

1. Record Nr.	UNINA9910819610903321
Titolo	Textile finishing : recent developments and future trends // edited by K.L. Mittal and Thomas Bahners
Pubbl/distr/stampa	Hoboken, New Jersey ; ; Beverly, Massachusetts : , : Scrivener Publishing : , : Wiley, , 2017 ©2017
ISBN	1-5231-2383-4 1-119-42687-1 1-119-42685-5 1-119-42679-0
Edizione	[1st ed.]
Descrizione fisica	1 online resource (586 pages) : illustrations
Collana	THEi Wiley ebooks
Disciplina	677.02
Soggetti	Textile finishing - Technological innovations
Lingua di pubblicazione	Inglese
Formato	Materiale a stampa
Livello bibliografico	Monografia
Nota di bibliografia	Includes bibliographical references at the end of each chapters and index.
Nota di contenuto	Cover -- Title Page -- Copyright Page -- Contents -- Preface -- Part 1 Recent Developments and Current Challenges in Textile Finishing -- 1 Recent Concepts of Antimicrobial Textile Finishes -- 1.1 Introduction -- 1.2 Antimicrobial Agents -- 1.2.1 Mechanisms of Antimicrobial Activity -- 1.2.2 Structures of Antimicrobial Agents -- 1.2.2.1 Leaching Antimicrobial Agents -- 1.2.2.2 Bound Antimicrobial Agents -- 1.3 Low Adhesion Agents -- 1.4 Dual-Action Antimicrobial Agents -- 1.5 Evaluation of Antimicrobial Activity of Functionalized Textiles -- 1.5.1 Standardized Methods for the Determination of Antibacterial Activity -- 1.5.2 Standardized Methods for the Determination of Antifungal Activity -- 1.6 Health and Environmental Issues -- 1.6.1 Health and Environmental Impacts of Antimicrobial Compounds -- 1.7 Future Trends -- 1.8 Summary -- Acknowledgement -- References -- 2 Flame Retardant Textile Finishes -- 2.1 Introduction -- 2.2 Current Commercial, Durable Flame Retardants: Advantages and Disadvantages -- 2.3 Current Challenges -- 2.3.1 Minimisation of Effluents -- 2.3.2 Replacing Formaldehyde Chemistry, Particularly with Respect to Cotton and Blended Fabrics -- 2.3.2.1 Oligomeric Phosphate-Phosphonate --

2.3.2.2 Multifunctional Carboxylic Acids -- 2.3.2.3 Alkyl Phosphoramidate Adduct -- 2.3.2.4 Phosphonyl Cyanurates -- 2.3.2.5 Cellulose-Phosphoramidate Ester Interchange -- 2.3.2.6 Cellulose-Chloro Triazinyl Derivative Condensation -- 2.3.2.7 Phosphorus Acid Derivatives of Cellulose -- 2.3.2.8 Phosphorus-Nitrogen-Silicon Developments -- 2.3.2.9 Polymer Networks -- 2.3.2.10 Other Finishing Treatments -- 2.3.3 Replacing Bromine, Notably in Coating and Back-Coating Formulations -- 2.3.3.1 Reducing the BrFR Concentrations -- 2.3.3.2 Possible Bromine-Chlorine and Phosphorus-Bromine Synergies -- 2.3.3.3 Effectiveness of Phosphorus. 2.3.3.4 The Sensitisation of Decomposition or Flame Retarding Efficiency of Phosphorus-Based Systems -- 2.3.3.5 The Introduction of a Volatile and Possible Vapour-Phase Active, Phosphorus-Based Flame Retardant Component -- 2.4 Novel Surface Chemistries -- 2.4.1 Sol-Gel Surface Treatments -- 2.4.2 Layer-by-Layer Treatments -- 2.4.3 Polymer Coating and UV and Plasma Grafting Treatments -- 2.4.3.1 Plasma Treatments -- 2.4.3.2 UV and Other Grafting Treatments -- 2.5 Summary -- References -- Bibliography -- 3 Striving for Self-Cleaning Textiles - Critical Thoughts on Current Literature -- 3.1 Introduction -- 3.2 Fundamental Principles -- 3.2.1 Self-Cleaning - The Super-Hydrophobic Approach -- 3.2.2 Self-Cleaning - The Super-Hydrophilic Approach -- 3.2.3 Expected Merits of the Concepts -- 3.3 Attempts to Attain Super-Hydrophobic Behavior -- 3.3.1 Minimized Surface Free Energy -- 3.3.1.1 Novel Chemical Finishes of Non-Polar Character -- 3.3.1.2 Deposition of Non-Polar Thin Layers by Plasma and Dielectric Barrier Discharge (DBD) -- 3.3.1.3 Deposition of Non-Polar Thin Layers by Photo-Chemical Surface Modification -- 3.3.2 Enhancing Liquid Repellence by Adding Surface Roughness -- 3.3.2.1 Application of Micro- and Nano-Rough (Hybrid) Coatings -- 3.3.2.2 Incorporation of Micro- and Nanoparticles -- 3.3.2.3 Laser-Based Surface Roughening -- 3.4 Attempts to Attain Super-Hydrophilic Properties -- 3.4.1 Use of Photo-Catalytic TiO₂ -- 3.4.2 Making Use of Micro-Roughness According to the Wenzel Model -- 3.5 Relevance for Dirt Take-Up, Cleanability, and Self-Cleaning -- 3.6 Summary -- References -- 4 Metallization of Polymers and Textiles -- 4.1 Introduction -- 4.2 Main Methods of Metallization -- 4.2.1 Methods Based on Physical Vapor Deposition -- 4.2.2 Chemical Vapor Deposition Methods -- 4.3 Electroless Metallization -- 4.4 Summary -- References. 5 Wettability Characterization in Textiles - Use and Abuse of Measuring Procedures -- 5.1 Introduction -- 5.2 Peculiarities of Textile Substrates -- 5.3 Wettability Measurements on Fabrics -- 5.3.1 Contact Angle Measurements -- 5.3.2 Drop Penetration Tests -- 5.3.3 Soaking or Rising Height Test -- 5.3.4 The Wilhelmy Method -- 5.4 Contact Angle Measurements on Fibers -- 5.4.1 Adapting the Wilhelmy Plate Method to Single Fibers -- 5.4.2 The Washburn Approach - Wilhelmy Wicking Method -- 5.5 Summary and Concluding Remarks -- Acknowledgements -- References -- Part 2 Surface Modification Techniques for Textiles -- 6 Surface Functionalization of Synthetic Textiles by Atmospheric Pressure Plasma -- 6.1 Introduction -- 6.2 Processing Parameters of Atmospheric Pressure Plasma (APP) Jet -- 6.3 Change in Single Fiber Wettability Due to APP Jet Treatment -- 6.4 Hydrophobic Recovery after APP Jet Treatment -- 6.5 Chemical and Topographical Changes on Fiber Surface Due to APP Jet Treatment -- 6.6 Fabric Damage Due to APP Jet Treatment -- 6.7 Improvement of Textile Serviceability Properties by APP Jet Treatment -- 6.7.1 Water Wicking Property -- 6.7.2 Detergency -- 6.7.3 Dyeability -- 6.8 Summary and Prospects -- Acknowledgements -- References -- 7 UV-Based Photo-Chemical Surface Modification of Textile Fabrics -- 7.1

Introduction -- 7.2 Fundamentals of the Process -- 7.2.1 Photo-Addition, Irradiation in Air -- 7.2.2 Layer Formation by Homo-Polymerization and Graft-co-Polymerization -- 7.2.3 Experimental Concept -- 7.3 Fiber Properties Defined by the Surface Chemistry of Deposited Layers -- 7.3.1 Wetting and Adhesion -- 7.3.2 Wetting and Protein Adhesion - Antifouling Surfaces -- 7.3.3 Highly Liquid Repellent Technical Textiles -- 7.3.4 Patterned Wettability -- 7.4 Fiber Modification by Bulk Properties of Deposited Layers -- 7.4.1 Mechanical and Thermal Stability. 7.4.2 Barrier Function -- 7.4.3 Charge Storage -- 7.4.4 Permanent Flame Retardant Finish -- 7.5 Summary and Outlook -- References -- Part 3 Innovative Functionalities of Textiles -- 8 Glimpses into Tunable Wettability of Textiles -- 8.1 Introduction -- 8.2 Paths to Tunable Wettability -- 8.2.1 Fibre and Textile Surface Functionalisation -- 8.2.2 Stimuli-Responsive Hydrogel Functionalising Systems -- 8.2.3 Modes of Functionalisation and Additional Parameters to be Considered -- 8.3 Practical Aspects and Applications -- 8.4 Prospects -- 8.5 Summary -- References -- 9 3D Textile Structures for Harvesting Water from Fog: Overview and Perspectives -- 9.1 Introduction -- 9.2 Biological Models -- 9.2.1 Namib Desert Grass -- 9.2.2 Black Beetle in the Namib Desert -- 9.2.3 Epiphytic bromeliads -- 9.2.4 Pinus canariensis -- 9.3 Textile Development and Engineering -- 9.3.1 Fog Harvesting Efficiency in the Laboratory -- 9.3.2 Model of Drop Formation on the Yarn System of 3D Textiles -- 9.3.3 Scale Up to an Industrial Process -- 9.4 Technical Realization -- 9.5 Summary and Prospects -- References -- 10 Textile-Fixed Catalysts and their Use in Heterogeneous Catalysis -- 10.1 Introduction -- 10.2 Immobilization of Catalysts on Textile Carrier Materials -- 10.2.1 Inorganic Catalysts -- 10.2.2 Organo-Metallic Catalysts -- 10.2.3 Enzymes -- 10.2.4 Organic Catalysts -- 10.3 Summary and Outlook -- Acknowledgements -- References -- 11 Medical Textiles as Substrates for Tissue Engineering -- 11.1 Introduction -- 11.1.1 Concept of TE -- 11.1.2 Background of Medical Textiles in TE -- 11.2 Fiber Formation Approaches -- 11.2.1 Wet Spinning -- 11.2.2 Melt Spinning -- 11.2.3 Microfluidic Spinning -- 11.2.4 Self-Assembly -- 11.3 Fiber-Based Architectures for the TE Scaffold -- 11.3.1 Woven Fabrics -- 11.3.2 Knitted Fabrics -- 11.3.3 Braided Fabrics -- 11.3.4 Non-Woven Fabrics. 11.3.5 Bioprinting -- 11.4 Applications of Medical Textiles in TE -- 11.4.1 Musculoskeletal Tissues -- 11.4.2 Muscular Tissues -- 11.4.3 Ocular Tissues -- 11.4.4 Nerve Tissue -- 11.4.5 Skin -- 11.5 Summary and Prospects -- Note -- References -- Part 4 Fiber-Reinforced Composites -- 12 Thermoset Resin Based Fiber Reinforced Biocomposites -- 12.1 Introduction -- 12.1.1 Reinforcements and Fillers -- 12.1.2 Resins -- 12.1.3 Composites -- 12.1.4 Nanocomposites -- 12.1.5 Interfaces -- 12.1.6 Petroleum Based and Biobased Resins and Fibers -- 12.2 Characteristics of Biocomposites -- 12.3 Composite Classification -- 12.3.1 Hybrid Composites -- 12.3.2 'Greener' Composites -- 12.3.3 'Green' Composites -- 12.4 Natural Fiber Processing -- 12.4.1 Fiber Extraction -- 12.4.2 Fiber Treatments -- 12.4.3 Fiber Forms (Nonwoven, Woven, Knitted) -- 12.5 Polymeric Resins -- 12.5.1 Green Resins -- 12.5.2 Thermoset Green Resins -- 12.5.2.1 Protein Based Resins -- 12.5.2.2 Starch Based Resins -- 12.5.2.3 Fats/Lipids/Oils Based Resins -- 12.6 Biobased Thermoset Composites -- 12.6.1 Plant Based Cellulose Fiber Biocomposites -- 12.6.2 Starch Based Biocomposites -- 12.6.3 Protein Based Biocomposites -- 12.6.4 Chitosan Based Biocomposites -- 12.6.5 Lipid Based Biocomposites -- 12.7 Bionanocomposites -- 12.7.1 Starch Based Nanocomposites -- 12.7.2 Cellulose Based Nanocomposites --

12.7.3 Protein Based Nanocomposites -- 12.7.4 Chitosan Based Nanocomposites -- 12.8 Applications and Advantages of Biocomposites -- 12.9 Opportunity and Challenges -- 12.10 Summary -- References -- 13 Characterisation of Fibre/Matrix Adhesion in Biobased Fibre-Reinforced Thermoplastic Composites -- 13.1 Introduction -- 13.1.1 Terms and Definitions -- 13.1.1.1 Fibre -- 13.1.1.2 Fibre Bundle -- 13.1.1.3 Equivalent Diameter -- 13.1.1.4 Critical Length -- 13.1.1.5 Aspect Ratio and Critical Aspect Ratio. 13.1.1.6 Single Element versus Collective.

Sommario/riassunto

Textiles have been historically and traditionally used to make clothes, but even in ancient times there were technical textiles for making sails, tents, etc. Today, technical textiles are used in various industries for a host of purposes and applications. Recently, there have been exciting developments on various fronts in the textile field to impart novel and innovative functionalities to textiles, e.g., easy-to-clean or dirt-repellent, flame retardancy, anti-bacterial, and fog-harvesting properties, to name a few. Also, textiles for electronics based on graphene, CNTs and other nanomaterials, conductive textiles, textiles for sensor function, textile-fixed catalysts, textiles for batteries and energy storage, textiles as substrates for tissue engineering, and textiles for O/W separation have appeared in the literature. All this has been possible through adopting novel ways for finishing textiles, e.g., by appropriate surface modification techniques, and utilizing biomimetic concepts borrowed from nature. This unique book entitled "Textile Finishing: Recent Developments and Future Trends" is divided into four parts: Part 1: Recent Developments/Current Challenges in Textile Finishing; Part 2: Surface Modification Techniques for Textiles; Part 3: Innovative Functionalities of Textiles; Part 4: Fiber-Reinforced Composites. The topics covered include: Antimicrobial textile finishes; flame retardant textile finishing; "self-cleaning" or easy-to-clean textiles; metallization of textiles; atmospheric pressure plasma, and uv-based photochemical surface modification of textiles; tunable wettability of textiles; 3D textile structures for fog harvesting; textile-fixed catalysts; medical textiles as substrates for tissue engineering; and fiber-reinforced "green" or "greener" biocomposites and the relevance of fiber/matrix adhesion.
