

# Reporter: Sainan Wei

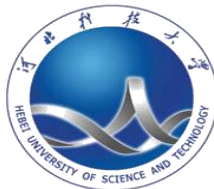
**Visiting scholar Supported by the Hebei Provincial Department of  
Human Resources**

**ENSAIT, France, From 24 July to 13 Oct.**

**Department of Textile Engineering, College of Textile & Garment,  
Hebei University of Science and Technology, China**

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# Report catalog

**01**

**Introduction of Hebei University of Science and Technology**

**02**

**Self-introduction**

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# 1. Introduction of Hebei University of Science and Technology (It can be abbreviated as HEBUST)

It was established in June 1956 and is located in Shijiazhuang, capital of Hebei province, China, about 300 kilometers away from Peking, one and half hour train time from Capital Peking, covering an area of 1,618,000 square meters. There are over 28 thousand full-time students, as well as more than 2200 teachers and staff members.





# 18 Colleges in HEBUST

| College of Materials Science and Engineering     | College of Chemical Engineering         | College of Textile and Garment    |
|--------------------------------------------------|-----------------------------------------|-----------------------------------|
| College of Environmental Science and Engineering | College of Mechanical Engineering       | Sports Work Department            |
| College of Foreign Languages                     | College of Architecture and Engineering | College of Electrical Engineering |
| College of Management and Economics              | College of Civil Engineering            | College of Food and Biology       |
| College of Science                               | College of Humanities and Law           | College of art                    |
| College of Information Science and Engineering   | Marxist Academy                         | College of Film and Television    |



# College of Textile and Garment of HEBUST

It was founded in 1998. The discipline system covers all segments of textile and clothing. At present, There are 77 faculty members and about 1,500 students in the college, including 14 professors and 22 teachers with doctoral degrees.

## Majors

1. Textile Engineering

2. Clothing Engineering

3. Dyeing and Finishing Engineering

4. Fashion Design



## 2. Self-introduction

- Professor of Textile engineering
- PhD of Textile engineering, Tianjin polytechnic university, China
- I have been working at Department of Textile Engineering, College of Textile & Garment, Hebeu University since Nov. 2006
- Visiting scholar supported by the CSC(China Scholarship Council) in Manchester University UK. from Feb.2016 to Feb.2017, Deakin University Australia last year for 3 months



# My teaching courses

- *“Industrial textiles”*
- *“High performance fibers”*
- *“Frontiers of Textile Specialty”*
- *“Foreign trade correspondence”*
- *“Fashion Marketing”*
- *“Fashion English”*



# My research activities

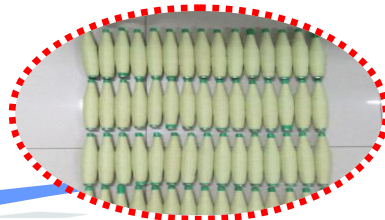
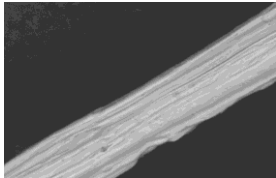
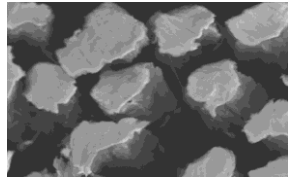
- 1. Flexible electromagnetic wave absorbing fabrics
- 2. Multi Spectrum Camouflage and Stealth Fabric
- 3. Nickel plated fabric absorbing composites based on VARI process
- 4. Testing and evaluation of surface hairiness on fabrics





# 1. Flexible electromagnetic wave absorbing fabrics

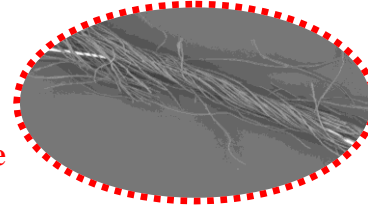
Metal wire bundle drawing technology



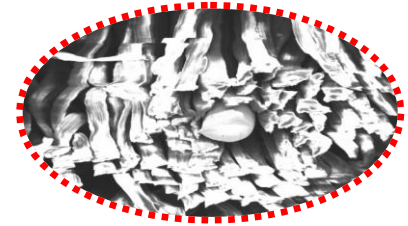
Ni-Fe/Kevlar  
Blended Yarn



Ni-Fe/Cotton Blended Yarn



Stainless steel filament core  
spun yarn



Sectional diagram of core  
spun yarn

Spinnable Absorbing  
Nickel Iron Fiber

Spinning of  
Blended Yarn

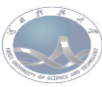
Fabric Structure  
Design and  
Development

Fabric Functional  
finishing

Thin, light, wide and  
strong multifunctional  
fabrics

[1] Monograph: Wei Sainan, *"Flexible Radar Stealth Materials"*, Jilin University Press, 2017

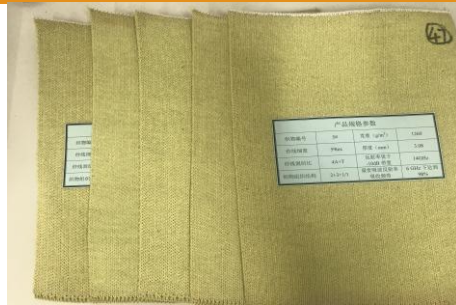
[2] Characterization of flexible radar-absorbing materials based on ferromagnetic nickel micron-fibers. *Journal of Industrial Textiles*, 2018(4). DOI:10.1177/1528083718772304



# Fabric Structure Design and Development



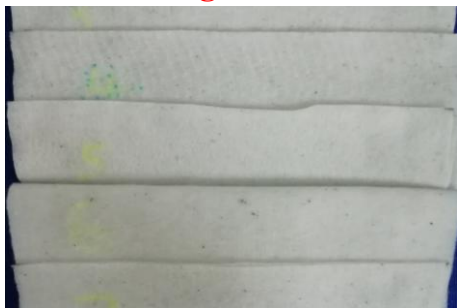
**Nickel iron fiber/cotton  
absorbing woven fabric**



**Nickel iron fiber/aramid  
absorbing knitted fabric**



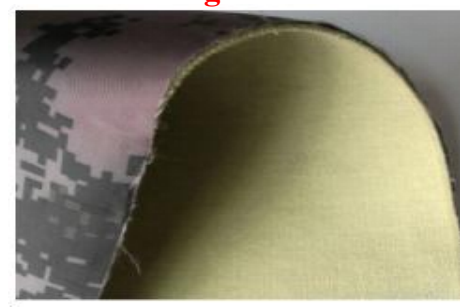
**Nickel iron fiber/cotton  
absorbing knitted fabric**



**Nickel iron fiber wave  
absorbing nonwoven fabric**



**Absorbing cluster velvet blanket**



**Waterproof, flame retardant,  
multispectral absorbing  
tarpaulin**

The product has a reflectivity of -20dB and a stealth efficiency of over 99%,  
fabric density <1kg/m<sup>2</sup>

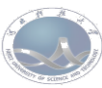


## 2. Multi Spectrum Camouflage and Stealth Fabric

The products have two types: individual soldier camouflage cloak and apparels, which are made by fabric coating, cutting, and weaving technology. The printed coating fabric contains specific components that can have both visible light and infrared camouflage and stealth functions.

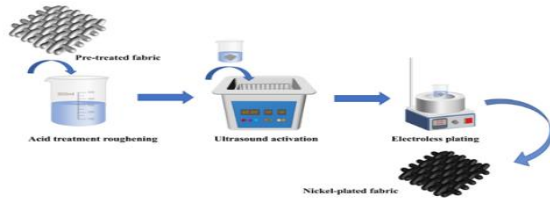


- [1] Investigating the electromagnetic wave absorbing capacity and mechanical properties of flexible radar-absorbing knitted compound materials, Journal of Industrial Textiles, 2022 ,51(4S): 5482S–5502S. DOI:10.1177/1528083719877006
- [2]Preparation and mechanical properties of absorbing composites based on nickel plated fabric. Journal of Industrial Textiles.2024(6):1–14. DOI:10.1177/15280837241260065

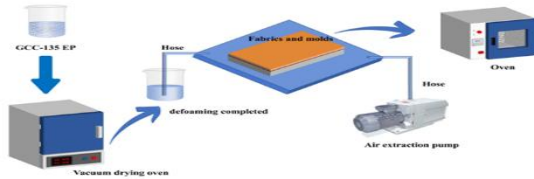




### 3. Wave absorbing composites based on VARI process



Process flowchart of electroless nickel plating on fabrics

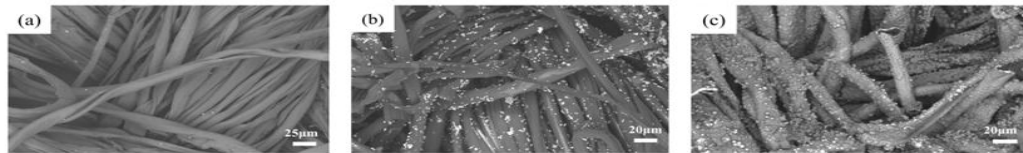


Preparation of carbon fiber UD cloth, nickel plated fabric, and glass fiber absorbing composite materials using VARI process

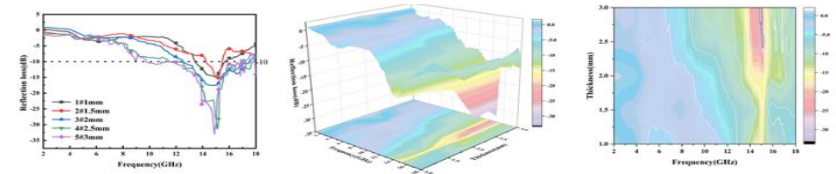
Wave absorbing fabrics with nickel particles on the surface were prepared by plating method. Then proceed with the layering process with glass fiber/epoxy resin as the transparent layer, nickel plated fabric as the absorbing layer, and carbon fiber UD cloth as the reflective layer. Using vacuum assisted resin infusion (VARI) process, absorbing composite materials will be prepared with both absorbing and mechanical properties.

- [1]Progress on Microwave Absorption Performance of Carbon Fiber Reinforced Composites. Chemistry Select, 2024(9):1-21. DOI:10.1002/slct.202305226  
[2]Flexible composites of Ni-Fe fiber/NBR for effective electromagnetic wave absorption. Appl. Phys. A (2024).DOI:10.1007/s00339-024-07928-3

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SEM image (a) unmodified fabric (b) activated fabric  
(c) nickel plated fabric



Reflection loss plots of different thicknesses composites

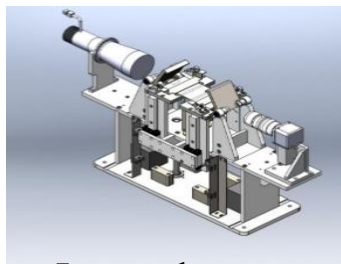


# 4. Testing and evaluation of surface hairiness on fabrics

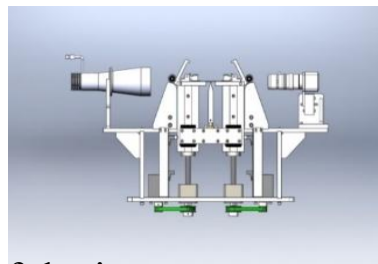
The traditional evaluation of fabric hairiness often adopt manual visual inspection of fabric creases. This instrument adopts projection counting processing technology, which uses parallel light to irradiate the folded part of the fabric. It can captures the hairiness image and can characterizes the number, length, area and other distribution status of the fabric hairiness, calculates the level of the fabric hairiness based on these indexes. We have authorized patents and national standards.



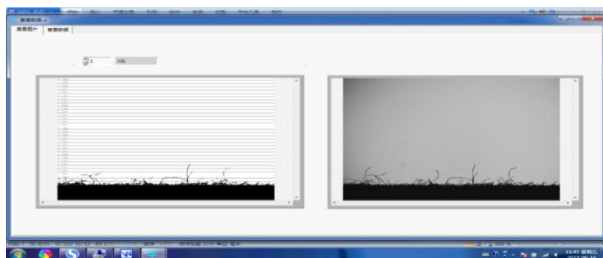
Instrument appearance



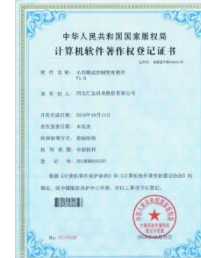
Internal structure of the instrument



Computer interface



Computer interface



Achievements



# Applications of fabric hairiness tester

Applic



# Interest to participate to teaching activities at ENSAIT

Follow some professional courses, including teaching and practical courses.

Courses interest:

- *Spinning*
- *Weaving*
- *dyeing*
- *Industrial textiles*
- *High performance fibers*
- ...



# My interest to research projects with Gemtex

Participate in related conferences, seminars and academic discussions.

Research projects of interest

- High performance and functional textiles
- Electromagnetic wave shielding and absorbing functional materials
- Fiber-reinforced composites
- Advanced Textile Testing Technology





# Seminar

Date: End of September

Topic of my scientific research works

- Electromagnetic wave absorbing fabrics
- Testing and evaluation of surface hairiness on fabrics



■ ■ ■ ■ Thank you for attention.

And if you want to have an onsite  
discussion (before 13<sup>th</sup> Oct.)

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Welcome to China and Hebust