



Promotion of T-Pot's publications

1. Young Scientists in the Protective Textiles Research
2. Functional Protective Textiles



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YOUNG SCIENTISTS IN THE PROTECTIVE TEXTILES RESEARCH MLADI ZNANSTVENICI U ISTRAŽIVANJU ZAŠTITNIH TEKSTILIJA



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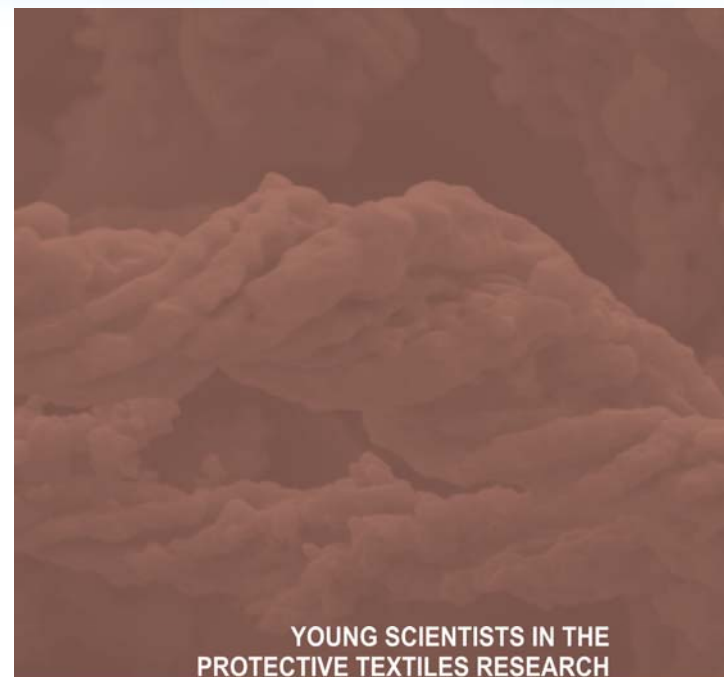
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**YOUNG SCIENTISTS IN THE
PROTECTIVE TEXTILES RESEARCH
MLADI ZNANSTVENICI U
ISTRAŽIVANJU ZAŠTITNIH TEKSTILIJA**



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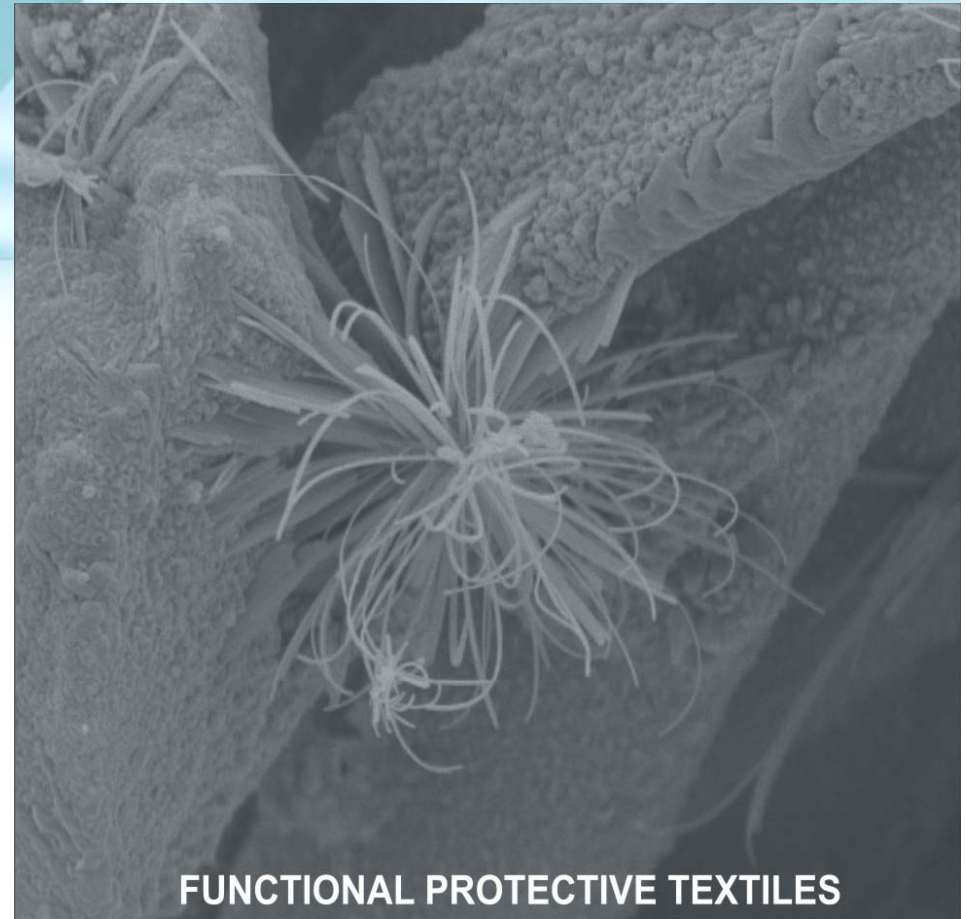
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FUNCTIONAL PROTECTIVE TEXTILES

Edited by **Sandra Bischof Vukušić**



Sveučilište u Zagrebu
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Tekstilno - tehnološki fakultet
Faculty of Textile Technology



Chapter 1

Lead Market Initiative

Lutz Walter

- European Apparel and Textile Confederation (EURATEX)

Within this industry driven policy protective textiles have been selected by the European Commission as one of the 6 most important areas. The aim of this initiative is to create an innovation friendly market framework to relaunch conventional industrial sectors and reduce time of the market of new goods and services. LMI defines protective textiles as one of the most profitable markets for Europe. Since importance of this market is steadily rising every year, this particular topic has been chosen as sub-topic of T-Pot project. The majority of TTF's researchers have found their interest in the topic of either functional or protective textiles or even in both.



Chapter 2

Personal Protective Equipment- Certification, Research and Future Trends

H. Beier, P. Franitza and R. Naumann

- Saxony Research Institute (STFI)

For producers to be able to effectively exploit the chances which have arisen not only to retain and enhance their position on the local market, but also to become visible and competitive on the single European market, European norms and standards have to be complied with in the first place. This precondition is necessary, but insufficient on its own. It is also necessary to work steadily on innovative products and their quality, and to constantly seek and use available 'technological niches'.



Chapter 3

Design of Functional Protective Clothing

G. Dammacco, E. Turco and M. I. Glogar

- Grado Zero Espace (GZE) and University of Zagreb, Faculty of Textile Technology (TTF), Department for Textile Chemistry & Ecology



Today, modern protective clothing is expected to offer something more than protection. Besides this important basic function, clothing has to be neat and inspire motivation as well as reinforce team spirit of the workers who wear it. Even though in the past protective clothing was not expected to be very attractive, nowadays this aspect is becoming increasingly important.



Chapter 4

Construction of Functional Protective Clothing

S. Bogović

- University of Zagreb, Faculty of Textile Technology (TTF)

Construction is the first of the six requirements on which efficiency of working clothes, irrespective of its category, depends. They are: construction, material, manner of wearing, tearing, cleaning, maintenance and storage. The importance of specific design and construction is emphasized, enabling proper fit of clothes to each individual user, in different static or dynamic working conditions.



Chapter 5

Antimicrobial Protective Textiles

S. Bischof Vukusic and S. Gaan

- University of Zagreb, Faculty of Textile Technology (TTF) and EMPA, Switzerland

This chapter provides an overview of antimicrobial agents, their mode of action, methods of protection against microbes and/or bacteria and testing of the effectiveness of antimicrobial treated textiles. This feature has potential to provide protective clothing for patients and medical workers, wound dressings, bed linen, masks, but may also be applied to sportswear particularly in terms of odour control. Antimicrobial/antibacterial activity is nowadays obtained by using different nanoparticles, such as silver or copper which have also been investigated and their effectiveness is presented by S. Bischof Vukušić from TTF and S. Gaan from Swiss Federal Laboratories for Material Testing and Research (EMPA).



Chapter 6

Hydrophobic & Oleophobic Protection

B. Simončič

- University of Ljubljana, Faculty of Natural Sciences and Engineering, Department of Textiles

Chapter 6 presents an up-to-date status of hydrophobic and oleophobic protection. Breathability and comfort is highly desirable for workplace, sport/outdoor activities, combat situations, but also in everyday clothing. Nowadays, water-repellent and self-cleaning textiles can be obtained by nanoscale modification of the surface roughness resulting in water and dirt rolling off the surface. However, water vapor may still pass through, ensuring breathability.



Chapter 7

Textiles as Ultraviolet Radiation Protection

A. Tomljenovic

- University of Zagreb, Faculty of Textile Technology (TTF), Department of Materials, Fibres and Textile Testing

Chapter 7 fully addresses parameters affecting the protection from UV radiation, such as the fabrics' layering and creasing, combining UV effectiveness with functional design. Functionalized textiles exhibiting UV blocking properties find wide application nowadays, mostly in protective or sport/outdoor garments. Such properties are obtained either by coating with different UV agents or by surface treatments (e.g. plasma, microwave or laser treatments). Treatments with nanoparticles of zinc oxide or titanium dioxide represent one of the first examples of applying nanotechnologies to the textile sector.



Chapter 8

Flame Retardant Textiles

C. Q. Yang and E. D. Weil

- University of Georgia, USA and Polytechnic Institute of New York University, USA

This chapter analyses the benefits and risks of using flame retardants and discusses major trends in textile flame retardant development and production. Many nanomaterials (including titanium dioxide, silicon dioxide, clays and layered double hydroxide) have shown promise as flame retardant additives, enhancers of flame retardant coatings - effectively providing the flame resistance.



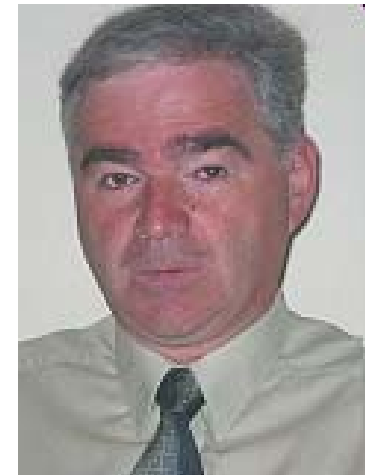
Chapter 9

Thermal Protection

D. Rogale and S. First Rogale

- University of Zagreb, Faculty of Textile Technology (TTF), Department of Clothing Technology

Chapter 9 continues with a review of the challenges posed on clothing for thermal protection. All forms of such outwear have particularly high degree of thermal functionality, obtained either by means of construction tools, passive and active heating/cooling or by intelligent clothing. The application of nanotechnology for exceptional insulation performance, providing protection against very low or high temperatures, includes application of aerogels (nanoporous structures of amorphous silica gel). Textiles with thermal functionality are advantageous for those working in harsh environments, but also for extreme sport/outdoor activities.



Chapter 10

Protective Insulation Materials

R. Paul, M. Brouta-Agnésa and H. Esteve Núñez

- Leitat Technological Center, Spain

Chapter 10 continues with the topic of thermal protection, but viewing it from the point of requirements laid on insulation materials. Additional environmental requirements and the problematic of toxic smokes emitted during the insulation materials combustion has been taken into the consideration and presented. The advantages of modified insulation materials, compared with the conventional ones, are addressed.



Chapter 11

Protection against Microwave Radiation

D. Katovic

- University of Zagreb, Faculty of Textile Technology (TTF), Department for Textile Chemistry & Ecology

Chapter 11 identifies microwave radiation as one of possible environmental and health risks. The environment is now thoroughly polluted by man-made sources of electromagnetic radiation with frequencies and magnitudes never present before. Man's activities have probably changed the Earth's electromagnetic background to a greater degree than they have changed any other natural physical attribute of the Earth whether land, water or the atmosphere. The evidence now indicates that the present abnormal electromagnetic environment can constitute even health risk.



Chapter 12

Protective Clothing against Nuclear, Biological and Chemical Threats

Z. Dragcevic, E. Vujasinovic and Z. Orehovec

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This chapter provides an overview of chemical protective clothing with functionality against chemical toxins, toxic agents and poisonous gases. Recent functionalisation in PPE has been realised with textiles containing nanoparticles of magnesium oxide, dendrimers or gold, and have been shown as more effective than the more commonly utilised charcoal. Further novel applications include single walled carbon nanotubes (SWCNT) based sensors, developed for detection of nerve gas agents.



Chapter 13

Comfort of Protective Textiles

M. Zimniewska

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Chapter 13 addresses the issue of comfortable wearing, as the second most important requirement of protective clothing. Wear comfort can be expressed, for instance, through the product's ergonomics, how easy it can be put on as well as its low weight, freedom of the user's movements and easy maintenance. The aspect of physiological comfort is worth stressing here, since protective clothing perfectly performs its basic functions today, yet the directions of its world-wide development are for clothing to be made as comfortable as possible for its users. Analysts said the industrial protective clothing that offers higher performance alongside its increased comfort and style would drive sales. The effect is already visible in the market for multi-functional clothing.



Chapter 14

Care of Workwear

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- University of Zagreb, Faculty of Textile Technology (TTF) and University of Maribor, Faculty of Mechanical Technology, Faculty of Health Sciences

This chapter tackles the problematic of care. The accent is laid on workwear and problems which might occur upon the application of incorrect cleaning methods. The importance of validated processes for care and maintenance has been addressed as well as the importance of complying with the standards relevant to the industrial laundry and textile renting industry.



Chapter 15

Recycling in the Area of High-Performance Textile Materials & Protective Clothing

E. Vujasinovic

- University of Zagreb, Faculty of Textile Technology (TTF), Department of Materials, Fibres and Textile Testing

Chapter 15 provides a full account of the problematic of protective clothing recycling and paradigms of proper recycling route for high-performance textiles. Recycling of the fibre reinforced composites and some particular protective clothing, e.g. body armour made of aramide fibres, have been addressed as well as future recycling trends. The need for environmentally friendly recycling or disposal technologies has nowadays become of major importance.





Etno butik Marea

