Biomaterials For Artificial Organs Woodhead Publishing Series In Biomaterials

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Fundamental Biomaterials: Polymers BoD – Books on Demand

Biomaterials for Skin Repair and Regeneration examines a range of materials and technologies used for regenerating or repairing skin. With a strong focus on biomaterials and scaffolds, the book also examines the testing and evaluation pathway for human clinical trials. Beginning by introducing the fundamentals on skin tissue, the book goes on to describe contemporary technology used in skin repair as well as currently available biomaterials suitable for skin tissue repair and regeneration. Skin tissue engineering and the ideal requirements to take into account when developing skin biomaterials are discussed, followed by information on the individual materials used for skin repair and regeneration. As evaluation of biomaterials in animal models is mandatory before proceeding into human clinical trials, the book also examines the different animal models available. With a strong focus on materials, engineering, and application, this book is a valuable resource for materials scientists, skin biologists, and bioengineers with an interest in tissue engineering, regeneration, and repair of skin. Provides an understanding of basic skin biology Comprehensively examines a variety of biomaterial approaches Looks at animal models for the evaluation of biomaterial-based skin constructs

Cardiac Regeneration and Repair Woodhead Publishing Limited

Urology is the branch of medicine dealing with disorders or diseases of the male genitor-urinary tract and the female urinary tract. This important book summarises the wealth of recent research on the use of biomaterials and tissue engineering to treat urological disorders. Part one reviews the fundamentals with chapters on such topics as biofilms and encrustation formation. Part two then discusses recent advances in biomaterials and design of urological devices such as metal ureteral stents, self-lubricating catheter materials and penile implants. Chapters in Part three address urological tissue engineering with coverage of themes such as artificial and natural biomaterials, nano-technology and placental stem cells for tissue engineering the regeneration of urological tissue and organs. With its eminent editors and international team of contributors, Biomaterials and tissue engineering in urology is an invaluable resource to researchers of urological biomaterials, devices and regenerative medicine in both industry and academia, as well as an important reference for medical practitioners. Provides a comprehensive review of biomaterials and tissue engineering in urology Explores the fundamentals of urology, focusing on biofilms and encrustation and formation Discusses recent advances in biomaterials and the design of urological devices, catheters and stents

Woodhead Publishing

Biointegration of Medical Implant Materials, Second Edition, provides a unique and comprehensive review of recent techniques and research into material and tissue interaction and integration. New sections discuss soft tissue integration, with chapters on the biocompatibility of engineered stem cells, corneal tissue engineering, and vascular grafts. Other sections review tissue regeneration, inorganic nanoparticles for targeted drug delivery, alginate based drug delivery devices, and design considerations, with coverage of the biocompatibility of materials and their relevance to drug delivery and tissue engineering. With its distinguished editor and team of international contributors, this book is ideal for medical materials scientists and engineers in industry and academia. Provides a unique and comprehensive review of recent techniques and research into material and tissue interaction and integration Discusses soft tissue biointegration, with chapters on the biocompatibility of engineered stem cells, corneal tissue engineering, vascular grafts and replacement materials for facial reconstruction Includes new information on a variety of tissue regeneration techniques and applications

Biomaterials, artificial organs and tissue engineering CRC Press

These contribution books collect reviews and original articles from eminent experts working in the interdisciplinary arena of biomaterial development and use. From their direct and recent experience, the readers can achieve a wide vision on the new and ongoing potentialities of different synthetic and engineered biomaterials. Contributions were selected not based on a direct market or clinical interest, but on results coming from a very fundamental studies. This too will allow to gain a more general view of what and how the various biomaterials can do and work for, along with the methodologies necessary to design, develop and characterize them, without the restrictions necessary imposed by industrial or profit concerns. Biomaterial constructs and supramolecular assemblies have been studied, for example, as drug and protein carriers, tissue scaffolds, or to manage the interactions between artificial devices and the body. In this volume of the biomaterial series have been gathered in particular reviews and papers focusing on the application of new and known macromolecular compounds to nanotechnology and nanomedicine, along with their chemical and mechanical engineering aimed to fit specific biomedical purposes.

Biomaterials Woodhead Publishing

Advanced 3D-Printed Systems and Nanosystems for Drug Delivery and Tissue Engineering explores the intricacies of nanostructures and 3D printed systems in terms of their design as drug delivery or tissue engineering devices, their further evaluations and diverse applications. The book highlights the most recent advances in both nanosystems and 3D-printed systems for both drug delivery and tissue engineering applications. It discusses the convergence of biofabrication with nanotechnology, constructing a directional customizable biomaterial arrangement for promoting tissue regeneration, combined with the potential for controlled bioactive delivery. These discussions provide a new viewpoint for both biomaterials scientists and pharmaceutical scientists. Shows how nanotechnology and 3D printing are being used to create systems which are intelligent, biomimetic and customizable to the patient Explores the current generation of nanostructured 3D printed medical devices Assesses the major challenges of using 3D printed nanosystems for the manufacture of new pharmaceuticals

Progenitor and Stem Cell Technologies and Therapies Woodhead Publishing

Maintaining quality of life in an ageing population is one of the great challenges of the 21st Century. This book summarises how this challenge is being met by multi-disciplinary developments of specialty biomaterials, devices, artificial organs and in-vitro growth of human cells as tissue engineered constructs. Biomaterials, Artificial Organs and Tissue Engineering is intended for use as a textbook in a one semester course for upper level BS, MS and Meng students. The 25 chapters are organized in five parts: Part one provides an introduction to living and man-made materials for the non-specialist; Part two is an overview of clinical applications of various biomaterials and devices; Part three summarises the bioengineering principles, materials and designs used in artificial organs; Part four presents the concepts, cell techniques, scaffold materials and applications of tissue engineering; Part five provides an overview of the complex socio-economic factors involved in technology based healthcare, including regulatory controls, technology transfer processes and ethical issues. Comprehensive introduction to living and man-made materials Looks at clinical applications of various biomaterials and devices Bioengineering principles, materials and designs used in artificial organs are summarised

Bioactive Materials in Medicine Elsevier

Progenitor and stem cells have the ability to renew themselves and change into a variety of specialised types, making them ideal materials for therapy and regenerative medicine. Progenitor and stem cell technologies and therapies reviews the range of progenitor and stem cells available and their therapeutic application. Part one reviews basic principles for the culture of stem cells before discussing technologies for particular cell types. These include human embryonic, induced pluripotent, amniotic and placental, cord and multipotent stem cells. Part two discusses wider issues such as intellectual property, regulation and commercialisation of stem cell technologies and therapies. The final part of the book considers the therapeutic use of stem and progenitor cells. Chapters review the use of adipose tissue-derived stem cells, umbilical cord blood (UCB) stem cells, bone marrow, auditory and oral cavity stem cells. Other chapters cover the use of stem cells in therapies in various clinical areas, including lung, cartilage, urologic, nerve and cardiac repair. With its distinguished editor and international team of contributors, Progenitor and stem cell technologies and therapies is a standard reference for both those researching in cell and tissue biology and engineering as well as medical practitioners investigating the therapeutic use of this important technology. Reviews the range of progenitor and stem cells available and outlines their therapeutic application Examines the basic principles for the culture of stem cells before discussing technologies for particular cell types, including human embryonic, induced pluripotent, amniotic and placental, cord and multipotent stem cells Includes a discussion of wider issues such as intellectual property, regulation and commercialisation of stem cell technologies and therapies

Rapid Prototyping of Biomaterials Elsevier

Rapid Prototyping of Biomaterials: Principles and Applications provides a comprehensive review of established and emerging rapid prototyping technologies (such as bioprinting) for medical applications. Rapid prototyping, also known as layer manufacturing, additive manufacturing, solid freeform fabrication, or 3D printing, can be used to create complex structures and devices for medical applications from solid, powder, or liquid precursors. Following a useful introduction, which provides an overview of the field, the book explores rapid prototyping of nanoscale biomaterials, biosensors, artificial organs, and prosthetic limbs. Further chapters consider the use of rapid prototyping technologies for the processing of viable cells, scaffolds, and tissues. With its distinguished editor and international team of renowned contributors, Rapid Prototyping of Biomaterials is a useful technical resource for scientists and researchers in the biomaterials and tissue regeneration industry, as well as in academia. Comprehensive review of established and emerging rapid prototyping technologies (such as bioprinting) for medical applications Chapters explore rapid prototyping of nanoscale biomaterials, biosensors, artificial organs, and prosthetic limbs Examines the use of rapid prototyping technologies for the processing of viable cells, scaffolds, and tissues

Green Biocomposites for Biomedical Engineering Elsevier

Rapid Prototyping of Biomaterials: Techniques in Additive Manufacturing, Second Edition, provides a comprehensive review of emerging rapid prototyping technologies, such as bioprinting, for biomedical applications. Rapid prototyping, also known as additive manufacturing, solid freeform fabrication, or 3D printing, can be used to create complex structures and devices for medical applications from solid, powder or liquid precursors. Sections explore a variety of materials, look at applications, and consider the use of rapid prototyping technologies for constructing organs. With its distinguished editor and international team of renowned contributors, this book is a useful, technical resource for scientists and researchers in academia, biomaterials and tissue regeneration. Presents a comprehensive review of established and emerging additive manufacturing technologies (such as bioprinting) for medical applications Contains chapters that explore the additive manufacturing of nanoscale biomaterials for a range of applications, from drug delivery, to organ printing Includes new information on 3D printing on a variety of material classes

Tailor-Made and Functionalized Biopolymer Systems Woodhead Publishing

Tailor-Made and Functionalized Biopolymer Systems: For Drug Delivery and Biomedical Applications covers the design and application of these functionalized and tailor-made biopolymers and biopolymer systems intended for drug delivery and biomedical applications. Various concepts, design protocols and biomedical applications of tailor-made biopolymer systems are covered, guiding the reader from theoretical knowledge to practical application. Authored by an array of experts from global institutions, this book offers an interdisciplinary approach to how tailor-made biopolymers lead to novel drug delivery and treatment solutions. This will be a useful reference to a broad audience, including biomedical engineers, materials scientists, pharmacologists and chemists. Provides a concise overview of tailor-made and functionalized biopolymer systems for biomedical applications Covers a range of modified biopolymers, biopolymeric composites and biopolymer-based systems in drug delivery, development of artificial organs, diagnostic applications, and more Describes characterization, synthesis and functionalization of biopolymers and biopolymers systems

Fundamental Biomaterials: Ceramics World Scientific

Biocompatibility and Performance of Medical Devices, Second Edition, provides an understanding of the biocompatibility and performance tests for ensuring that biomaterials and medical devices are safe and will perform as expected in the biological environment. Sections cover key concepts and challenges faced in relation to biocompatibility in medical devices, discuss the evaluation and characterization of biocompatibility in medical devices, describe preclinical performance studies for bone, dental and soft tissue implants, and provide information on the regulation of medical devices in the European Union, Japan and China. The book concludes with a review of histopathology principles for biocompatibility and performance studies. Presents diverse insights from experts in government, industry and academia Delivers a comprehensive overview of testing and interpreting medical device performance Expanded to include new information, including sections on managing extractables, accelerating and simplifying medical device development through screening and alternative biocompatibility methods, and quality strategies which fasten device access to market

Biomaterials, Artificial Organs and Tissue Engineering Springer Nature

Despite recent advances in medical devices using other materials, metallic implants are still one of the most commercially significant sectors of the industry. Given the widespread use of metals in medical devices, it is vital that the fundamentals and behaviour of this material are understood. Metals in biomedical devices reviews the latest techniques in metal processing methods and the behaviour of this important material. Initial chapters review the current status and selection of metals for biomedical devices. Chapters in part two discuss the mechanical behaviour, degradation and testing of metals with specific chapters on corrosion, wear testing and biocompatibility of biomaterials. Part three covers the processing of metals for biomedical applications with chapters on such topics as forging metals and alloys, surface treatment, coatings and sterilisation. Chapters in the final section discuss clinical applications of metals such as cardiovascular, orthopaedic and new generation biomaterials. With its distinguished editor and team of expert contributors, Metals for biomedical devices is a standard reference for materials scientists, researchers and engineers working in the medical devices industry and academia. Reviews the latest techniques in metal processing methods including surface treatment and sterilisation Examines metal selection for biomedical devices considering biocompatibility of various metals Assesses mechanical behaviour and testing of metals featuring corrosion, fatigue and wear

Biomaterials for Organ and Tissue Regeneration CRC Press

Bioactive materials play an increasingly important role in the biomaterials industry, and are used for a range of applications, including artificial organs, drug delivery systems, nanomedicine, and biosensors. Bioactive materials in medicine reviews the current status and ongoing development of bioactive materials for medical applications. Following an introduction to bioactive materials in medicine, part one covers the process of designing bioactive materials, including chapters on molecular design, nanotechnology, and tissue engineering. Part two focuses on the different applications of bioactive materials in medicine, with chapters discussing applications in orthopaedics, in the circulatory system,and as antibacterials. The final chapters focus on the uses of these materials in gene therapy, plastic surgery and body reconstruction, and in drug delivery systems. With its distinguished editors and international team of contributors, Bioactive materials in medicine is an essential reference for researchers and designers in industry, as well as those with an academic interest in the subject. Discusses the current status and ongoing development of bioactive materials for medical applications Explores the process of designing bioactive materials, including molecular design, nanotechnology, and tissue engineering Assesses different applications of bioactive materials in medicine featuring applications in orthopaedics, in the circulatory system,and as antibacterials

Biomaterials for Artificial Organs Woodhead Publishing

Alumina Ceramics: Biomedical and Clinical Applications examines the extraordinary material, Alumina, and its use in biomedicine and industry. Sections discuss the fundamentals of Alumina Ceramics, look at the various industrial applications, and examine a variety of medical applications. Readers will find this to be an invaluable and unique resource for researchers, clinical professionals, engineers, and advanced level students. Alumina ceramics are a leading biomaterial used for specialist medical applications, such as bionic implants and tissue engineering, and the only biomaterial commercially viable for use as bearings for orthopedic hip replacements. As such, this book is a timely resource on the topics discussed. Provides a unique and thorough review of Alumina ceramics Written by one of the world’s leading experts in bioceramics and advanced industrial ceramics, especially alumina Targeted to researchers in the materials, clinical and dental fields Enables the non-expert with an overview of the underlying alumina technology, major challenges, major successes and future directions

Biomaterials in Artificial Organs Woodhead Publishing

Medical tribology can be defined as the science of tribological phenomena in the human body, both those that naturally occur in the tissues or organs and those that arise after implantation of an artificial device, while biomaterials are inert substances designed to be incorporated into living systems. Biomaterials and medical tribology brings together a collection of high quality articles and case studies focussing on new research and developments in these two important fields. The book provides details of the different types of biomaterial available and their applications, including nanoparticles for biomedical applications, synergism effects during fiction and fretting corrosion experiments, application of biomedical-grade titanium alloys in trabecular bone and artificial joints, fatigue strengthening of an orthopaedic Ti6AI4V alloy, wear determination on retrieved metal-on-metal hip arthoplasty, natural articular joints, the importance of bearing porosity in engineering and natural lubrication, tribological characterization of human tooth enamel, and finally, liposome-based carrier systems and devices used for pulmonary drug delivery. Biomaterials and medical tribology is an essential reference for materials scientists, engineers, and researchers in the field of medical tribology. The title also provides an overview for academics and clinicians in this area.

Alumina Ceramics Biomaterials, Artificial Organs and Tissue Engineering

Green Biocomposites for Biomedical Engineering: Design, Properties, and Applications combines emergent research outcomes with fundamental theoretical concepts relevant to processing, properties and applications of advanced green composites in the field of biomedical engineering. The book outlines the design elements and characterization of biocomposites, highlighting each class of biocomposite separately. A broad range of biomedical applications for biocomposites is then covered, with a final section discussing the ethics and safety regulations associated with manufacturing and the use of biocomposites. With contributions from eminent editors and recognized authors around the world, this book is a vital reference for researchers in biomedical engineering, materials science and environmental science, both in industry and academia. Provides comprehensive information regarding current advances in the interdisciplinary field of eco-friendly green composite materials for biomedical applications Offers coverage of state-of-the-art physics-based advanced models used in composites Lists a broad range of characterization techniques and biomedical applications

Rapid Prototyping of Biomaterials Woodhead Publishing

Biomaterials, Artificial Organs and Tissue EngineeringElsevier

Biocompatibility and Performance of Medical Devices Elsevier

Myocardial tissue engineering (MTE), a concept that intends to prolong patients’ life after cardiac damage by supporting or restoring heart function, is continuously improving. Common MTE strategies include an engineered ‘vehicle’, which may be a porous scaffold or a dense substrate or patch, made of either natural or synthetic polymeric materials. The function of the substrate is to aid transportation of cells into the diseased region of the heart and support their integration. This book, which contains chapters written by leading experts in MTE, gives a complete analysis of the area and presents the latest advances in the field. The chapters cover all relevant aspects of MTE strategies, including cell sources, specific TE techniques and biomaterials used. Many different cell types have been suggested for cell therapy in the framework of MTE, including autologous bone marrow-derived or cardiac

progenitors, as well as embryonic or induced pluripotent stem cells, each having their particular advantages and disadvantages. The book covers a complete range of biomaterials, examining different aspects of their application in MTE, such as biocompatibility with cardiac cells, mechanical capability and compatibility with the mechanical properties of the native myocardium as well as degradation behaviour in vivo and in vitro. Although a great deal of research is being carried out in the field, this book also addresses many questions that still remain unanswered and highlights those areas in which further research efforts are required. The book will also give an insight into clinical trials and possible novel cell sources for cell therapy in MTE.

Metals for Biomedical Devices Woodhead Publishing

This book presents a broad scope of the field of biomaterials science and technology, focusing on theory, advances and applications. It is written for those who would like to develop their interest and knowledge towards biomaterials or materials science and engineering. All aspects of biomaterials science are thoroughly addressed, from basic principles of biomaterials, organs and medical devices to advanced topics such as tissue engineering, surface engineering, sterilization techniques, 3D printing and drug delivery systems. Readers are also introduced to major concepts of surface modification techniques, and potential applications of different classes of biomaterials. Multiple-choice questions at the end of every chapter will be helpful for students to test their understanding of each topic, with answers provided at the end of the book.Ultimately, this book offers a one-stop source of information on the essentials of biomaterials and engineering. It is useful both as an introduction and advanced reference on recent advances in the biomaterials field. Suitable readers include undergraduate and graduate students, especially those in Materials Science, Biomedical Engineering and Bioengineering.

Plastics in Medical Devices for Cardiovascular Applications Springer

Cardiac Regeneration and Repair, Volume Two reviews the use of biomaterials, alone or combined with cell therapy, in providing tissue-engineered constructs to repair the injured heart and prevent or reverse heart failure. Part one explores the variety of biomaterials available for cardiac repair, including nanomaterials and hydrogels. Further chapters explore the use of biomaterials to enhance stem cell therapy for restoring ventricular function and generating stem cell-modified intravascular stents. Part two focuses on tissue engineering for cardiac repair, including chapters on decellularized biologic scaffolds, synthetic scaffolds, cell sheet engineering, maturation of functional cardiac tissue patches, vascularized engineered tissues for in vivo and in vitro applications, and clinical considerations for cardiac tissue engineering. Finally, part three explores vascular remodeling, including chapters highlighting aortic extracellular matrix remodeling, cell-biomaterial interactions for blood vessel formation, and stem cells for tissue-engineered blood vessels. Cardiac Regeneration and Repair, Volume Two is complemented by an initial volume covering pathology and therapies. Together, the two volumes of Cardiac Regeneration and Repair provide a comprehensive resource for clinicians, scientists, or academicians fascinated with cardiac regeneration, including those interested in cell therapy, tissue engineering, or biomaterials. Surveys the variety of biomaterials available for cardiac repair, including nanomaterials and hydrogels. Focuses on tissue engineering for cardiac repair including clinical considerations for cardiac tissue engineering Explores vascular remodeling, highlighting aortic extracellular matrix remodeling, cell-biomaterial interactions for blood vessel formation, and stem cells for tissue-engineered blood vessels