surface Modifications of Ti Implants With Polymers -- 8.3 Nanotopography and Protein Absorption -- 8.4 Nanotopography Alters Osteoblast Responses -- 8.4.1 Cell Morphology -- 8.4.2 Cell Adhesion -- 8.4.3 Cell Proliferation -- 8.4.4 Bioactive Molecules -- 8.4.5

Osseointegration -- 8.5 Nanotopography and Stem Cell Responses --
8.5.1 Effects of Nanotopography on Endothelial Progenitor Cells --
8.5.2 Effects of Nanotopography on Bone Marrow Stem Cells -- 8.6
Conclusions -- References -- 9 Corrosion resistance of Ti-6Al-4V with
nanostructured TiO₂ coatings -- 9.1 Introduction -- 9.1.1 SiO₂-CaO
Coatings on Ti-6Al-4V Alloys.
9.1.2 SiO₂ and SiO₂-TiO₂ Intermediate Coatings on Titanium and Ti-
6Al-4V Alloy -- 9.1.3 Coated Hydroxyapatite on Ti-6Al-4V by
Electrophoretic Deposition -- 9.1.4 Double-Layer Glass-Ceramic
Coatings on Ti-6Al-4V -- 9.2 Nanostructured TiO₂ Deposited on Ti-
6Al-4V -- 9.2.1 Preparation of the Ti-6Al-4V Electrode -- 9.2.2 TiO₂
Nanoparticles Coating -- 9.3 Characterization Techniques -- 9.3.1
Scanning Electron Microscopy -- 9.3.2 Raman Microscopy -- 9.4
Corrosion Test With Electrochemical Techniques -- 9.4.1 Open-Circuit
Voltage (OCV) and Tafel Analysis -- 9.4.2 Electrochemical Impedance
Spectroscopy -- 9.5 Conclusion -- References -- 10 Multiwalled
Carbon nanotubes/hydroxyapatite nanoparticles incorporated GTR
membranes -- 10.1 Introduction -- 10.2 Periodontal Defects and GTR
-- 10.2.1 Studies Using Nonresorbable Membranes -- 10.2.2 Studies
Using Bioresorbable Membranes -- 10.2.3 Layer-Designed Membranes
for GTR -- 10.2.4 Cell-Sheet-Based Technology for GTR -- 10.3 Use of
Electrospinning for Preparation of Nanocomposites -- 10.3.1
Electrospinning -- 10.3.2 Carbon Nanotubes Incorporated Into
Nanofibers -- 10.3.3 Organic-Inorganic Composite Nanofibers -- 10.4
GTR Membranes Based on Electrospun CNT/HA Nanoparticles
Incorporated Composite Nanofibers -- 10.4.1 Fabrication of
MWCNTs/HA Hybrids -- 10.4.2 Electrospun Nanofibers With Different
Fiber Arrangements -- 10.4.3 Fabrication of PLLA/MWCNTs/HA
Composite Nanofibers -- 10.4.4 Characterization of PLLA/MWCNTs/HA
Composite Nanofibers -- 10.4.5 Cell Culture on PLLA/MWCNTs/HA
Composite Nanofibers Membranes -- 10.4.6 In Vivo Implantation of
PLLA/MWCNTs/HA Membranes -- 10.5 Conclusions -- References --
11 Nanoapatitic composite scaffolds for stem cell delivery and bone
tissue engineering -- 11.1 Introduction -- 11.2 Development of
Nanoapatitic and Macroporous Scaffolds -- 11.3 Cell Infiltration into
Scaffold.
11.4 Biomimetic Nanoapatite-Collagen Fiber Scaffold -- 11.5 Fast
Fracture of Nanoapatite Scaffold -- 11.6 Fatigue of Nanoapatite
Scaffold -- 11.7 Nanoapatite Scaffold-Human Umbilical Cord Stem Cell
Interactions -- 11.8 Seeding Bone Marrow Stem Cells on Nanoapatite
Scaffolds -- 11.9 Conclusions -- Acknowledgments -- References --
12 Self-assembly of proteins and peptides and their applications in
bionanotechnology and dentistry -- 12.1 Introduction -- 12.2
Mechanism of Molecular Self-Assembly -- 12.3 Classification of Self-
Assembly -- 12.4 Self-Assembly of Proteins and Peptides -- 12.5
Bionanotechnology Applications -- 12.6 Peptide Nanofibers,
Nanotubes, and Nanowires -- 12.7 Three-Dimensional Peptide Matrix
Scaffolds -- 12.8 Advantages and Limitations of Self-Assembling
Peptide Matrix Scaffolds -- 12.9 Self-Assembly in Regenerative Biology
and Dentistry -- 12.10 Conclusions -- References -- 13 Surface
engineering of dental tools with diamond for enhanced life and
performance -- 13.1 Tooth Materials -- 13.2 Dental Burs -- 13.3
Chemical Vapor Deposition of Diamond Films Onto Dental Burs --
13.3.1 Plasma-Enhanced CVD -- 13.3.1.1 Microwave plasma-enhanced
CVD -- 13.3.1.2 RF plasma-enhanced CVD -- 13.3.1.3 DC plasma-
enhanced CVD -- 13.3.2 Hot Filament CVD -- 13.3.2.1 Growth
mechanisms -- 13.3.2.2 Filament characteristics -- 13.3.2.3 Diamond
nucleation process -- 13.3.3 Controlling Structure and Morphology --

13.3.3.1 Effects of temperature -- 13.3.3.2 Effect of negative BEN on the dental bur -- 13.3.3.3 Effects of substrate preparation on diamond deposition -- 13.4 Bur Performance Investigations -- 13.4.1 Tool Preparation -- 13.4.2 CVD Diamond Deposition on the Dental Burs -- 13.4.3 Dental Bur Machining: Drilling Experiments -- 13.4.4 Dental Bur Machining: Machining Experiments on Human Teeth -- 13.4.5 Performance Testing -- 13.4.6 Drilling Experiments.
13.4.7 Performance Results.
