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Sustainable Composites for Lightweight Applications Dec 08

2020 Carbon and glass fibre reinforced composite materials have been used for many years in several different types of applications. However, these conventional composites are derived from non-renewable reinforcements and they pose a significant threat to the environment. Government legislation and consumer behaviour have recently forced many industries to adapt sustainable composites. Industries such as automotive, marine and aerospace are now seeking sustainable lightweight composites with the aim to reduce the overall weight of the components with enhanced materials and design aspects. Therefore, there is high demand on research for the development of sustainable lightweight composites. This book presents a comprehensive review of lightweight composites with the central aim to increase their use in key industrial sectors such as automotive, marine and aerospace. There is no such book currently available that is dedicated to sustainable lightweight applications covering important topics such as key drivers for lightweight composites, mechanical properties, damage characterisation, durability and environmental aspects. Key topics that are addressed include: The roles of reinforcements and matrices in composite materials Sustainable natural fibre reinforcements and their morphological structures Lightweight applications and properties requirements Design, manufacturing processes and their effects on properties Testing and damage characterisation of composite materials Sustainable composites and techniques for property enhancement Future trends and challenges for sustainable composites in lightweight applications It will be a valuable reference resource for those working in material Science, polymer science, materials engineering, and industries involved in the manufacture of automotive and aerospace components from lightweight composite materials. Provides a comprehensive review of

sustainable lightweight composites looking at key industrial applications such as automotive, marine, and aerospace and construction Important relationships between structure and properties are analysed in detail Enhancement of properties through hybrid systems, are also explored with emphasis on design, materials selection and manufacturing techniques

Injectable Biomaterials Feb 28 2020 Novel injectable materials for non-invasive surgical procedures are becoming increasingly popular. An advantage of these materials include easy deliverability into the body, however the suitability of their mechanical properties must also be carefully considered. Injectable biomaterials covers the materials, properties and biomedical applications of injectable materials, as well as novel developments in the technology. Part one focuses on materials and properties, with chapters covering the design of injectable biomaterials as well as their rheological properties and the mechanical properties of injectable polymers and composites. Part two covers the clinical applications of injectable biomaterials, including chapters on drug delivery, tissue engineering and orthopaedic applications as well as injectable materials for gene delivery systems. In part three, existing and developing technologies are discussed. Chapters in this part cover such topics as environmentally responsive biomaterials, injectable nanotechnology, injectable biodegradable materials and biocompatibility. There are also chapters focusing on troubleshooting and potential future applications of injectable biomaterials. With its distinguished editor and international team of contributors, Injectable biomaterials is a standard reference for materials scientists and researchers working in the biomaterials industry, as well as those with an academic interest in the subject. It will also be beneficial to clinicians. Comprehensively examines the materials, properties and

biomedical applications of injectable materials, as well as novel developments in the technology Reviews the design of injectable biomaterials as well as their rheological properties and the mechanical properties of injectable polymers and composites Explores clinical applications of injectable biomaterials, including drug delivery, tissue engineering, orthopaedic applications and injectable materials for gene delivery systems

Thermosets Apr 11 2021 In this new edition, *Thermosets: Structure, Properties, and Applications* builds on and updates the existing review of mechanical and thermal properties, as well as rheology and curing processes of thermosets, and the role of nanostructures in thermoset toughening. All chapters have been updated or re-written, and new chapters have been added to reflect ongoing changes and developments in the field of thermosetting materials and the applications of these materials. Applications of thermosets are the focus of the second part of the book, including the use of thermosets in the building and construction industry, aerospace technology and as insulation materials. Thermoset adhesives and coatings, including epoxy resins, acrylates and polyurethanes are also discussed, followed by a review of thermosets for electrical applications. New chapters include coverage of thermoset nanocomposites, recycling issues, and applications such as consumer goods, transportation, energy and defence. With its distinguished editor and international team of expert contributors, the second edition of *Thermosets: Structure, Properties, and Applications* is an essential guide for engineers, chemists, physicists and polymer scientists involved in the development, production and application of thermosets, as well as providing a useful review for academic researchers in the field. Links structure, properties, and applications, making this book relevant to both academia and engineers in industry Includes entirely new chapters on the

use of thermosets in aerospace, transport, defense, and a range of consumer applications Enables practitioners to stay current on the latest developments in recycling of thermosets and their composites

Magnetic Nanoparticle-Based Hybrid Materials Jan 09 2021

Magnetic Nanoparticle-Based Hybrid Materials: Fundamentals and Applications introduces the principles, properties, and emerging applications of this important materials system. The hybridization of magnetic nanoparticles with metals, metal oxides and semiconducting nanoparticles may result in superior properties. The book reviews the most relevant hybrid materials, their mechanisms and properties. Then, the book focuses on the rational design, controlled synthesis, advanced characterizations and in-depth understanding of structure-property relationships. The last part addresses the promising applications of hybrid nanomaterials in the real world such as in the environment, energy, medicine fields. Magnetic Nanoparticle-Based Hybrid Materials: Fundamentals and Applications comprehensively reviews both the theoretical and experimental approaches used to rapidly advance nanomaterials that could result in new technologies that impact day-to-day life and society in key areas such as health and the environment. It is suitable for researchers and practitioners who are materials scientists and engineers, chemists or physicists in academia and R&D. Provides in-depth information on the basic principles of magnetic nanoparticles-based hybrid materials such as synthesis, characterization, properties, and magnon interactions Discusses the most relevant hybrid materials systems including integration of metals, metal oxides, polymers, carbon and more Addresses the emerging applications in medicine, the environment, energy, sensing, and computing enabled by magnetic nanoparticles-based hybrid materials

Nanostructured Metals and Alloys Feb 07 2021 Tensile strength, fatigue strength and ductility are important properties of nanostructured metallic materials, which make them suitable for use in applications where strength or strength-to-weight ratios are important. *Nanostructured metals and alloys* reviews the latest technologies used for production of these materials, as well as recent advances in research into their structure and mechanical properties. One of the most important issues facing nanostructured metals and alloys is how to produce them. Part one describes the different methods used to process bulk nanostructured metals and alloys, including chapters on severe plastic deformation, mechanical alloying and electrodeposition among others. Part two concentrates on the microstructure and properties of nanostructured metals, with chapters studying deformation structures such as twins, microstructure of ferrous alloys by equal channel angular processing, and characteristic structures of nanostructured metals prepared by plastic deformation. In part three, the mechanical properties of nanostructured metals and alloys are discussed, with chapters on such topics as strengthening mechanisms, nanostructured metals based on molecular dynamics computer simulations, and surface deformation. Part four focuses on existing and developing applications of nanostructured metals and alloys, covering topics such as nanostructured steel for automobiles, steel sheet and nanostructured coatings by spraying. With its distinguished editor and international team of contributors, *Nanostructured metals and alloys* is a standard reference for manufacturers of metal components, as well as those with an academic research interest in metals and materials with enhanced properties.

Applications of Advanced Green Materials Jun 13 2021
Applications of Advanced Green Materials provides a

comprehensive and authoritative review on recent advancement in green materials in various applications. Each chapter is focused on a specific application of advanced green materials from packaging to sensor technology, biomedical to environmental applications, textile to catalysis to electronic shielding applications, supercapacitors, drug delivery, tissue engineering, bioelectronic, gas storage and separation, etc. This book also discusses life cycle assessment and circular economy of green materials and their future prospective. The book is unique with contributions from renowned scientists working on biopolymers and biocomposites, bioactive and biodegradable materials, composites, and metallic natural materials. This book is an essential resource for academicians, researchers, students and professionals interested in exploring potential of advanced green materials. Includes up to date information on applications of advanced green materials Each chapter is specifically discussing a particular application with examples Present a unified approach to discuss in detail about origin, synthesis and application of green materials

Polymeric Gels Mar 11 2021 Polymeric Gels: Characterization, Properties and Biomedical Applications covers the fundamentals and applications of polymeric gels. Particular emphasis is given to their synthesis, properties and characteristics, with topics such as natural, synthetic, and smart polymeric gels, medical applications, and advancements in conductive and magnetic gels presented. The book covers the basics and applications of hydrogels, providing readers with a comprehensive guide on the types of polymeric gels used in the field of biomedical engineering. Provides guidance for decisions on the suitability and appropriateness of a synthetic route and characterization technique for particular polymeric networks Analyzes and compares experimental data Presents in-depth information on

the physical properties of polymeric gels using mathematical models Uses an interdisciplinary approach to discuss potential new applications for both established polymeric gels and recent advances

Woven Textile Structure Dec 20 2021 Understanding and predicting the structure and properties of woven textiles is important for achieving specific performance characteristics in various woven applications. Woven textiles are used in a range of products such as apparel, technical and industrial textiles. *Woven textile structure: Theory and applications* provides comprehensive coverage of the structure, behaviour, modeling and design of woven fabrics and their relevance to the textile industry. The first group of chapters review the fundamental principles of woven fabric structures. Part two discusses the mechanics of woven fabrics, topics include shrinkage in woven fabrics, yarn behaviour in woven fabrics and bending behaviour of woven fabrics. Part three presents a selection of chapters on design engineering of woven fabrics, themes such as textile product design methods and modelling for woven fabric design are covered. A final group of chapters is dedicated to addressing practical applications of woven fabrics. *Woven textile structure: Theory and applications* is essential reading for designers, engineers and technicians involved in the design, manufacture and use of woven textiles and garments. It will also be beneficial to academics and students. Provides comprehensive coverage of the fundamentals of woven fabric structure including geometrical modeling Examines mechanisms of woven fabric structure featuring shrinkage, buckling, bending and creasing behaviour of textiles Illustrates mathematical modeling and building predictive models for textile product design incorporating validation and testing

Adhesive Bonding Oct 30 2022 Adhesive Bonding: Science,

Technology and Applications, Second Edition guides the reader through the fundamentals, mechanical properties and applications of adhesive bonding. This thoroughly revised and expanded new edition reflects the many advances that have occurred in recent years. Sections cover the fundamentals of adhesive bonding, explaining how adhesives and sealants work, and how to assess and treat surfaces, how adhesives perform under stress and the factors affecting fatigue and failure, stress analysis, environmental durability, non-destructive testing, impact behavior, fracture mechanics, fatigue, vibration damping, and applications in construction, automotive, marine, footwear, electrical engineering, aerospace, repair, electronics, biomedicine, and bonding of composites. With its distinguished editor and international team of contributors, this book is an essential resource for industrial engineers, R&D, and scientists working with adhesives and their industrial applications, as well as researchers and advanced students in adhesion, joining, polymer science, materials science and mechanical engineering. Offers detailed, methodical coverage of the fundamentals, mechanical properties and industrial applications of adhesive bonding Enables the successful preparation of adhesives for a broad range of important load-bearing applications in areas such as automotive and aerospace, construction, electronics and biomedicine Covers the latest advances in adhesive bonding, including improved repair techniques for metallic and composite structures, cohesive zone modeling, and disassembly and recycling

Titanium in Medical and Dental Applications Jul 27 2022
Titanium in Medical and Dental Applications is an essential reference book for those involved in biomedical materials and advanced metals. Written by well-known experts in the field, it covers a broad array of titanium uses, including implants,

instruments, devices, the manufacturing processes used to create them, their properties, corrosion resistance and various fabrication approaches. Biomedical titanium materials are a critically important part of biomaterials, especially in cases where non-metallic biomedical materials are not suited to applications, such as the case of load-bearing implants. The book also covers the use of titanium for implants in the medical and dental fields and reviews the use of titanium for medical instruments and devices. Provides an understanding of the essential and broad applications of Titanium in both the medical and dental industries Discusses the pathways to manufacturing titanium into critical biomedical and dental devices Includes insights into further applications within the industry

Biosensors for Medical Applications Sep 28 2022 Biomedical sensors are an essential tool in the detection and monitoring of a wide range of medical conditions from cancer to Parkinson's disease. Biosensors for medical applications provides a comprehensive review of established, cutting edge and future trends in biomedical sensors and their applications. Part one focuses on key principles and transduction approaches, reviewing electrochemical, piezoelectric and nano-sized biosensors. Impedance interrogated affinity biosensors for medical applications and practical applications of enzyme biosensors are explored, before part two goes on to review specific medical applications. Biosensors for DNA and RNA detection and characterization, disease biomarker detection, and the use of affibodies as an alternative to antibodies in cancer marker biosensors are investigated, along with biosensors for drug testing and discovery, non-invasive measurements, and wearable biosensors for medical applications. With its distinguished editor and international team of expert contributors, Biosensors for medical applications is an essential

guide for all those involved in the research, design, production and use of medical biosensors. Provides a comprehensive review of established, cutting edge and future trends in biomedical sensors and their applications Examines key principles and transduction approaches, reviewing electrochemical, piezoelectric and nano-sized biosensors Reviews biosensors for DNA and RNA detection and characterisation, disease biomarker detection, and the use of affibodies as an alternative to antibodies in cancer marker biosensors

Advances in Brazing May 25 2022 Brazing processes offer enhanced control, adaptability and cost-efficiency in the joining of materials. Unsurprisingly, this has led to great interest and investment in the area. Drawing on important research in the field, *Advances in brazing* provides a clear guide to the principles, materials, methods and key applications of brazing. Part one introduces the fundamentals of brazing, including molten metal wetting processes, strength and margins of safety of brazed joints, and modeling of associated physical phenomena. Part two goes on to consider specific materials, such as super alloys, filler metals for high temperature brazing, diamonds and cubic boron nitride, and varied ceramics and intermetallics. The brazing of carbon-carbon (C/C) composites to metals is also explored before applications of brazing and brazed materials are discussed in part three. Brazing of cutting materials, use of coating techniques, and metal-nonmetal brazing for electrical, packaging and structural applications are reviewed, along with fluxless brazing, the use of glasses and glass ceramics for high temperature applications and nickel-based filler metals for components in contact with drinking water. With its distinguished editor and international team of expert contributors, *Advances in brazing* is a technical guide for any professionals requiring an understanding of brazing

processes, and offers a deeper understanding of the subject to researchers and engineers within the field of joining. Reviews the advances of brazing processes in joining materials Discusses the fundamentals of brazing and considers specific materials, including super alloys, filler metals, ceramics and intermetallics Brazing of cutting materials and structural applications are also discussed

Organic Flexible Electronics Jul 03 2020 Organic Electronics is a novel field of electronics that has gained an incredible attention over the past few decades. New materials, device architectures and applications have been continuously introduced by the academic and also industrial communities, and novel topics have raised strong interest in such communities, as molecular doping, thermoelectrics, bioelectronics and many others. Organic Flexible Electronics is mainly divided into three sections. The first part is focused on the fundamentals of organic electronics, such as charge transport models in these systems and new approaches for the design and synthesis of novel molecules. The first section addresses the main challenges that are still open in this field, including the important role of interfaces for achieving high-performing devices or the novel approaches employed for improving reliability issues. The second part discusses the most innovative devices which have been developed in recent years, such as devices for energy harvesting, flexible batteries, high frequency circuits, and flexible devices for tattoo electronics and bioelectronics. Finally the book reviews the most important applications moving from more standard flexible back panels to wearable and textile electronics and more futuristic applications like ingestible systems. Reviews the fundamental properties and methods for optimizing organic electronic materials including chemical doping and techniques to address stability issues; Discusses the most promising organic

electronic devices for energy, electronics, and biomedical applications; Addresses key applications of organic electronic devices in imagers, wearable electronics, bioelectronics.

3-D Fibrous Assemblies Apr 23 2022 There have been important recent developments in the production and application of three dimensional fabrics. These 3D textile structures have great potential for new fabrics and textile applications. 3D fibrous assemblies summarises some key developments and their applications in the textile industry. The book begins with an introductory chapter which defines the concepts and types of 3D fibrous assemblies. The book then discusses how 3D fabrics can be applied in textile products. These range from composites and protective clothing to medical textiles. The remainder of the book reviews the two main 3D fabrics; multi-axial warp knitted fabrics and multi-layer woven fabrics. Themes such as structure, manufacture, properties and modelling are considered for both fabrics. Written by a distinguished author, 3D fibrous assemblies is a pioneering guide for a broad spectrum of readers, ranging from fibre scientists and designers through to those involved in research and development of new generation textile products. Presents exciting opportunities for the creation of new textiles through the use of three dimensional textile fibre assemblies A comprehensive account of the different types of 3D fabrics and their associated structure, properties, manufacture and modelling Examples of how three dimensional fibres can be applied in textile products

Polymer-based Nanocomposites for Energy and Environmental Applications Jul 15 2021 Polymer-Based Nanocomposites for Energy and Environmental Applications provides a comprehensive and updated review of major innovations in the field of polymer-based nanocomposites for energy and environmental applications. It covers properties and

applications, including the synthesis of polymer based nanocomposites from different sources and tactics on the efficacy and major challenges associated with successful scale-up fabrication. The chapters provide cutting-edge, up-to-date research findings on the use of polymer based nanocomposites in energy and environmental applications, while also detailing how to achieve material's characteristics and significant enhancements in physical, chemical, mechanical and thermal properties. It is an essential reference for future research in polymer based nanocomposites as topics such as sustainable, recyclable and eco-friendly methods for highly innovative and applied materials are current topics of importance. Covers a wide range of research on polymer based nanocomposites Provides updates on the most relevant polymer based nanocomposites and their prodigious potential in the fields of energy and the environment Demonstrates systematic approaches and investigations from the design, synthesis, characterization and applications of polymer based nanocomposites Presents a useful reference and technical guide for university academics and postgraduate students (Masters and Ph.D.)

Titanium Alloys Aug 23 2019 Given their growing importance in the aerospace, automotive, sports and medical sectors, modelling the microstructure and properties of titanium and its alloys is a vital part of research into the development of new applications. This is the first time a book has been dedicated to modelling techniques for titanium. Part one discusses experimental techniques such as microscopy, synchrotron radiation X-ray diffraction and differential scanning calorimetry. Part two reviews physical modelling methods including thermodynamic modelling, the Johnson-Mehl-Avrami method, finite element modelling, the phase-field method, the cellular automata method, crystallographic and fracture behaviour of

titanium aluminide and atomistic simulations of interfaces and dislocations relevant to TiAl. Part three covers neural network models and Part four examines surface engineering products. These include surface nitriding: phase composition, microstructure, mechanical properties, morphology and corrosion; nitriding: modelling of hardness profiles and kinetics; and aluminising: fabrication of Ti coatings by mechanical alloying. With its distinguished authors, *Titanium alloys: Modelling of microstructure, properties and applications* is a standard reference for industry and researchers concerned with titanium modelling, as well as users of titanium, titanium alloys and titanium aluminide in the aerospace, automotive, sports and medical implant sectors. Comprehensively assesses modelling techniques for titanium, including experimental techniques such as microscopy and differential scanning calorimetry Reviews physical modelling methods including thermodynamic modelling and finite element modelling Examines surface engineering products with specific chapters focused on surface nitriding and aluminising

Denim Aug 28 2022 *Denim: Manufacture, Finishing and Applications* provides exhaustive coverage of denim manufacture, jeans washing, novel applications and environmental impacts. It also contains information on the history and social influence of denim, and includes the details relevant to the fashion and apparel industry. The topics covered are comprehensive with contributions from experts the world over, and the book is offered as an authentic reference book for any relevant information on denim. Provides a thorough review of denim manufacturing and jeans washing technologies Includes details relevant to the fashion and apparel industry while maintaining a high level of technological content on spinning, dyeing, weaving, garments, washing, finishing and other

applications Includes several contributions from industry experts
Drug-Device Combination Products Feb 19 2022 Drug delivery systems represent a vast area of research and development within biomaterials and medicine and the demand for sophisticated drug delivery devices continues to drive novel product development. Advanced drug delivery devices can offer significant advantages over conventional drugs and devices alone, such as increased efficiency, improved performance and convenience. The purpose of this book is to illustrate how effective drug delivery can be achieved by means other than tablets. The book will provide a thorough analysis of the fundamentals, applications and new technologies of drug-device combination products for use throughout the human body. Part one provides readers with an introduction and background to the field. Chapters in Part two discuss areas of application such as catheter based products, drug eluting stents and beads and antibiotic loaded cements. Part three covers the development of drug device combination products with chapters on such topics as pre-clinical testing, sterilisation, patent issues and regulation of drug device combination products. With its distinguished editor and team of international contributors, *Drug-device combination products: delivery technologies and applications* is an invaluable reference for product development specialists, materials scientists and engineers in the biomedical industry and academia as well as those concerned with drug delivery. Illustrates how effective drug delivery can be achieved by means other than tablets providing readers with a comprehensive introduction and background to the field Provides a thorough analysis of the fundamentals, applications and new technologies of drug device combination products Discusses areas of application such as catheter based products and reviews the development of drug device combination products including pre-

clinical testing and sterilisation

Biomineralization and Biomaterials Aug 16 2021

Biomineralization is a natural process by which living organisms form minerals in association with organic biostructures to form hybrid biological materials such as bone, enamel, dentine and nacre among others. Scientists have researched the fundamentals of these processes and the unique structures and properties of the resulting mineralized tissues. Inspired by them, new biomaterials for tissue engineering and regenerative medicine have been developed in recent years. *Biomineralization and biomaterials: fundamentals and applications* looks at the characteristics of these essential processes and natural materials and describes strategies and technologies to biomimetically design and produce biomaterials with improved biological performance. Provides a thorough overview of the biomineralization process Presents the most recent information on the natural process by which crystals in tissues form into inorganic structures such as bone, teeth, and other natural mineralized tissues Investigates methods for improving mineralization Explores new techniques that will help improve the biomimetic process

Peptide Applications in Biomedicine, Biotechnology and Bioengineering May 13 2021 *Peptide Applications in Biomedicine, Biotechnology and Bioengineering* summarizes the current knowledge on peptide applications in biomedicine, biotechnology and bioengineering. After a general introduction to peptides, the book addresses the many applications of peptides in biomedicine and medical technology. Next, the text focuses on peptide applications in biotechnology and bioengineering and reviews of peptide applications in nanotechnology. This book is a valuable resource for biomaterial scientists, polymer scientists, bioengineers, mechanical engineers, synthetic chemists, medical

doctors and biologists. Presents a self-contained work for the field of biomedical peptides Summarizes the current knowledge on peptides in biomedicine, biotechnology and bioengineering Covers current and potential applications of biomedical peptides

Colour Design Oct 18 2021 Given its importance in analysing and influencing the world around us, an understanding of colour is a vital tool in any design process. Colour design provides a comprehensive review of the issues surrounding the use of colour, from the fundamental principles of what colour is to its important applications across a vast range of industries. Part one covers the main principles and theories of colour, focusing on the human visual system and the psychology of colour perception. Part two goes on to review colour measurement and description, including consideration of international standards, approval methods for textiles and lithographic printing, and colour communication issues. Forecasting colour trends and methods for design enhancement are then discussed in part three along with the history of colour theory, dyes and pigments, and an overview of dye and print techniques. Finally, part four considers the use of colour across a range of specific applications, from fashion, art and interiors, to food and website design. With its distinguished editor and international team of contributors, Colour design is an invaluable reference tool for all those researching or working with colour and design in any capacity. Provides a comprehensive review of the issues surrounding the use of colour in textiles Discusses the application of colour across a vast range of industries Chapters cover the theories, measurement and description of colour, forecasting colour trends and methods for design enhancement

Advances in Braiding Technology Mar 23 2022 Braiding is the process of interlacing three or more threads or yarns in a diagonal direction to the product axis in order to obtain thicker,

wider or stronger textiles or, in the case of overbraiding, in order to cover a profile. Braids are becoming the reinforcement of choice in composite manufacturing, and have found a range of technical applications in fields including medicine, candles, transport and aerospace. Building on the information provided in Prof. Kyosev's previous book, *Braiding Technology for Textiles*, this important title covers advanced technologies and new developments for the manufacture, applications and modelling of braided products. Part One covers the braiding of three-dimensional profiles, and includes a detailed overview of three-dimensional braiding technologies as well as chapters devoted to specific kinds of 3D braiding. Part Two addresses specialist braiding techniques and applications, and includes chapters reviewing the use of braids for medical textiles and candles. Part Three focuses on braiding techniques for ropes and Part Four reviews braiding for composites. The final part of the book considers modelling and simulation, and covers topics including overbraiding simulation, Finite Element Method (FEM) modelling and geometrical modelling. Covers advanced braiding techniques, technical applications, and modelling and simulation of braided textiles. Focused on the needs of the textile industry by offering suitable breadth and depth of coverage of a range of braiding manufacturing technology, applications and modelling techniques in a single volume. Written by an eminent team of authors, composed of leading scientists and developers in the field who have a wealth of relevant, first-hand experience in braiding, and edited by a high-profile editor who is an expert in his field.

Advanced Composite Materials for Aerospace Engineering Nov 26 2019 *Advanced Composite Materials for Aerospace Engineering: Processing, Properties and Applications* predominately focuses on the use of advanced composite

materials in aerospace engineering. It discusses both the basic and advanced requirements of these materials for various applications in the aerospace sector, and includes discussions on all the main types of commercial composites that are reviewed and compared to those of metals. Various aspects, including the type of fibre, matrix, structure, properties, modeling, and testing are considered, as well as mechanical and structural behavior, along with recent developments. There are several new types of composite materials that have huge potential for various applications in the aerospace sector, including nanocomposites, multiscale and auxetic composites, and self-sensing and self-healing composites, each of which is discussed in detail. The book's main strength is its coverage of all aspects of the topics, including materials, design, processing, properties, modeling and applications for both existing commercial composites and those currently under research or development. Valuable case studies provide relevant examples of various product designs to enhance learning. Contains contributions from leading experts in the field Provides a comprehensive resource on the use of advanced composite materials in the aerospace industry Discusses both existing commercial composite materials and those currently under research or development

Organic Ferroelectric Materials and Applications Sep 04 2020 Organic Ferroelectric Materials and Applications aims to bring an up-to date account of the field with discussion of recent findings. This book presents an interdisciplinary resource for scientists from both academia and industry on the science and applications of molecular organic piezo- and ferroelectric materials. The book addresses the fundamental science of ferroelectric polymers, molecular crystals, supramolecular networks, and other key and emerging organic materials systems. It touches on important processing and characterization

methods and provides an overview of current and emerging applications of organic piezoelectrics and ferroelectrics for electronics, sensors, energy harvesting, and biomedical technologies. Organic Ferroelectric Materials and Applications will be of special interest to those in academia or industry working in materials science, engineering, chemistry, and physics. Provides an overview of key physical properties of the emerging piezoelectric and ferroelectric molecular and supramolecular systems Discusses best practices of processing, patterning, and characterization methods and techniques Addresses current and emerging applications for electronics, materials development, sensors, energy harvesting, and biomedical technologies

Biomedical Hydrogels Oct 25 2019 Hydrogels are very important for biomedical applications because they can be chemically manipulated to alter and control the hydrogel's interaction with cells and tissues. Their flexibility and high water content is similar to that of natural tissue, making them extremely suitable for biomaterials applications. Biomedical hydrogels explores the diverse range and use of hydrogels, focusing on processing methods and novel applications in the field of implants and prostheses. Part one of this book concentrates on the processing of hydrogels, covering hydrogel swelling behaviour, superabsorbent cellulose-based hydrogels and regulation of novel hydrogel products, as well as chapters focusing on the structure and properties of hydrogels and different fabrication technologies. Part two covers existing and novel applications of hydrogels, including chapters on spinal disc and cartilage replacement implants, hydrogels for ophthalmic prostheses and hydrogels for wound healing applications. The role of hydrogels in imaging implants in situ is also discussed. With its distinguished editor and international team of contributors,

Biomedical hydrogels is an excellent reference for biomedical research scientists and engineers in industry and academia, as well as others involved in research in this area, such as research clinicians. Examines the diverse range and use of hydrogels, focusing on processing methods and novel applications
Comprehensive book explores the structure and properties of hydrogels and different fabrication technologies Covers important areas such as processing of hydrogels, covering hydrogel swelling behaviour, superabsorbent cellulose-based hydrogels and regulation of novel hydrogel products

Smart Textiles and Their Applications Sep 24 2019 Smart Textiles and Their Applications outlines the fundamental principles of applied smart textiles, also reporting on recent trends and research developments. Scientific issues and proposed solutions are presented in a rigorous and constructive way that fully presents the various results, prototypes, and case-studies obtained from academic and industrial laboratories worldwide. After an introduction to smart textiles and their applications from the editor, Part One reviews smart textiles for medical purposes, including their use in health monitoring, treatment delivery, and assistive technologies. Part Two covers smart textiles for transportation and energy, with chapters covering smart textiles for the monitoring of structures and processes, as well as smart textiles for energy generation. The final section considers smart textiles for protection, security, and communication, and includes chapters covering electrochromic textile displays, textile antennas, and smart materials for personal protective equipment. Scientific issues and proposed solutions are presented in a rigorous and constructive way regarding various results, prototypes, and case-studies obtained from academic and industrial laboratories worldwide Useful for researchers and postgraduate students, and also for existing

companies and start-ups that are developing products involving smart textiles Authored and edited by an international team who are experts in the field ensure comprehensive coverage and global relevance

Industrial Tomography Jan 01 2023 Industrial Tomography: Systems and Applications, Second Edition thoroughly explores the important techniques of industrial tomography, also discusses image reconstruction, systems, and applications. This book presents complex processes, including the way three-dimensional imaging is used to create multiple cross-sections, and how computer software helps monitor flows, filtering, mixing, drying processes, and chemical reactions inside vessels and pipelines. This book is suitable for materials scientists and engineers and applied physicists working in the photonics and optoelectronics industry or in the applications industries. Provides a comprehensive discussion on the different formats of tomography, including advances in visualization and data fusion Includes an excellent overview of image reconstruction using a wide range of applications Presents a comprehensive discussion of tomography systems and their applications in a wide variety of industrial processes

Microfluidic Devices for Biomedical Applications Mar 30 2020 Microfluidics or lab-on-a-chip (LOC) is an important technology suitable for numerous applications from drug delivery to tissue engineering. Microfluidic devices for biomedical applications discusses the fundamentals of microfluidics and explores in detail a wide range of medical applications. The first part of the book reviews the fundamentals of microfluidic technologies for biomedical applications with chapters focussing on the materials and methods for microfabrication, microfluidic actuation mechanisms and digital microfluidic technologies. Chapters in part two examine applications in drug discovery and

controlled-delivery including micro needles. Part three considers applications of microfluidic devices in cellular analysis and manipulation, tissue engineering and their role in developing tissue scaffolds and stem cell engineering. The final part of the book covers the applications of microfluidic devices in diagnostic sensing, including genetic analysis, low-cost bioassays, viral detection, and radio chemical synthesis. Microfluidic devices for biomedical applications is an essential reference for medical device manufacturers, scientists and researchers concerned with microfluidics in the field of biomedical applications and life-science industries. Discusses the fundamentals of microfluidics or lab-on-a-chip (LOC) and explores in detail a wide range of medical applications Considers materials and methods for microfabrication, microfluidic actuation mechanisms and digital microfluidic technologies Considers applications of microfluidic devices in cellular analysis and manipulation, tissue engineering and their role in developing tissue scaffolds and stem cell engineering

Diamond-Based Materials for Biomedical Applications Nov 18 2021 Carbon is light-weight, strong, conductive and able to mimic natural materials within the body, making it ideal for many uses within biomedicine. Consequently a great deal of research and funding is being put into this interesting material with a view to increasing the variety of medical applications for which it is suitable. Diamond-based materials for biomedical applications presents readers with the fundamental principles and novel applications of this versatile material. Part one provides a clear introduction to diamond based materials for medical applications. Functionalization of diamond particles and surfaces is discussed, followed by biotribology and biological behaviour of nanocrystalline diamond coatings, and blood compatibility of diamond-like carbon coatings. Part two then goes on to review

biomedical applications of diamond based materials, beginning with nanostructured diamond coatings for orthopaedic applications. Topics explored include ultrananocrystalline diamond for neural and ophthalmological applications, nanodiamonds for drug delivery systems, and diamond nucleation and seeding techniques for tissue regeneration. Finally, the book concludes with a discussion of diamond materials for microfluidic devices. With its distinguished editors and international team of expert contributors, Diamond-based materials for biomedical applications is an authoritative guide for all materials scientists, researchers, medical practitioners and academics investigating the properties and uses of diamond based materials in the biomedical environment. Presents the fundamental principles and novel applications of this versatile material Discusses the functionalization of diamond particles and surfaces, biotribology and biological behaviour of nanocrystalline diamond coatings and blood compatibility of diamond-like carbon coatings Reviews nanostructured diamond coatings for orthopaedic coatings

Joining Textiles Nov 30 2022 Understanding the techniques for joining fabrics together in a way that considers durability, strength, leak-tightness, comfort in wear and the aesthetics of the joints is critical to the production of successful, structurally secure fabric products. *Joining textiles: Principles and applications* is an authoritative guide to the key theories and methods used to join fabrics efficiently. Part one provides a clear overview of sewing technology. The mechanics of stitching, sewing and problems related to sewn textiles are discussed, along with mechanisms of sewing machines and intelligent sewing systems. Part two goes on to explore adhesive bonding of textiles, including principles, methods and applications, along with a review of bonding requirements in coating and laminating

of textiles. Welding technologies are the focus of part three. Heat sealing, ultrasonic and dielectric textile welding are covered, as are laser seaming of fabrics and the properties and performance of welded or bonded seams. Finally, part four reviews applications of joining textiles such as seams in non-iron shirts and car seat coverings, joining of wearable electronic components and technical textiles, and the joining techniques involved in industrial and medical products including nonwoven materials. With its distinguished editors and international team of expert contributors, *Joining textiles* is an important reference work for textile product manufacturers, designers and technologists, fibre scientists, textile engineers and academics working in this area. Provides an authoritative guide to the key theories and methods used to efficiently join fabrics Discusses the mechanics of stitching and sewing and problems related to sewn textiles, alongside mechanisms of sewing machines, and intelligent sewing systems Explores adhesive bonding of textiles, including principles, methods and applications, along with a review of bonding requirements in coating and laminating of textiles

[Dielectric Metamaterials](#) Jun 01 2020 *Dielectric Metamaterials: Fundamentals, Designs and Applications* links fundamental Mie scattering theory with the latest dielectric metamaterial research, providing a valuable reference for new and experienced researchers in the field. The book begins with a historical, evolving overview of Mie scattering theory. Next, the authors describe how to apply Mie theory to analytically solve the scattering of electromagnetic waves by subwavelength particles. Later chapters focus on Mie resonator-based metamaterials, starting with microwaves where particles are much smaller than the free space wavelengths. In addition, several chapters focus on wave-front engineering using dielectric

metasurfaces and the nonlinear optical effects, spontaneous emission manipulation, active devices, and 3D effective media using dielectric metamaterials. Highlights a crucial link in fundamental Mie scattering theory with the latest dielectric metamaterial research spanning materials, design and applications Includes coverage of wave-front engineering and 3D metamaterials Provides computational codes for calculating and simulating Mie resonances

Silk Jan 27 2020 *Silk: Processing, Properties and Applications, Second Edition*, examines all aspects of silk technology, including its manufacture, processing, properties, structure-property relationships, dyeing, printing and finishing, and applications. This new edition is updated and expanded to include the very latest developments in silk production. Detailed chapters discuss silk reeling and silk fabric manufacture, the structural aspects of silk, its mechanical and thermal properties, and silk dyeing. Further chapters focus on the latest developments in terms of processing and applications, covering emerging topics, such as spider silks, non-mulberry silks, the printing and finishing of silk fabrics, and by-products of the silk industry. This book will be a highly valuable source of information for textile technologists, engineers and manufacturers, fiber scientists, researchers and academics in natural fibers or textile technology. Offers in-depth coverage of silk production, properties and structure-property relationships Provides an authoritative reference on sericulture, silk fabric processing and applications of silk Expanded to include non-mulberry silks, printing and finishing of silk fabrics, and by-products of sericulture

Nanomedicine Jun 25 2022 Nanotechnology is at the forefront of advances in medicine. *Nanomedicine: Technologies and applications* provides an important review of this exciting technology and its growing range of applications. After an

introduction to nanomedicine, part one discusses key materials and their properties, including nanocrystalline metals and alloys, nanoporous gold and hydroxyapatite coatings. Part two goes on to review nanomedicine for therapeutics and imaging, before nanomedicine for soft tissue engineering is discussed in part three, including organ regeneration, skin grafts, nanotubes and self-assembled nanomaterials. Finally, nanomedicine for bone and cartilage tissue engineering is the focus of part four, with electrically active biocomposites as smart scaffolds investigated, as is cartilage and bone tissue engineering, regeneration and replacement. With its distinguished editor and international team of expert contributors, *Nanomedicine: Technologies and applications* is an indispensable guide for all those involved in the research, development and application of this exciting technology, whilst providing a comprehensive introduction for students and academics interested in this field. Provides an important review of nanomedicine technology and its growing range of applications Discusses key nanomedicine materials and their properties, including nanocrystalline metals and alloys, nanoporous gold and hydroxyapatite coatings Reviews nanomedicine for therapeutics and imaging and nanomedicine for soft tissue engineering

Hydrometallurgy Sep 16 2021 This book is concerned with the theoretical principles of hydrometallurgical processes and engineering aspects. The hydrometallurgical processes of production of copper are discussed and leaching of chalcopyrite as the main sulphide mineral of copper processed in industry is used as an example. The book is suitable as a university textbook for students of metallurgy. Examines the different techniques involved Discusses the production of specific metals using hydrometallurgical processes Looks at the future of hydrometallurgy

Mems for Biomedical Applications Oct 06 2020 The application of Micro Electro Mechanical Systems (MEMS) in the biomedical field is leading to a new generation of medical devices. MEMS for biomedical applications reviews the wealth of recent research on fabrication technologies and applications of this exciting technology. The book is divided into four parts: Part one introduces the fundamentals of MEMS for biomedical applications, exploring the microfabrication of polymers and reviewing sensor and actuator mechanisms. Part two describes applications of MEMS for biomedical sensing and diagnostic applications. MEMS for in vivo sensing and electrical impedance spectroscopy are investigated, along with ultrasonic transducers, and lab-on-chip devices. MEMS for tissue engineering and clinical applications are the focus of part three, which considers cell culture and tissue scaffolding devices, BioMEMS for drug delivery and minimally invasive medical procedures. Finally, part four reviews emerging biomedical applications of MEMS, from implantable neuroprobes and ocular implants to cellular microinjection and hybrid MEMS. With its distinguished editors and international team of expert contributors, MEMS for biomedical applications provides an authoritative review for scientists and manufacturers involved in the design and development of medical devices as well as clinicians using this important technology. Reviews the wealth of recent research on fabrication technologies and applications of Micro Electro Mechanical Systems (MEMS) in the biomedical field Introduces the fundamentals of MEMS for biomedical applications, exploring the microfabrication of polymers and reviewing sensor and actuator mechanisms Considers MEMS for biomedical sensing and diagnostic applications, along with MEMS for in vivo sensing and electrical impedance spectroscopy

Textile Design Aug 04 2020 Textile design is a complex field of

practice which operates in a competitive, global industry. Designers need to take into account not only the design but also the manufacture, technological development and application of the final product. Textile design provides a broad overview of the fundamentals of and advances in textile design, as well as practical case studies of relevant industries. Part one covers the principles of fabric construction as applied to textile design, with chapters on fundamental principles, woven and knitted textile design. Part two discusses surface approaches to textile design, with chapters on such topics as surface design of textiles, printed and embroidered textile design, dyeing and finishing and the use of colour in textile design. Finally, part three focuses on the applications and advances in textile design, including chapters covering colour trend forecasting, sustainable textile design, fashion, interior and 2D to 3D design considerations and new developments in technical and future textiles. With its distinguished editors and international team of contributors, Textile design is an essential reference for design professionals in the textile and fashion industries, as well as those who specialise in interior textiles and academics with a research interest in the area. A broad overview of textile design covering fundamental topics such as principles of fibres and fabrics, knitted fabric design, through to the dyeing, finishing and printing aspects of textile design Explores the design aspects of technical textiles and future textiles An invaluable source of information on textile design and suitable for design professionals in the textile and fashion industries, as well as those in academia

Biocomposites for High-Performance Applications Jan 21 2022 Biocomposites for High-Performance Applications: Current Barriers and Future Needs Towards Industrial Development focuses on future research directions that will make

biocomposites a successful player in the field of high-strength structural applications. With contributions from eminent academic researchers and industrial experts who have first-hand experience on the advantages/disadvantages of biocomposites in their daily lives, the book examines the industrial development of biocomposite products, identifying the current barriers and their future industrial needs. Topics covered include: recent research activities from academia in the biocomposite research field, valuable thoughts and insights from biocomposite manufacturing industries, the strength and weaknesses of biocomposite products, and the practical issues that need to be addressed to reach the next level. Highlights the practical issues involved in biocomposites research. Contains contributions from eminent academic researchers and industrial experts. Discusses recent research activities from academia in the biocomposite research field, along with valuable thoughts and insights from biocomposite manufacturing industries.

The Cold Spray Materials Deposition Process Nov 06 2020 The cold spray process produces dense, low oxide coatings which can be used in such diverse applications as corrosion control and metals repair. It has emerged as an important alternative to thermal spray coating techniques in certain areas. This pioneering book reviews both the fundamentals of the process and how it can best be applied in practice. The first part of the book discusses the development of the process together with its advantages and disadvantages in comparison with thermal spray coating techniques. Part two reviews key process parameters such as powders, nozzle design, particle temperature and velocity, and particle/substrate interaction. It also describes portable and stationary cold spray systems. The final part of the book discusses how the cold spray process can be applied in such areas as improved wear, corrosion protection,

electromagnetic interference shielding and repair of damaged components. The cold spray materials deposition process is a standard reference on this important process and its industrial applications. Examines the fundamentals of the cold spraying process Assesses how the technique can best be applied in practice Describes portable and stationary cold spray systems

Physical Properties and Applications of Polymer

Nanocomposites May 01 2020 Polymer nanocomposites are polymer matrices reinforced with nano-scale fillers. This new class of composite materials has shown improved mechanical and physical properties. The latter include enhanced optical, electrical and dielectric properties. This important book begins by examining the characteristics of the main types of polymer nanocomposites, then reviews their diverse applications. Part one focuses on polymer/nanoparticle composites, their synthesis, optical properties and electrical conductivity. Part two describes the electrical, dielectric and thermal behaviour of polymer/nanoplatelet composites, whilst polymer/nanotube composites are the subject of Part three. The processing and industrial applications of these nanocomposite materials are discussed in Part four, including uses in fuel cells, bioimaging and sensors as well as the manufacture and applications of electrospun polymer nanocomposite fibers, nanostructured transition metal oxides, clay nanofiller/epoxy nanocomposites, hybrid epoxy-silica-rubber nanocomposites and other rubber-based nanocomposites. Polymer nanocomposites: Physical properties and applications is a valuable reference tool for both the research community and industry professionals wanting to learn about these materials and their applications in such areas as fuel cell, sensor and biomedical technology. Examines the characteristics of the main types of polymer nanocomposites and reviews their diverse applications Comprehensively assesses

polymer/nanoparticle composites exploring experimental techniques and data associated with the conductivity and dielectric characterization A specific section on polymer/nanotube composites features electrical and dielectric behaviour of polymer/carbon nanotube composites

Laser Additive Manufacturing Dec 28 2019 Laser Additive Manufacturing: Materials, Design, Technologies, and Applications provides the latest information on this highly efficient method of layer-based manufacturing using metals, plastics, or composite materials. The technology is particularly suitable for the production of complex components with high precision for a range of industries, including aerospace, automotive, and medical engineering. This book provides a comprehensive review of the technology and its range of applications. Part One looks at materials suitable for laser AM processes, with Part Two discussing design strategies for AM. Parts Three and Four review the most widely-used AM technique, powder bed fusion (PBF) and discuss other AM techniques, such as directed energy deposition, sheet lamination, jetting techniques, extrusion techniques, and vat photopolymerization. The final section explores the range of applications of laser AM. Provides a comprehensive one-volume overview of advances in laser additive manufacturing Presents detailed coverage of the latest techniques used for laser additive manufacturing Reviews both established and emerging areas of application