
Book Review

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Biosurface: A Materials Science and Engineering Perspective

by: K. Balani, V. Verma, A. Agarwal and R. Narayan

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The interdisciplinary nature of the biomaterials field requires a synergistic interaction of materials science, biomedical engineering and surgical medicine that brings together the requisite physical, chemical and biological paradigms of an implant surface. Since the biomaterials surface is the site of interaction with the host, the interactions are governed by tailoring the specific surface properties to the desired application. The ability to engineer successful implants will depend intimately on a thorough understanding of biosurfaces.

This book describes in detail the interactions between biomaterials and tissues, the immune response to biomaterials and several other topics that are the basic building blocks of any biomaterial. The multi-length scale complexity that occurs in natural materials is presented and described in excellent detail. The discussions of the role of superhydrophobicity in altering protein adsorption or cellular behaviour, along with the discussions of designing gradient hydrophilic–hydrophobic surfaces for achieving tunable cellular response, are commendable.

This book also provides excellent sections on altering surfaces with coatings, micro/nano-fabrication of biomaterials via laser prototyping and other topics. The authors have done an excellent job in describing specific mechanical and tribological characterisation methods for real-life biocomposites. The text has many excellent examples of the actual applications of bioengineered surfaces developed for specific enhancements in the quality of life and for restoration of function in the patient.

Biosurfaces simplifies the concepts associated with biosurfaces and brings this understanding within reach of material scientists and biomedical engineers alike. Introduction of biomaterials, processing of biosurfaces, implementation as implants (or drug delivery conduits), evaluating the performance of materials and emphasising the societal, safety and ethical issues are all covered.

The book contains the following chapters:

- Introduction to biomaterials
- Tissue interaction with biomaterials
- Host response of implanted biomaterials

- Fundamentals of surface modification
- Multi-length scale hierarchy in natural materials
- Superhydrophobic surfaces
- Surface engineering and modification for biomedical applications
- Lasers engineering of surface structures
- Processing and nanomechanical properties of hydroxyapatite-nanotube biocomposite
- Application of biomaterials
- Nanosafety, nanosocietal, and nanoethical issues
- Physical, thermal and mechanical properties of polymers
- Corrosion behaviour of metals

This book is recommended as a textbook for students and academicians, as a handbook or guide for industrial researchers/engineers/developers and as a refresher for scientists working in the emerging field of biosurfaces.