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Commodity aspects of forming a modern range of interior nanotextiles

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Abstract. The use of modern nanotechnologies in the manufacture of interior textile materials allows expanding and diversifying the range of products, providing completely new functional properties, as well as obtaining unique beneficial effects on these materials and products: aesthetic, antimicrobial, dirt-repellent, therapeutic, and at the same time satisfying the specific needs of consumers. The purpose of the article was to study and substantiate the main directions of formation of the modern range and properties of interior nanotextiles for various purposes. The study used statistical, analytical methods, and the method of system analysis. The analysis of literature sources has shown that in 2010-2024, Ukrainian and foreign scientists studied in detail the economic and technological feasibility of the widespread use of textile nanotechnologies to expand and optimise the range of nanotextiles, including interior ones. Guided by this approach, the article presented an analysis of literature sources for the last 2019-2024 years, which considered the main directions of development and achievements of nanotechnology in textile production to expand the range and properties of interior nanotextiles in Ukraine and the world. On this basis, theoretical provisions for the further development of nanotechnology and the market of interior nanotextiles were formulated and substantiated. The article identified promising areas of use of interior nanotextiles for curtains and draperies, linen, furniture, decor and floor coverings. The advantages and disadvantages of these types of nanotextiles in comparison with traditional materials are identified. The necessity and expediency of expanding the production of various nanoemulsions, nanodispersions and nanopreparations in Ukraine is substantiated in order to provide interior textiles with useful properties, improving their quality and environmental safety. The main focus is on providing textile interior nanomaterials and products with polyfunctional unique properties. In practice, the conducted research can serve to select priority areas of research in the manufacture of interior nanotextiles for various purposes

Keywords: nanotechnology; interior; nanoprocessing; nanopreparations; consumer properties; environmental safety; hygiene

Introduction

In 2024, it is important to consider the problems of introducing modern nanotechnologies into the practice of Ukrainian textile production in order to create a fundamentally new unique range of nanotextiles for various purposes (interior, medical, clothing, technical, special). Modern innovative nano-, bio-, chemical

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and information technologies are widely used in the textile production of textile materials and products. All this has led to the expansion and increase of the existing range of textile clothing, interior and other textile materials and the emergence of new types of textiles on the world markets. In order to assess the state and generalise the problem of forming the range and properties of interior nanotextiles, it is advisable to provide an abstract of the publications of Ukrainian and foreign authors, including our own publications, considered in this paper.

In her research, L.V. Kyrylenko (2019) analysed scientific papers on the development of nanotechnology and the production of nanomaterials in Ukraine. The author provided an assessment of the legislative acts of Ukraine aimed at solving these problems. The author reveals the impact of the growth of nanotechnology on the development of other industries. The expediency and importance of state support for the development of modern priority nanotechnologies in Ukraine are substantiated. The main problems of further development of the market of modern textile nanomaterials in Ukraine are identified.

The paper by M.A. Shah *et al.* (2022) provided an overview of the latest achievements in the field of nanotechnology and the production of nanotextiles for various purposes with new unique properties. First of all, it is noted that it is possible to obtain new modern properties using nanotechnology on textile nanomaterials for various purposes, including interior, namely: water-repellent properties; antibacterial properties; UV protection properties; low shrinkage properties; dirt-repellent properties; fire-resistant properties.

The work of D. Pargai (2021) described the types of smart dyes, such as photochromic, thermochromic, electrochromic, solvatochromic, used in the textile industry. The characteristics and properties of these types of dyes are given, and the most common areas of application of textile materials dyed with them are indicated. It has been found that textiles dyed with photochromic dyes of different fibre composition have high protective properties against UV radiation and are widely used for sewing window curtains, producing protective camouflage clothing and other products. The properties of dyes on textile materials with antibacterial and UV-protective properties, as well as dyes with high protection against mosquitoes and insects on dyed textile materials, were investigated.

The authors O.N. Aguda & A. Lateef (2022) analysed scientific research on the modification of the surface of textile materials with nanostructures to ensure the antimicrobial properties of nanotextiles for various purposes. The role of nanoparticles in the functionalisation of textiles as a means of combating resistant strains of microorganisms is investigated. The authors note that since bed linen, medical textiles, and clothing come into contact with microbes, nanotechnology has made it possible to produce antibacterial nanotextiles. The article presents research on the effect of zinc oxide, titanium dioxide, copper (II) oxide and silver nanoparticles on the antibacterial properties of cotton, wool, silk fabrics and some synthetic fibres. Positive results were obtained in the production of innovative functional nanotextiles with antimicrobial properties.

Scientists A. Komolafe *et al.* (2021) noted that the integration of electronics into traditional textile materials creates innovative electronic textiles (e-textiles). Electronic textiles are textiles that contain special electronic functions of biometric sensors, wireless communication, power transmission, and connection of sensors and other devices within the textile material. The scope of electronic textiles is diverse. Electronic textiles are used in the production of medical textiles for monitoring human health and interior textiles for decorating living spaces. Electronic textiles are especially widely used in the production of protective clothing for military purposes, etc. The paper describes in detail the types of e-textiles, the most popular areas of their application, properties and technologies for the manufacture of e-textiles for various purposes.

Scientists A. Singh & J. Sheikh (2022) have successfully synthesised a multifunctional reactive dye for dyeing polyamide fabric (nylon) to give it enhanced properties. The authors have dyed and treated polyamide fabric with a multifunctional reactive dye that has a repellent function and a protective function against UV radiation. The resulting textile materials have unique properties, namely the ability to protect people from mosquito bites, since the dyed fabric contains a repellent dye that acts on insects when in contact with the surface. The durability of the dyeing and the resulting effects on the fabric to various wear factors was investigated. The studied fabrics can be used in the production of protective clothing for various purposes, curtains, tents, technical fabrics.

R.A. El-Abassy *et al.* (2019) studied the problem of improving the microclimate of the interior of premises in medical institutions. It has been established that with the right choice of interior nanotextiles (floor coverings, curtain materials, bed linen), it is possible to improve the microclimate of hospital premises, where it is especially important. It is noted that interior textile nanomaterials contribute to the destruction of bacteria, mould, fungi, and prevent their development. Thus, the use of interior nanotextiles with antibacterial properties helps maintain a healthy microclimate in hospitals.

The work of E. Decker (2023) noted that the textile industry is undergoing a profound shift towards sustainable development, driven by demand and the urgent need to address environmental issues. The authors emphasise that information on the assessment of the impact of nanotechnologies, nanomaterials and nanoparticles on the safety of nanotextiles for various purposes, including interior nanotextiles, in scientific

sources is fragmentary and requires a more qualified interpretation. It is noted that in 2024, the research of new nanotechnologies for the production of nanotextiles, nanofibres, nanopreparations and nanoemulsions, nanoapretents, nanodyes for textile purposes is significantly ahead of research on their negative impact on the human body and environmental pollution. Therefore, nanotextiles for various purposes, including interior textiles, should be marketed only after assessing their safety. It is emphasised that it is important and expedient to continue to conduct comprehensive commodity research on the properties, quality and safety of nanotextiles for various purposes, fibre composition and production methods.

In this study, it is advisable to assess the problems associated with the formation of the range of interior nanotextiles, their classification and environmental safety assessment. The aim of the study was to substantiate the directions of development of the latest (improved) range of interior textile nanomaterials for various purposes obtained by various types of nanoprocessing.

Materials and Methods

This study was conducted in 2023-2024 by researchers from Lviv University of Trade and Economics and Lutsk National Technical University. The expediency of addressing these issues is due to the lack of modern commodity analysis of these problems in educational, periodical and scientific publications of Ukraine; the need to increase the export potential of the Ukrainian textile and light industry to implement the Association Agreement with the EU; and the need to bring Ukrainian enterprises out of the protracted economic crisis they are in as of 2024.

Practical aspects of the formation of a modern range of interior nanotextiles were studied using analytical and statistical methods. Analytical methods were used when considering the term 'nanotextiles' using the ISO 18184:2019 (2019) standard, when analysing scientific publications, analysing the economic indicators of nanotextiles use, which were determined on the basis of the report of the Textile Manufacturers Association (Nanotextiles market report overview, 2023). The paper also used the official report of Archroma (2022), which has developed and implemented the Perapret® AIR liq technology for purifying indoor air with interior nanotextiles using nanosized TiO_2 particles. Statistical methods were used to process official statistical data, in particular, to analyse the largest producers of nanotextiles and to identify trends in their development. In addition, statistical analysis was used to assess the dynamics of the introduction of nanotechnology in the production of textile materials, and to forecast future trends in supply and demand for nanotextiles. Systematic analysis was used to comprehensively assess the impact of nanotechnology on the properties of textile materials, thus verifying the statements about the positive impact of nanotechnology on the formation of a set of consumer properties of nanotextiles. The key indicators studied were antimicrobial activity, water repellency, self-cleaning ability and resistance to contamination.

A diverse selection of sources was a key prerequisite for a qualitative analysis of the issue. This study was conducted based on the analysis and systematisation of data from regulatory documents (ISO standards) and reports from textile manufacturers (Nanotextiles market report overview, 2023). The secondary data for the study of this topic are scientific publications from open sources for the period 2010-2024, which contain the results of research on the use of nanotextiles in the world. A cross-comparative and chronological search was used to select scientific sources. For the analysis, it was selected articles that consider both commodity and economic aspects of nanotextiles, focusing on a review of scientific papers on determining the mechanisms for the formation of an improved set of consumer properties of nanotextiles, analysis of textile processing technologies (modification with nanoparticles of Ag, Se, ZnO, TiO_2, SiO_2, CuO and Fe_3O_4 to obtain antifungal properties on these textile materials, treatment with nanoemulsions, use of graphene and silver nanoparticles for the treatment of textile fibres), efficiency and usability of the resulting nanotextiles during operation.

Results and Discussion

As the analysis of Ukrainian and foreign literature shows, in the practice of foreign textile production, nanotechnology is primarily used to provide new (improved) specific properties to interior nanotextiles. In textile commodity science, nanotextiles are structured into six main groups, as shown in Figure 1.

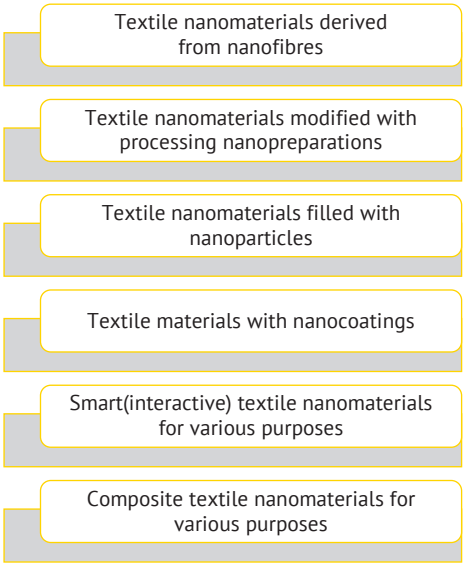

Figure 1. *Types of nanotextiles*
Source: *developed by the authors*

The most popular textile nanomaterials and products on the nanotextile market are: textile nanomaterials for various purposes (interior, medical, sports, military); nanowear for sports purposes; nanowear for military purposes; nanowear for medical purposes; nanotextiles for technical purposes. The leading countries in the production of nanotextiles for various purposes are: USA, Japan, China. The largest leading companies operating in the nanotextile market are: Nano Textile, Colmar, Shanghai Huzheng Nano Technology, eSpin Technologies, FTEnE, Parker Hannifin, Schoeller Technologies, Odegon Technologies, Aspen Aerogel (Research and market, 2024).

Based on the analysis of the achievements of modern nanotechnologies in the production of interior nanotextiles, a table was compiled with a list of new unique properties that interior textiles acquire when produced using the latest nanotechnologies (Table 1).

Table 1. *Interior nanotextiles with new properties obtained using nanotechnology*

No.	Interior textile group	Specific properties
1	Bed and table nanolinen	Biostability, hydrophilicity, dirt resistance, dirt repellency
2	Curtain and blind textile nanomaterials	Lightfastness of dyes, fire resistance, dirt repellency, ability to purify indoor air
3	Textile nanomaterials and products for floor and wall coverings	Biostability, fire resistance, hydrophobicity, oleophobicity self-cleaning ability, ability to purify indoor air
4	Furniture and decorative nanomaterials and products	Biostability, fire resistance, hydrophobicity, oleophobicity, self-cleaning ability

Source: *developed by the authors*

The table shows that the use of nanotechnologies for the production of different groups of interior textiles allows to obtain a fundamentally new range of interior textile nanomaterials and products with improved unique properties (dirt-repellent, fire-resistant, biostable, hydrophobic, oleophobic, self-protecting and indoor climate improvement). It is worth giving an example of the most promising types of nanomodifications used to obtain new (improved) properties on interior textile nanomaterials for various purposes. The main types of nanoparticles used in the textile industry in the production of interior nanotextiles and their properties are shown in Table 2.

Table 2. *Properties of nanoparticles used to modify interior textile materials*

No.	Properties	Nanoparticles
1	Antibacterial, antifungal properties	Ag, chitosan. SiO_2, TiO_2, ZnO, CuO Se, Fe_3O_4
2	Protective properties against ultraviolet radiation	TiO_2, ZnO
3	Self-cleaning, dirt and water repellency	Fluoroacrylate, SiO_2, TiO_2, carbon nanotubes
4	Water absorption	TiO_2
5	Fire resistance	Carbon nanotubes, nanoclay
6	Increase in strength	Al_2O_3, SiO_2, carbon nanotubes, ZnO, polybutylacrylate
7	Electrical conductivity, antistatic, remote heating	Fe, soot, carbon nanotubes, Cu, polypyrrole, polyaniline
8	Release of active substances, medicines or aromas	Nanoclay, SiO_2
9	Chemical, biological protective properties, self-sterilising function	TiO_2, MgO
10	Antiviral properties	Graphene and silver composite
11	Ability to purify the air	TiO_2

Source: *developed by the authors based on L. Almeida & D. Ramos (2017), K.S. Lyubka et al. (2019), O.N. Aguda & A. Lateef (2022)*

Nanoparticles of various substances in the form of nanoemulsions and nanodispersions are used in the final processing of interior textile materials. The data in Table 1 and Table 2 show that the introduction of nanotechnology into textile production allows for the creation of new and improvement of existing types of textile nanomaterials and products for interiors. Innovative nanotextiles for interiors contribute to a significant increase in human comfort and provide effective protection against various negative impacts (atmospheric, mechanical, biological).

It is worth focusing on a more detailed consideration of the range of interior nanotextiles in foreign textile production practice, while determining the possibility of using foreign experience in the practice of the Ukrainian textile industry. It is worth emphasising

that nanotechnology is increasingly being used to protect interior nanotextiles (especially cellulose and keratin-based materials) from the effects of harmful pathogenic and fibre-destroying microorganisms. Since microbiological degradation is a significant factor in the wear and tear of interior textiles, it is important to note that the problem of effective protection of various types of interior nanotextiles using nanotechnology is not yet well understood and scientifically substantiated.

It should also be emphasised that in the practice of Ukrainian finishing textile production, a limited range of biocidal nanopreparations of selective action, nanoemulsions, nanodispersions is used for antimicrobial treatment of interior textiles of various purposes, which suppress the development of the most harmful types of microorganisms for human health and environmental pollution. In this regard, there is a need to study the interaction of interior nanomaterials with certain types of harmful microorganisms, especially on those types of interior textiles that are most vulnerable to their impact.

Analysis of the work of L. Almeida & D. Ramos (2017) shows that it is necessary to pay attention to the use of nanopreparations to provide interior nanotextiles for various purposes with polyfunctional properties (several beneficial effects) – appropriate biostability, hydrophobicity, oleophobicity, self-cleaning from contaminants. It is reasonable and justified to use biocidal dyes for this purpose, which provide textile materials and interior products with the simultaneous effect of antimicrobial resistance and colouring of these materials.

Scientists I.S. Halyk & V.D. Semak (2014) substantiated the feasibility of using nanotechnologies in the colouring of eco-textiles for various purposes and in the final processing of clothing and interior textile materials. First of all, this concerns the use of nanotechnology to significantly increase the weather resistance and biostability of textile materials for various purposes, fibre composition and structure.

In her work, H.O. Pushkar (2013) studied the problem of developing a new promising environmentally friendly range of interior textile materials in order to improve their consumer properties by using modern types of environmentally friendly raw materials, various types of natural (vegetable) and synthetic dyes, as well as promising types of dirt-repellent and fire-retardant treatments for the main processing. Based on the results of theoretical and experimental studies, practical recommendations have been developed for the targeted creation of a new environmentally friendly range of interior textiles with specified consumer properties.

The possibility of introducing modern innovative nanotechnologies into the research and practice of production of goods in the light industry of Ukraine was determined by T.V. Kutsenko (2017). The author also described the characteristics of the range of textile nanomaterials for various purposes with protective functions. The questions presented in Figure 2 require a comprehensive commodity research in this regard.

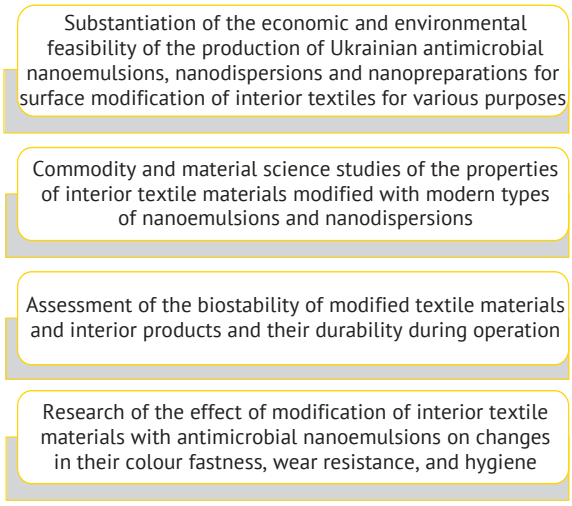

Figure 2. *Directions of interior textile materials research*
Source: *developed by the authors*

It is worth mentioning that it is appropriate and justified to use the latest nanotechnologies to make interior textile materials and products fire-resistant and less prone to ignition. This primarily applies to interior textiles for curtains and draperies, floor and wall coverings, as well as textile materials for furniture upholstery and wall drapery. V.A. Barbur & A. Heintz (2019) state that the following can be used for this purpose: low-flammability nanofibres, yarns and films of various chemical structures; various flame retardant nanoemulsions, nanodispersions and various nanopreparations.

Nanocoatings using nanoclay and carbon nanotubes are widely used to provide interior textiles with fire-resistant properties. The most promising brands of flame retardant nanopreparations that provide interior products with a given fire resistance are described in A.K.R. Chowdhury (2020). The book discusses the fundamentals of fire resistance and flammability of textile materials of different fibre composition and explores different types of flame retardants, including natural flame retardants, halogen, phosphorus and nanotechnology-based flame retardants. The research is aimed at developing fire-resistant and safe textile materials for a wide variety of uses, including clothing, protective clothing, floor coverings, upholstery, drapery.

It is worth mentioning that interior nanotextiles play an important role in improving the microclimate in residential, administrative and public spaces. This applies to chemical, biological, mechanical and other types of indoor microclimate pollution, which should be minimised and cleaned by decorating these premises with different types of interior nanotextiles. In particular, the study by H.O. Pushkar (2013) found that nanoemulsions, nanodispersions and nanopreparations

used to modify interior textile materials and products should be able to neutralise microclimate pollution in these rooms and purify their air.

According to foreign experience, nanoscale TiO_2 particles are used to treat interior textile materials (cotton, polyester, polyamide, viscose and their mixtures). This treatment has been developed and studied by Archroma material scientists for interior textile nanomaterials and products made from them (curtains, textile wall and floor coverings, upholstery and covers for home furniture) (Archroma..., 2022). Studies have shown that colouring based on nanoscale TiO_2 particles is activated by daylight or artificial light and thus provides air microclimate purification in residential and public spaces.

It is worth mentioning that in 2024, nanotechnology will be widely used to provide interior textile materials and products with higher and more durable effects of hydro- and oleophobicity, dirt repellency and self-cleaning. According to the analysis of literature sources, it is in this area that nanotechnology in textile production has the greatest success. In their research, M.A. Shah *et al.* (2022) comprehensively consider the use of nanomaterials in the textile industry: the economic efficiency of their use, improving the functional properties of textiles, the comfort of products, and the issue of potential nanotoxicity of textiles, taking into account the leaching of nanomaterials into the environment. Ukrainian scientists I.S. Halyk & V.D. Semak (2014) found in their research that it is due to nanotechnology that traditional interior materials can acquire such properties as water and oil resistance, reduced flammability, resistance to pollution, softness, antistatic and antibacterial characteristics, heat resistance and the ability to retain their shape. One of the best-known nanotechnologies for finishing is Teflon, which provides materials with water-, oil- and dirt-repellent properties. For this purpose, nanoemulsions of fluorocarbon polymers are used. Interior textile nanomaterials and products with such nanocoatings are resistant to repeated washing, have high form stability and excellent aesthetic appearance, which is confirmed by the studies of K.S. Lyubka *et al.* (2019) and H.O. Pushkar *et al.* (2020). Md. Syduzzaman *et al.* (2023) also studied superhydrophobic textile materials with self-cleaning ability, in particular, their work presents the results of studies of textiles on the surface of which silica is applied with subsequent hydrophobic modification of polydimethylsiloxane. The researchers found that this treatment significantly improves wear resistance, water repellency and self-cleaning properties of the material.

The influence of nanoparticles on the antimicrobial properties of textiles is widely studied in textile materials science. In particular, O.N. Aguda & A. Lateef (2022) in their work studied in detail and thoroughly the role of nanoparticles in the functionalisation of textiles as agents to combat microorganisms, analysed scientific reports on their antiviral, antifungal and antibacterial effects. The authors also discussed the problems and prospects of nanotextiles for biomedical applications.

The work of V.A. Barbur & A. Heintz (2019) noted that the American company Battelle has developed coated textiles with conductive properties using carbon nanotubes (CNT-Carbon Nanotubes), which eliminates many of the problems associated with metal yarns or embedded wire systems in textile material. Such a textile nanocoating has high electrical conductivity, flexibility, lightness and can be applied to the textile material in a thin layer, which contributes to the high drape properties and performance characteristics of the textile nanomaterial itself. The resulting nanocoated textiles (CNTs) are used in the production of furniture and household goods. Heated textile materials can be used in mattress covers, for upholstery of sofas and armchairs, in the production of blankets and pillows and other interior textile products. With these textile nanomaterials, furniture can be heated, allowing people to feel comfortable at low room temperatures while reducing overall energy costs. Battelle has also developed nanofabrics with sensors. The sensors embedded in the fabrics can be used to detect and assess humidity levels, and can also measure movement, weight, orientation, light levels, or vital signs of human health. The information received from the sensors can be transmitted to the point of use via a conductive coating. This technology thus opens up a range of potential intelligent applications in the production of nanotextile floor and wall coverings, most notably carpets that can glow in the dark to show the way to emergency exits or bathrooms, or wall coverings for bathrooms and laundry rooms where there is excessive humidity. T. Ali *et al.* (2023) noted that nanotextiles are very popular as of 2023 because they are multifunctional, offer UV blocking, are flame retardant, have antimicrobial properties, and are capable of tissue regeneration without compromising comfort.

Ukrainian scientists O.V. Pakholiuk *et al.* (2021) studied the effect of colour fastness of cellulose-containing fabrics that can be used as interior textiles on repeated washing. The study established the influence of cold and classical dyeing technologies using different types of active dyes at different concentrations in the dye. The authors of O.V. Pakholiuk *et al.* (2020) noted that it is important to create a separate segment of the nanotextile and clothing market for different purposes.

According to the analysis of the state of the foreign interior nanotextile market, in particular, the results of research by M.A. Shah *et al.* (2022) and the official Nanotextiles market report overview (2023), the world practice has already outlined the areas of use of interior nanotextiles and nanomaterials for their manufacture. In particular, this applies to such types of interior nanotextiles as furniture and decorative materials and products made of them, carpet floor coverings, curtain and drapery textile materials and products, as well as bed and table linen. C. Som *et al.* (2011) noted that

engineered nanomaterials can open the way to the use of textile products in construction, medicine, automotive, environmental and safety technologies. S. Mura *et al.* (2015) demonstrated the synthesis of silica nanoparticles without the use of toxic organic compounds.

However, given all the advantages of nanotextiles, scientists highlight the issue of environmental friendliness and safety of its use. In particular, M.A. Shah *et al.* (2022) critically assess the use of nanotextiles, pointing out the need for in-depth scientific research on the potential toxicity of leached nanomaterials from textiles. D. Brouwer (2010) found in his study that the share of atmospheric pollution by carbon compounds from textile and clothing production is about 10% of total emissions, and textile dyeing contributes to water pollution by 17-20%, the use of nanomaterials for dyeing contributes to the accumulation of nanomaterials in water bodies. Information on the range and properties of interior nanotextiles for various purposes presented in the literature remains incomplete.

It should be mentioned that the Ukrainian textile industry has not yet resolved a number of important issues related to the formation of the range, properties, quality level and environmental safety of various types of interior nanotextiles. The key problems include:

- incapability to determine the economic, environmental and technological feasibility of producing certain types of interior textiles in Ukraine and the need to import these goods;
- insufficient research on the impact of nanoparticles, nanotechnologies and interior nanomaterials on human health and the environment;
- lack of standards for interior nanotextiles, as well as norms, methods and criteria for assessing their quality;
- lack of information on potential research on the range and properties of interior nanotextiles, which makes it difficult to determine the main directions of such research;
- there is no information on the results of the commodity (including environmental) examination of the range and properties of interior nanotextiles for various purposes.

The outlined problems highlight a number of commodity and material science issues related to the production, formation of the range and properties of interior nanotextiles that require priority research. Most of the issues discussed in the article are of a staging nature and do not claim to be exhaustive.

Conclusions

Based on the analysis of literature data and the results of own research, the main directions of formation of the range and properties of interior nanotextiles for various purposes are substantiated. The areas of the most promising and effective application of interior nanotextiles for furniture and decoration, curtains and drapes, linen and floor covering purposes are substantiated. The article identified the strengths and weaknesses of different groups of interior nanotextiles in comparison with their traditional analogues.

The possibility of applying foreign experience for the production of interior nanotextiles at Ukrainian textile enterprises has been determined. At the same time, the priority should be given to those nanotechnologies that can provide interior nanotextiles with various multifunctional, unique properties. The necessity and expediency of expanding the range of Ukrainian-made nanopreparations to provide interior textile materials and products with a wide range of various useful properties to improve their environmental safety and quality was also substantiated. As a result of the study, it was determined that it is advisable to use nanopreparations for the treatment of interior textile materials and products to provide interior nanotextiles with properties that minimise or neutralise air pollution and contribute to the improvement of the microclimate in residential and public spaces. The study also found that the use of nanotechnology in textile production makes it possible to create new and improve existing types of textile nanomaterials and products for interiors. Innovative nanotextiles for interiors increase human comfort and provide effective protection against various negative impacts, such as atmospheric, mechanical and biological factors.

The issues raised should be covered and professionally interpreted in new generation textbooks on textile nanomaterials and nanomaterials science, the publication of which is currently particularly necessary and relevant. In the periodicals of the relevant specialised universities, it is necessary to create separate thematic sections for professional coverage of issues related to the formation of the range, properties, quality and safety of nanotextiles for various purposes. Prospects for further research are consideration and discussion of these problems at regional inter-university scientific and practical conferences, as they are relevant and need to be addressed quickly in the Ukrainian textile industry and trade.

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Conflict of Interest

None.

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Товарознавчі аспекти формування сучасного асортименту інтер'єрного нанотекстилю

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Анотація. Застосування сучасних нанотехнологій у виготовленні текстильних матеріалів для інтер'єру дозволяє розширити та урізноманітнити асортимент продукції, надати абсолютно нові функціональні властивості, а також отримати на цих матеріалах та виробах унікальні корисні ефекти: естетичні, антимікробні, брудовідштовхувальні, лікувальні, і разом з тим задовольнити конкретні потреби споживачів. Метою статті було дослідити та обґрунтувати основні напрямки формування сучасного асортименту та властивостей інтер'єрного нанотекстилю різного цільового призначення. У дослідженні було використано статистичний, аналітичний методи, метод системного аналізу. Аналіз літературних джерел показав, що за 2010-2024 роки, українськими та зарубіжними науковцями детально досліджувалася економічна і технологічна доцільність широкого використання текстильних нанотехнологій для розширення та оптимізації асортименту нанотекстилю, включаючи інтер'єрного призначення. Керуючись цим підходом, в статті наведено аналіз літературних джерел за останні 2019-2024 роки, в яких було розглянуто основні напрямки розвитку та досягнень нанотехнологій в текстильному виробництві для розширення асортименту і властивостей нанотекстилю інтер'єрного призначення в Україні та світі. На цій основі було сформульовано та обґрунтовано теоретичні положення подальшого розвитку нанотехнологій і ринку нанотекстилю інтер'єрного призначення. Визначено перспективні напрямки використання інтер'єрного нанотекстилю для портьєр, штор, білизни, меблів, декору та покриттів для підлоги. Виявлено переваги і недоліки цих видів нанотекстилю порівняно з традиційними матеріалами. Обґрунтовано необхідність та доцільність розширення виробництва різних наноемульсій, нанодисперсій та нанопрепаратів в Україні, щоб надати текстильним виробам для інтер'єрів корисні властивості, підвищивши їх якість та екологічну безпечність. Акцентовано основну увагу на наданні текстильним інтер'єрним наноматеріалам і виробам поліфункціональних унікальних властивостей. На практиці, проведені дослідження можуть слугувати у виборі пріоритетних напрямків досліджень у виготовлені інтер'єрного нанотекстилю різного цільового призначення

Ключові слова: нанотехнології; інтер'єр; нанооброблення; нанопрепарати; споживні властивості; екологічна безпечність; гігієнічність