

Table of Contents

Dedicated	
Contents	
Forward	
Preface	
Contributors	

CHAPTER 1 Skeletal Regenerative Nanobiomaterials

1. Introduction	3
2. Basics of Bone Biology	4
3. Current Scenarios of Bone Grafting	7
4. Concept of Biomimetics in Skeletal Regeneration	9
5. Mechanism of Biological Mineralization	10
6. Biomimetic Mineralization – Rationale and Benefits	11
7. Processing of Biomineralized Nanobiomaterial Systems	18
8. Biomineralization of Electrospun Nanofibers – A New Approach	23
Conclusions and Future Challenges	26
Glossary	28
References	31

CHAPTER 2 Silica-Based Materials as Precursorsof Nanoapatites

1. Bioactive glasses	37
2. Sol-Gel Glasses: Components of Mixed Materials	52
3. Organic-Inorganic Hybrids to Expand the Clinical Application of Bioactive Glasses	56
4. Star Gels Bioactive Materials	58
5. Silica Based Ordered Mesoporous Materials	59
6. Synthesis of Templated Glasses	66
7. Considerations on Materials Eligible for Bone Regeneration Duties	68
References	71

CHAPTER 3 Phytochemicals for Bone Regeneration

1. Introduction	83
2. Material and Methods	87
3. Results	91
4. Discussion	92
5. Conclusion	97
References	98

CHAPTER 4 Designed Biomaterial Scaffoldsfor Bone Regeneration

1. Introduction	109
2. Scaffold Design	110
3. Effective Mechanical and Permeability Properties of Designed Scaffolds	112
4. Bone Regeneration on Designed Scaffolds	114

5. Discussion	117
References	118

CHAPTER 5 Engineered Ca-Si Based Ceramics for Skeletal tissue Reconstruction

1. Introduction	
2. Ca-Si Based Bioactive Glass and Glass-Ceramics	123
3. Ca-Si Based Binary Oxide System Bioactive Ceramics	124
4. Ca-Si-Mg Bioactive Ceramics	125
5. Future Trends. References	142

CHAPTER 6 Calcium Phosphate-Based Materials for Bone regenerative Medicine

1. Introduction	153
2. Bioactive Glasses and Glass-Ceramics	154
3. Silicon-Substituted Apatites	156
4. Calcium Phosphate-Based Materials	157
5. Bonelike[®] Medical Applications	158
References	172

CHAPTER 7 Cell Adhesion and Proliferation over Zinc-Glass reinforced Hydroxyapatite Composites (Zn-GRHA)

1. Introduction	183
2. Materials and Methods	185
3. Physicochemical and Morphological Analysis of the Zn-GRHA Composites	187
4. <i>In Vitro</i> Biocompatibility of the Zn-GRHA Composites	190
5. Conclusions. References	193