Project title: Development of antimicrobial nonwoven products from silk waste for medical applications

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Andijan Machine Building Institute

Principal investigator: Prof. Jakhongir Akhmedov, D.Sc.

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PROBLEM AND OPPORTUNITY

Uzbekistan ranks 4th in the world in terms of silk production

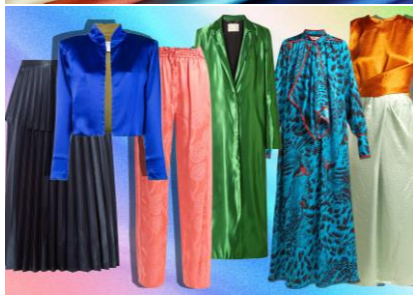
- 19 000 tons in 2019
- 19 500 tons in 2020
- 20 000 tons in 2021
- 22 000 tons in 2022

Approximately, the same amount of silk waste is generated during the production of 1 kg of silk

Instead of the process of making silk yarn spun from silk waste fibers, which is a complex and multi-technological process, low-cost and short-process non-woven fabrics are used.

Waste

Soft Silk



SOLUTION

The main goal of this project is to develop a technology for the production of environmentally friendly non-woven materials using raw silk waste

Recommended technological process

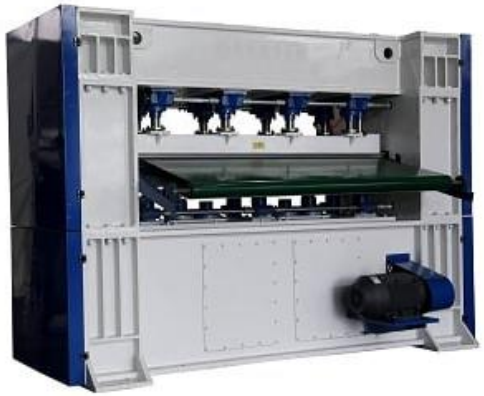
The technological parameters of getting non-woven fabrics will be studied by **needle punching** and **hydroentanglement** methods.

The physical, mechanical and operational properties of the obtained non-woven fabrics will be analyzed.

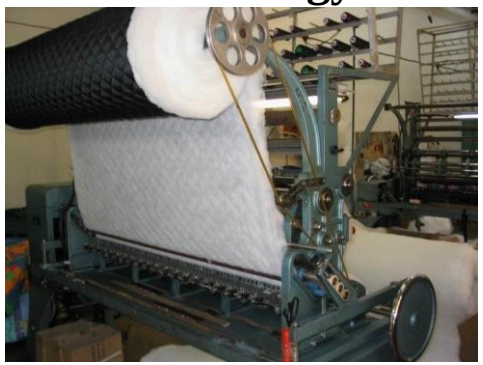
Non-woven fabrics are tested in areas related to human health

New assortments of products are created for use in medicine

Needle punching technology



Hydroentanglement technology



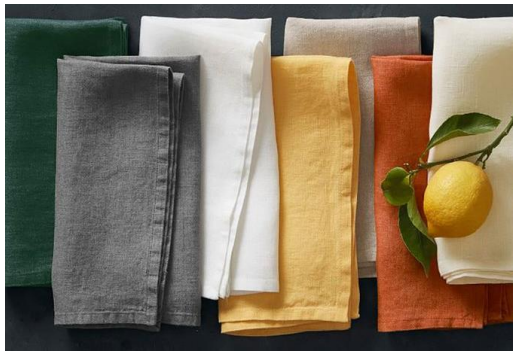
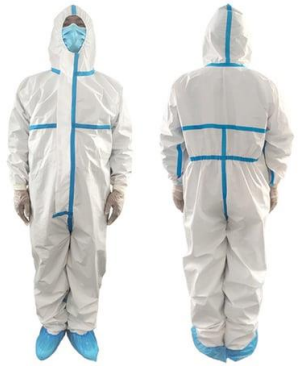
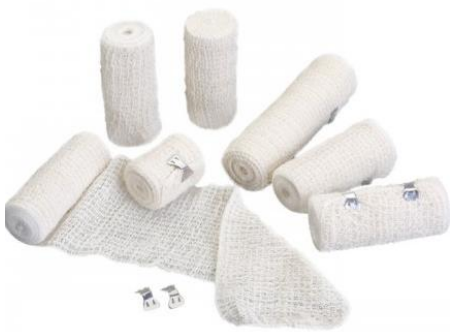
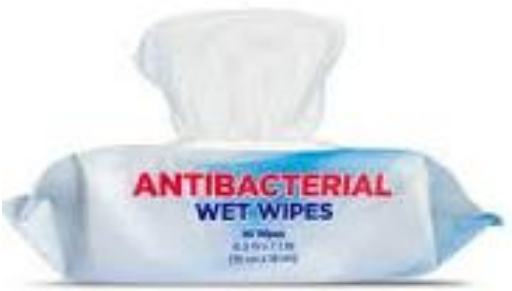
Why this technology better than others

- A simple technological process
- Energy efficient technology
- Efficient use of waste materials
- Creating environmentally friendly products
- High productive technologies will be introduced to silk factories in Uzbekistan

Innovation and potential for commercialization

After the successful clinical tests **the following single-use medical products** are planned to produce.
Products will be recommended to use as sanitary-hygienic product in medical practice.

Face masks | **Napkins** | **Protective clothes** | **Medical bandage** | **Wet wipes**

INTELECTUAL PROPERTIES

2 international
4 national patens

8 scientific publications

4 PhD dissertations

8 Master of science thesis

INDUSTRIAL PARTNERS

"UZBEKIPAKSANOAT" ASSOCIATION

ANDIJAN SILK CO
International company

TURAN SILK
Joint company

RAVNAQ-SILK
Joint company

CORRENT STATUS

- **IAP 05838 Medical bandage**
- **IAP 05480 Method for preparing twisted silk threads for producing**
- **IAP 05210 Medical gauge**
- **IAP 06302 Method for producing yarn from mixed fibers**

- **Maintaining the natural quality of the product and increasing energy efficiency on the basis of silk nanotechnology**
- **Creation of production methods and technologies of competitive new types of products based on silk nanotechnology**
- **Creating methods and technologies for the production of new types of products used in medicine and household needs using natural silk and its nanoparticles**

- **Khabibullaev Doniyor Anvarjonovich defended his dissertation for the degree of Doctor of Philosophy (PhD) in technical sciences on the topic "Improving the technology of raw material preparation for polycomponent new types of fabrics" (2022)**

- **More than 10 scientific papers have been published on international high indexed scientific journals**

Use of Funds

Cost Category	Amount
Direct personnel costs (PI, senior staff, postdocs, students, other personnel costs)	**40 000**
Subcontracting costs (no indirect costs)	**10 000**
Purchase costs [travel and subsistence, equipment (including major equipment), consumables (including fieldwork and animal costs), publications (including any costs related to Open Access fees) and dissemination, and other additional direct costs] 4 special laboratory equipment 2 travels	**135 000**
Internally invoiced goods and services (no indirect costs)	
Internal audit	**10 000**
Overhead expenses (%)	**5 000**
Estimated total cost of the project	**200 000**

Timeline

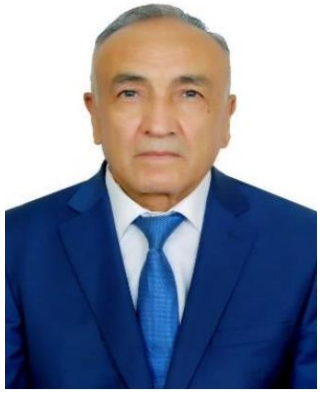
Key stage description	Year 1				Year 2			
	Q 1	Q 2	Q 3	Q 4	Q 5	Q 6	Q 7	Q 8
Stage 1								
Project Coordination								
Dissemination of Project Results								
Stage 2								
Development of a Technological Concept								
Preparation for Performance of Experimental Studies								
Stage 3								
Organization of the Experimental Laboratory								
Stage 4								
Conducting Experiments to Obtain Non-Woven Materials								
Conducting Performance Tests of Non-Woven Materials								
Stage 5								
Development of Regulatory and Technical Documentation								

PROJECT TEAM

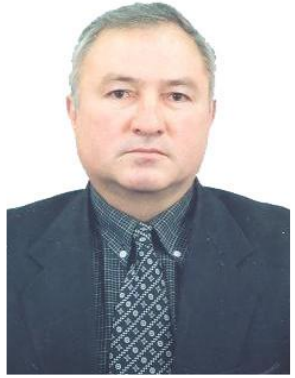
PI: Prof. Jakhongir Akhmedov, D.Sc.
Head of silk technology department
Tashkent Textile and Light Industry Institute

Co-PI: Prof. Zafar Juraev,
Candidate of technical science
Andijan Machine-Building Institute

Co-executing institute manager:
Prof. Thomas Gries,
Univ.-Professor at RWTH Aachen University for textile machinery
Director of the Institut für Textiltechnik



Technology development:
Prof. Egamov Yuldoshali, D.Sc.
Head of department of Facultative and General Surgery at
Andijan State Medical Institute



Biological study:
Prof. Azizov Yuliy, D.Sc.
Head of the Department of Microbiology, Virology, Immunology at Andijan State Medical Institute

Research and laboratory assistants:
4 PhD researchers and
8 master students at from
3 partner universities