

Stab Resistance Of Shear Thickening Fluid Stf Kevlar

Presented in an accessible and introductory manner, this is the first book devoted to the comprehensive study of colloidal suspensions.

Advanced Fibrous Composite Materials for Ballistic Protection provides the latest information on ballistic protection, a topic that remains an important issue in modern times due to ever increasing threats coming from regional conflicts, terrorism, and anti-social behavior. The basic requirements for ballistic protection equipment are first and foremost, the prevention of a projectile from perforating, the reduction of blunt trauma to the human body caused by ballistic impact, the necessity that they are thermal and provide moisture comfort, and that they are lightweight and flexible to guarantee wearer's mobility.

The main aim of this book is to present some of the most recent developments in the design and engineering of woven fabrics and their use as layering materials to form composite structures for ballistic personal protection. Chapter topics include High Performance Ballistic Fibres, Ultra-High Molecular Weight Polyethylene (UHMWPE), Ballistic Damage of Hybrid Composite Materials, Analysis of Ballistic Fabrics and Layered Composite Materials, and Multi-Scale Modeling of Polymeric Composite Materials for Ballistic Protection.

Contributions from leading experts in the field Cutting edge developments on the engineering of ballistic materials Comprehensive analysis of the development and uses of advanced fibrous composite materials

This book presents select proceedings of the International Conference on Future Learning Aspects of Mechanical Engineering (FLAME 2020). The book focuses on latest research in mechanical engineering design and covers topics

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such as computational mechanics, finite element modeling, computer aided engineering and analysis, fracture mechanics, and vibration. The book brings together different aspects of engineering design and the contents will be useful for researchers and professionals working in this field.

High-Performance Apparel: Materials, Development, and Applications covers the materials and techniques used in creating high-performance apparel, the technical aspects of developing high-performance garments, and an array of applications for high-performance clothing and wearable technology. Part One covers fabric construction for high-performance garments, from fiber types and spinning methods, to weaving, knitting, finishing, and joining techniques. Development of high-performance apparel is covered in Part Two, with particular emphasis on design and product development for function and wearer comfort. Part Three covers a range of applications and wearable technology that make use of high-performance apparel, including chapters on sportswear, protective clothing, and medical, military, and intelligent textiles. The book provides an excellent resource for all those engaged in garment development and production, and for academics engaged in research into apparel technology and textile science. Offers a range of perspectives on high-performance apparel from an international team of authors with diverse expertise Provides systematic and comprehensive coverage of the topic from fabric construction, through apparel design and development, to the range of current and potential applications Presents an excellent resource for all those engaged in garment development and production, and for academics engaged in research

The volume is a collection of best selected research papers presented at the 4th International Conference on Inventive Material Science Applications (ICIMA 2021) organized by

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PPG Institute of Technology, Coimbatore, India during 14 – 15 May 2021. The book includes original research by material science researchers towards developing a compact and efficient functional elements and structures for micro, nano and optoelectronic applications. The book covers important topics like nanomaterials and devices, optoelectronics, sustainable electronic materials, nanocomposites and nanostructures, hybrid electronic materials, medical electronics, computational material science, wearable electronic devices and models, and optical/nano-sensors. Functional finishes for textiles reviews the most important fabric finishes in the textile industry. It discusses finishes designed to improve the comfort and other properties of fabrics, as well as finishes which protect the fabric or the wearer. Each chapter reviews the role of a finish, the mechanisms and chemistry behind the finish, types of finish and their methods of application, application to particular textiles, testing and future trends. Describes finishes to improve comfort, performance, and protection of fabric or the wearer Examines the mechanisms and chemistry behind different types of finishes and their methods of application, testing and future trends Considers environmental issues concerning functional finishes

Textiles for military uniforms face a complex set of challenges. They must provide protection, durability and comfort in a wide range of hostile environments. Military textiles reviews the range of recent research on how military clothing can best meet soldiers' needs. The first part of the book reviews general requirements of military textiles, including damage resistance, comfort, sweat management, cold-weather conditions and the integration of high-tech materials into uniforms. Part II concentrates on the protective role of military textiles, covering such areas as high-performance ballistic fibres, textiles for chemical and

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biological protection, camouflage materials and military fabrics for flame protection. The book also reviews the use of non-woven fabrics and new coatings for military applications. With its distinguished editor and international team of contributors, Military textiles is a valuable reference for those researching and manufacturing military textiles, as well as those interested in the wider area of textiles for protection. Reviews the range of recent research on how military clothing can best meet soldier's needs Examines damage resistance, sweat management and comfort Discusses the protective role of military textiles

Textile manufacturing is an important subject in textile programs and processing industries. The introduction of manmade and synthetic fibers, such as polyester, nylon, acrylic, cellulose, and Kevlar, among others, has greatly expanded the variety of textile products available today. In addition, new fiber development has brought about new machines for producing yarns, fabrics, and garments. Textile Manufacturing Processes is a collection of academic and research work in the field of textile manufacturing. Written by experts, chapters cover topics such as yarn manufacturing, fabric manufacturing, and garment and technical textiles. This book is useful for students, industry workers, and anyone interested in learning the fundamentals of textile manufacturing.

A novel approach has been introduced in making flexible armor composites. Armor composites are usually made by reinforcing Kevlar fabric into the mixture of a polymer and nanoscale particles. The current procedure deviates from the traditional shear thickening fluid (STF) route and instead uses silane (amino-propyl-trimethoxy silane) as the base polymer. In addition, a cross-linking fixative such as Glutaraldehyde (Gluta) is added to the polymer

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to create bridges between distant pairs of amine groups present in Kevlar and silated nanoparticles. Water, silane, nanoparticles and Gluta are mixed using a homogenizer and an ultra-sonochemical technique. Subsequently, the admixture is impregnated with Kevlar - bypassing the heating and evaporating processes involved with STF. The resulting composites have shown remarkable improvement in spike resistance; at least one order higher than that of STF/Kevlar composites. The source of improvement has been traced to the formation of secondary amine C-N stretch due to the presence of Gluta.

Advances in Nanocomposites - Synthesis, Characterization and Industrial Applications was conceived as a comprehensive reference volume on various aspects of functional nanocomposites for engineering technologies. The term functional nanocomposites signifies a wide area of polymer/material science and engineering, involving the design, synthesis and study of nanocomposites of increasing structural sophistication and complexity useful for a wide range of chemical, physicochemical and biological/biomedical processes. "Emerging technologies" are also broadly understood to include new technological developments, beginning at the forefront of conventional industrial practices and extending into anticipated and speculative industries of the future. The scope of the present book on nanocomposites and applications extends far beyond emerging technologies. This book presents 40 chapters organized in four parts systematically providing a wealth

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of new ideas in design, synthesis and study of sophisticated nanocomposite structures.

Volume is indexed by Thomson Reuters CPCI-S (WoS). This collection of 301 peer-reviewed papers reflects a meeting of academic research and industry applications, the sharing of R&D experience and the discussion of innovative achievements in the field of materials and manufacturing. It will not only furnish readers with a broad overview of the latest advances, but also provide a valuable summary and reference work for researchers in this field.

Smart textiles are the textiles that are sensitive to any environmental conditions and can respond accordingly. Using passive and active coatings to generate high sensitivity to textiles is among the most recent research trends by engineers around the World. This has resulted in expansion in the application of smart textiles in various industrial fields including medicals, electronics and protective clothing. The aim of this special issue is to introduce the most state-of-the-art research and review articles by distinguished researchers in the field of smart coatings on textiles. The guest editor hopes that content will be useful for researchers, students and companies for continuation of research and development with the concept of smart textiles.

Nanomaterials-Based Coatings: Fundamentals and Applications presents the fundamental concepts and applications of nanomaterial-based coatings in anticorrosion, antiwear, antibacterial, antifungal, self-cleaning, superhydrophobic, super hard, super heat resistance, solar reflective, photocatalytic and radar

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absorbing coatings. It is an important resource for those seeking to understand the underlying phenomenal and fundamental mechanisms through which nanoparticles interact with polymeric and metallic matrices to create stronger coatings. As nanomaterials-enforced coatings are smarter, stronger and more durable, the information listed in this book will helps readers understand their usage and further applications. Highlights the latest methods in design, preparation and characterization techniques for nanomaterials-based coatings Discusses emerging applications of nanomaterials-based coatings, including substrates protection, sustainable energy, and in the environment and healthcare Assesses the major challenges in making nanomaterials-based coatings more reliable and cost-effective

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

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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

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.

The first edition of Handbook of Technical Textiles has been an essential purchase for professionals and researchers in this area since its publication in 2000. With revised and updated coverage, including several new chapters, this revised two volume second edition reviews recent developments and new technologies across the field of technical textiles. Volume 2 – Technical Textile Applications offers an indispensable

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guide to established and developing areas in the use of technical textiles. The areas covered include textiles for personal protection and welfare, such as those designed for ballistic protection, personal thermal and fire protection, and medical applications; textiles for industrial, transport and engineering applications, including composite reinforcement and filtration; and the growing area of smart textiles. Comprehensive handbook for all aspects of technical textiles Provides updated, detailed coverage of processes, fabric structure, and applications Ideal resource for those interested in high-performance textiles, textile processes, textile processing, and textile applications Many of the original, recognized experts from the first edition update their respective chapters

The stab resistance of shear thickening fluid (STF)-Kevlar and STF-Nylon fabric composites are investigated and found to exhibit significant improvements over neat fabric targets of equivalent areal density. Specifically, dramatic improvements in puncture resistance (spike threat) are observed under high and low speed loading conditions, while slight increases in cut protection are also observed. These results, combined with improvements in ballistic properties reported in earlier studies (Lee et al., 2002, Lee et al. 2003), indicate that these novel materials could be used to fabricate flexible body armors which provide improved protection against both stab and ballistic threats. Highlights Recent Advances in Materials/Armour Technology As long as conflict exists in the world, protection technologies will always be in demand.

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Armour: Materials, Theory, and Design describes the existing and emerging protection technologies that are currently driving the latest advances in armour systems. This book explains the theory, applications, and material science aspects of modern armour design as they are used in relation to vehicles, ships, personnel, and buildings, and explores the science and technology used to provide protection against blasts and ballistic attacks. It covers materials technologies used in protection; addresses the system effects of adding blast-wave shaping to vehicles, as well as the effect on the human body; and outlines ballistic testing techniques. **Look at How Armour Works** The book discusses ceramics for armour applications; transparent armour; and metals for armour applications (including aluminium alloys, magnesium alloys, titanium alloys and steels); as well as composite armour systems; explosive reactive armour systems with reference to defensive aid suites for vehicles; and wound ballistics. In addition, the author lists more than 100 references for advanced study and further reading. **Armour: Materials, Theory, and Design** introduces a variety of armour technologies, outlines modern threats and dangers applicable to protection technology, and aids readers in implementing protective structures that can be used in battle, conflict, military zones, and other related environments.

The Science of Armour Materials comprehensively covers the range of armor materials from steels and light alloys, through glasses and ceramics, to fibers, textiles, and protective apparel. The book also discusses aspects of analytical and numerical modeling, as well as

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laboratory-based high-strain rate testing and ballistic testing methodologies. Each chapter is written from an international perspective, including reviews of the current global literature, and incorporates case studies that focus upon real life applications, research outcomes, and lessons learned. The threat spectrum is restricted to small arms ammunition, high velocity fragments, and stab and spike attacks, as well as blast loadings. Features input from an editor who is an expert in his field: Dr. Ian Crouch, the author of over 80 publications in his field, with three patents to his name Provides systematic and comprehensive coverage of armor materials, modeling, and testing Offers a cross-disciplinary approach that brings together expertise in materials science and defense engineering Discusses aspects of analytical and numerical modeling, as well as laboratory-based high-strain rate testing and ballistic testing methodologies

Already in its 5th edition, this standard work describes the principles of rheology clearly, vividly and in practical terms. The book includes the rheology of additives in waterborne dispersions and surfactant systems. Not only it is a great reference book, it can also serve as a textbook for studying the theory behind the methods. The practical use of rheology is presented in the areas quality control, production and application, chemical and mechanical engineering, materials science and industrial research and development. After reading this book, the reader should be able to perform tests with rotational and oscillatory rheometers and interpret the results correctly. This book, with its internationally peer-reviewed papers,

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covers the subject areas of Textile Science and Technology, Textile Dyeing and Finishing, Textile Machinery and Equipment, Apparel Design and Merchandising and New Trends in the Textile Industry. It will be of interest to anyone working in these subject areas.

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

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products involving smart textiles Authored and edited by an international team who are experts in the field ensure comprehensive coverage and global relevance

Stab Resistance of Shear Thickening Fluid (STF)-Kevlar Composites for Body Armor Applications

This book will interest researchers, scientists, engineers and graduate students in many disciplines, who make use of mathematical modeling and computer simulation. Although it represents only a small sample of the research activity on numerical simulations, the book will certainly serve as a valuable tool for researchers interested in getting involved in this multidisciplinary field. It will be useful to encourage further experimental and theoretical researches in the above mentioned areas of numerical simulation.

Advanced Textile Engineering Materials is written to educate readers about the use of advanced materials in various textile applications. In the first part, the book addresses recent advances in chemical finishing, and also highlights environmental issues in textile sectors. In the second part, the book provides a compilation of innovative fabrication strategies frequently adopted for the mechanical finishing of textiles. The key topics are • Smart textiles • Functional modifications • Protective textiles • Conductive textiles • Coated/laminated textiles • Antimicrobial textiles • Environmental aspects in textiles • Textile materials in composites • 3-D woven preforms for composite reinforcement • Evolution of soft body armor

Engineering of High-Performance Textiles discusses the fiber-to-fabric engineering of various textile products. Each chapter focuses on practical guidelines and approaches for common issues in textile research and development. The book

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discusses high-performance fibers and yarns before presenting the engineering fabrics and architectures needed for particular properties required of high-performance textiles. Properties covered include moisture absorption, pilling resistant knitwear, fire retardant fabrics, camouflage fabrics, insect repellent fabrics, filtration, and many more.

Coordinated by two highly distinguished editors, this book is a practical resource for all those engaged in textile research, development and production, for both traditional and new-generation textile products, and for academics involved in research into textile science and technology. Offers a range of perspectives on high-performance textiles from an international team of authors with diverse expertise in academic research, textile development and manufacture Provides systematic and comprehensive coverage of the topic from fabric construction, through product development, to the range of current and potential applications that exploit high-performance textile technology Led by two high-profile editors with many years' experience in engineering high-performance textiles

Comprehensive Nanoscience and Technology, Second Edition allows researchers to navigate a very diverse, interdisciplinary and rapidly-changing field with up-to-date, comprehensive and authoritative coverage of every aspect of modern nanoscience and nanotechnology. Presents new chapters on the latest developments in the field Covers topics not discussed to this degree of detail in other works, such as biological devices and applications of nanotechnology Compiled and written by top international authorities in the field

This book summarizes recent advances in the fabrication methods, properties, and applications of various ceramic-filled polymer matrix composites. Surface-modification methods and chemical functionalization of the ceramic fillers are

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explored in detail, and the outstanding thermal and mechanical properties of polymer–ceramic composites, the modeling of some of their thermal and mechanical parameters, and their major potential applications are discussed along with detailed examples. Aimed at researchers, industry professionals, and advanced students working in materials science and engineering, this work offering a review of a vast number of references in the polymer–ceramic field, this work helps readers easily advance their research and understanding of the field. This book collects selected high quality articles submitted to the 2nd International Conference on Natural Fibers (ICNF2015). A wide range of topics is covered related to various aspects of natural fibres such as agriculture, extraction and processing, surface modification and functionalization, advanced structures, nano fibres, composites and nanocomposites, design and product development, applications, market potential, and environmental impact. Divided into separate sections on these various topics, the book presents the latest high quality research work addressing different approaches and techniques to improve processing, performance, functionalities and cost-effectiveness of natural fibre and natural based products, in order to promote their applications in various advanced technical sectors. This book is a useful source of information for materials scientists, teachers and students from various disciplines as well as for R& D staff in industries using natural fibre based materials. This book is a result of contributions of experts from international scientific community working in different aspects of nanocomposite science and applications and reports on the state of the art research and development findings on nanocomposites through original and innovative research studies. Through its 19 chapters the reader will have access

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to works related to the theory, and characterization of various types of nanocomposites such as composites of cellulose and metal nanoparticles, polymer/clay, polymer/Carbon and polymer-graphene nanocomposites and several other exciting topics while it introduces the various applications of nanocomposites in water treatment, supercapacitors, green energy generation, anticorrosive and antistatic applications, hard coatings, antiballistic and electroconductive scaffolds. Besides, it reviews multifunctional nanocomposites, photonics of dielectric nanostructures and electron scattering in nanocomposite materials.

This special volume brings together the latest advances in, and applications of, Manufacturing Engineering and Automation. It comprises 598 peer-reviewed papers selected from over 1000 papers submitted by universities and industrial concerns all over the world. Volume is indexed by Thomson Reuters CPCI-S (WoS).

The third book in a series on heterogeneous materials, this volume offers integrated approaches to the measurement and modeling of materials using approaches from materials science, physics, mechanics, biology and other disciplines. The volume contains 289 chapters presenting original research on the connections among the nano-, micro-, and mesoscale mechanical properties and behaviors of many different types of engineered and natural heterogeneous materials. The book contains a wealth of never published multiscale data on materials loading behaviors, plasticity, creep, damage, fracture and failure. A separate section is devoted to the design and functionalization of materials using multiscale data and techniques

This volume contains select papers presented during the Functional Textiles and Clothing Conference 2020 held at Indian Institute of Technology Delhi. The volume covers recent developments, challenges and opportunities in the

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field of functional and protective clothing; functional printing and finishing; sustainable production and supply chain; and testing and characterisation. This volume will be of interest to researchers, professional engineers, entrepreneurs, and market stakeholders interested in functional textiles and clothing.

Technical d104iles are high performance speciality materials. Applications are found in inflatable structures, tents, as reinforcement in composites for construction, as body armour and vehicle protection, in filters, as a base for flexible printed circuits, hose, conveyor belts and tyres. Polymer Enhancement of Technical d104iles examines the potential for these materials. The review is accompanied by around 400 abstracts from papers and books in the Rapra Polymer Library database.

There is increasing interest in the area of protective vests, either for protection against bullets or protection from the most realistic threats within domestic frontline operations: edged weapon, knives, and medical needles. This volume addresses that need. This new book provides an in-depth survey of the state-of-the-art research and practical techniques in the area of protected fabrics, especially stab-resistant and bulletproof fabrics. The book covers:

- The history of protective armor: the long history of the art of protective armor manufacturing.
- Materials used for body armor: the design and materials used for soft armor to increase its perforation-resistance utilizing high-performance fibers.
- Anti-stab and anti-bullet armor design: the different design parameters required for the design of flexible armor in order to stop high-velocity projectiles.
- The comfort of the body armor design: the flexibility, thermal resistivity, and evaporative moisture resistivity through the fabric.
- Methods of testing the flexible body armors: testing the components of flexible body armor, according to the level of the protection

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required, such as NIJ Standards, HOSDB Body Armour Standards for UK Police, and the German SK1 Standard, among others. Written by an expert in textile composite material engineering, this volume fills an important gap in the area of protective fabric against stabbing or bullets and provides invaluable practical knowledge for body armor design.

Academic researchers who are working on the development of composite materials for ballistic protection need a deeper understanding on the theory of material behavior during ballistic impact. Those working in industry also need to select proper composite constituents, to achieve their desired characteristics to make functional products. *Composite Solutions for Ballistics* covers the different aspects of ballistic protection, its different levels and the materials and structures used for this purpose. The emphasis in the book is on the application and use of composite materials for ballistic protection. The chapters provide detailed information on the various types of impact events and the complexity of materials to respond to those events. The characteristics of ballistic composites and modelling and simulation results will enable the reader to better understand impact mechanisms according to the theory of dynamic material behavior. A complete description of testing conditions is also given that includes sensors and high-speed devices to monitor ballistic events. The book includes detailed approaches and schemes that can be implemented in academic research into solutions for ballistic protection in both theoretical and experimental fields, to find solutions for existing and next generation threats. The book will be an essential reference resource for materials scientists and engineers, and academic and industrial researchers working in composite materials and textiles for ballistic protection, as well as postgraduate students on materials science, textiles and mechanical

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engineering courses. Discusses the fundamentals of impact response mechanisms and related solutions covering advantages and disadvantages for both existing and next generation applications Includes various methods for evaluation of ballistic constituents according to economic and environmental criteria, types of green ballistics are considered to enhance sustainable production of applications as well as hybrid composites from natural wastes Discusses selection methodologies for ballistic applications and detailed information on the use of textiles for reinforcement fabrication This book highlights fundamental research on the design and application of engineering materials, and predominantly mechanical engineering applications. This area includes a wide range of technologies and materials, including metals, polymers, composites, and ceramics. Advanced applications include manufacturing cutting-edge materials, testing methods, and multi-scale experimental and computational aspects. The book introduces readers to a wealth of engineering applications in transport, civil, packaging and power generation.

Advances in Functional and Protective Textiles explores the latest research in the use of textile materials for protective clothing. The book's international roster of researchers in industry and academia describe innovative applications in defense, medical, sports, fire protection, radiation protection, and more. This book is an invaluable resource for readers seeking to produce textiles with self-cleaning, antimicrobial, super-hydrophobic, UV-protective, insect repellent, flame retardant or anti-felting properties. Particular attention is given to textile fibers, including cotton, wool, viscose, and other synthetic fibers whose properties solve many problems. Sustainable approaches to the processing of textiles for protective properties are also addressed, as are hazards. Introduces the advanced testing and modeling methods that

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are necessary for the production of protective textiles
Describes the properties of the latest advanced chemicals
and materials used to make protective textiles and clothing
Covers every step in the development of protective clothing,
from the engineering of novel materials, to advanced
fabrication methodologies and applications

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