

Book of Abstracts  
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OPEN DAY 2020

**TEXTILES FOR CLIMATE CHANGES**



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# IMPRESSUM

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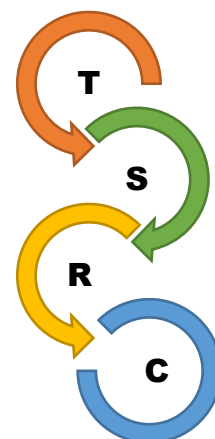
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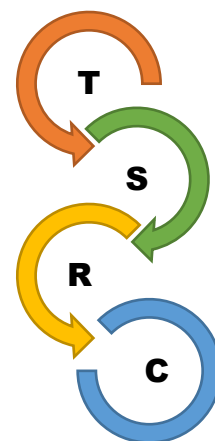
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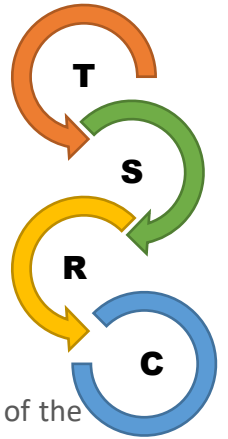


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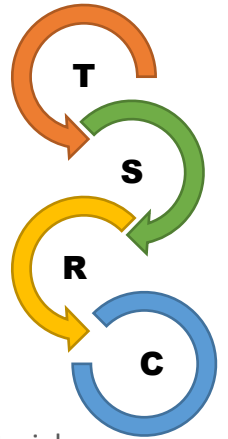
## D. DRMAČ: CEFIC – The Influence of new Initiatives for Sustainability



The industry of all the industries, chemical sector, will be pivotal in reaching the goals of the EU Green Deal. Chemicals are instrumental in every sector, including textiles, whether it is for performance/functional finishing, aesthetics or making new fibers from regenerated cellulose. The new Chemical Strategy for Sustainability is seen as a game changer by many, it will set ambitious and challenging goals – how will the chemical industry contribute to reaching those targets and how can we work together with other sectors?



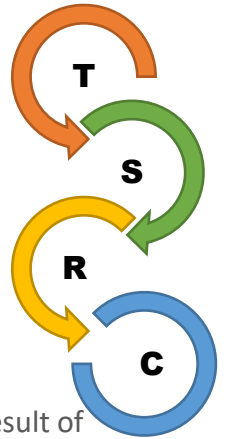
## E. VUJASINOVIĆ: Textile Fibers and Journey into the Future



Textile is perhaps one of the longest and best inventions of mankind in the field of materials. For more than three million years, textiles have played an essential role in the development of human society but also a profound impact on shaping our lives. Although originally perceived as protection against cold and harmful external impacts, textiles have evolved significantly with the discovery of new and modification of existing textile fibres, so that today everyday clothes might be transformed into smart ones that are capable of responding to various stimuli from the environment.

There has been so much progress in textiles in the last few decades that it is difficult to predict what brings the future. What is the textile of the future? & Is the future textile new? The answer is not simple. If the future is oriented exclusively to the conquest and settlement of the universe then the answer is YES. However, if the future is survival of the humankind on Earth then, the answer is NO.

## G. HUDEC: Sustainable Materials against Climate Changes

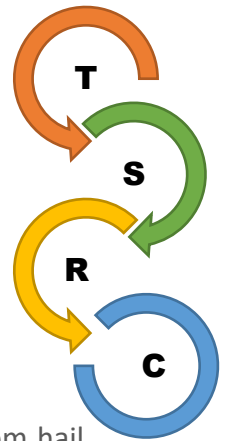


Climate changes - initiated by the irrational consumption of natural resources - is the result of humanity's greedy approach to the environment. It took a long time to reach the level of awareness that the problem - climate change is the global problem which can only be solved by an equally widely accepted strategy. The United Nations presented „*The Paris Agreement*“ at their conference in Paris, with the central aim to strengthen the global response to the threat of climate change.

This is still a production optimization approach, however a consumption approach is much more important. We still live in a consumer world, where a person's value is often judged by the amount of product they own, with the criterion more expensive = better. This fundamental change is far from recognizable, and the goal of an approach to possess as much as needed is still far away. The first step is to promote materials that are more environmentally friendly for everyday use.



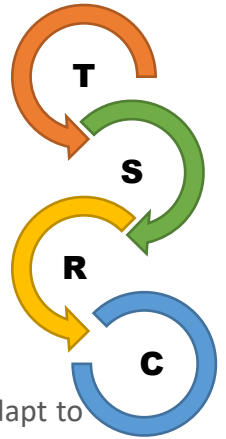
## Z. VRLJIČAK: Knitted Nets for Anti Hail Protection



The basic principles of construction of nets for protection of fruits and vegetables from hail and other disasters, such as wind, sun, insects, animals, dirt, etc. The nets are most often used to protect the fruit and stem, or fruits, vegetables, plants, flowers, hothouses, animals, material goods: houses, agricultural machinery, cars, etc. Examples of the application of protective nets in vineyards and orchards both on plantations and individual protection are presented. The constructional features of knitted safety nets with a pillar stitch in combination with a partial weaving of the weft have been developed. The basic constructions of knitted nets are made with two systems of warp threads. One system of warp threads makes loops in a pillar loop, and the other system connects rows of loops made in a chain by partially inserted weft. Polyethylene in the form of monofilament with a diameter of 0.15 to 0.30 mm, or a fineness of 15 to 60 tex, is often used to make knitted nets. Lighter nets have a mass per unit area of 30 to 60 g/m<sup>2</sup>. Networks with a fuller structure are stronger and have a mass per unit area above 60 g/m<sup>2</sup> and up to 150 g/m<sup>2</sup>. More complex net constructions are made with three or more systems of warp threads. The application of a particular net construction depends on the climate, climatic conditions and the agricultural crop or material good being protected. Quality application of safety nets increases the quality of grown fruits and vegetables. The application of protective hail nets can significantly reduce hail damage.



## D. ROGALE, S. FIRŠT ROGALE, Ž. KNEZIĆ, D. ČASAR VELIČAN: Smart Clothing as Response to Mitigating the Effects of Climate Changes on Humans



The diving suit, G-suit and astronaut suit were among the first garments that could adapt to conditions in an inhospitable environment. Therefore they can be considered a precursor of contemporary intelligent clothing.

During the development of smart and intelligent clothing, special attention is paid to the aspect of health protection and protection from the negative impact of the environment on human health. Mentioned types of clothing can be a response to mitigating the effects of climate change on humans. This is done by monitoring the state of the environment and the state of your wearer and optimally adapting to the needs of the wearer in accordance with the observed changes in the environment. Smart and intelligent garments can measure and analyse environmental parameters, evaluate them using a built-in electronic microcomputer. Intelligent clothing also has the ability to make independent decisions that adapt to environmental conditions. For modern types of clothing, it is important that their development requires a multidisciplinary research team involving engineers from different professions and fields. The multidisciplinary team includes clothing and textile engineering experts, electrical engineers, IT and mechanical engineering experts. Experts in the field of medicine, occupational safety, military sciences, but also experts in the field of ecology can also be included. In this way, high-tech professional knowledge is incorporated into clothing. With an exceptional functional level of clothing, high added value and selling price of clothing is obtained.

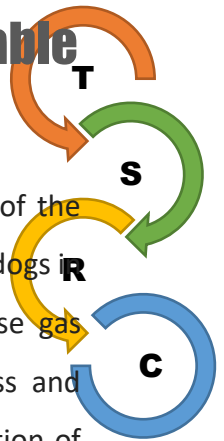




## A. GRILEC: Is sustainability in fashion really sustainable

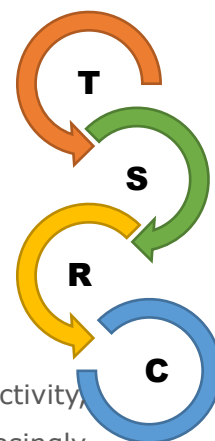
The fashion industry is often mentioned in the media as one of the main polluters of the environment. Thus, in the media, terms such as textile waste in the environment, blue dogs in China, the Red River in Bali, and the impact on climate change due to greenhouse gas emissions are often associated with the fashion industry. As a result of awareness and increased concern for the environment, the fashion industry has moved in the direction of promoting and creating sustainable fashion. But is there really a shift or has “sustainability” as a name alongside “fashion” become just fashion? Fashion brands such as Stella McCartney gave up animal fur long time ago, "Save the Duck" duck feathers, "Patagonia" has turned to anti-consumption promotion by allowing free repair of clothing and thus extending the life-cycle of its products, while Gucci in its Sustainability Strategy plans to reduce greenhouse gas emissions for 50% by 2025. Furthermore, the efforts are reflected in biodegradable Croatian fashion items such as Miret and Native sneakers, Vollebak and C&A T-shirts or Jordyn Leah swimsuits. Brands such as Zara, Intimissimi and H&M encourage recycling by giving discounts to the bearers of old garments on their next purchase. But does this actually shorten the life-cycle of the product and encourage a new purchase?

All efforts related to the sustainability of the company are used in their promotion and communication, because brands are aware of the positive impact of the term "sustainability" in the purchase decision, and the question of the credibility of promotional messages arises. The results of a survey conducted in the USA and Canada on the topic of "greenwashing" back in 2010 are shocking. "Greenwashing" is a term used for misusing the terms such as "sustainability", "green", "healthy", "environmentally friendly" and generally to create false "sustainable image" of a company in order to present it to potential customers in a better light. In the mentioned research conducted on 4,744 products marked as “green”, 95% were accused of abusing the term “green” and therefore for greenwashing (UL, 2010). This research has shaken the credibility of the promotional messages of all "sustainable" brands, and the responsibility for promoting sustainable fashion is placed on customers who can choose brands that are truly sustainable. As a conclusion of this presentation, the fact is imposed that it is impossible to achieve sustainable fashion without conscious consumers.





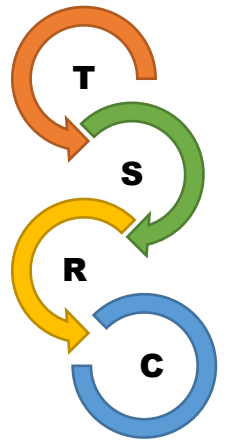
## T. DEKANIĆ: UV Functionalization through Detergent Composition



It is well-known that climate change is caused by long-term and systematic human activity, which is directly affecting the entire ecosystem. Lately, research has become increasingly focused on solving this problem, as well as reducing the negative impact of humans on the environment and vice versa. One of the burning issues is the increasing amount of harmful UV radiation that comes to earth and can cause health problems: erythema, skin ageing, damage to the immune system, cataract and various types of skin cancer, of which is the most deadly melanoma. According to the Croatian National Cancer Registry, it has been observed that the incidence of malignant tumours recorded a trend of growth and it is worrying that the melanoma is increasingly being diagnosed among the younger population. The consequences of the harmful effects of UV radiation can be partially prevented by applying a sunscreen with a high sun protective factor, with protective sunglasses and by suitable clothing. With well-known ways how to prevent and reduce the effects of solar radiation on humans, it is less known that the functionalization of textile materials can be effective in combating the negative effects. The respectable human-ecological approach in the textile industry has focused the research on the UV functional compounds in the processes of finishing and care. Due to the nature of fluorescence compounds, which is reflected in the ability to absorb UV radiation, it is possible to add a value to the treated textile material. Through investigating the protection potential in washing processes with detergents containing UV functional compounds, such as an optical brightener or a combination of an optical brightener and a UV absorber, it has been proven that the level of protection is provided in a considerably shorter time, with a simultaneous increase in whiteness.



# T. PUŠIĆ, M. ČURLIN, B. VOJNOVIĆ: Problems of Microplastics in Efluents from Washing Process



The problem of microplastics in the environment is an interdisciplinary topic that arouses public interest on a global scale. Numerous studies have confirmed that textile fibers as primary and secondary microplastics are one of the most common components in plastic waste. This presentation focuses on the release of microplastic particles in washing, existing methods of analysis and examples of good practice in reducing the number of released particles from textiles in the washing process. Development and research concept will be presented with the aim of assessing the release of microplastics of textile origin into the environment using innovative washing process procedures and environmentally friendly processing of synthetic materials.



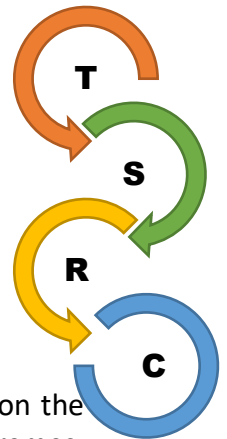


# I. ŠPELIĆ, A. MIHELIĆ-BOGDANIĆ: The Impact of Energy Stability on the Economic Development of the European Union: Guidelines for Achieving European Energy Neutrality by 2050



In the last thirty years, world economy is confronted by large scale monetary losses due to climatic changes. According to data provided by the European Environment Agency in 2010, 11 billion of people was affected by natural hazards and technological accidents. The European Economic Area state members suffered loss of about € 150 billion between 1998 and 2009. This forced European Union to come up with systematic risk assessment on losses caused by natural disasters due to pronounced climatic changes and create global guidance on how to decrease environmental pollution and protect both the climate and the environment. At the end of 2019, the European Green Deal was adopted. The European Green Deal is common name for Communication from the Commission to the European Parliament, the European Council, the Council, the European Economic and Social Committee and the Committee of the Regions, which seeks to initiate the necessary changes in the social and economic trends of Europe, in order to protect the population from the increasingly devastating consequences of natural disasters and to reduce environmental pollution. Through intensifying public investment and redirecting capital, Europe is moving towards sustainable development and inclusive growth. The European Green Deal calls for the increasing inclusion of renewable energy sources in the development of the energy sector, encouraging new industrial policies based on a sustainable circular economy, greater investment in energy efficient construction, reducing greenhouse gas emissions by restructuring European roads and encouraging the use of alternative fuels, biodiversity and investment in afforestation and protection of marine and watercourses, encouraging investment in environmentally friendly agricultural production and the introduction of a zero tolerance rate for air, water and soil pollution.

## T. KRIČKA, D. VICAN, S. ZJALIĆ, S. BISCHOF: Production of food, biocomposites and biofuels from cereals in a circular bioeconomy (PROJECT CLIMATE)



One of the fundamental challenges of modern agricultural production will be based on the challenges caused by climate change. Climate change, through temperature extremes, droughts and intense precipitation in a short period of time, the emergence of new pests, significantly affect the achieved yields and quality of cultivated food, especially cereals. Therefore, the emphasis is on their "sustainable breeding". It is also known that the occurrence of pests and mycotoxins on cereals is directly related to climatic conditions in a given year, so monitoring is desirable to prevent side effects. Furthermore, the RED II Directive and the objectives of the 2030 Framework for Climate and Energy Policies, the Paris Climate Agreement and the Biofuels and Indirect Land Use Change (ILUC) emphasize the great potential that soil has to absorb carbon and thus mitigate climate change and characterize biomass and biofuels as an important segment in Europe's quest to become a self-sustaining, low-carbon society. Based on the above, it is important to know the circulation of CO<sub>2</sub> emissions during the cultivation of cereals in order to create a precondition for creating sustainable soil management. The RED II directive defines agricultural biomass through innovative 4x4 biomass management (food, feed, fuel and fiber). After harvest, the collected biomass can be used for biofuel production, which would ensure the reduction of harmful gas emissions. In accordance with 4F management, part of the research provides determining the potential and evaluation of residues from the wheat, barley and corn production for the biocomposites and biotechnical textiles production as value-added textiles. With a cascading approach to biomass management, the rest from the biocomposites or technical textiles production will become a new raw material which will be explored as a potential raw material in the production of solid biofuels or as a potential soil enhancer. Based on the above, the project CLIMATE "Production of food, biocomposites and biofuels from cereals in a circular bioeconomy" includes applied research of proper agrotechnical measures for old and new wheat and barley varieties and maize hybrids to determine optimal ratios between grain and biomass and the presence of mycotoxins. The grain quality of cereals for food and nutrition will be determined, as well as the sequestration of carbon into soil and plant, and the biomass quality for biocomposites, biofilters, second-generation bioethanol and solid biofuels from production residues. By exploiting the residues, potential waste will become a raw material and the process of circular bioeconomy will be closed.





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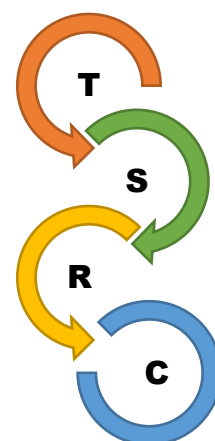
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