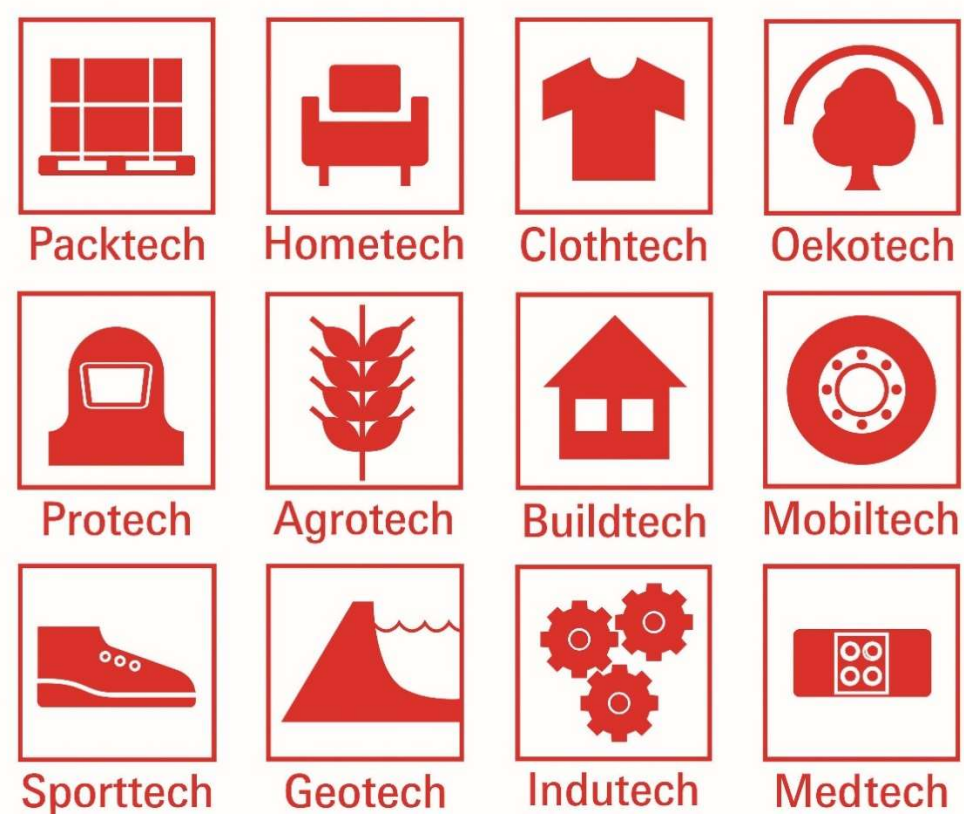
Book of Abstracts

TEXTILE SCIENCE RESEARCH CENTRE

OPEN DAY 2022

BIO AND/OR GREEN - NEW PARADIGMS FOR TECHNICAL TEXTILES



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EXHIBITORS:

1. Mikrolux, d.o.o.
2. Crescat, d.o.o.

DUNJA DRMAČ: European Chemical Industry Council (CEFIC), Brisel

Transition pathways for green and digital transformation of EU industry

Abstract:

The European Green Deal has an ambition to make Europe the first climate neutral continent by 2050. To get there, different industries will need to make massive investments to achieve these goals. Therefore, the European Commission is now developing Transition Pathways, a co-creation mechanism between different stakeholders towards a green and digital transition. This is even more important now during these unprecedented times.

Both the chemical and textile sector have an important role to play. Numerous examples of technical textiles with required chemical application for its durability and functionality are pivotal for Green Deal solutions.

Innovation is key but often times easier said than done – therefore, the European industries are ready to work with EU policy makers to explain real-world challenges and find solutions together for green and digital transition.

Key words:

The European Green Deal, Transition Pathways, green and digital transition, technical textiles

MAJA SOMOGYI ŠKOC & ANA FUDURIĆ: TTF & Lola Ribar

Medical textiles

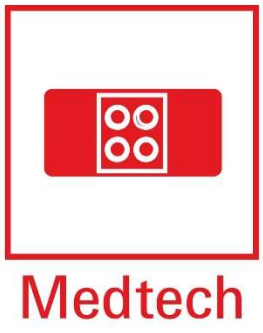
Abstract:

The energy, climate and financial crisis and their long-term devastating consequences are an ideal opportunity to turn to green industries. Technical Textiles is turning towards green technologies and through its 12 areas (agrotextiles (Agrotech), geotextiles (Geotech), building textiles (Buildtech), textiles for industrial purposes (Indutech), textiles for use in transport (Mobiltech), textiles for interior decoration (Hometech), clothing textiles (Clothtech), textiles for protective purposes (Protech), textiles for sports and recreation (Sporttech), medical textiles (Medtech), textiles for packaging (Packtech) and textiles for environmental protection (Oekotech), seeks to implement as much green technology as possible and move away from "business as usual".

In the field of medical textiles, which includes all textile products and constructions used in medicine, for hygienic purposes and rehabilitation, first aid and implantable applications, natural, artificial, recycled, smart and other fibers and materials are constantly being used, and thus to the application of classic as well as new technologies. These are highly demanding textile materials, the development and production of which sometimes require highly interdisciplinary scientific research in accordance with the programs and/or documents of the agencies for medicines and medical products at the national level, in the Republic of Croatia in accordance with the requirements of the Agency for Medicinal Products and Medical Devices of Croatia (HALMED), legal and by-laws of the Republic of Croatia. Turning to more sustainable and circular products is a big challenge in the production of medical textiles and the health sector in general. To implement the above as successfully as possible, it is necessary to distinguish between medical and hygiene products, and the legal acts that define them.

Key words:

technical textiles, medical textiles, medical products, hygiene products



AGATA VINČIĆ: TTF

Agrotextiles

Abstract:

Agrotextiles belong to one of the 12 groups of technical textiles with a growing market trend, albeit with a relatively small volume share, with global market share in total technical textiles of 6%. Although in 2020 the market faced a severe decline in demand, due to the emergence of the pandemic, in the period of 2021-2026 the market is estimated to grow rapidly. According to different sources it can be find the different market data of agrotextile, Global Market Estimates published that in 2021 it was 9.4 bill. USD. The fields of application of agro-textiles are very different, which determines the different characteristics of textile products, but their main purpose is to increase yields and quality, often also the taste of agro-products.

The applications of these textile products include the fields of agriculture, aquaculture, horticulture and forestry, and the product forms from fibres, yarns, woven, non-woven and knitted products to composite materials. The selection of the type and properties of the product, first of all, depends on the purpose, and it is related to the geographical location, that is, the climatic conditions. From the above, it is clear how diverse agro-textile products are and how complex the area is. In addition, their alignment with the BIO AND/OR GREEN paradigm requires a good knowledge of the properties and technologies of textile materials and products (especially biodegradability and ecological acceptability) and cooperation with agronomists - knowledge of the requirements of individual agro-cultures. In order to achieve the set requirements, there is frequent collaboration with experts from other fields of science. A brief presentation should give a broader picture of textile products for use in agronomy and the trend of change towards bio- and eco- friendly products and production.

Key words:

agrotextiles, usages area and forms, properties, biodegradability, agrotextiles exemplifiers

Agrotech

EMILIJA ZDRAVEVA: TTF

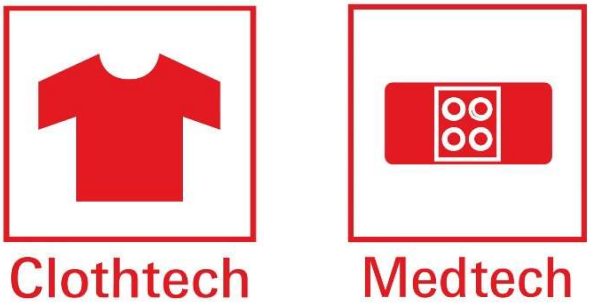
Recent progress in electrospinning and its applications in technical textiles

Abstract:

From the beginning of the electrospinning technique's popularization in the late 90s until today, the number of publications in the field of electrospun materials' production and application has not decreased, moreover, the research is frontier, challenging and rapidly growing. In the context of technical textiles, electrospun materials can be used independently, i.e. as nonwovens, due to the (usually) random nanofibers' arrangement in the materials' structure, or in combination with a technical textile in order to improve its properties. This presentation will discuss the application areas of electrospun materials with an emphasis on biomedicine (e.g. drug delivery, wound healing and tissue regeneration), energy storage/transformation (e.g. nanogenerators, solar cells) and wearable electronics (e.g. sensors, conductors, rectennas), food packaging (e.g. antibacterial, superhydrophobic membranes) and cosmetics (moisturizing and anti-aging bioactive beauty masks). In the field of biomedicine, particularly prominent examples are local, drug delivery, electrospun materials in cancer diagnosis and treatment. Further, electrospun materials for non-invasive release of hormones into the body against chronic diseases, as well as examples of clinical trials of electrospun wound dressings for i.e. diabetic ulcers. In the field of wearable electronics, the research of electrospun sensors for the detection of body metabolic activities, through human sweat or breath, is particularly interesting. Final discussion will concern the research of electrospun rectennas, i.e. for the development of smart contact lenses, where transparency, flexibility and breathability are extremely important.

Key words:

electrospinning, biomedicine, electronics, food packaging, cosmetics, technical textiles



EDITA VUJASINOVIĆ: TTF

Maritime textiles

Abstract:

When, in the 80s of the last century, the era of technical textiles started, meaning textiles used in various industrial, economic and technical branches, where their functionality was more important than comfort and aesthetics, the foundations of 12 different categories of technical textiles were set (agrotextiles, architexiles, geotextiles, mobiltextiles, ecotechtextiles, industrial textiles, packing textiles, home textiles, medical textiles, sports textiles, protective textiles and clothing textiles). It is interesting to note that maritime textiles lat. maritimus ≃ mare: more) were set apart within this distribution, as a group of textiles associated since the beginnings of history with human activities on the sea, in the sea and around it. The reason lies probably in the fact that only today, with the development and discovery of some new fibres, textile structure and nano-finishes, the demand for maritime textiles has grown, as, apart from functionality and usability, these materials often have to meet requirements regarding appearance and comfort for the end-user. Having in mind diverse properties of maritime textiles, their specific environment in which they are used, as well as the urgent requirements to preserve the environment (particularly from microplastics as prevailing threat), it is obvious that the development of contemporary maritime textiles asks for teamwork of interdisciplinary experts, while biomimicry has become key notion and new paradigm of their design (Jacques Yves Cousteau cit. „The sea, when it once throws its magic on you, will keep you in its network of wonder forever. “).

Key words:

Maritime textiles; technical textiles, sails, mooring ropes, ship interior, fibre-reinforced composites

This investigation is related to the following projects:

HRZZ IP-2020-02-7575: *Assessment of microplastic shedding from polyester textiles in washing process*

KK.05.1.1.02.0016: *Production of food, biocomposites and biofuels from cereals in a circular bioeconomy*

KK.01.1.1.04.0091: *Design of advanced biocomposites from energy-sustainable sources - BIOCOMPOSITES*

IVANA GRČIĆ: Faculty of Geotechnical Engineering

Environmental protection – Water purification

Abstract:

Water purification has long been one of the most important topics of environmental protection. Today, there are a number of alternative technologies focused on the elimination of recalcitrant pollution at all levels – from macro to nanoscale. Nevertheless, the development of new technologies is basically reduced to the development of new materials in order to enhance the performance of widely known processes. The photocatalytic oxidation of pollutants, heterogeneous photocatalysis with titanium dioxide (TiO2) and similar semiconductor materials in particular, are one of the thoroughly studied alternative processes for water purification. Although the technology has progressed to great extents, some shortcomings remain that hamper widespread environmental use. One of the main issues is the very choice of suitable supports for semiconductors that would be environmentally friendly, easy to apply and cost-effective.

Our research is partly focused on the mentioned aspect of photocatalysis optimization. Textile materials (wool and mixtures with polyester) that can create bonds with TiO2 via urea-bridges, and glass fibers where TiO2 can be immobilized by a simple sol-gel method have been shown to be interesting materials for application as supports for TiO2. The prepared photocatalytic materials represent an interesting alternative for passive and active protection of surface waters since they are proven to be active under solar radiation, flexible and extremely easy to apply in real systems of different geometry.

Key words:

photocatalysis, photocatalytic support, new materials

Oekotech

KREŠIMIR DRAGČEVIĆ: Faculty of Graphic Arts

The influence of communication r(evolution) on the use of textiles in the production of packaging

Abstract:

Textile fibers have always been used in paper production. Until the end of the 19th century, textile fibers (cotton, linen, wool, etc.) were used as the primary material in the formation of paper, and in the 20th century, and with the improvement of the process of splitting wood into cellulose fibers, they are used in smaller percentages to improve the mechanical properties of paper. Since the beginning of the 21st century, with the sudden development and soon the dominance of electronic media, all industrial branches that participate to a greater or lesser extent in the global communication network are fundamentally changing and adapting to the new market that is new users and their needs. In most industries, existing technologies are improved, or new technologies are created that can convey information or emotion that cannot be conveyed by a computer or mobile phone screen. In such a market environment, perhaps the most significant fusion of the textile and graphic industries and the creation of a new type of cardboard occurs, where during the formation of the cardboard strip, cotton is pressed into its surface and becomes its integral part. The resulting cardboard is distinguished by the mechanical properties necessary to produce exclusive packaging, and the textile cotton surface gives it exceptional tactile properties and a color that can easily be adjusted according to the wishes of the customer. This segment of production is among the fastest growing in the production of packaging cardboards.

Key words:

packaging, communication, textile fibers

Packtech

SUZANA KUTNJAK-MRAVLINČIĆ: TTF

Environmentaly friendly sports shoes

Abstract:

Among environmentally friendly footwear, sneakers are the most represented and the most exposed in the media. Sneakers, once exclusively footwear used for spots, have outgrown their primary function and became, to a certain extent, a cultural symbol of our time. In addition to casual and informal occasions, in the last decade, they became socially acceptable on formal (elegant) occasions. In 2020, the total revenue of the global sneaker market was estimated at approximately USD 70 billion, and this figure is predicted to rise to USD 120 billion by 2026. Their increased production is directly related to excessive consumption with a progressive decrease in footwear's lifespan, resulting in major environmental consequences. This has caused sustainability to become a key factor of change within the industrial processes in the footwear sector in recent years.

There are various ways and tools at a national and international level supporting companies in implementing sustainability practices including choosing more sustainable materials, making easily disposable or recyclable products, environmental certificates, emission reduction targets, communication with the public and similar. However, there is no general approach, but each company guided by market and consumer requirements independently defines actions it will implement in its production process. Considering that sneakers, like all footwear, are made of various materials (upper, sole, lining, filling and reinforcements, adhesives and other) that need to be treated and taken care of in different ways, several new solutions and business models are currently being promoted in the development and production of sneakers. Their main trait is striving for positive standards of social and environmental impact. The aim of this presentation is to present innovative solutions of ecological sports shoes of well-known and less well-known brands that work to set new (sustainable) standards.

Key words:

environmentally friendly, eco-friendly, sustainability, sports shoes, sneakers, brands, materials

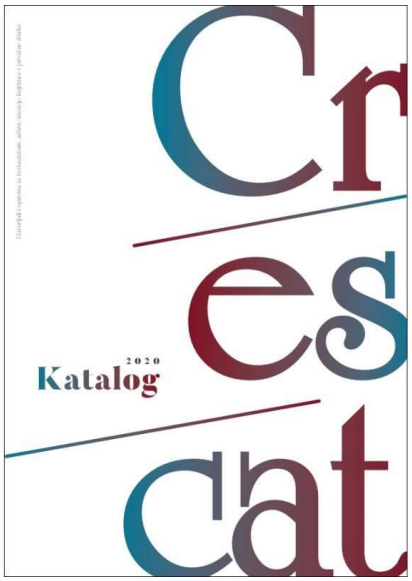
Sporttech

Exhibitors:

1. Mikrolux, d.o.o.

Mikrolux Advantageous Technologies Consulting

2. Crescat, d.o.o.



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