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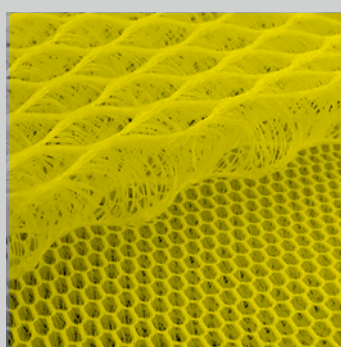
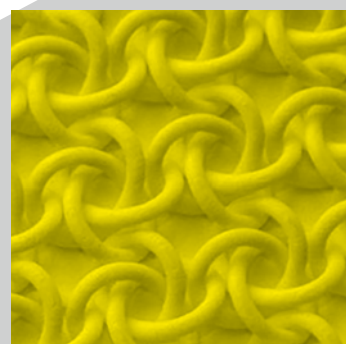
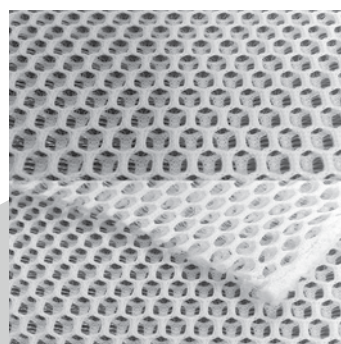
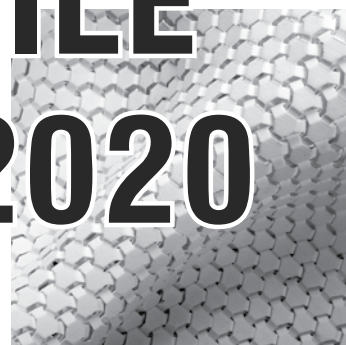
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BOOK OF ABSTRACTS

NATIONAL TEXTILE CONFERENCE - 2020



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Topic № 1
FIBRES AND YARNS;
CHEMICAL TECHNOLOGIES;
NANOTECHNOLOGIES

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Industry of High Molecular Substances.
Rubber industry. Plastic industry.



LEATHER PRINTING AND OTHER DECORATION METHODS

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Leathers differ from other materials in dyeing or printing due to their diverse structure. The dyeing process results in a monochrome background, while the printing processes can reproduce multicolored patterns on the face of the material using different printing techniques. The printing of patterns, symbols and ornaments on materials is a form of decoration that is more common in the textile industry than in the leather industry. Modern printing technologies offer fast printing on leather and other materials with different structure and color, which stimulates designers to develop their graphic designs for prints and patterns digitally.

The aim of the present work is to study and analyze the methods and techniques for printing and decoration on leather.

The interaction of dyes or printing inks with the protein substances of the skin tissue and the hair cover is a complex process. The reasons is the different structure and properties of the printing inks and the different application of the main component of the dyed material - collagen and keratin, depending on the pre-treatment of the leather, tanning and finishing processes.

Printing on leather can be done by screen printing, transfer, inkjet, digital and other types of printing. The special ink, developed for leather, made it possible to apply high-quality, multi-colored motifs. The requirement is to use dyed smooth leather, as a transparent cover layer is applied to prevent the paint from being erased by sealing the ink layer.

Leather printing processes include the stages of preparing an image with a monochromatic or polychromatic character, printing the image using one or more inks on a sheet of paper (so-called transfer printing) and transferring them to the leather.

The ability to print white ink, UV printing makes it possible for advanced printing on leather based on shadows. This suggests that it can also be printed on dark leather goods.

Conclusions:

- There are various printing techniques in the leather industry, many of which are taken from the textile printing technique;
- The interaction of dyes and printing inks with the protein substances of the skin tissue and hair cover is a complex process and requires a specific approach to each material;
- Most of the applied techniques of printing on leather are described as patents;
- Laser printing has also entered the leather industry, creating a diverse palette of colors and designs.
- Many different decoration techniques are applied to leather products: stamping, engraving, perforation, embroidery, etc.



Key words: leather, printing techniques, inks, decoration techniques

EXTRACTION AND ANALYSIS OF KERATIN HYDROLYSATES OBTAINED FROM SHEEP WOOL

Margarita KOLEVA¹, Darina ZHELEVA¹

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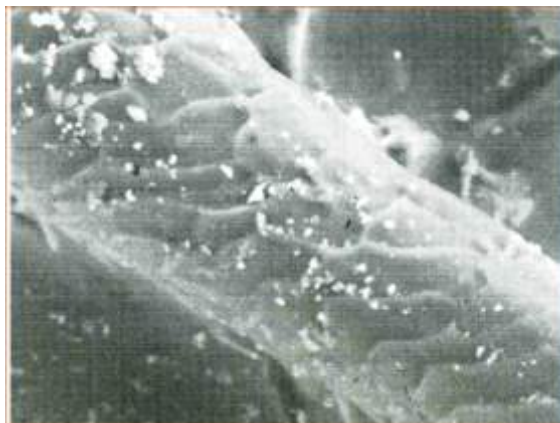
Introduction

Keratin in wool is a potentially important natural source of protein with many applications. Wool keratin is a strong resistant, insoluble biomaterial that can play a major structural role in many biological systems. The aim of the present study is to obtain and analyse keratin hydrolysates from sheep wool, respectively native and alkaline pre-treated, using different oxidation and reduction methods.

Experimental part

The raw materials for the extraction of keratin hydrolysates in our research are samples from the hair cover of sheepskins, respectively in native form and obtained after lime sulfide unhairing. The wool, which is lime sulphide pre-treated, is obtained after the process of unhairing of sheepskin under certain conditions. The methods used for the hydrolysis of keratin-containing materials are the following: with thioglycolic acid and urea; by sulphitolysis with sodium pyrosulphate and with sodium hydroxide.

The obtained hydrolysates were characterized by qualitative reactions, spectrophotometric and infrared analysis.



Results and discussion

The hydrolyzates obtained by lime sulfide unhairing process have shown a high concentration of polypeptides in the sample and rupture of the disulfide bonds in their chains. The highest degree of hydrolysis was achieved for the pre-treated samples. It was proved that the method of hydrolysis with NaOH is the most appropriate for sheep wool and to a much greater extent for the alkaline treated wool than for the native. Therefore, pre-treatment of hair samples facilitates the hydrolysis process and makes it easier to break disulfide bonds. The data from the IR analysis completely correlate with the quantitative and qualitative analyzes and show the degree of rupture of the disulfide bonds depending on the intensity of the adsorption bands.

Conclusion

Three methods were used for the hydrolysis of keratin from the hair cover of sheep skins, respectively of native wool and that obtained by lime sulfide unhairing. NaOH has the best hydrolyzing effect on disulfide and peptide bonds. Pre-alkaline treatment of the wool by reducing agent increases the degree of hydrolysis compared to the native wool. It has been proven the presence of keratin protein in some of the hydrolysates as well as the rupture of disulfide bonds.

Keywords: sheep wool, keratin hydrolysates, methods of analysis

STRUCTURAL CHANGES OF THE HYDROGEL FOR TEXTILE MODIFICATION DEPENDING ON THE INTENDED APPLICATION

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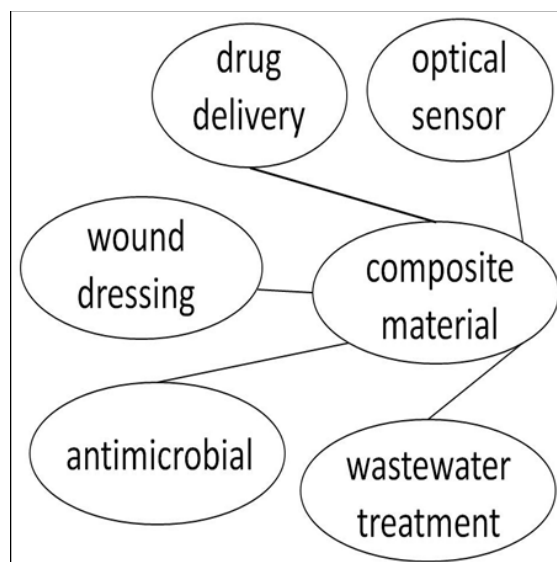
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In the recent years, we have conducted several studies related to the modification of textile materials with hydrogel, and included or not inorganic nanoparticles. Some of the properties and applications of these composites are antimicrobial; optical sensors; wastewater treatment materials; wound dressings or delivery of biologically active substances. The aim of this study is to summarize the results in terms of the factors that affect the properties of the respective composite materials and how their modification allows achieving a suitable application.

The modification of cotton or polyamide fabrics with hydrogel was performed by surface-initiated photopolymerization. Photosensitive dye (eosin Y) in combination with a co-initiator (N-methyl diethanolamine) was used to initiate radical polymerization. It was found that the greater amount of photoinitiator and the simultaneous presence of three monomers affect the polymerization process and, accordingly, the properties of the pH sensor. The controllable swelling of the hydrogel is an important parameter for suitable loading and releasing of drugs with minimal burst effect. The amount of the crosslinking monomer and the hydrogel on the cotton surface has been changed to find the most suitable structure providing adequate loading and releasing of vitamin B12 under appropriate physiological conditions (temperature and pH).

The composite material cotton fabric with hydrogel and silver nanoparticles is a suitable material for production of wound dressings. A key point that affects the obtained properties is again eosin Y, as it is an intermediate link in the simultaneous conduct of photoreduction of silver ions to nanoparticles and hydrogel polymerization. It has been found that other metal ions can also be used for the production of materials with antimicrobial properties. The conversion of zinc ions to zinc oxide is done by varying the quantity of co-initiator of photopolymerization N-methyl diethanolamine. The higher concentration of zinc ions and amine increases the concentration of ZnO nanoparticles and the antimicrobial properties of the material. The immobilization of iron oxide nanoparticles with polyacrylamide hydrogel on the polyamide fabric can be used as a heterogeneous Fenton catalyst for purification of real wastewater upon dyeing. The material obtained at a higher Fe(II) ions concentration is more efficient in the degradation of this dye.



Keywords: textile, hydrogel, nanoparticles, applications

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COTTON FABRIC MODIFIED WITH CHITOSAN AND ZINC OXIDE

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Introduction

The fulfillment of the circular economy goals is closely connected with finding various possibilities for the application of the already used materials. The growing consumption of cheap and second-hand clothes decreases the possibility of their reuse as wearable textiles. Another possibility is to utilize the textiles for cleaning or become a raw material for other industries. In the recycling, additional processing is often required to create the appropriate characteristics of the new product that suit the desired use. The composite materials integrating the specific textile properties with biodegradable renewable biopolymers and inorganic nanoparticles can find applications as sorbents and filters for the treatment of wastewater or oil spilling.

The aim of this study is to prepare a composite material from cotton fabric modified with cross-linked chitosan and zinc oxide nanoparticles.

Experimental part

Three samples, containing different concentrations of zinc oxide were obtained (Ch, ChZn, ZnChZn). In the first sample (Ch) cotton fabric was impregnated with a water solution of chitosan and glacial acetic acid, and next was crosslinked with glutaraldehyde. In the second sample (ChZn) the solution of chitosan and zinc nitrate was applied on the fabric and successively treated with glutaraldehyde and NaOH. The sample (ZnChZn) was obtained by irrigation with water solution of zinc nitrate, next with chitosan and zinc nitrate solution, and finally with glutaraldehyde and NaOH.

Results and Discussion

The surface of the composite materials has been compared with the initial cotton fabric by using a scanning electron microscope. In the sample (Ch) the individual fibers are glued together by a thin layer of chitosan. In the ChZn material, the surface of the fabric is covered with an almost uniform film, in which defects and cracks are observed. Evenly distributed small white grains of zinc oxide are included throughout the structure of the film. The morphology of the samples in dry and wet state was evaluated by optical microscope. The increased amount of zinc oxide results in a denser layer on the surface of the fibers and impedes water penetration and the macro-gaps in the fabric structure are still visible. The modification of cotton fabric with chitosan and its crosslinking was confirmed by FT-IR analysis and the appearance of the new characteristics bands.

Conclusion

A film of chitosan containing in situ formed zinc oxide nanoparticles on the surface of a cotton fabric has been successfully obtained. The resulting composites have the potential use as antimicrobial, self-cleaning materials with suitable sorption properties.

Keywords: composite materials, chitosan, cotton fabric, zinc oxide particles

Acknowledgments:

The authors acknowledge the support through Project № КП-06-H37/27 provided by the National Science Fund, Ministry of Education and Science of Bulgaria.

NOVEL ANTIOXIDANT ELECTROSPUN NONWOVEN TEXTILE FROM POLYLACTIDE AND 8-HYDROXYQUINOLINE DERIVATIVE AND ITS COMPLEX WITH Cu^{2+}

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Introduction

8-hydroxyquinoline and its derivatives are well known for their high antimicrobial, antioxidant and antitumor activity [1]. It is assumed that their biological activity is related to their chelating ability against transition metal ions (Cu^{2+} , Fe^{2+} , Fe^{3+} , etc.) of biological importance [2]. When included in electrospun fibrous materials, such compounds may impart them beneficial properties. The purpose of this work was to investigate the possibility for the preparation of novel electrospun nonwoven textile containing 8-hydroxyquinoline derivative or its complex with metal ion of diverse design, as well as to study the impact of the fiber composition on the antioxidant activity of the fibrous materials.

Experimental part

8-hydroxyquinoline derivative - Schiff base from Jeffamine ED[®] and 8-hydroxyquinoline-2-carboxaldehyde (Jeff-8Q) and its complex with Cu^{2+} (Jeff-8Q. Cu^{2+}) were prepared as described earlier [3,4]. Custom-made electrospinning equipment was used. The morphology of the fibrous materials was observed by scanning electron microscopy (SEM) using a Jeol JSM-5510 SEM (JEOL Co. Ltd, Japan). The antioxidant activity of the mats was evaluated using the DPPH assay.

Results and Discussion

Novel nonwoven textile from polylactide (PLA) and Jeff-8Q or its complex with Cu^{2+} of various design was successfully prepared. To achieve this, one-pot electrospinning (type "in") or combining the electrospinning and dip-coating techniques (type "on") were applied. The morphology of the mats and chemical composition of their surface were studied by scanning electron microscopy (SEM) and X-ray photoelectron spectroscopy (XPS). The coordination of Cu^{2+} in Jeff-8Q. Cu^{2+} complexes incorporated into electrospun nonwoven textile or deposited on its surface was studied by electron paramagnetic resonance spectroscopy. It was found that for the type "on" mats the *in vitro* release of Jeff-8Q (Jeff-8Q. Cu^{2+}) was more rapid as compared to type "in" mats. The performed DPPH radical scavenging assay showed that Jeff-8Q. Cu^{2+} -containing fibrous materials (both types "in" and "on") exhibited higher antioxidant activity than that of Jeff-8Q-containing mats.

Conclusion

In this study it was shown that Jeff-8Q and its complex with Cu^{2+} might successfully be incorporated in the electrospun nonwoven textile from polylactide. This novel nonwoven textile is promising for biomedical applications.

Keywords: 8-hydroxyquinoline derivative, electrospinning, dip-coating, antioxidant electrospun nonwoven textile

Acknowledgments: Financial support from Bulgarian National Science Fund (Grant KP-06-N39/13/2019) is gratefully acknowledged.

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NOVEL ELECTROSPUN NONWOVEN TEXTILE CONTAINING BIOACTIVE COMPOUNDS OF PLANT ORIGIN WITH ANTIOXIDANT AND ANTIBACTERIAL PROPERTIES

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Introduction

In recent years, the incorporation of bioactive compounds of plant origin in electrospun nonwoven textile intended for biomedical applications is increasing. The specific properties of the electrospun fibrous materials related to their nanoscale size provided a possibility for extended release of bioactive compounds resulting in enhancement of the therapeutic effect of the compounds, diminishing their cytotoxicity and improving their bioavailability. Essential oil from *Salvia* spp. and polyphenolic compounds of plant origin are highly attractive for application in biomedicine and pharmacy due to the set of their beneficial biological properties (antioxidant, antimicrobial and anticancer activities). Therefore finding routes to incorporate these bioactive compounds in electrospun nonwoven textile is of great interest.

Experimental part

Fibrous materials containing essential oil from *Salvia* spp. and individual bioactive polyphenolic compound were fabricated by electrospinning. The morphology of the fibrous materials was evaluated by scanning electron microscopy (SEM) with Jeol JSM-5510 (Jeol Ltd., Japan). The antioxidant activity of the electrospun nonwoven textile was studied by the DPPH radical scavenging method.

Results and Discussion

Novel nonwoven textile from biocompatible and biodegradable aliphatic polyester (PE) and nonionogenic water-soluble polymer (polyvinylpyrrolidone (PVP)), containing essential oil from *Salvia* spp. and individual bioactive polyphenolic compound were successfully prepared by electrospinning. The obtained fibrous materials were defect-free and cylindrical. The incorporation of essential oil from *Salvia* spp. and bioactive polyphenolic compound into the fibrous materials does not affect significantly their thermal stability. Antioxidant activity test showed that nonwoven textile containing essential oil and bioactive polyphenolic compound displayed high antioxidant activity. The microbiological screening demonstrated that incorporation of essential oil and bioactive polyphenolic compound in the fibers led to inhibition of the growth of Gram-positive bacteria *S. aureus*, Gram-negative bacteria *E. coli* and fungi *C. albicans* by the fibrous materials.

Conclusion

This novel nonwoven textile has potential as wound dressing materials.

Keywords: essential oil from *Salvia* spp., individual bioactive polyphenolic compound, nonwoven textile, electrospinning, antioxidant properties, antibacterial activity

Acknowledgments: This work was supported by the Bulgarian Ministry of Education and Science (Grant D01-217/30.11.2018 and D01-323/18.12.2019) under the National Research Programme "Innovative Low-Toxic Bioactive Systems for Precision Medicine (BioActiveMed)" approved by DCM # 658/14.09.2018.

INFLUENCE OF THE SURFACE MASS IRREGULARITY ALONG THE WIDTH OF THE FABRIC ON THE DYEING AFFINITY AND COLOUR DEVIATION

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The uniform dyeing of light fabrics implies adjustment and maintenance of the already optimized technological mode, in terms of temperature and duration of the process.

In practice, it turns out that in order to achieve maximum uniformity of colour on the surface of the fabric; the corresponding uniform dye affinity is required.

In cases where the fibrous composition of the fabrics is uniformly distributed, only the density can affect the uniform penetration of the dye solution between the fibres.

The density of the fabric or surface mass is generally evenly distributing due to its negligibly small thickness relative to the width, and especially the thickness.

In fact, in woven fabrics there is a difference in the surface mass between the edges and the middle of the fabric. This is largely due to the different tension of the main threads gripped by the wide holders and the rest. Any other differences in the setting of the weaving loom and geometric unevenness cause deviations in the distribution of the area mass.

In a similar way, the setting of circular knitting or warp knitting machines causes a difference in the density or area of the knitted fabrics.

The problem is to determine the critical level of unevenness by surface mass of the fabric already produced, which would cause a difference in dye affinity, which in turn would lead to divergence and declassification of the fabric as a non-compliant product.

In this case, the solution lies in the synchronization of three technological indicators with clearly expressed numerical values.

In the first place is the analysis of textile physical metrology, which will assess the uniformity of the surface mass across the fabric.

In second place is the recipe and the mode of dyeing the fabric.

Third is the generalized assessment of the conformity of the colour along the width of the fabric to the set value. Such a numerical estimate is obtaining from a spectrophotometer.

The subject of this article is the comparison of the non-uniformity of the surface mass of knitted fabrics and the estimation of the colour deviations, flattened by means of a spectrophotometer.

The aim of the development is to establish the limit level of mass non-uniformity on the acceptable colour deviation in the width of the fabric.

Keywords: textile fabrics, mass irregularity, dyeing affinity, colour deviation.

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Fabrics: woven and knitted

**SURFACE MASS
IRREGULARITY**

DYEING AFFINITY

COLOUR DEVIATION

PREPARATION AND CYTOTOXICITY OF NOVEL BIOACTIVE COMPOUND-CONTAINING POLYMERIC NANOSIZED MATERIALS

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Introduction

It is well known that 8-hydroxyquinoline, its derivatives and berberine chloride (Brb) manifest a set of beneficial biological properties: antimicrobial, antioxidant, antitumor, etc. [1,2]. The incorporation of these bioactive compounds in polymeric nanosized materials (electrospun nonwoven textile and nanoparticles (NPs)) can impart advantageous properties to the materials. Therefore finding routes to prepare 8-hydroxyquinoline derivatives- and Brb- containing polymeric nanosized materials and to explore the effect of the composition of the obtained materials on their cytotoxicity is of great interest.

Experimental part

8-Hydroxyquinoline derivative and its complex with Cu²⁺ were prepared as described earlier [3,4]. Custom-made electrospinning equipment was used. The in vitro cytotoxicity of the obtained nanosized materials against HeLa human cervical tumor cells and non-tumor BALB/c 3T3 mouse fibroblast cells was assessed by the MTT assay. The morphology changes in the cells cultured in the presence of nanosized materials were assessed by fluorescent staining methods.

Results and Discussion

Novel nonwoven textile from polylactide and 8-hydroxyquinoline derivative (Schiff base from Jeffamine ED® and 8-hydroxyquinoline-2-carboxaldehyde (Jeff-8Q)) or its complex with Cu²⁺ (Jeff-8Q.Cu²⁺) of diverse design was fabricated by one-pot electrospinning or electrospinning combined with dip-coating. Stable aqueous dispersions of NPs based on complexes of Brb and poly(methacrylic acid) or poly(acrylic acid), were also successfully prepared by mixing their dilute aqueous solutions. The morphology of the fibrous mats and NPs were studied by scanning electron microscopy (SEM) or transmission electron microscopy (TEM). In vitro cell viability studies and used fluorescent staining methods demonstrated that the prepared Jeff-8Q- or Jeff-8Q.Cu²⁺-containing fibrous materials and Brb-containing NPs displayed a higher cytotoxicity against HeLa tumor cells than against non-tumor BALB/c 3T3 mouse fibroblast cells. It was found that the observed antitumor effect against HeLa cells is mainly due to the induction of apoptosis.

Conclusion

These properties render these novel polymeric nanosized materials promising as potential candidates in the drug delivery systems in the treatment of cervical tumors.

Keywords: 8-hydroxyquinoline, Schiff base, complex with Cu²⁺, berberine, electrospun nonwoven textile, nanoparticles, cytotoxicity of nanosized materials

Acknowledgments: Financial support from Bulgarian National Science Fund (Grant KP-06-N39/13/2019) is gratefully acknowledged.

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POLYMER MEMBRANES FROM BIODEGRADABLE POLYMER AND CHEMICAL FUNGICIDE PREPARED BY ELECTROSPINNING

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Introduction

Esca is one of the earliest described diseases in grapevines that cause trunk damages and sudden wilting of the entire plant. It is known that esca is caused mainly by species *Phaeoacremonium chlamydospora* and *Phaeoacremonium aleophilum*. However, there are no known curative approaches for fighting with esca directly. Novel approaches and agents for solving the problem can be provided by developing innovative fibrous polymer membranes containing biologically active chemical fungicides.

Experimental part

Cellulose acetate (CA, 30 000 g/mol and DS 39.8%), polyethylene glycol (PEG, Mr = 1 900-2 200 g/mol) and 5-chloro-8-hydroxyquinoline (5-Cl8Q) (Sigma-Aldrich) were used. Acetone (Sigma-Aldrich) of analytical grade of purity was used.

Results

Fibrous membranes of CA, CA/5-Cl8Q, CA,PEG and CA,PEG/5-Cl8Q were obtained by electrospinning. Electrospinning of CA solution (10wt%) reproducibly resulted in obtaining continuous defect-free fibers with mean fiber diameter of 780 ± 100 nm. The addition of PEG into the spinning solutions resulted in decrease of the average fiber diameter (531 ± 80 nm). The addition of 5-Cl8Q (10 wt%) to the spinning solutions led to the preparation of fibers with diameters 750 ± 90 nm for the CA/5-Cl8Q fibrous membranes and 446 ± 60 nm for the CA,PEG/5-Cl8Q membranes. The antifungal activity of the electrospun membranes was assessed as well. The incorporation of 5-Cl8Q in the membranes that were placed in contact with *P. chlamydospora* and *P. aleophilum* resulted in complete inhibition for all fungi.

Discussion

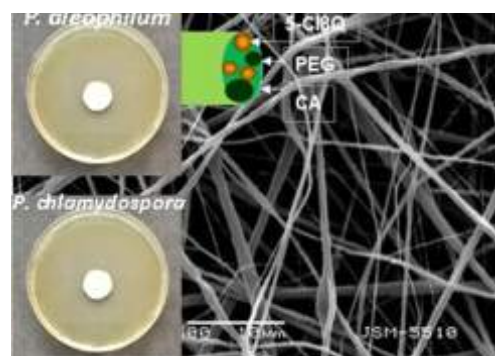
The observed decrease in fiber diameter of CA,PEG and CA,PEG/5-Cl8Q fibers may be explained by the decrease in the solution viscosity by adding a lower molecular weight polymer (PEG) to the spinning solution. The observation of wide zones of inhibition around all membranes containing 5-Cl8Q is evidence that the incorporated bioactive compound impart antifungal activity to the prepared novel fibrous membranes.

Conclusion

Polymer membranes from CA - a biodegradable polymer and a chemical fungicide - 5-Cl8Q were successfully prepared by electrospinning. The incorporation of 5-Cl8Q in the membranes imparted a considerable antifungal effect against *P. chlamydospora* and *P. aleophilum*. These features indicate that the obtained novel fibrous membranes are suitable candidates for application in agriculture for plant protection against two main causative agents of esca disease.

Keywords: electrospinning; cellulose acetate, chemical fungicide, *Phaeomoniella chlamydospora*; *Phaeoacremonium aleophilum*;

Acknowledgment: The authors thank the National Science Fund of Bulgaria for the financial support (Grant number KP-06-OPR03/2 (14.12.2018)).



DESIGN OF ECO-FRIENDLY ELECTROSPUN MATERIALS WITH FUNGICIDAL ACTIVITY AGAINST *P. CHLAMYDOSPORA*

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Introduction

Electrospinning is a cutting-edge nanotechnology that allows facile fabrication of fibrous materials with unique features. The suitable combination of biocompatible and biodegradable poly(3-hydroxybutyrate) (PHB) with nanosized TiO₂-anatase capable to generate singlet oxygen by using electrospinning alone or in conjunction with electrospraying, is expected to enable the creation of innovative polymer composites with varied design able to protect mechanically damaged vines from entering the spores of *P. chlamydospora*, i.e. to protect vineyards from Esca - the most devastating disease of grapevines.

Experimental part

Poly(3-hydroxybutyrate) (PHB, 330000 g/mol), titanium (IV) oxide (TiO₂, 99.7% anatase nanopowder, <25 nm), chitosan oligomers (COS, 3000-5000 g/mol), chloroform (CHCl₃) and N,N-dimethylformamide (DMF) were of analytical grade and used without further purification.

Results

Fibrous TiO₂-in-PHB materials were obtained by electrospinning of a mixture of PHB solution with TiO₂ (7% w/v). Fibrous TiO₂-on-PHB materials were prepared by using a PHB spinning solution (14% w/v) for electrospinning and TiO₂-COS dispersion for electrospraying. For this purpose, an aqueous COS solution (0.5%) was added to TiO₂ (10% w/v) dispersion in ethanol. Electrospinning was performed at 25 kV voltage, tip-to-collector distance of 25 cm and 1500 rpm collector rotation speed. In order to study the antifungal activity against *P. chlamydospora* of the fibrous materials, 20 ml conidia suspension (with final concentration 10⁷ conidia/ml) was passed through each fibrous material by using a filtration device.

Discussion

One-pot electrospinning of a suspension of TiO₂ in PHB solution resulted in materials in which TiO₂ was incorporated within the fibers (design type "in"). Simultaneous electrospinning of PHB solution and electrospraying TiO₂-COS dispersion enabled the preparation of materials consisting of PHB fibers on which TiO₂ was deposited on the fibers' surface (design type "on"). It was shown that TiO₂-on-PHB exhibited complete inhibition of fungal growth of *P. chlamydospora*.

Conclusion

The obtained eco-friendly fibrous materials based on PHB and TiO₂ are promising candidates for plant protection against penetration and growth of main causative fungi causing Esca disease.

Keywords: antifungal activity, electrospinning, electrospraying, PHB, TiO₂.

Acknowledgment: The authors thank the National Science Fund of Bulgaria for the financial support (Grant number KP-06-OPR03/2 (14.12.2018)).

ANTIOXIDANT ACTIVITIES OF NOVEL QUERCETIN-LOADED ELECTROSPUN FIBROUS MATERIALS

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Introduction

Quercetin occurs abundantly in a variety of fruits and vegetables. This biologically active compound exhibits remarkable antioxidant, anti-inflammatory, antibacterial and anti-tumor activities. Quercetin incorporation in fibrous polymer matrices is of interest when its biomedical and pharmaceutical applications are intended.

Experimental part

Cellulose acetate (CA, 30 000 g/mol and DS 39.8%), polyethylene glycol (PEG, Mr = 1 900-2 200 g/mol) and quercetin (QUE, >95%; Sigma-Aldrich) were used. Acetone (Sigma-Aldrich) of analytical grade of purity was used.

Results

Electrospinning of CA solution (10 wt%) resulted in obtaining defect-free fibers (780 ± 80 nm). It was found that the incorporation of PEG resulted in decrease of the mean fiber diameter (530 ± 150 nm). Further decrease in the mean fiber diameters to 390 ± 150 nm was observed in the case of CA/PEG/QUE fibrous materials. The addition of a water-soluble polymer - PEG led to reduction of the contact angle value from 120° for the CA mat to 0° for the CA/PEG and CA/PEG/QUE mats. The antioxidant capacity of CA/PEG/QUE mats using 2,2-diphenyl-1-picrylhydrazyl (DPPH) radical scavenging assay was evaluated. It was found that CA/PEG mats exhibited very low antioxidant activity. In contrast, after 30 minutes of contact with DPPH solution, QUE-containing mats exhibited high antioxidant activity (DPPH absorption decreased by approximately 94.4%). The colour of the DPPH solution changed to pale yellow upon contact with CA/PEG/QUE mat.

Discussion

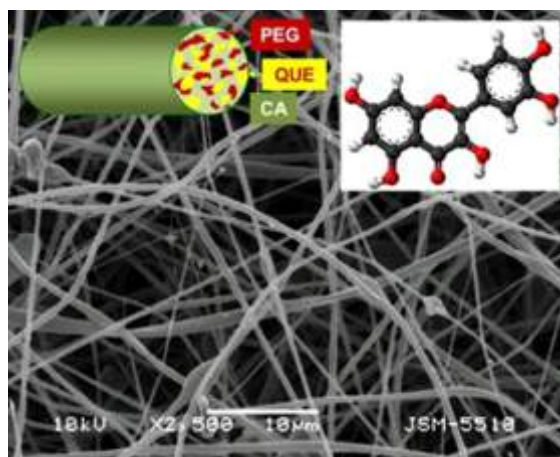
No peak corresponding to the melting point of QUE was observed in the DSC thermogram of CA/PEG/QUE fibers, which evidenced that the QUE incorporated in the fibers was in amorphous state. Moreover, quercetin-containing fibrous mats exhibited high antioxidant activity as estimated by DPPH free radical scavenging method.

Conclusion

Novel fibrous materials with antioxidant activities based on cellulose acetate, polyethylene glycol and quercetin were successfully obtained by electrospinning. It was found that the incorporation of PEG in the polymer matrix led to hydrophilization of the material and facilitated the release of the biologically active compound - quercetin. In addition, it was shown that the quercetin-containing fibrous materials exhibited high antioxidant activity.

Keywords: quercetin, electrospinning, antioxidant activity, cellulose acetate fibers

Acknowledgment: The authors thank the Bulgarian Ministry of Education and Science (Grant D01-217/30.11.2018) under the National Research Programme "Innovative Low-Toxic Bioactive Systems for Precision Medicine (BioActiveMed)" approved by DCM # 658/14.09.2018.





Topic № 2
TEXTILE TECHNOLOGIES:
SPINNING, WEAVING
AND KNITTING

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Textile Industry.
Technology of textile materials.



IMPACT OF THE COEFFICIENT OF FRICTION ON THE SEAM QUALITY OF DENIM JEANS

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Introduction

The so called "blue jeans" were invented in the far 1873 and remain modern nowadays. Their quality is determined by the properties of the fabric and that of the seams. The quality of the seam depends on many factors, one of which is the coefficient of friction between the fabrics that influences the slippage of the layers each to other during the sewing process. The value of the friction coefficient depends on the material used, the linear density and the twist of the warp and weft threads, the weave, the density of the threads in the weave, and the finishing treatment. In order to increase the friction forces between the fabric layers during sewing, a pressure by means of a presser foot is exerted on them.

Experimental part

The study is carried out for 6 denim fabrics made of 100% cotton in twill 3/1 weave.

The static and dynamic coefficients of friction before and after finishing at different pressure levels are determined. The experiments were performed using the μ -meter MXD-02 of Labthink, China.

For each test two samples were cut. The first one was positioned so that the longer side to be in the direction of the warp threads. It was placed and fastened on the movable platform. The second sample was placed on the sliding block. It was cut and positioned so that the friction to be carried out in the following directions: warp, bias (45°) or weft direction.

Measurements under pressure of 200 g (sliding block dead load), 300 g (+100 g) and 400 g (+200 g) were performed.

Results

The mean values of the static and dynamic friction coefficients by changing pressure and direction of friction were calculated and summarized in tabular form.

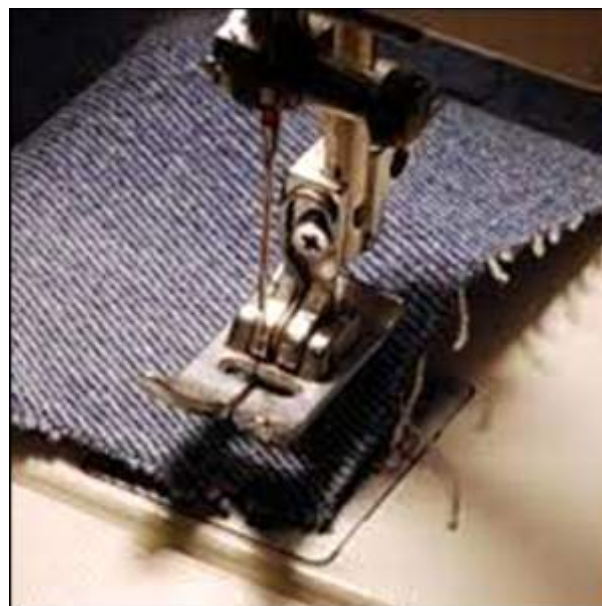
Discussion

The pressure increase leads to a growth in the friction coefficients, as a result of the bigger contact surface. The finishing processes have no statistically proven effect on friction coefficients. Dynamic coefficients of friction are more strongly influenced by the direction of friction than static ones.

Conclusion

The study clearly showed that the static and dynamic friction coefficients of the denim fabrics are high (between 0.54 and 1.19), and they are influenced by the pressure and direction of friction.

Keywords: Static and dynamic coefficients of friction, Denim fabrics, Finishing, Seam quality.



IMPLEMENTATION OF INCOMING QUALITY CONTROL OF FABRICS IN THE CONDITIONS OF QMS ACCORDING TO ISO 9001

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The incoming control of fabrics is carried out upon their receipt in three production cycles.

In the most general case, it is the cycle when the finished fabric enters the tailoring department of the sewing enterprise.

In the second cycle, the raw fabric enters a finishing workshop and after processing is sent to the sewing plant.

At the beginning of the third cycle, the raw fabric enters a dyeing shop, after dyeing it is directed to the finishing and finally to the sewing plant.

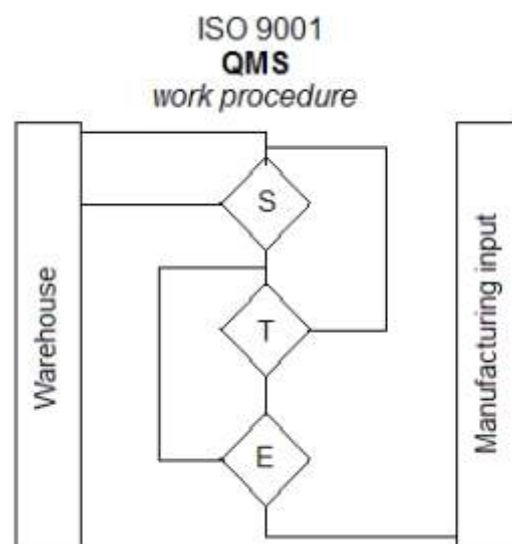
In all three cases it is necessary to apply observations, measurements and tests, which for the most part are the same and prescribed in detail in the relevant industry standards.

The greater variety is found in the types of fabric.

According to the basic construction, the fabrics are woven or knitted, which leads to significant differences in test methods.

The fibrous composition; wool, cotton and man-made fibers also provoke a different approach in assessing quality compliance.

Each cycle is characterized by the logical sequence of sampling - S, laboratory testing - T and quality assessment - E.



Depending on the variants and the specificity of the cycle, the samples may be representative samples of the entire batch of fabric, pieces of fabric from the beginning of each roll or observations of the entire length of the fabric.

Also, laboratory tests can be performed as measurement of geometric parameters and area mass, physico-mechanical tests and visual inspection of the entire length of the fabric. For this reason, the cycles are spirally interconnected and the tests tend to expand in detailed analysis.

The subject of this article is the working procedure for the implementation of incoming quality control of fabrics in organizations with implemented quality management system (QMS) according to ISO 9001. The aim of the work is to differentiate the individual elements of the procedure and to ensure the quality compliance by minimal resources.

Keywords: fabrics, sewing production, input quality control.

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COMPATIBILITY OF TESTING WATER RESISTANCE AND WETTING CONTACT ANGLE OF FABRICS WITH WATER-REPELLENT TREATMENT

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Filtration capability of textile media or the resistance towards the fluid penetration through different fabrics is depending on their surface repellency.

The emission of condensed exhaled air on the outer layer of the half face mask from the FFP2 (EN 149) category indicates the termination of its protective properties.

The overcoming by the fluid of the textile environment of the mask in its role of an artificial barrier goes through two stages.

Initially, the aerosols in the exhaled air condense and meet the repulsion from the inner fabric.

Later, due to the hydrodynamic pressure, the condensed droplets pass through the textile medium, overcoming the friction among the fibrous layers.

Finally, the droplets irrigate the outer, front layer of the mask and are released into the environment with all the consequences.

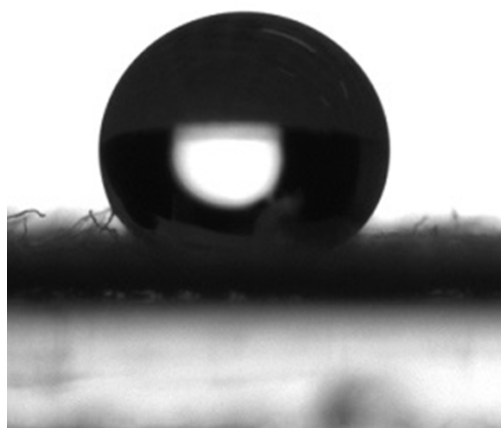
Closest to this physiological process is the hydrostatic pressure test method.

The test of resistance to fluid penetration gives a final assessment of the property of the textile environment without clarifying the elements of the process.

Experimental studies have shown similarities in the results of the penetration of the fluid through the textile medium and the initial repulsion of aerosols from the surface of the fibrous layer. The repulsion of water droplets is of predominant importance in relation to the general barrier capacity of the textile media.

The main indicator of water repellency is the contact angle of the free drop on the fabric.

The subject of this article is the comparison between the contact angle of wetting and the penetration of the fluid by means of standard test methods. The aim of the work is to explain and model the process of fluid penetration through protective masks, as well as to optimize the properties of repulsion and resistance.



Keywords: FFP2 masks, COVID-19, fluid filtration, contact angle.

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EXPERIMENTAL DETERMINATION OF THE FRICTIONAL CHARACTERISTICS OF FABRICS MADE OF NATURAL SILK

Umme KAPANYK¹

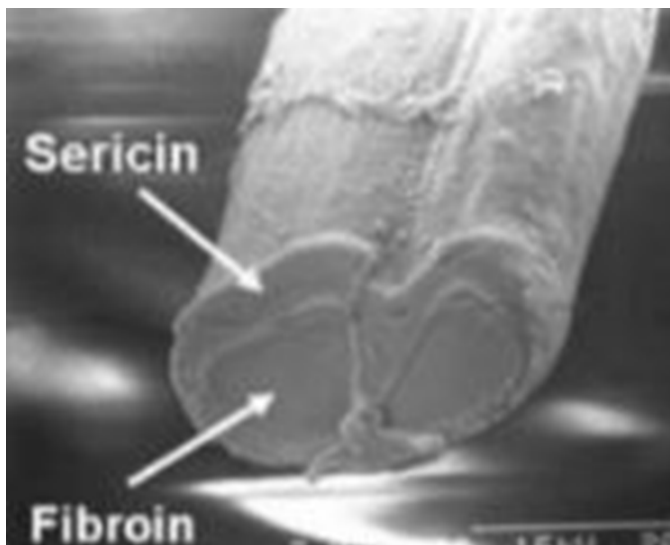
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Introduction

Natural silk fabric is directly derived from insect produced cocoons containing large volumes of fibroin protein. The fibroin fibres secreted by the two silk glands of *Bombyx mori* are smooth and soft and form the structural center of silk. Sericin is a coating with an amorphous structure that bonds the two strands. It is the component hardening the raw thread. The fabric as we know it with low mass per unit area. The level of friction of textile materials depends on a number of test factors - normal load, contact surface area, friction speed, as well as the nature of the textile surface and the direction of friction - warp - warp, warp - weft.

Experimental part

In this study, four types of fabric made of 100% natural silk have been examined. They all have different characteristics for mass per unit area, weave, density and linear density of the warp and weft threads. The study makes use of appliance tribometer MXD -02, from Labthink, China to determine the values of static and dynamic friction coefficients. Friction is conducted in different directions and under different pressure. Three tests are performed for each studied fabric; all of them are conducted with low sliding speed and different directions and pressure levels are applied (pressure level is regulated by adding additional weights to the sled's own weight). First, normal compressive forces N_i and friction forces F_i are calculated; next friction factor and friction index are determined and lastly, $\log(F_i / B)$ and $\log(N_i / B)$ are calculated. The following expression applies: $y = a + x \cdot b$ (where $x = \lg(N_i/B)$; $y = \lg(F_i/B)$; $a = \lg C$; $b = n$)



Results

Frictional characteristics at rest and at sliding, namely friction index for friction at rest and at sliding, friction parameter, and friction coefficient, are determined and are displayed in a tabular form.

Discussion

This experimental study has clearly showed that silk fabrics with higher surface mass - display friction coefficient values (at rest and in sliding) greater than 1. Friction index and friction coefficient are influenced by the test direction where friction index in warp direction of one fabric with parallel arrangement of the threads is higher compared to threads in weft direction of another fabric.

Conclusion

Direction of friction which has been confirmed to have influence over frictional characteristics with other fabrics (fabrics with different composition and structure) has proven to have the same influence with silk.

Keywords: Natural Silk fabric, dynamic and static friction coefficient, friction index, surface textiles.

DIRECTIONS, LEVELS AND INDICATORS FOR CERTIFICATION OF PROTECTIVE FILTER MASKS AGAINST COVID 19

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The pandemic crisis has raised many societal issues, but three constitute the civilizational - expectation responsible behaviour, immunization, and personal protective equipment. The common belief is the use of personal protective equipment to protect the individual from the environment and other people. In the current situation, the mask serves to isolate the individual and protect society from a potential carrier of the infection. Prior to the onset and spread of COVID-19, the use of half-face masks was restricted in the work environment of medical and industrial facilities.

In these conditions, the masks become essential and cover the daily life of the whole society with a long-term perspective. From a seemingly simple and small sewing product, the mask turned out to be a complex and difficult tool for individual use and mass distribution.

The most specialized mask is for medical purposes and is known as a surgical mask. One of the requirements for these masks is sterility, which is achieved only in closed production facilities - "clean room".

The main standard that surgical masks meet is EN 14683 + AC, in which antibacterial properties are mandatory.

The professional mask, known as a personal protective equipment from categories FFP1, 2 and 3, is the most common functional mask. It is produced in conventional industrial conditions and after the consumer requirements are met, it is subject to commercial distribution and official use. These masks for official use comply with the standard EN 149: 2001 + A1 and with the NaCl filtration relief - PPE-R / 02.075 Version 2 are subject to certification in accordance with EU Regulation 2016/425.

The household mask is the most popular mask in society. It is usually made of available fabrics in home or craft conditions. The essential characteristic of this mask consists in the variety at the expense of the symbolic protective properties.

The essential issue in the design and certification of masks concerns their action. The barrier mask prevents the penetration of particles into the interior of the textile media and acts as a protective screen. These properties are achieved by imparting water and oil repellent properties on the surface of the canvas. The mask acts as a shield, close to the face and holding the aerosols of human respiration in the small volume between the face and the mask. The filtering mask absorbs and retains moisture and particles in the exhaled air aerosol inside the textile medium.

The subject of the article is the normative base for industrial production and legal trade in masks. The purpose of the present development is to clarify the process from conception, through production to the certification of masks with successful trade.

Keywords: COVID 19, masks, protective equipment, certification.



Topic № 3

APPAREL

TECHNOLOGY

687

Tailoring (apparel) Industry.



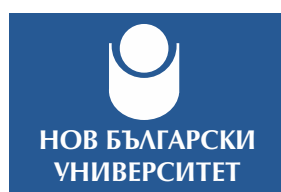
Topic № 4
TEXTILE ART
AND FASHION DESIGN

745/749

Applied Art. Art Crafts. Interior. Design.

658.512.23

Artistic design (industrial design).



CUTTING AS AN INNOVATIVE APPROACH TO SURFACE AND TEXTILE DESIGN

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We live in an age where new technologies enable materials and techniques, hitherto unconventional for this field, to start being applied in the design of surfaces and textiles. One such technique is cutting. As a technique for the creation of works with high artistic value, the manual cutting of paper has been developed to the level of an autonomous art form: *kirigami* - the Japanese art of cutting paper.

One particularity of cutting is that it enables the creation of three-dimensional structures out of two-dimensional sheet materials with minimal manipulation. This can only be achieved via strategically positioned cuts, thus enabling the already cut material to “unfold”. The surfaces having been thus manipulated can attain sculptural features, become adaptive and much more.



Inspired by the technique of *kirigami*, designers and artists today continue to create two- and three-dimensional surfaces and artworks through patterns of cuts in a wide variety of materials such as textiles, polymer foils, wood, metal and others. These cuts can be made by hand, or cut by machine, using technologies such as laser cutting. Novel technologies and materials open the way for an innovative expansion of the characteristics, functions and the aesthetic value of the textiles and surfaces created through these processes.

The in-depth study and calculation of the geometry of such patterns of cuts also plays an important role in the scientific research of "smart" surfaces, as well as of surfaces which have the capability to morph from a two-dimensional structure into a three-dimensional one and vice versa.

The current research has as its aim to survey how contemporary designers study and develop cutting techniques in unconventional ways, such as creating three-dimensional structures using minimal manipulation, engineering the properties of surfaces and finding alternative ways of constructing objects. The role of the geometry of patterns of cuts used for the creation of innovative textiles and surfaces will be taken into consideration in this report, and the connection between structure, function and aesthetics and the technologies and materials used will be analysed to determine prevalent tendencies in the field.

Keywords: textile design, surface design, kirigami, cutting

TEXTILE ROPE ART

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There is a direction in art installations which impresses with the attractive application of textile threads and ropes. A number of contemporary authors discover in these materials a way of self-expression and realization in the field of art and design. Textile installations are used not only as a decoration and highly influential artwork. The variety of functional applications in stage design, design of furniture and accessories and design of playing environment for children are best examples of textile rope application.

The subject of the present study focuses on three main types of rope art installations, differing in the method of constructing the textile structure: taut rope material, knitted art objects, or a combination of the two.

Taut rope textile installations are characterized by its incredible airiness and have a strong aesthetic impact. Their structure is hemstitched and the impression is almost intangible and airy. A specific connection between matter and space is achieved.

Knitted art objects are another approach to creating textile rope installations. Consistent with the technique of knitting the material, they can be divided into three groups - knitted with two knitting needles, knitted with a crochet-hook, or macramé?

The combined techniques have an incredible effect and are extremely rich in various structures and pliable forms, as well as volumetric-spatial compositions. Most commonly used is the combination of netlike knitted surfaces or volumes of taut ropes fixed to architectural elements, or specially designed constructions.

Textile art installations find their application not only as attractive art and decorative forms, but also in stage design, design of furniture and accessories, and building a playing environment for children and others.

Keywords: textile design, textile art, Installation art



Gabriel Dawe – Installation Artist
Colourful 'Plexus' installatio

NEW FORMS BASED ON THE CLASSIC SLOPER OF THE SLEEVE

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ABSTRAKT

During the fifteen years of my teaching experience in the Fashion department in the field of pattern making, draping and design of garments at the National Academy of Arts in Sofia, Bulgaria, my observation on the students' work and their understanding of pattern making led me to different techniques of developing new forms and designs of garments.

Students are admitted in the Fashion department after serious personal training in drawing, and high scores on the entrance exam for the specialty, which consists of life drawing of a human figure in black and in colour. The second task of the exam is to design and draw an accessory inspired by an assigned object. The majority of them are coming from schools with general education and they don't have any background knowledge on the real process of creating a garment.

In our program, pattern making is one of the main courses. Students start to learn how to create a basic form for all the classic garments of the female and male wardrobe. The course is taught during the bachelor's and master's degrees, starting from flat pattern making, and concluding with the learning of draping. During the study process students are expected to be very consistent, and great perseverance is required for the knowledge to be assimilated. Maintaining constant interest and consciousness along the process to the final result represents a big effort for them. That takes long group work, and learning without creating for a relatively long period of one semester can be confusing. Students are eager to start their own projects, and have difficulty to accept that learning pattern making is a process similar to learning a new language, in regards to the time and practice it requires.

My deep understanding of the profession of a fashion designer is to include the knowledge of pattern making, draping, and to combine it with the feeling and understanding of the relationship between the human figure and the garment. Knowing these principles allows them to freely make variations of the garment design.

. What is key in this method is acquiring the notion of how alterations in construction are applied to the final result. The main goal of this method is to arrive fast at the realization of the prototype. Nowadays, creating new constructions and forms plays a big role in a designer's projects, and the quest for innovation is oriented towards the construction of the garments. The idea to achieve three-dimensional forms by using flat patterns has been an inspiration in the process. Using experimental methods of making new forms expands the students' creative thinking.

Encouraging creative thinking in pattern making is positively received by students. The notion of using the strict classic system in pattern making is often considered difficult. Once they learn to create the basic blocks, they can start to play with all the basic principles. They can break the rules, be innovative, and are free to apply the accumulated knowledge to develop further ideas. By cutting, adding, and withdrawing forms on basic sleeves, bodice blocks, collars, and hoods, a new unexpected form can result in the idea of a new garment design.

Keywords: prototype, pattern making, draping, garment, design

3D GARMENT DESIGN WITH CLO

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Today's fashion industry is increasingly imposing its choice in using computer technologies for garment design (both for design and patternmaking). One of the major challenges in this case concerns the 3D representation of garments.

Today's fashion industry is increasingly imposing its choice in using computer technologies for garment design (both for design and patternmaking). One of the major challenges in this case concerns the 3D representation of garments.

3D CAD systems, used in the fashion industry, can be generally divided into two groups. The first one uses '2D to 3D' approach, creating prior digital 2D patterns, which next can be draped around a 3D body. The second one applies '3D to 2D' approach where the garment is designed onto three dimensional human figures, which further can be transformed into flat 2D patterns. Some CAD systems combine these two approaches.

Compared to other mechanical product, garment CAD has to address some special issues. Firstly, it models soft material with low bending stiffness rather than rigid solid objects. Secondly, garment components such as collar and sleeve, are assembled together following specific pattern-making rules which are totally different from the conventional assembly methods. Thirdly, while the garment is constructed from 2D patterns, the quality of fit is evaluated on 3D human models. Based on these observations, garment CAD is a unique research area that has attracted considerable attentions.

In this study, we will overview 3D Fashion Design Software CLO and her possibilities for an effective application.

Keywords: 3D CAD systems, fashion design, patternmaking.



TEXTILE FACTORY "NEDEV & SARAIVANOV" IN SLIVEN - A STORY OF THE PAST AND THE FUTURE

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ABSTRACT

The Sliven textile industry has an important role in the Bulgarian industrialization. The establishment of the first textile factory by Dobri Zhelyazkov in 1834 marked the beginning of the process that develops rapidly in the end of the 19th and in the beginning of 20th centuries.

One of the first textile factories during this period was the “Nedev & Saraivanov” factory. It bears the marks of the various epochs through which it has survived and still exists today as a projection from the past into the present.

The exhibition aims to present the historical development of the textile factory “Nedev & Saraivamov” and an idea for its restoration reconstruction and adaptation.

Keywords: textile, factory, industry, history

CREATIVE METHODS FOR TRANSFORMING IDEAS FROM ART TO FASHION

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Abstract:

The forms in art have the tendency to live in fashion. This scientific research unwraps the methods of identifying, and the principles of transferring and transforming these forms into new ones. Each trend in the fine arts (abstract art, pop art, op art, minimalism, land art, conceptual art, action, installation, performance, etc.) has marked main goals, ideas and principles, its own colors, preferred types, way of composition, stylizing, expression, own plots, philosophies, forms and way of execution. Not all trends in art are recognizable; sometimes it is difficult to identify characteristic features and unique manifestations. Not all have clear boundaries and characteristic traits.

The subject of the research is the extraction of the main characteristics of the currents in art after the 50's of the XX century and introducing of the methods for transformation of ideas and aesthetic characteristics from the fine arts into fashion. The goal is, while outlining the ways for transferring ideas from one area to the other, to bring out creative methods that will serve to create new innovative and relevant for its time apparel.

Every artistically made thing contains in itself the meaning of human self-expression, which builds man as a cultural being, as a subject of cultural forming activity - creator of values and norms. Interpretability is an inseparable characteristic and way of existence for a work of art. According to Evgeni Velevev, each new interpretation is an event in the life of the work of art. He supports the idea of the artist in both areas (fashion and art), and that there is a need for interpretation, originality, uniqueness or work with open systems, to which he gives different meanings according to the idea pursued by him (Velevev 2010). We believe that the modern artist must meet the spirit and desires of the time in which he lives, but at the same time, to some extent anticipate it, be an innovator, a bearer of new ideas, be able to apply new means of expression and have creative individuality.

Revealing the nature and influences between these two seemingly different cultural worlds and outlining the ways and mechanisms of their interaction and influences, offering typical examples with visual materials, this research would contribute to improving the quality of students' education, both in contemporary art and in fashion. It will help them to gain knowledge and skills to recognize and identify the signs of manifestation of trends and processes in art, to line them with new creative ideas and to realize them by performing practical tasks and projects.

Keywords: fashion, fine art, fashion trends

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HOW PANDEMIC CHANGE DESIGN AND MANUFACTURING

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Introduction

Undoubtedly, the pandemic changed the lives of all of us. This study examines the changes that have taken place in the field of design, as well as design technologies and production. As an active participant in the design and manufacturing industry, I closely watched the sector adapt so quickly that it achieved even what was considered impossible. The adaptation of this sector has helped health in so many ways. Globally, engineers and designers have constantly demonstrated the need for invention and the need for ideas to support our existence in an epidemic environment.

Research

The study examines changes in design and technology. It discusses the advantages and disadvantages of the changes that have taken place in the field of design. The changes related to the transition from the usual use of technology to digital technologies, as well as the adaptation of users

Results

Many changes have taken place as a result of the attempts of the governments of the countries of the world. Restrictions have been applied to reduce the physical interaction of people with the world around them.

We were forced to minimize living social life, which in turn gave an even greater impetus and literal congestion of social networks and applications related to communication. The need for workshops has moved to another dimension and has developed this sector beyond recognition. Our home has become our workplace, each of us has found a way to adapt to keep his job or save his business. Most people have invested in their homes to make them more comfortable and affordable to work from home.

As a consequence of the pandemic, design and production will be positioned as a highly valued industry. This will encourage more and more people to enter this industry. The experience gained will forever change the design and the manufacturing industry

Keywords: Design, design change, digital manufacturing



PAUL POIRET IN THE CONTEXT OF FRENCH FASHION DESIGN FROM THE EARLY XX CENTURY

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The purpose of this article is to analyze and highlight important aspects of the life and work of Paul Poiret - one of the brightest figures in French fashion. His name is associated with the revolution in women's wardrobe, namely the removal of the corset.

In his text, the author traces and marks key moments in the life and work of Paul Poiret, such as creating collections devoid of corsets, the realization of iconic costumes for theatre productions, creating a professional school of arts and crafts, imposing oriental themes in Western European fashion, etc. In conclusion, conclusions are drawn about the fundamental role of Paul Poiret in the enrichment and development of French fashion, as well as about his character traits – cosmopolitanism, experimental spirit and rich imagination.

A surprising new element in Poiret are the bright colour tones and bold colour combinations. Next to the cold sea green there is a sparkling orange, next to the olive green – cinnabar, next to the dark green – grey there is a bright lemon yellow. Its tones are opposite to the actual for this period killed colours, which lack vitality. In the range of colour combinations of Poiret, the oriental tonality is unmistakably noticeable. He admires Persian miniatures and has Oriental costumes in his library. Poiret spends weeks at the Victoria and Albert Museum in London, where he explores Indian book decorations, costumes, turbans (which he will bring into fashion in the coming seasons), jewellery and exotic feathers. His works have a unique handwriting and always stand out with their wide artistic scope.

Keywords: fashion, fashion collections, art, style, oriental style, oriental colours, haute couture, costumes, perfumes.

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PROTOTYPE A WINE LABEL DESIGN

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Introduction

The article presents a concept for creating a label for a bottle of wine. Design is a tool that can draw consumers' attention to products and increase sales. The creation process is different for each designer.

Research

A study has been made of the most popular materials that have been used to create wine labels. A prototype wine label design is designed to withstand the conditions of an ice bucket, as wines are often offered chilled. To begin developing a prototype project like this, we prefer to start with a general constraint. For wine labels, this is usually the shape of the bottle. Bevels and composite curves can be a challenging surface for overturning, so it is chosen to avoid graphs in these areas of the bottle.

Results

The look, this is the distinguishing part of the product from the other products on the crowded shelves of supermarkets and helps the brand to remain in the minds of customers long after their purchase.

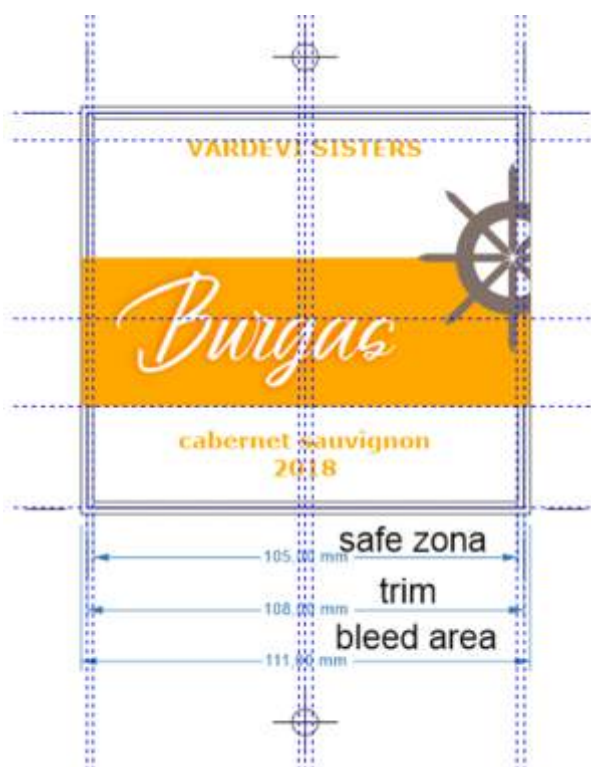
Anatomy of label design

There are many factors in the formation of the composition of the label. First, these are certain requirements regulated by law.

As with any print design, the product label must contain the three main components: trim line, bleed area and safety line.

The entire content of the design of your label must fit well in the safety line.

The product should always be considered as a whole, including the shape of the bottle, cap and others. Secondly, what is the ultimate goal of the label what and how it should talk about wine. This, in my opinion, determines the appearance of the product: the number of elements and their organization, the choice of fonts, illustrations and if desired by the customer, printing effects. Absolutely everything should correspond to the general idea and convey the dignity of the product to the buyer as much as possible.



Keywords: Label design, design prototype, digital design



ЮГОЗАПАДЕН
УНИВЕРСИТЕТ
·НЕОФИТ РИЛСКИ·



Topic № 5

TEXTILE MACHINERY AND EQUIPMENT



Topic № 6
TEXTILE MANAGEMENT,
MARKETING AND
SUSTAINABILITY

33
Economics.
Economic sciences.



ADVERTISING CHALLENGES IN THE FASHION INDUSTRY

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From the very beginning, advertising aims to attract people's attention and sales. Today, advertising is everywhere to shape consumer demand, establish brands and provide such important targeted communication and customer experience. The advertising business has the power to change and change itself according to the environment. The change is with the rapid development of Industry 4.0 and in line with the development of the industry for which it works. Yes, advertising in the fashion industry today mostly expands consumer interest in products, services, brands and individuals, but it is also interactive and the consumer is involved. Whether it is fast fashion or luxury and unique products and services, today effective advertising and communication is in both real and virtual environments and provides a personalized experience.

The purpose of this article is to provide a comprehensive overview of the current challenges of the fashion advertising. To gain this, the article describes the main directions in the development of the fashion industry such as differentiation and digitalization, as well as the prospects for its innovative development. The article examines the changes in the advertising and in the fashion industry, taking into account their specific characteristics and relationships.

The main research on consumer attitudes in fashion and their reactions to different advertising models, as well as the specific marketing challenges in the fashion industry to attract the attention of consumers are discussed. The problematic directions in which the advertising strategies are developed, the unique for the fashion innovative advertising channels and the key factors for effective advertising are presented.

Digital transformations in the cultural and creative industries, which include advertising and fashion, require customer orientation through data analysis techniques, algorithms that study customer behavior and artificial intelligence.

Keywords: fashion, industry, advertising, transformation

UNDERSTANDING FAST FASHION AS-A-SERVICE BUSINESS MODEL

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Fast fashion has changed the industry and the economy. Implemented through a business model that encourages buying and buying more fashionable clothes at affordable prices, the fast fashion faces numerous challenges. The model is perceived of being unsustainable, at least due to water pollution and waste generation because of the short cycle of use of otherwise fashionable clothes. In order to increase value added under competitive pressure and growing demands for environmental protection, new business models are being born.

The study aims to provide a critical look at the fast fashion as-a-service business model and stressed the need to developing a new business and consumer culture for. The purpose of the approach is twofold. On the one hand, to achieve improvements in customer relationship as consumer become more aware and conscious when buying clothes, so the excess asset does not become garbage, while the consumer remains loyal to the brand in the long term.

On the other hand, the manufacturer should be responsible for the entire life cycle of his product from production to its transformation into an unnecessary asset for the end user. The as-a-service model is different from any other technological trend that seeks to disrupt established models. The trends are the global market of everything-as-a-service to grow as it is strongly impacted by digitalisation of economic, industrial and social life while calling for free choice of service, accessibility, flexibility and all this at low cost.

Service as a topic in the fashion industry is a new, unexplored, unused, but gaining momentum concept. Assuming to be strongly influenced by the possibility of creating a digital ecosystem by connected actors, fast fashion companies may struggle to create a digital stakeholder ecosystem as part of the as-a-service model, where manufacturers, retailers, consumers, software vendors and decision makers can create and offer services to each other to achieve sustainability.

A conceptual model of fast fashion as-a-service business model is introduced and discussed. It requires fast fashion companies to change both their processes, disruptive innovation and their strategic thinking. Areas for future research are outlined.

Keywords: services, fast fashion, as-a service, cloud, platforms, sustainability

Topic № 7

INNOVATIONS

IN TEXTILE EDUCATION

377

Special Education.
Vocational education.
Vocational schools

378

Higher Education / Higher
Education Institutions.



ЮГОЗАПАДЕН
УНИВЕРСИТЕТ
· НЕОФИТ РИЛСКИ ·

KNOWLEDGE ALLIANCE IMPROVING DIGITAL AND ENTREPRENEURIAL SKILLS OF TEXTILE AND CLOTHING ENGINEERS

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Introduction

The textile and clothing industry is traditional for Europe. It includes 176,400 companies, 99% of which are SMEs. It is in a huge need of human resources because a great part of them is expected to retire in the next few years. The development of the necessary competences and skills for existing workforce and attracting qualified young experts of the next generation has become a priority for the companies. The young people prefer ICT and are not aware that they are widely applied in the textile industry. This determines the tremendous need for engineers, especially those who can work with CAD, CAM, CAE and PLM systems. According to the existing university curricula the ICT and digital education as well as entrepreneurial education often is neglected. The analysis of the presented trends led to the idea to develop a European project, which main purpose is to develop a curriculum and syllabuses that meet the requirements (incl. digital and entrepreneurial competencies) of the business to the specialists working in the field of textile and clothing design and production.

Experimental part

The developed project titled "ICT in Textile and Clothing Higher Education and Business" was funded under Erasmus+ Program Key Action 2: Cooperation for innovation and the exchange of good practices. The following main steps in achieving the aim are foreseen: performing a gap analysis, development and conducting a pilot course, development of courses in all textile and clothing sectors as open information products and dissemination.

Results

At this stage, there are results from a survey conducted among 62 companies. It includes 84 questions, structured in 10 sections. The answers will help to specify the needs and requirements of the business.

Discussion

Comments and deep analysis of the obtained answers was made.

Conclusion

The training materials and courses developed under the project will be entirely practical, interactive and suitable for distance learning. They will be located on an open access web-platform.

Keywords: Information and Communication Technologies (ICT), Entrepreneurship, Interactive distance learning, Practical and selectable free accessed modules.

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KOTEL CARPETS - UPDATING TRADITIONS

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Introduction

Kotel carpets are one of the Bulgarian national symbols. They are known not only in the country but all over the world. Their production is kept till nowadays, although the number of people who produce them is rapidly declining. To help the cause of preserving traditions come modern methods such as digitization of patterns, development of electronic catalogues and their storage, engineering approaches and solutions for transformation of handmade patterns in manufacturing technologies, as well as other technological calculations.

Carpet weavers have an intuition based on their long-years' experience to estimate looking at the pattern how many warp threads to take and how many weft threads to lay in order to become a desired figure. The main goal of the research was to put their knowledge and skills on a scientific ground.

Experimental part

The present work briefly describes the handmade carpet weaving technology. Based on its principles, a methodology has been developed to determine the number of threads corresponding to a pattern cell. By input parameters: pattern, linear density of warp and weft threads and density of warp winding, the size of the finished woven carpet can be calculated. In case of existing carpet sample, conversely, the pattern can be restored, and the material parameters calculated.

Results

An expert computing module based on Excel spreadsheets to automate the calculations has been developed. It is worked out in 2 versions, depending on the applied weaving method: by pairs or by single warp threads.

Discussion

Well-known formulas have been used to recalculate the linear density into diameter. The need for periodic crossing of neighbour threads during the fabric formation is also taken into account, in order to avoid the formation of large hollow windows (ajour?), which can reduce the strength of the carpet.

Conclusion

Proposed methodology can be used successfully because it has been validated through a large number of experimental tests conducted with patterns and materials from the production range of BG Nuance.

Keywords: Kotel carpets, pattern, digitalization, automated engineering calculations.



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LEARNING AND CREATIVE ASPECTS OF DRAWING AS A STAGE OF DESIGN OF CLOTHING

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Abstract

1. Introduction

Drawing is an important, initial stage in the design and in general of the creation of clothing. You can say it is the most creative, the most essential. Drawing is the basis of all the arts associated with a vision. It expresses imaginative thinking in its purest form. Depending on the specific task and the area it serves, it may be different in nature.

Mastering and drawing the human figure is one of the difficult problems that must be solved when designing a clothing project. Its interpretation in this process has specific peculiarities and problems for solving in a purely creative and educational way.

Understanding the problems, opportunities and specific features in the construction of a clothing project is an important condition for successful creative development in a given field.

2. Experimental part

This study addresses the theoretical and practical problems associated with the creation of clothing projects, which are relevant not only to creative problems, but also to teaching, related to the understanding of the peculiarities and mastery of the necessary knowledge, skills, procedures, techniques, materials.

The different disciplines involved in the artistic construction of the project contribute differently to this. Better alignment between them is necessary for the common purpose.

3. Results and a Discussion

The specificities in the academic drawing and artistic execution of clothing projects, the tasks they solve, and issues related to their practical application and mastery are analyzed. Specific and more common problems related to successful creative and teaching practice in this field are indicated.

4. Conclusion

Thinking about and applying the problems involved can contribute to the more effective training and creative realization of students studying specialties related to fashion design and the design of clothing in general.

Keywords: drawing, fashion, clothing design, human figure.

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ЮГОЗАПАДЕН
УНИВЕРСИТЕТ
· НЕОФИТ РИЛСКИ ·

TEXTILE AND GARMENT MAGAZINE - GENERAL DESCRIPTION

According to data by SS. *Cyril and Methodius* National Library Sofia

(<http://www.nationallibrary.bg>), the specialised *Textile and Garment* Magazine has been issued, without interruption, since 1949 and is the successor of *Textile Review*, which had been published in 1931 and 1932 in Sliven, with Editor-in-Chief P. Starbanov.

Inspired by the creators of the departments in Textiles at the Technical University of Sofia and the University of Chemical Technology and Metallurgy - Sofia, Prof. Agop Kevorkian and Prof. Kiril Dimov, the magazine has a scientifically applied character and publishes author's papers of lecturers from universities and research units as well as from vocational high schools in textiles, clothing and design.

The magazine also publishes materials from textiles and clothing industries.

The purpose of the magazine is to present to the highly specialized community in the country and abroad the achievements of the theoretical and experimental research of scientists and specialists from all points of view of textile science and practice.

The main topics of the published papers comprise chemical and mechanical technology of textile materials, technology and design of sewing products, textile art, textiles industry economics and the pedagogy of textiles training and education.

Editorial Board of the magazine does the selection and review of the papers collectively while over the years its Editors-in-Chief have been:

Assoc. Prof. Ivelin Rahnev - from 2015 until present;
Prof. Ivan Georgiev - from 2000 to 2015;
Prof. Georgi Nikolov Georgievich - from 1996 to 2000;
Prof. Ivan Hardalov - from 1995 to 1996;
Eng. Svilena Kissyova - from 1990 to 1995;
Prof. Petar Adarov - from 1984 to 1987
Prof. Atanas Chervendinev - from 1964 to 1984;
Editorial Board - from 1958 to 1963;
K. Pastarmadzhiev - from 1952 to 1957;
Stanka Tsekova - from 1950 to 1951;
Editorial Committee - since 1949.

Title of the magazine in Bulgarian: Текстил и облекло (Tekstil i Obleklo).

Title of the magazine in English: *Textiles and Garments* magazine.

The publisher of the magazine is:

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Language of the text: mainly in Bulgarian, abstracts - in English and some whole articles - in English the working language of foreign authors.

Origin of the published materials:

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papers presented at conferences and other forums

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377, Special Education. Vocational education. Vocational schools.

378, Higher Education / Higher Education Institutions.

677, Textile Industry. Technology of textile materials.

678, Industry of High Molecular Substances. Rubber industry. Plastic industry.

687, Tailoring (apparel) Industry.

745/749, Applied Art. Art Crafts. Interior. Design.

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From 1957 to 1957: Light industry: Textiles' edition, ISSN C625-9138;

From 1952 to 1957: Light industry, ISSN C617-924X;

From 1949 to 1950: Industry: a monthly edition of the Ministry of Industry, ISSN C616-9929.

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Sofia, March 2018

Ivelin Rahnev

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БРОЙ 10/2020

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