

## Biomaterials for Oral and Craniomaxillofacial Applications

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# Biomaterials for Oral and Craniomaxillofacial Applications

Volume Editor

**Sanjukta Deb** London

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## Preface

Classically, biomaterials can be defined as materials that are synthetic or natural in origin, and suitable for use in creating artificial constructs for replacement or repair of damaged part(s) of the living body in a safe and reliable manner. The field of biomaterials has grown rapidly since its inception, and evolved from materials being mere inert to integrative materials with active function in tissue healing. A majority of the global population require repair or replacement of a craniofacial structure in their lifetime. Engineering tissues for restoration or repair of damaged tissues in the oral cavity involves bone, teeth and soft tissue, which set a challenging goal. The defects in this anatomical region arise largely as a result of tooth decay or loss; however, major craniofacial defects that are either caused by disease/trauma or are congenital in nature necessitate complex tissue augmentation or regeneration procedures. Although this presents a formidable challenge, exciting developments are taking place in the field of biomaterials towards successful oral and facial rehabilitation.

Recent advances in the synthesis and fabrication of devices, functionalisation and bioactivity of biomaterials, biomimetic approaches, and delivery of drugs and biological molecules in regenerative medicine have seen the translation of some of these technologies to clinical dentistry. Currently, biomaterials are used to repair or restore loss of a tooth structure subsequent to disease or trauma, replace missing teeth and regen-

erate degenerated supporting structures for the induction of new tissue formation. Newer treatment modalities in dentistry and craniomaxillofacial reconstruction have embraced the application of novel biomaterials, the principles of dentine demineralisation and remineralisation that influence modern restorative dental practice, advanced polymer therapeutics, hybrid composites, bioactive materials, functional nanomaterials, and surface modification of biomaterials for enhanced integration and regenerative approaches. With increasing novel biomaterials and different clinical applications, the understanding of biomaterials at a genetic level that provides useful information for existing and future evaluation as well as the design of biomaterials is extremely important. This book integrates the application of biomaterial science and describes the recent advances, the role of cutting-edge biomaterials in engineering oral tissues, surface modification technologies, the emerging field of nanomaterials and clinical translation through to the future directions in oral and craniomaxillofacial health care.

This book will provide a unique insight into biomaterials in relation to dentistry and craniomaxillofacial surgery, which are detailed in chapters authored by eminent scientists and specialists in their field, and valuable information on new dimensions, innovations and emerging concepts of the role of biomaterials. The reader will find the contents helpful not only in furthering their knowl-

edge in this field, but will also draw inspiration to deal with the problems associated with facial deformities that cause major aesthetic, functional and psychological disabilities for those affected.

Finally, I would like to express my sincere gratitude to and acknowledge the valuable con-

tribution of all the authors towards this project and I hope that the readers will be able to familiarise themselves with the latest developments in this field.

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