Electronic Textiles Smart Fabrics And Wearable Technology Woodhead Publishing Series In Textiles | d50d64e5870e2670ebd3513cdd10a0c3

Electronic Textiles Smart Fabrics And Wearable Technology Woodhead Publishing Series In Textiles

Smart Textiles Production Triboelectric Nanogenerators

Nanotechnology in Smart Textiles

We are on the cusp of a revolution, where the intersection of technology, the human body and everyday objects will become completely seamless. Smart textiles are a key part of this revolution. Smart Textiles for Designers introduces the different qualities and properties that can be embedded in, integrated with, and applied to fabrics and looks at the different contexts in which these smart textiles can be used, from healthcare to haute couture, firefighting to sportswear. A survey of specific fabrics grouped by properties provides a core reference section and a palette for the designer to work from. The book also examines five different design approaches and features interviews with leading designers and design teams, showing their processes and working methods. The first book to look at this exciting and quickly developing area of technology through the eyes of a designer, this is both a core reference work and an inspirational guide for students and professionals alike.

Beginning e-Textile Development

The integration of electronics into textiles and clothing has opened up an array of functions beyond those of conventional textiles. These novel materials are beginning to find applications in commercial products, in fields such as communication, healthcare, protection and wearable technology. Electronic Textiles: Smart Fabrics and Wearable Technology opens with an initiation to the area from the editor, Tilak Dias. Part One introduces conductive fibres, carbon nano-tubes and polymer yarns. Part Two discusses techniques for integrating textiles and electronics, including the design of textile-based sensors and actuators, and energy harvesting methods. Finally, Part Three covers a range of electronic textile applications, from wearable electronics to technical textiles featuring expert chapters on embroidered antennas for communication systems and wearable sensors for athletes. Comprehensive overview of conductive fibres, yarns and fabrics for electronic textiles Expert analysis of textile-based sensors design, integration of micro-electronics with yarns and photovoltaic energy harvesting for intelligent textiles Detailed coverage of applications in electronic textiles, including wearable sensors for athletes, embroidered antennas for communication and electronic textiles for military personnel

Electronic Textiles Wearables, Smart Textiles & Smart Apparel, the first book of its kind on the topic, is divided into two major themes, wearables that are part of the large textile family and those that are not. It provides a broad overview of topics, markets, applications, benefits, fears and technologies, also emphasizing the industrial economics and costs, etc. As the wearables market continues to grow, making inroads in classic clothing, luxury, medical and professional use, and in protection and accessories like sports bracelets, watches, glasses, fashion or sports shoes, etc., this book helps users understand the technology and its future in industry. Helps define which wearables are part of the textile family Presents both the negative and positive aspects of wearables Demonstrates the connection and intelligence of wearables

Electronic Textiles Electronic textiles (e-textiles) involves the combination of electronics and textiles to form "smart" textile products. It is an emerging technology with immense opportunities in the field of wearables fashion technology. And while there are many e-textile development platforms available on the market, this book uses the Wearic smart textile kit, a modular prototyping platform, to get you building projects and experiments easily and quickly. This book presents the essential skills required to get started developing e-textiles. The code presented is built using MakeCode blocks, an
easy-to-use visual programming language. You'll use the BBC micro:bit microcontroller for all the projects, and with few exceptions, they require no soldering and wiring. In the end, you'll be able to apply and sell electronics to wearables, garments, and fabrics in this emerging technology. Beginning e-Textile Development presents the essential components to get you started with developing e-textiles. What You'll Learn Program with the BBC micro:bit Add lights to your wearables using LED textiles Use different textile sensors to measure heat, detect water, actuate attachments, and enable sense touch and pressure Actuate attachments on wearables with muscle activity and heartbeat Make chemistry-based color-changing fabrics using thermochromic pigments Utilize Bluetooth Low Energy to send sensor data to mobile apps and WiFi to send sensor data to the ThingSpeak IoT analytics platform service Who This Book Is For Beginners to the e-textile industry seeking a comprehensive toolkit. Fashion designers, Makers, engineers, scientists, and students can all benefit from this book.


Smart Textiles for Protection Smart-textiles developers draw on diverse fields of knowledge to produce unique materials with enhanced properties and vast potential. Several disciplines outside the traditional textile area are involved in the construction of these smart textiles, and each individual field has its own language, specific terms and approaches. Multidisciplinary know-how for smart-textiles developers provides a filtered knowledge of these areas of expertise, explaining key expressions and demonstrating their relevance to the smart-textiles field. Following an introduction to the new enabling technologies, commercialisation and market trends that make up the future of smart-textiles development, part one reviews materials employed in the production of smart textiles. Types and processing of electro-conductive and semiconducting materials, optical fibres for smart photonic textiles, conductive nanofibres and nanocoatings, polymer-based resistive sensors, and soft capacitance fibres for touch-sensitive smart textiles are all discussed. Part two then investigates such technologies as the embedding of electronic functions, the integration of thin-film electronics, and the development of organic and large-area electronic (OLAE) technologies for smart textiles. Joining technologies are also discussed, alongside kinetic, thermoelectric and solar energy harvesting technologies, and signal processing technologies for activity-aware smart textiles. Finally, product development and applications are the focus of part three, which investigates strategies for technology management, innovation and improved sustainability, before the book concludes by exploring potential industrial, automotive and architectural applications of smart textiles. With its distinguished editor and international team of expert contributors, Multidisciplinary know-how for smart-textiles developers is a key tool for readers working in industries including design, fashion, textiles, through to electronics, computing and material science. It also provides a useful guide to the subject for academics working across a wide range of fields. Reviews materials used in the production of smart textiles Examines the technologies used in smart textiles, such as optical fibres and polymer based resistive sensors Investigates strategies for technology management, innovation and improved development

Multidisciplinary Know-How for Smart-Textiles Developers Active Coatings for Smart Textiles presents the latest information on active materials and their application to textiles in the form of coatings and finishes for the purpose of improving performance and creating active functional effects. This important book provides detailed coverage of smart coating types, processes, and applications. After an introduction to the topic, Part One introduces various types of smart and active coatings, including memory polymer coatings, durable and self-cleaning coatings, and breathable coatings. Technologies and related processes for the application of coatings to textiles is the focus of Part Two, with chapters devoted to microencapsulation technology, plasma surface treatments, and nanotechnology-based treatments. The book ends with a section on applications of smart textiles with responsive coatings, which are increasingly finding commercial niches in sportswear, protective clothing, medical textiles, and architecture. Introduces various types of smart and active coatings for textiles Covers technologies and application processes for the coating and finishing of textiles Reviews commercial applications of such coatings, including in sportswear, protective clothing, medical textiles and architecture

Flexible and Wearable Electronics for Smart Clothing Provides the state-of-the-art on wearable technology for smart clothing The book gives a coherent overview of recent development on flexible electronics for smart clothing with emphasis on wearable and durability of the materials and devices. It offers detailed information on the basic functional components of the flexible and wearable electronics including sensing, systems-on-a-chip, interacting, and energy, as well as the integrating and connecting of electronics into textile form. It also provides insights into the compatibility and integration of functional materials, electronics, and the clothing technology. Flexible and Wearable Electronics for Smart Clothing offers comprehensive coverage of the technology in four parts. The first part discusses wearable organic nano-sensors, stimuli-responsive electronic skins, and flexible thermoelectrics and thermoelectric textiles. The next part examines textile triboelectric nanogenerators for energy harvesting, flexible and wearable solar cells and supercapacitors, and flexible and wearable lithium-ion batteries. Thermost and humid management for next-generation textiles, functionalization of fiber
materials for washable smart wearable textiles, and flexible microfluidics for wearable electronics are covered in the next section. The last part introduces readers to piezoelectric materials and devices based flexible bio-integrated electronics, printed electronics for smart clothes, and the materials and processes for stretchable and wearable e-textile devices. Presenting the most recent developments in wearable technology such as wearable nanosensors, logic circuit, artificial intelligence, energy harvesting, and wireless communication. Covers the flexible and wearable electronics as essential functional components for smart clothing on-a-chip, interacting, energy to the integrating and connecting of electronics. Of high interest to a large and interdisciplinary target group, including materials scientists, textile chemists, and electronic engineers in academia and industry. Flexible and Wearable Electronics for Smart Clothing will appeal to materials scientists, textile industry professionals, textile engineers, electronics engineers, and sensor developers.

Advances in Smart Medical Textiles Electronics in Textiles and Clothing: Design, Products and Applications covers the fundamentals of electronics and their applications in textiles and clothing product development. The book emphasizes the interface between electronics and textile materials, detailing diverse approaches to functionalizing textiles and creating electronic devices that are wearable and functional. It explores ways to integrate textile materials with electronics for communicating/signal transferring applications. It also discusses wearable electronic products for industrial applications based on functional properties and end users in sectors such as defense, medicine, health monitoring, and security. The book details the application of wearable electronics and outlines the textile fibres used for wearable electronics. It includes coverage of different yarn types and fabric production techniques and modifications needed on conventional machines for developing fabrics using specialty yarns. The coverage includes problems faced during the production processes and their solutions. Novel sensors, specialty yarns, Body Sensor Networks (BSN), and the development of flexible solar tents used for power generation round out the coverage. The book then concludes with discussions of the development of fabric-integrated wearable electronic products for use in mobile healthcare systems, smart cloth for ambulatory remote monitoring, electronic jerkin, heating gloves, and pneumatic gloves. Based mainly on the authors’ projects and field work, the book takes a practical approach to the issues involved in designing electronic circuits and their possibilities for signals, giving you an understanding of problems that can occur when executing the work. It also describes the future scope of e-textiles using conductive materials for medical, healthcare textile product development, and safety aspects. The text provides guidelines for the development of wearable textiles, giving a new meaning to the term human-machine symbiosis in the context of pervasive/invisible computing.

Advanced Textile Testing Techniques The research field of smart textiles is currently witnessing a rapidly growing number of applications integrating intelligent functions in textile substrates. With an increasing amount of new developed product prototypes, the number of materials used and that of specially designed production technologies are also growing. This book is intended to provide an overview of materials, production technologies, and product concepts for different groups concerned with smart textiles. It will help designers to understand the possibilities of smart textile production, so that they are enabled to design this type of products. It will also help textile and electronics manufacturers to understand which production technologies are suitable to meet certain product requirements. After an introduction to smart textiles and their market relevance, different material types for functional textiles are described along with their properties, application areas, and product examples. Special attention is given to materials for the realization of electrical conductivity in textiles, as these are crucial for the following overview on sensor and production technologies. Next, textile-based sensors are introduced. While numerous textile-based sensors, ranging from sensing fibers to coatings and three-dimensional structures, have been developed, their specific properties and usage are not clear. Bosowski et al. have suggested a structure for a classified catalogue as knowledge basis to support the smart textile product development process. This chapter develops the classification further and implements it in a catalogue to be used by practitioners from research and industry when developing new textile materials with sensing capabilities. The full catalogue is reported in the appendix. The third part of the book starts by describing the state of the art of research on production technologies for the integration of conductive materials into textile substrates, which include weaving, knitting, embroidery, printing, without mentioning specific products. Different variants of each technology are presented. Additionally, associated technologies to integrate electronic components in textile substrates are outlined. This part closes by reporting the current state of research on automated production systems for electronics integration into textiles. In the last part of the book, product and design concepts for smart textiles are evaluated along the example of touchpads.

Smart Clothes and Wearable Technology Smart textiles are materials and structures that sense and react to environmental conditions or stimuli, and their integration into protective clothing has led to the development of products with greatly enhanced protective capabilities in hazardous situations. Smart textiles for protection provide a comprehensive analysis of smart materials used in producing protective textiles, and explores a wide range of end-use protective applications. Part one reviews smart materials and technologies. Beginning with an overview of smart textiles for protection, this section goes on to discuss types of materials, surface treatments and the use of nanofibres and smart barrier membranes. The application of sensors, actuators and computer systems in smart protective textiles is explored, followed by a review of biomimetic approaches to design. Part two investigates specific applications of smart textiles for protection. Smart technology for personal protective equipment and clothing, smart protective textiles for older people and smart high-performance textiles for protection in construction and geotechnical applications are all discussed in depth, as is the use of smart textiles in the protection of armoured vehicles and in protective clothing for fire fighters and first responders. The final chapter describes recent advances in
chemical and biological protective clothing. With its distinguished editor and international team of expert contributors, Smart textiles for protection is an essential guide for all those involved in the design, development and application of protective smart textiles. Provides a comprehensive analysis of smart materials used in producing protective textiles, and explores a wide range of end-use protective applications Discusses types of materials, surface treatments and the use of nanofibres and smart barrier membranes as well as the application of sensors, actuators and computer systems in smart protective textiles Investigates specific applications of smart textiles for protection, including smart high-performance textiles for protection in construction and geotechnical applications

Smart and Functional Soft Materials This book presents a global view of the development and applications of technical textiles with the description of materials, structures, properties, characterizations, functions and relevant production technologies, case studies, challenges, and opportunities. Technical textile is a transformative research area, dealing with the creation and studies of new generations of textiles that hoist many new scientific and technological challenges that have never been encountered before. The book emphasizes more on the principles of textile science and technology to provide solutions to several engineering problems. All chapter topics are exclusive and selectively chosen and designed, and they are extensively explored by different authors having specific knowledge in each area.

Wearable Electronics and Photonics Integrating electronics into clothing is a major new concept, which opens up a whole array of multi-functional, wearable electro-textiles for sensing/monitoring body functions, delivering communication facilities, data transfer, individual environment control, and many other applications. With revolutionary advancements occurring at an unprecedented rate in many fields of science and electronics the possibilities offered by wearable technologies are tremendous and widespread. These advancements will transform the world and will soon begin to permeate into commercial products. The first section of the book discusses the materials and devices used in the field, including electro-statically generated nanofibres, electroceramic fibres and composites and electroactive fabrics. It summarizes recent developments in electrically conductive fabric structures and puts together a few theoretical treatments of the electro-mechanical properties of various fabric structures. The next section reviews topics related to wearable photonics such as fibre optic sensors and integrated smart textile structures, the developments in various flexible photonic display technologies as well as looking at current communication apparel and optical fibre fabric displays. Next the book focuses on integrated structures and system architectures. Finally the issues facing a fashion designer working with wearables are explored. Wearable electronics and photonics covers many aspects of the cutting-edge research and development into this exciting field and provides a window through which only a small portion of the exciting emerging technology can be seen. With contributions from a panel of international experts in the field this is an essential guide for all electrical, textile and biomedical engineers as well as academics and fashion designers. Stay one step ahead of the industry on this hot topic Evaluates the major new concept of integrating electronics into clothing Explores future trends for fashion and specialist clothing

Designing with Smart Textiles From a holistic perspective, this handbook explores the design, development and production of smart textiles and textile electronics, breaking with the traditional silo-structure of smart textile research and development. Leading experts from different domains including textile production, electrical engineering, interaction design and human-computer interaction (HCI) address production processes in their entirety by exploring important concepts and topics like textile manufacturing, sensor and actuator development for textiles, the integration of electronics into textiles and the interaction with textiles. In addition, different application scenarios, where smart textiles play a key role, are presented too. Smart Textiles would be an ideal resource for researchers, designers and academics who are interested in understanding the overall process in creating viable smart textiles.

Wearables, Smart Textiles & Smart Apparel During the past 100 years, a large number of new materials have been developed, which provide us with various tools, wares, clothes, etc. with good properties but low weight and low cost. Recently, smart soft materials that can respond to an external stimulus (such as an electric field, magnetic field, sound, light, temperature, pH, and so on) as well as functional soft materials that are electronically, magnetically, or thermally conductive have attracted considerable attention. They have application potentials in various fields. To some extent, they are the way to fulfill most of the “black technology” described in the world of science fiction. This book introduces several smart soft materials and functional soft materials, which are of interest to scholars in related fields. Smart Textiles Electronic textiles, also known as smart garments, smart clothing, smart textiles, or smart fabrics, are fabrics that enable digital components, and electronics to be embedded in them. Smart textiles are fabrics that have been developed with new technologies that provide added value to the wearer. E-textiles are an exciting, new ?eld of electronics that combines embedded electronics with fabric and textiles. These wearable electronics are gaining lots of attention and are becoming more accessible to the non-technical crowd by the day. Smart textiles can be broken into two di?erent categories: aesthetic and performance enhancing. Aesthetic examples include everything from fabrics that light up to fabrics that can change color. Some of these fabrics gather energy from the environment by harnessing vibrations, sound or heat, reacting to this input. Then there are performance enhancing smart textiles, which will have a huge impact on the athletic, extreme sports and military industries. There are fabrics that help regulate body temperature,
reduce wind resistance and control muscle vibration all of which help improve athletic performance. In general, the development of electronic textiles supports the idea of wearable computing, or electronic devices worked into garment designs. However, there are other applications of electronic textiles, such as interior design technologies, that also rely on integrating electronic components into fabrics or yers. Within the relatively new industry around electronic textiles, projects are pursued based on various different kinds of functionality. Some electronic textile products may only be built for data storage, while others provide physical interfaces through control elements in the garment design. Although the practical applications of this technology are very new, some projects involving electronic textiles and intelligent garments do exist now. Many of these are aimed at uses within the health care industry, where wearable computing elements can be used to monitor vital signs and otherwise track a persons health in real time. This book, Electronic Textiles, emphasizes on the novelty and usages of smart garments or fabrics in numerous ?elds.

Electronically Active Textiles Textile testing is an important field of textile sciences involving experimental evaluation of conventional as well as technical textile products. This book aims to provide technical details, required protocols and procedures for conducting any specific evaluation test along with key parameters. The book is divided into two main sections. The first section focuses on the testing techniques starting from fiber to final product while the second one focuses on testing of technical textiles. Written with a reader friendly approach, it will cater to graduate students in textile engineering as well as industry personnel, focusing on following key points: Addresses all techniques for testing both conventional and technical textiles. Describes testing techniques compliance with the latest requirements of the updated EN ISO and AATCC standards. Provides detailed description on the testing of technical textiles and their products. Discusses the operations conditions, like atmospheric conditions, and human error with cause and effect diagrams. Covers both destructive and non-destructive testing.

Smart Textiles for Designers Smart coatings can produce coatings that offer above and beyond the normal functions of a coating, these range from improving the performance of fabrics, producing new forms of materials to providing decoration. This book reviews a variety of topics about textile coatings and laminates and aims to provide a stimulus for developing new and improved textile products. The first part of the book introduces the fundamentals of textile coatings and laminates, addressing general areas such as coating and laminating processes and techniques, as well as base fabrics and their interaction in coated fabrics. Part two discusses different types of smart and intelligent coatings and laminates for textiles. Topics include microencapsulation technology, conductive coatings, breathable coatings and phase change materials and their application in textiles. With its highly distinguished editor and array of international contributors, Smart textile coatings and laminates is a valuable reference book for chemists, textile technologists, fibre scientists, textile engineers and all those wishing to improve and understand the developments in textile coating and laminating technology. It will also be suitable for researchers in industry or academia. Reviews a number of issues surrounding textile coatings and laminates Discusses the fundamentals of textile coatings and laminates addressing processes and techniques Examines types of smart and intelligent coatings and laminates for textiles, including microencapsulation technology, conductive and breathable coatings.

The Types, Properties, and Applications of Conductive Textiles This book was written by authors in the field of preparation of advanced functional materials and their wide-ranging applications. The topics in the book include: preparation of several advanced functional materials, and their applications in sensors, health, concrete, textile, glasses, and pharmacy. In this book, the authors focused on recent studies, applications, and new technological developments in fundamental properties of advanced functional materials.

Smart Textiles and Their Applications Advances in Smart Medical Textiles: Treatments and Health Monitoring provides comprehensive coverage on smart textiles, the emerging and important materials that are finding applications in the fields of medicine and healthcare. The book explores the range of smart textiles available for use in medicine and the transfer of these innovative technologies into medical applications. Early chapters survey various smart fibers, fabrics, and finishes, while subsequent sections focus on the role of smart textiles in treating patients, from wound care to rehabilitation, and the use of textile-based sensors and wearable electronics for monitoring patient health. Provides a comprehensive review of the materials used in smart medical textiles Analyzes the application of these textiles in medical treatments and sensors for health monitoring Covers the range of international research in the field and keeps focus on the needs of the textile industry.

e-Textiles The “Handbook of Smart Textiles” aims to provide a comprehensive overview in the field of smart textile describing the state of the art in the research sector as well as the well-established techniques applied in industries. The handbook is planned to cover from fundamental theories, experimental techniques, characterization methods, as well as real applications with successful commercialized examples. The book is structured in a way in which it is appropriate for graduate students, PhD candidates, and professionals in diverse scientific and engineering communities devoted to relevant fields, including textile engineering, chemistry, bioengineering, material engineering, mechanical engineering, electrical engineering. The book will also provide a solid reference for industrial players who look for innovative technologies as well as environmental, safety concerns for the development of smart textile related products.

Page 5/9
Handbook of Smart Textiles The sensing, adapting, responding, multifunctionality, low energy, small size and weight, ease of forming, and low-cost attributes of smart textiles and their multidisciplinary scope offer numerous end uses in medical, sports and fitness, military, fashion, automotive, aerospace, the built environment, and energy industries. The research and development on these new and high-value materials cross scientific boundaries, redefine material science design and engineering, and enhance quality of life and our environment. "Novel Smart Textiles" is a focused Special Issue that reports the latest research of this field and facilitates dissemination, networking, discussion, and debate.

Active Coatings for Smart Textile-Based Energy Harvesting and Storage Devices for Wearable Electronics Discover state-of-the-art developments in textile-based wearable and stretchable electronics from leaders in the field In Textile-Based Energy Harvesting and Storage Devices for Wearable Electronics, renowned researchers Professor Xing Fan and his co-authors deliver an insightful and rigorous exploration of textile-based energy harvesting and storage systems. The book covers the principles of smart fibers and fabrics, as well as their fabrication methods. It introduces, in detail, several fiber- and fabric-based energy harvesting and storage devices, including photovoltaics, piezoelectric, triboelectric, supercapacitors, batteries, and sensors and self-powered electronic fabrics. The authors also discuss expanded applications of smart fabrics, like stretchable electronics, hydrophobicity, air permeability, and color-changeability. The book includes sections on emerging electronic fibers and textiles, including stress-sensing, strain-sensing, and chemical-sensing textiles, as well as emerging self-powered electronic textiles. Textile-Based Energy Harvesting and Storage Devices for Wearable Electronics concludes with an in-depth treatment of upcoming challenges, opportunities, and commercialization requirements for electronic textiles, providing valuable insight into a highly lucrative new commercial sector. The book also offers: A thorough introduction to the evolution from classical functional fibers to intelligent fibers and textiles An exploration of typical film deposition technologies, like dry-process film deposition and wet-process technologies for roll-to-roll device fabrication Practical discussions of the fabrication process of intelligent fibers and textiles, including the synthesis of classical functional fibers and nano/micro assembly on fiber materials In-depth examinations of energy harvesting and energy storage fibers, including photovoltaic, piezoelectric, and supercapacitor fibers Perfect for materials scientists, engineering scientists, and sensor developers, Textile-Based Energy Harvesting and Storage Devices for Wearable Electronics is also an indispensable resource for electrical engineers and professionals in the sensor industry seeking a one-stop reference for fiber- and fabric-based energy harvesting and storage systems for wearable and stretchable power sources.

Smart Textile Coatings and Laminates Fibres to Smart Textiles: Advances in Manufacturing, Technologies, and Applications offers comprehensive coverage of the fundamentals and advances in the textile and clothing manufacturing sectors. It describes the basics of fibres, yarns, and fabrics and their end use in the latest developments and applications in the field and addresses environmental impacts from textile processes and how to minimize them. This book serves as a single comprehensive source discussing textile fibres, yarn formation, filament formation techniques, woven fabric formation, knitting technologies, nonwoven manufacturing technologies, and dyeing, printing, and finishing processes. Testing of textile materials, environmental impacts of textile processes and use of CAD and CAM in designing textile products are also included. The book also discusses applications including textile composites and biocomposites, technical textiles, smart textiles, and nanotextiles. With chapters authored by textile experts, this practical book offers guidance to professionals in textile and clothing manufacturing and shows how to avoid potential pitfalls in product development.

Electronic Textiles The integration of electronics into textiles and clothing has opened up an array of functions beyond those of conventional textiles. These novel materials are beginning to find applications in commercial products, in fields such as communication, healthcare, protection, and wearable technology. Electronic Textiles: Smart Fabrics and Wearable Technology opens with an introduction to the area from the editor, Tilak Dias. Part One introduces conductive fibres, carbon nano-tubes and polymer yarns. Part Two discusses techniques for integrating textiles and electronics, including the design of textile-based sensors and actuators, and energy harvesting methods. Finally, Part Three covers a range of electronic textile applications, from wearable electronics to technical textiles featuring expert chapters on embroidered antennas for communication systems and wearable sensors for athletes. Comprehensive overview of conductive fibres, yarns and fabrics for electronic textiles Expert analysis of textile-based sensors design, integration of micro-electronics with yarns and photovoltaic energy harvesting for intelligent textiles Detailed coverage of applications in electronic textiles, including wearable sensors for athletes, embroidered antennas for communication and electronic textiles for military personnel

Fibres to Smart Textiles “This essential guidebook will teach librarians all they need to know about the tools, supplies, techniques, and science behind e-textiles and how to design successful collections and programs around this hot new topic”--

Advanced Functional Materials If you want to understand, and be a part of, the creative revolution in materials design, then Designing with Smart Textiles is the complete toolkit you need to get started. Beginning by introducing the terminology and key applications, the book goes on to examine the key design processes needed to develop interactive textile design concepts, with detailed projects and examples to help you apply these approaches in your own practice. Case studies and interviews with innovative designers introduce you to different artistic and technological practices, and demonstrate how world-leading researchers are creating new technologies, yarns, fabrics, and applications. Practitioners share unique insights into their processes, and “Tech Tips” so you can build on their research in your own work. Featured designers include: Yemi Awosile, Joanna Berzowska, Lauren Bowker, Marina Castan, Cute
Novel Smart Textiles

Smart clothes and wearable technology is a relatively novel and emerging area of interdisciplinary research within the fashion, textile, electronics and related industries. This book provides a comprehensive review of the end-user’s requirements and the technologies and materials available for the design and production of smart clothing. Part one looks at the design of smart clothing and wearable technology including the emergence of wearable computing, end-user requirements, and the design process from fibre selection to product launch. Part two examines the general requirements for merging of a range of textile structures with technology and communications for wearable technologies. Part three reviews the types of production technologies available for the development of smart clothing, including garment construction and fabric joining, and the final part discusses the application of these new technologies in smart clothing products and their presentation to consumers. Smart clothes and wearable technology is a unique and essential reference source for researchers, designers and engineers developing textiles and clothing products in this cross-disciplinary area. It is also beneficial for those in the healthcare industry and academics researching textiles, fashion and design. Examines this emerging area of textile research including a brief history and industry overview Assesses the technologies and materials available for the design and production of smart clothing Summarises

Narrow and Smart Textiles

Nanotechnology in Smart Textiles considers various aspects of nanotechnology including an extensive overview of nanotechnology and related issues. It includes a historical review of the development of electronic textiles, smart textiles and nano-technology, wearable e-textile technologies: a review on sensors, actuators and control elements, textile-based flexible coils for wireless inductive power transmission. Provides the reader with insights into the development of its history, so as to understand the new textile sensors for in situ structural health monitoring of textile reinforced thermoplastic composites based on the conductive poly(3,4-ethylenedioxythiophene)-poly(styrenesulfonate) polymer complex and recent advances in soft e-textiles.

E-textiles in Libraries

This important book provides a guide to the fundamentals and latest developments in smart technology for textiles and clothing. The contributors represent a distinguished international panel of experts and the book covers many aspects of cutting edge research and development. Smart fibres, fabrics and clothing technologies start with a review of the background to smart technology and goes on to cover a wide range of the material science and fibre science aspects of the technology including: Electrically active polymeric materials and the applications of nonionic polymer gel and elastomers for artificial muscles; Thermally sensitive fibres and fabrics; Cross-linked polyol fibrous substrates stimuli-responsive interpenetrating polymer network hydrogel; Permeation control through stimuli-responsive polymer membranes; optical fibre sensors, hollow fibre membranes for gas separation; integrating fibre-formed components into textile structures; Wearable electronic and photonic technologies; Adaptive and responsive textile structures (ARTS); Biomedical applications including the applications of scaffolds in tissue engineering It is essential reading for academics in textile and materials science departments, researchers, designers and engineers in the textiles and clothing product design field. Product managers and senior executives within textile and clothing manufacturing will also find the latest insights into technological developments in the field valuable and fascinating.

Chemical Engineering

Design Smart or intelligent textiles are a relatively novel area of research within the textile industry with enormous potential within the healthcare industry. This book provides a unique insight into recent developments in how smart textiles are being used in the medical field. The first part of the book assesses trends in smart medical textiles. Chapters cover topics such as wound care materials, drug-based release systems and electronic sensors for health care. The second part of the book discusses the role of smart textile in monitoring the health of particular groups such as pregnant women, children and those with particular physical disabilities. With its distinguished editor and team of international contributors, this book provides a unique and essential reference to those concerned with intelligent textiles in healthcare.

Electronics in Textiles and Clothing

Nanotechnology has been incorporated into a wide range of garments to improve the durability of clothing / apparel and create new properties for a special end-used application. It also incorporates wearable electronics into clothing to make it smarter. Smart nano-textiles refers to the uses and integration of smart nanocoatings, nanosensors and nanodevices in multifunctional textiles, since they are both low cost and have low power consumption. Various organic and inorganic nanomaterials can be used in garments to improve their properties and create new properties such as anti-bacterial, superhydrophobic, auto-cleaning, self-cleaning, stain repellent, wrinkle-free, static eliminating, fire resistant and electrically conductive properties. The book focuses on the fundamentals, properties, applications and potential of integrated multisensory soft e-textiles. It also incorporates wearable electronics into clothing to make it smarter. Smart nano-textiles refers to the uses and integration of smart nanocoatings, nanosensors and nanodevices in multifunctional textiles, since they are both low cost and have low power consumption. Various organic and inorganic nanomaterials can be used in garments to improve their properties and create new properties such as anti-bacterial, superhydrophobic, auto-cleaning, self-cleaning, stain repellent, wrinkle-free, static eliminating, fire resistant and electrically conductive properties. The book focuses on the fundamentals, properties, applications and potential of integrated multisensory soft e-textiles. It also incorporates wearable electronics into clothing to make it smarter. Smart nano-textiles refers to the uses and integration of smart nanocoatings, nanosensors and nanodevices in multifunctional textiles, since they are both low cost and have low power consumption. Various organic and inorganic nanomaterials can be used in garments to improve their properties and create new properties such as anti-bacterial, superhydrophobic, auto-cleaning. Explores which nanomaterial types are most compatible with particular textile classes. Assesses the major challenges of integrating nanosensors and nanodevices into textiles.
requirements for smart textiles from both health and performance perspectives

Smart Textiles for Medicine and Healthcare The book presents the latest developments in narrow fabrics and smart materials from research institutions, machinery building companies and producers of such products, presented during the International Week of Narrow and Smart Textiles in Spring 2018 in Mönchengladbach, Germany. It also demonstrates different applications of braided and woven narrow products are produced using completely different techniques, but have a lot of similarities in their applications - they are used as belts, ropes and tubes in areas ranging from medical textiles, cables, technical and home applications to large-scale transport belts and long tubes for transporting oil from the bottom of the ocean.

Textile-Based Energy Harvesting and Storage Devices for Wearable Electronics This book examines the physical testing of textiles in the form of fibre, yarn and fabric, the emphasis throughout being on standard and reproducible tests. After an introductory explanation of sampling and measurement, the author explores the effects of moisture on textiles, then goes on to discuss fibre dimension, yarn tests for linear density, twist, evenness and hairiness, tensile strength and dimensional stability and serviceability. Also covered are aspects of comfort and fabric handle, colour fastness and quality assurance. The book’s comprehensive coverage of the physical properties of textiles makes it an essential reference for managers in the textiles industry concerned with quality assurance, garment and fabric technologists, and students of textile science and engineering.

Printed Electronics Electronically Active Textiles (e-textiles) are a type of textile material that has some form of electronic functionality. This can be achieved by attaching electronics onto the surface of the textile, incorporating electronic components as part of the fabrication of the textile itself, or by integrating electronics into the yarns or fibers that comprises the textile. The addition of electronic components can give textiles a wide range of new functions from lighting or heating to advanced sensing capabilities. As such, e-textiles have provided a platform for developing a range of new novel products in fields, such as healthcare, sports, protection, transport, and communications. The purpose of this volume is to report on the advances in the integration of electronics into textiles, and presents original research in the field of e-textiles as well as a comprehensive review of the evolution of e-Textiles. Topics include the fabrication and illumination of e-textiles and the use of e-textiles for temperature sensing.

Physical Testing of Textiles 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

Textiles for Advanced Applications This book introduces an innovative and high-efficiency technology for mechanical energy harvesting. The book covers the history and development of triboelectric nanogenerators, basic structures, working principles, performance characterization, and potential applications. It is divided into three parts: Part A illustrates the fundamental working modes of triboelectric nanogenerators with their prototype structures and theoretical analysis; Part B and Part C introduce two categories of applications, namely self-powered systems and self-powered active sensors. The book will be an ideal guide to scientists and engineers beginning to study triboelectric nanogenerators or wishing to deepen their knowledge of the field. Readers will be able to place the technical details about this technology in context, and acquire the necessary skills to reproduce the experimental setups for fabrication and measurement.

Nanosensors and Nanodevices for Smart Multifunctional Textiles This book provides basic knowledge about the principles, roles, types and evaluation methods of antistatic and conductive textile materials, which are used for protection against charge dissipation, incendiary discharge, intense electrostatic fields and electromagnetic interference (EMI). It also discusses the basic properties of different types of conductive fibers and filaments and the manufacturing processes of conductive textile products. Although such materials are typically produced as shields against charge dissipation and EMI, they are also used in other special applications, such as sensors, antennas, flexible heaters, and specialized apparel. The book will be useful for students, pedagogues and other academics. It will also be of interest to the general reader who wants to expand their knowledge of the applications and properties of conductive textiles.