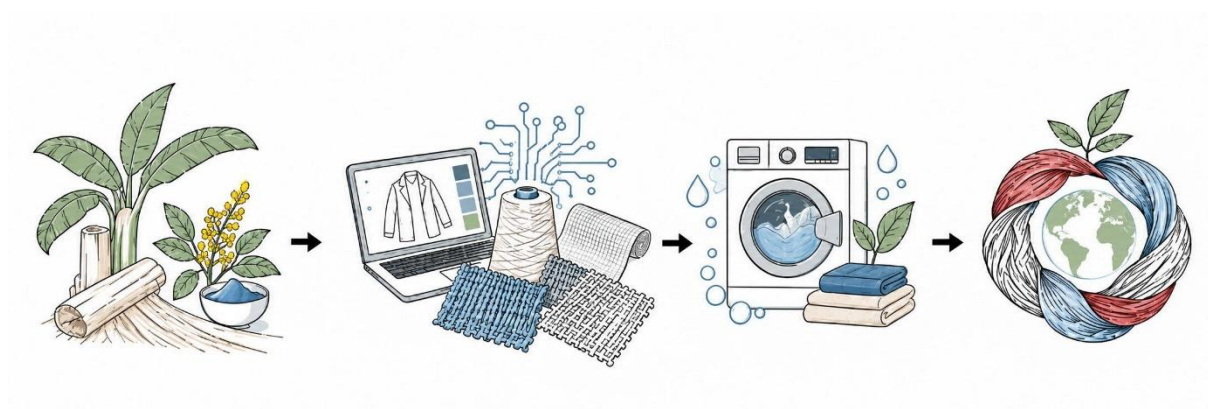


Book of abstracts

**OPEN DAYS OF THE TEXTILE SCIENCE
RESEARCH CENTRE 2026.**

**INTERDISCIPLINARY & INNOVATIVE TEXTILE
ECOSYSTEM**



Source: Original image created with the assistance of OpenAI image-generation tools, generated on 17 September 2026.

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LECTURES

MARINA CRNOJA ČOSIĆ:

MCC Innaware

President of the European Technology Platform for the Future of Textiles and Clothing

INTERDISCIPLINARITY: THE DRIVING FORCE BEHIND EUROPE'S FUTURE TEXTILE INNOVATION

Abstract:

The textile and apparel sector is undergoing one of the most profound transformations in its history. Sustainability, digitalization, advanced materials, circular economy, artificial intelligence and evolving regulatory frameworks are fundamentally reshaping how innovations are developed, scaled and brought to market. Addressing these complex challenges requires expertise that extends far beyond traditional textile disciplines.

This presentation will explore why interdisciplinarity has become the key driver of innovation and competitiveness in the European textile ecosystem. It will highlight how successful innovation emerges through collaboration between material science, chemistry, textile engineering, design, digital technologies, manufacturing, environmental sciences, business and public policy.

Drawing on the experience of the Textile ETP (European Technology Platform for the Future of Textiles and Clothing), the presentation will demonstrate how connecting research organizations, industry, start-ups, policymakers and investors accelerates the translation of scientific excellence into industrial and societal impact. Examples from fibre innovation, circular textiles and sustainable value chains will illustrate the importance of cross-sector collaboration in addressing today's challenges.

The presentation concludes by outlining how interdisciplinary innovation ecosystems will be essential for strengthening Europe's competitiveness, resilience and global leadership in sustainable textile innovation.

Key words:

European Technology Platform, textile engineering, textile innovations, cross-sector collaboration



TOMISLAV ROLICH:

University of Zagreb Faculty of Textile Technology

ALGORITHMS WITH STYLE: HOW GENERATIVE ARTIFICIAL INTELLIGENCE REDEFINES FASHION AND DESIGN

Abstract:

The emergence of generative artificial intelligence in recent years has bridged the gap between algorithmic logic and human creativity. Today, tools such as Midjourney, Adobe Firefly, and the advanced node-based environment ComfyUI are redefining fashion and design by rapidly transforming imagination into visual form. Through practical examples, this presentation demonstrates the application of controlled generative models (Structure Reference, ControlNet): transforming hand sketches into photorealistic renders, combining geometric structure with synthetic textures for virtual dress prototyping, varying textile patterns on furniture, and executing Virtual Try-On workflows. The ComfyUI framework allows full control over maintaining model identity and transferring garment details from flat lay photos. Generative AI does not replace human creative vision; rather, it removes technical barriers and accelerates concept visualization.

Key words:

generative artificial intelligence, fashion design, ComfyUI, ControlNet, Virtual Try-On

Acknowledgements:

The publication of this paper resulted from the implementation of the institutional research project "Sustainable Development of High Value-Added Clothing: Digital Prototyping, Application of Artificial Intelligence and Biomaterials", AI3D-BioWear, project code: TTF-IIP-02, funded by the European Union – NextGenerationEU.



LEA BOTTERI:

University of Zagreb Faculty of Textile Technology

BANANA PSEUDOSTEM SAP AS A POTENTIAL ECO-FRIENDLY TREATMENT FOR TEXTILE PROTECTION

Abstract:

The first thing that comes to mind with bananas is usually a favourite fruit that quickly restores our strength and brightens our day. However, this plant offers many possibilities that go beyond its nutritional role, hidden in a part that regularly ends up as waste: the pseudostem that remains after annual pruning. In practice, it is mostly discarded or burned in the fields, creating huge amounts of biowaste. Yet, if we change our perspective and apply the principles of the circular economy, this neglected “green residue” takes on a completely new role. This by-product is extremely rich in fibres and pseudostem sap which, due to its chemical composition, makes it a strong candidate for use in ecological treatment and protection of textiles. The use of this pseudostem sap opens up new directions in the development of environmentally friendly textile finishing. Its potential is evident across a wide range of applications – from the pretreatment of cotton fabrics, improved flame retardancy, UV and antimicrobial protection, through to natural dyeing. In this way, the plant transcends its traditional boundaries and becomes an extremely valuable raw material for sustainable textile technology.

Key words:

banana pseudostem sap, circular economy, eco-friendly treatment, cotton, flame retardancy

Acknowledgements:

This work has been supported by the institutional research project of the University of Zagreb Faculty of Textile Technology: “Green Technologies in Ecological Design and Development of Sustainable Materials – ZORA” (ZORA TTF IIP-04), funded by the European Union NextGenerationEU.



KATIA GRGIĆ:

Bright World Ltd.

SYNERGY OF TEXTILE CARE PROCESS PARAMETERS

Abstract:

Textile care represents an important factor in various sectors where textile materials are intensively used on a daily basis, including healthcare, the HoReCa sector, industry, social care institutions, and numerous other service activities. Modern washing processes are aimed at achieving an appropriate level of cleanliness and sanitation while reducing the consumption of water, energy, and chemical agents. During use, textile materials meet various types of soiling, ranging from organic matter to microorganisms, which is why textile care processes must be adapted to specific requirements of use. Therefore, textile care procedures and processes are not aimed solely at the removal of soiling, but also at achieving an appropriate level of hygienic safety while preserving the structure, colour, mechanical properties, and functional value of textile materials.

The Sinner's Circle is a fundamental model for understanding and optimizing washing processes. This conceptual model describes the interaction of four basic process factors: chemical action, mechanical action, time, and temperature. The efficiency of the washing process is the result of the synergistic action of these parameters, whereby a change in one factor can affect the contribution of the others. Lowering the washing temperature enables a reduction in energy consumption but may negatively affect the microbiological efficiency of the process. The application of ozone, due to its strong oxidative and antimicrobial properties, represents a potential approach to addressing this challenge.

The aim of this study was to investigate the effectiveness of ozone application at lower temperatures, with particular emphasis on textile sanitation, while simultaneously determining its effect on the removal of standardized soiling under different applications of washing agents. The study aimed to determine whether ozone could enable a reduction in process temperature while maintaining washing efficiency and achieving an appropriate level of hygienic safety in professional laundry using ozone generators.

Key words:

ozone, washing process, Sinner's circle, sanitation



JACQUELINE DOMJANIĆ:

Dr. Franjo Tuđman Defense and Security University

TEXTILES IN THE DEFENSE AND SECURITY INDUSTRY

Abstract:

Textile materials play an important role in the defence and security industry, going far beyond their use in military uniforms. Ballistic vests and helmets, clothing for protection against flames, biological and chemical hazards, as well as camouflage textiles, tents, and other items, are manufactured from technical and protective textiles. Fibre-reinforced composites made from aramid, carbon, and glass fibres enable the development of lightweight, strong, and resistant protective and structural elements, while the application of smart textiles enables the integration of sensor and communication functions within the textile structure. Nanofibers and antimicrobial textiles also represent an important development direction in the defence and security industry.

Croatia has several companies that produce textiles, clothing, footwear, and personal protective equipment for military purposes, intended for the Croatian Armed Forces as well as other military and security users.

Key words:

personal protective equipment, ballistic protection, fibre-reinforced composites, Croatian defence industry



JULIJA BOŽAN:

Galeb d.d.

INTERDISCIPLINARITY AND INNOVATION IN KNITTED FABRIC DEVELOPMENT

Abstract:

The development of modern knitted fabrics requires an interdisciplinary approach integrating knowledge of raw materials, fabric construction, knitting technology, dyeing and finishing, quality control, sustainability and end-use requirements. Using the vertically integrated production of GALEB d.d. as an example, the presentation outlines the path from initial requirements and knitted fabric development to industrial application. Particular emphasis is placed on future development opportunities through process digitalisation, automated quality control, artificial intelligence, functional materials, and the reduction of resource consumption and textile waste. Cooperation between science and industry is highlighted as an important prerequisite for developing, testing and implementing new solutions in a real industrial environment.

Key words:

knitted fabrics, interdisciplinarity, innovation, digitalisation, sustainability



KLARISA ČOP:

University of Zagreb Faculty of Textile Technology

FROM PLANT TO BLUE TEXTILE: AN INTERDISCIPLINARY STORY OF ISATIS TINCTORIA L.

Abstract:

Woad (*Isatis tinctoria* L.) is a traditional European source of indigoid dyes and represents a potential renewable source of blue colourants for textile applications. This study examines the extraction and application of indigoid dye compounds from fresh woad leaves for wool dyeing. Following hot-water extraction, the dye bath was alkalisied, aerated and chemically reduced with sodium dithionite to generate the soluble leuco form of indigotin. Wool samples were dyed under controlled conditions and characterised by spectrophotometric CIELAB analysis. Colour fastness to washing was evaluated from the resulting colour difference. Blue to blue-green shades were obtained, with colour properties varying with the harvesting period. Colour difference (ΔE) with value of 2.48 after washing indicated limited colour change, with the characteristic hue maintained. The findings confirm the applicability of woad-derived indigoid colourants for natural dyeing of wool.

Key words:

wool; natural dyes; *Isatis tinctoria* L.; woad; blue hues.

Acknowledgements:

This work has been supported by the institutional research project of the University of Zagreb Faculty of Textile Technology: “Green Technologies in Ecological Design and Development of Sustainable Materials – ZORA” (ZORA TTF IIP-04), funded by the European Union NextGenerationEU.



ANA PALČIĆ:

University of Zagreb Faculty of Textile Technology

COTTON WITH NATURAL ACTIVE COMPOUNDS FORMED BY MODERN TEXTILE TECHNOLOGIES

Abstract:

The application of natural active substances in complexes with β -cyclodextrin represents an interesting approach to developing functional textile materials. In this study, cotton fabric was functionalised with an inclusion complex of β -cyclodextrin and black cumin essential oil (*Nigella sativa* L.), and the effectiveness of the treatment and its durability after washing were evaluated. The results confirmed the attainment of antimicrobial activity, which decreased after washing but was not completely lost. At the same time, the treatment did not adversely affect properties relevant to comfort; the fabric retained its ability to rapidly absorb and dry liquid moisture, and improvements were observed in certain parameters. The results demonstrate that combining natural active substances with modern technologies can successfully impart new properties to textile materials while preserving their functionality. This approach opens up possibilities for developing more sustainable textile materials that combine antimicrobial activity and comfort, with potential applications in a hospital environment.

Key words:

cotton fabric; β -cyclodextrin; black cumin essential oil; antimicrobial efficacy; comfort

Acknowledgements:

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EXHIBITION



BRANKA KOŽUH & DANICA FRANIĆ

School of Fashion and Design:

EXHIBITION: FROM ART TO HAUTE COUTURE – ŠMID GALA

Abstract:

At the end of May, the School of Fashion and Design held the ŠMID Gala, a unique fashion event that turned the space into a living gallery of ideas, emotions and creative interpretations during the evening. The whole project was created as a result of several months of work by students and teachers who, inspired by the concept of the Met Gala and the theme of Costume Art, systematically prepared during the school year by exploring the boundaries between fashion, art and personal expression.

In the context of this, complex works have been created that reflect the connection between the interdisciplinary innovative textile ecosystem, art and high fashion. All three areas meet and intertwine in the exploration of materials, creativity, technologies and new ways of expression.

Artistic concepts and fashion as drivers of innovation can stimulate the development of new textile structures, colours, patterns and ways of designing clothes. Textiles are no longer just a functional material, but can be a sculpture, installation, conceptual work or a wearable art object. The collaboration of artists, designers, textile engineers, chemists, programmers and other experts enables the development of smart textiles, wearable technology, biotextiles and sustainable materials, and thus interdisciplinarity gains full meaning.

By interpreting and referring to works of art, haute couture can experiment with biobased, biodegradable or recycled materials and thus create new aesthetic and functional values.

The exhibition features models inspired by the works of Pablo Picasso, The Young Ladies of Avignon; Alexander Calder, The Lobster Trap and the Fishtail; Claude Monet, Water Lilies and the sculpture of Nike from Samothrace.

Key words:

art, haute couture, creativity, textile technology





ANDREA PAVETIĆ

University of Zagreb Faculty of Textile Technology

FROM THE COLLECTION OF ARTWORKS BY TTF STUDENTS

Abstract:

Over the years, hundreds of artworks created by students of the Faculty of Textile Technology within the Creativity in Textiles courses have formed an exceptionally valuable Faculty collection of outstanding visual quality. Seven student works that were previously exhibited at the Gallery of Applied Arts, were presented on this occasion. Working within a prescribed format, a circle measuring 100 cm in diameter, students created original artistic compositions under the mentorship of Professor Jadranka Bačić and Professor Andrea Pavetić. By employing a variety of artistic elements and techniques, they demonstrated the level of artistic skill, aesthetic sensibility, creativity, and originality they had attained at that stage of their education.

In addition to evoking fond memories of the period when Professor Jadranka Bačić was an active member of the Faculty, this exhibition also pays tribute to her significant contribution, together with Professor Zlatka Mencl Bajš, to the establishment of the Textile and Fashion Design study programme. At the same time, it stands as a testament to the continuity and enduring quality of the education provided to our students.

Key words:

collection of artworks by TTF students, group of courses Creativity in textiles, continuity of quality, education of students

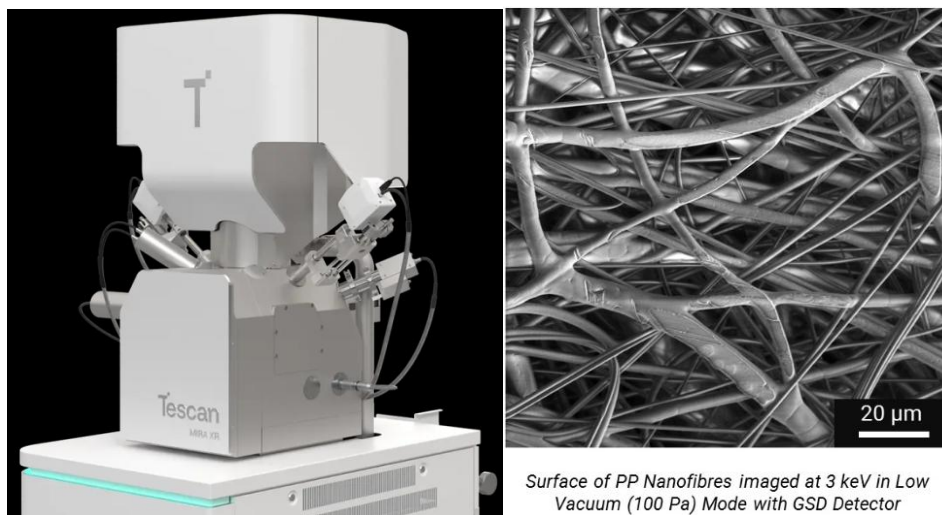




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