ITMF Annual Conference 2023

Industrialization and Application of Alginate Fiber for Textile

纺织用海藻纤维的产业化与应用

Prof. Yanzhi Xia

11/06/2023

Qingdao YuanHai New Material Technology Co., Ltd

Qingdao University Marine Fiber New Materials Research Institute

State Key Laboratory of Biological Polysaccharide Fiber Forming and Ecological Textile

Shandong Marine Biomass Fiber Materials and Textiles Collaborative Innovation Center

青岛源海新材料科技有限公司

青岛大学海洋纤维新材料研究院

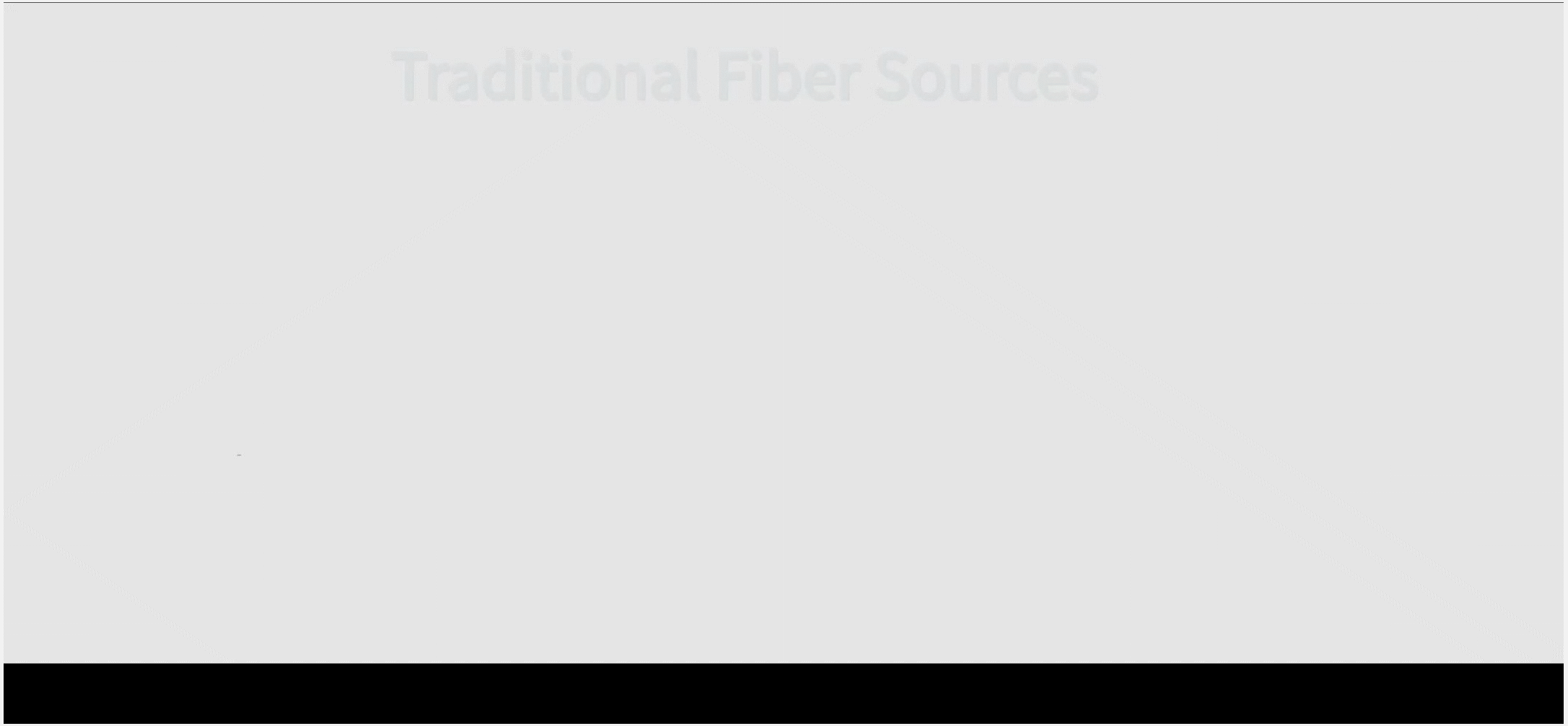
生物多糖纤维成形与生态纺织国家重点实验室

山东省海洋生物质纤维材料及纺织品协同创新中心

Contents

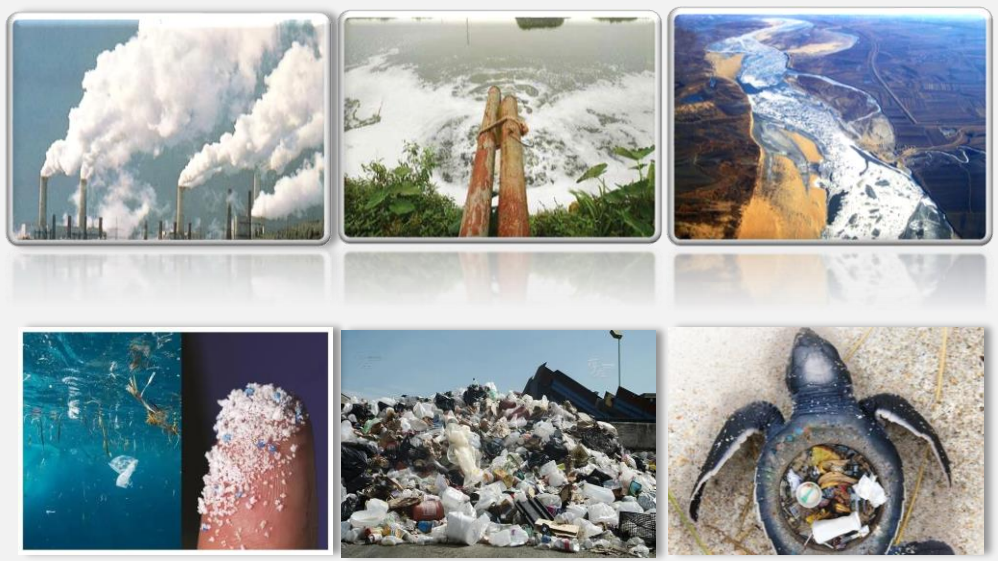
Alginate fiber-open up a new direction of marine bio-based fiber

海藻纤维—开辟海洋生物基纤维新方向



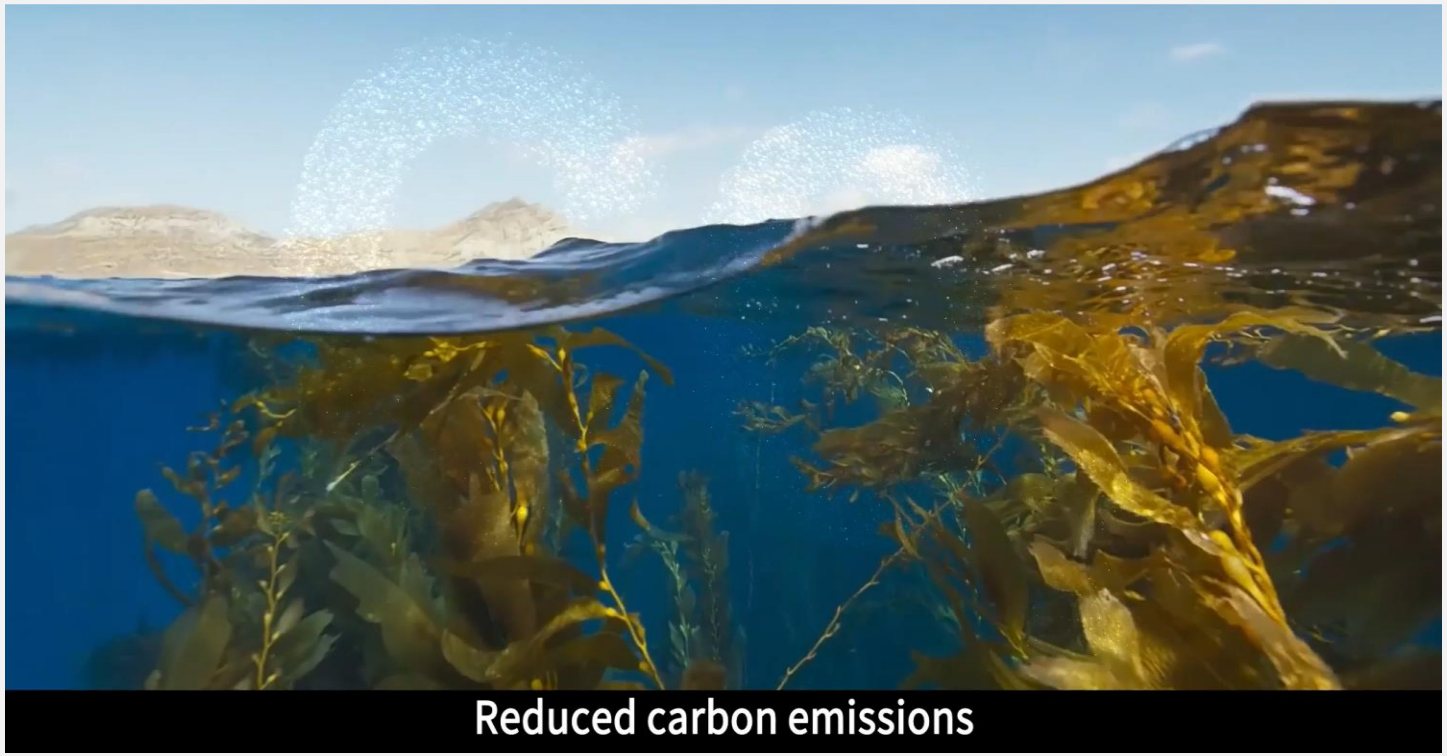
01 Research background

Growing environmental concerns 环境问题日益突出



Pollution 污染问题

Carbon peaking & Carbon neutrality

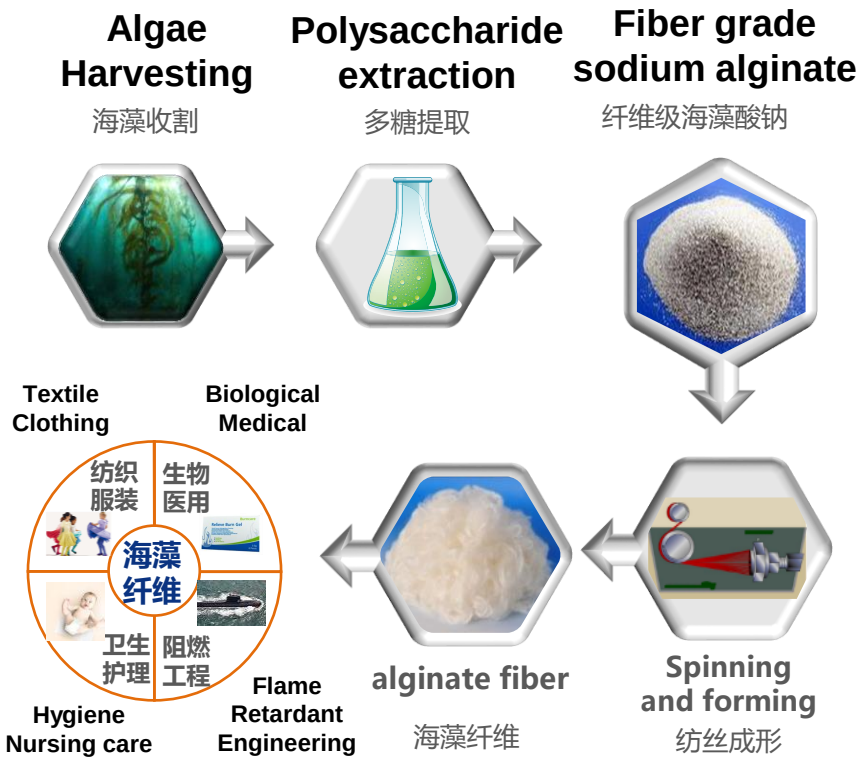


02 Industrialization of alginate fiber

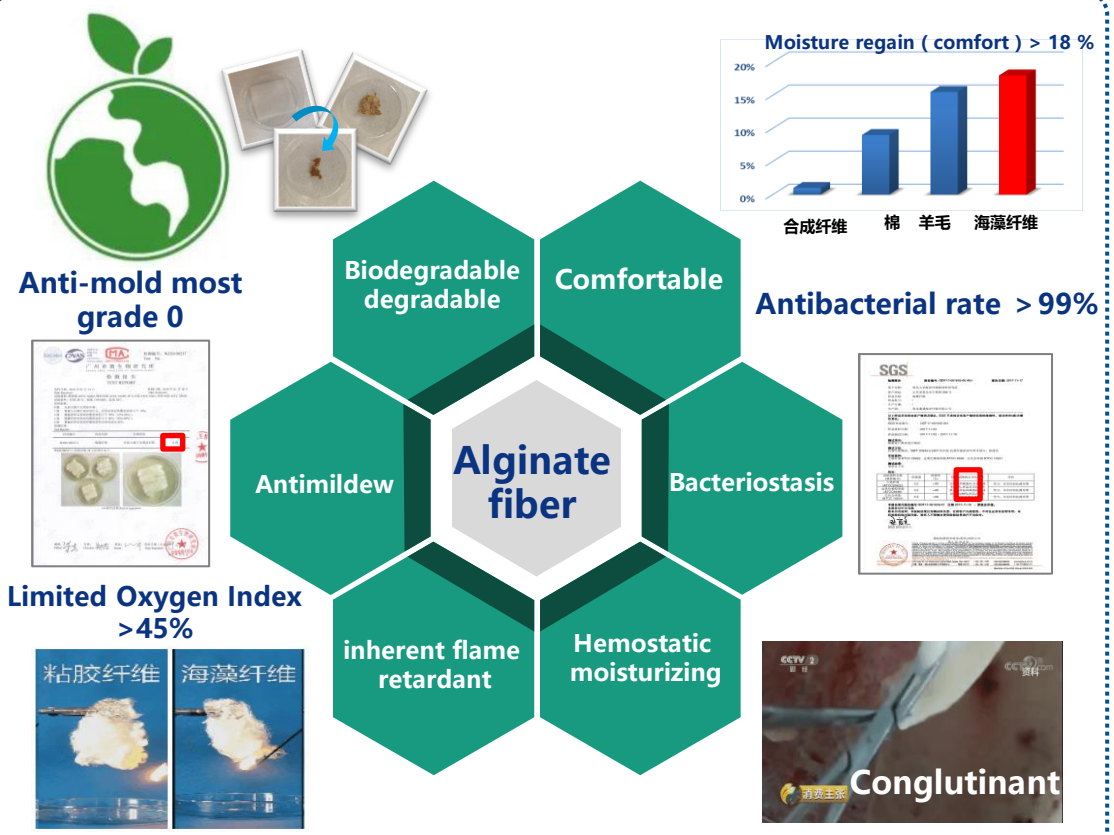
Alginate fiber-water system green processing, natural multi-function

海藻纤维—水体系绿色加工，天然多功能

Preparation process



Function



02 Industrialization of alginate fiber

Research process

The first alginate fiber small test spinning line in China

国内首条海藻纤维小试纺丝线

Medial test spinning line

4万喷丝孔中试纺丝线

800 tons/year production line

建成800吨/年生产线

Thousand-ton production line

建成千吨级海藻纤维生产线

Industrialization application

产业化应用

2004 — **The first research on alginate fiber for textile was carried out**

首创性开展纺织用海藻纤维研究

2005

2007

2010 — **Hundred-ton spinning line**

百吨级生产线建设

2012 — **Preparation and design**

筹备设计
千吨级生产线

2013

2015 — **Salt tolerance, washing resistance**

耐盐、耐洗涤剂
海藻纤维

2016 — **Design and fabrication**

设计建造千吨级生产线

2018 — **Incorporation**

成立青岛源海新材料科技有限公司

2019

2020 — **Technical breakthrough**

继续基础研究探索
持续技术/产能突破
扩大技术国际领先优势

Basic research

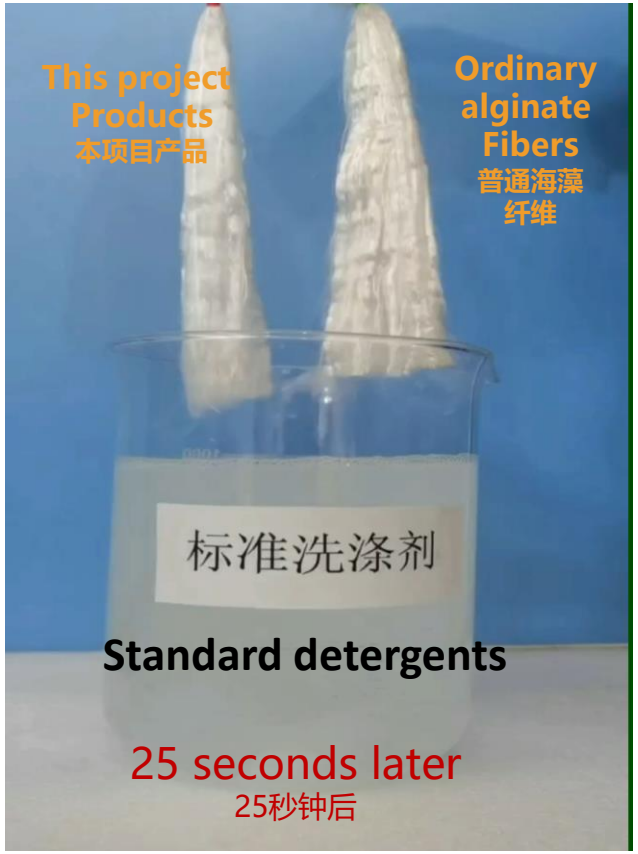
基础研究

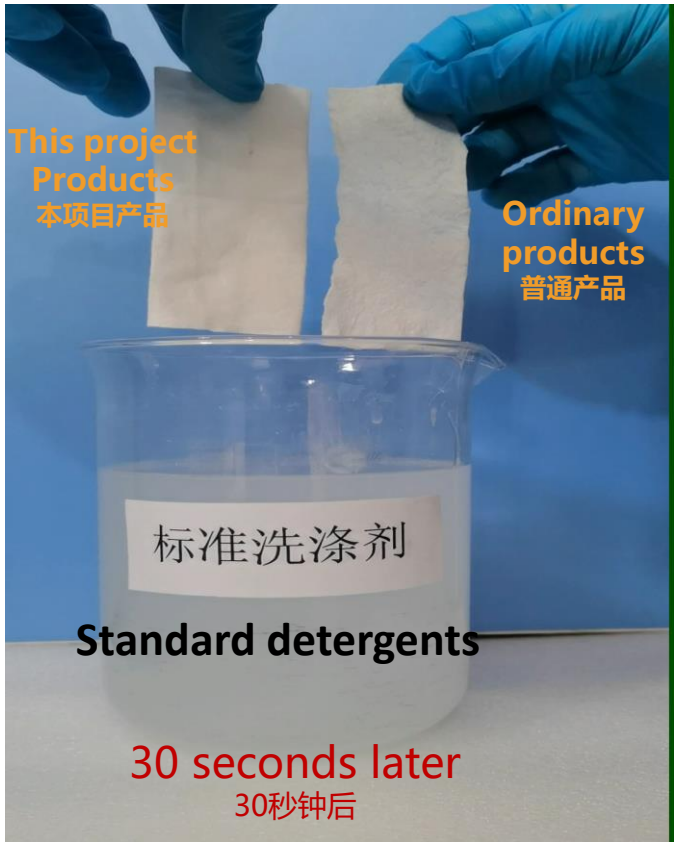
02 Industrialization of alginate fiber

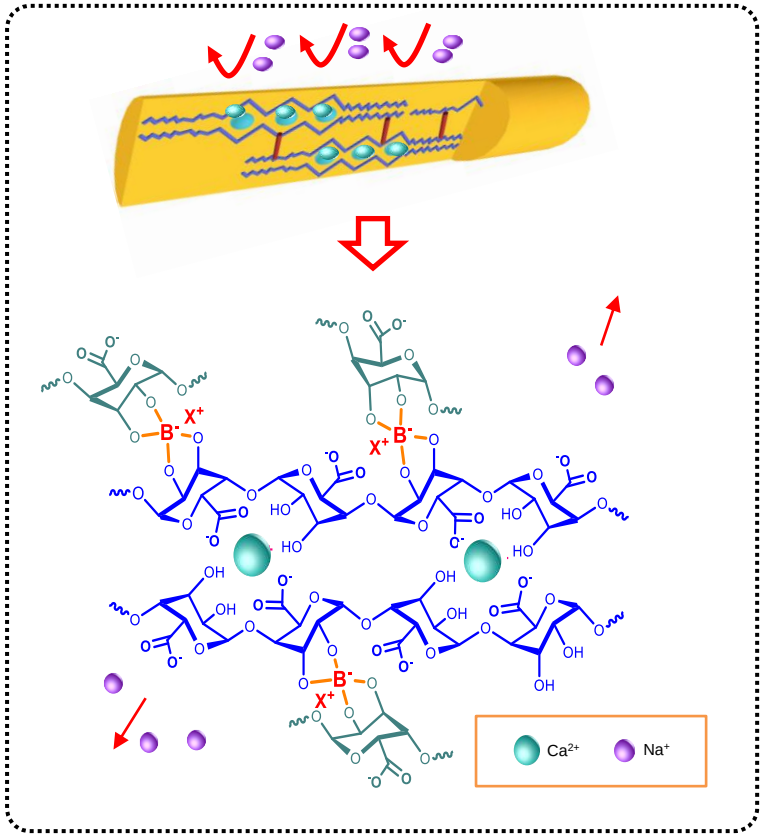
Technological breakthrough : alginate inorganic salt molecular crosslinking technology

技术突破：海藻酸盐无机盐分子交联技术

Solved the problem of seaweed fibers dissolving in salt water or detergents, and achieved its application in the field of textiles and clothing. 解决了海藻纤维遇盐水或洗涤剂发生溶解的难题，实现了在纺织服装领域的应用。







02 Industrialization of alginate fiber

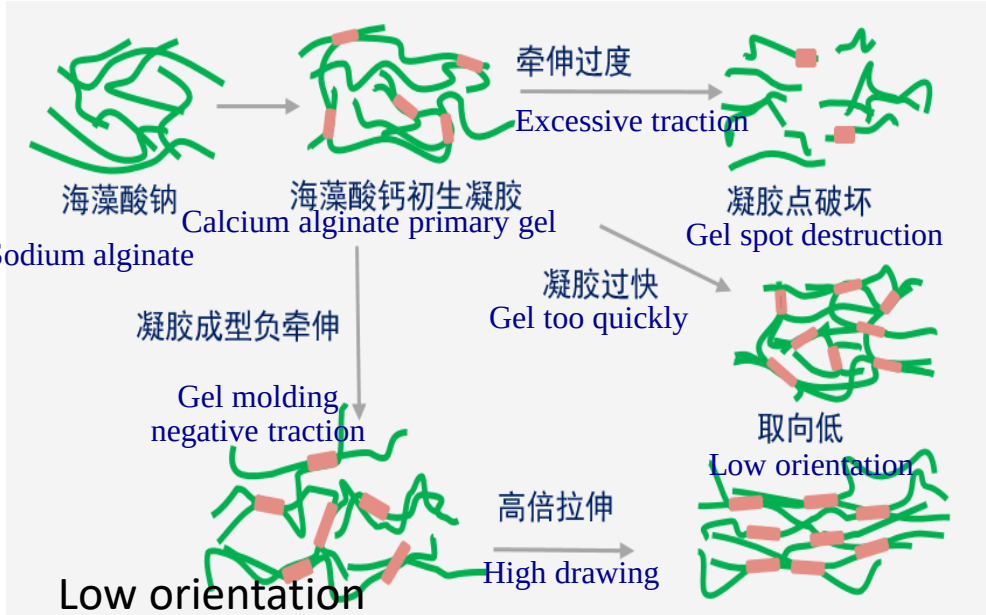
Technical breakthrough : fiber strength increased

技术突破：纤维强度提高

Achieve a significant increase in fiber strength
Solved the problem of limited application fields

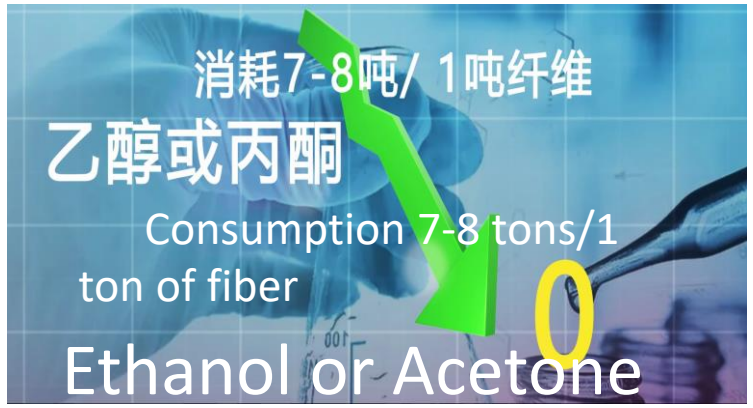
实现纤维强度大幅提升，解决了应用领域受限问题

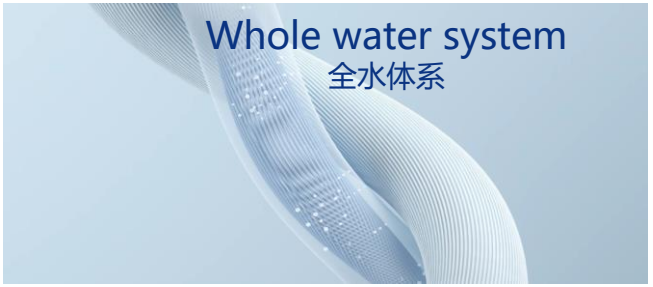
Gel orientation mechanism 凝胶取向机制



Technical breakthrough : Dehydrating agent-free fiber separation technology

技术突破：无脱水剂分纤技术





Improve security and reduce costs

提高安全性，降低成本

02 Industrialization of alginate fiber

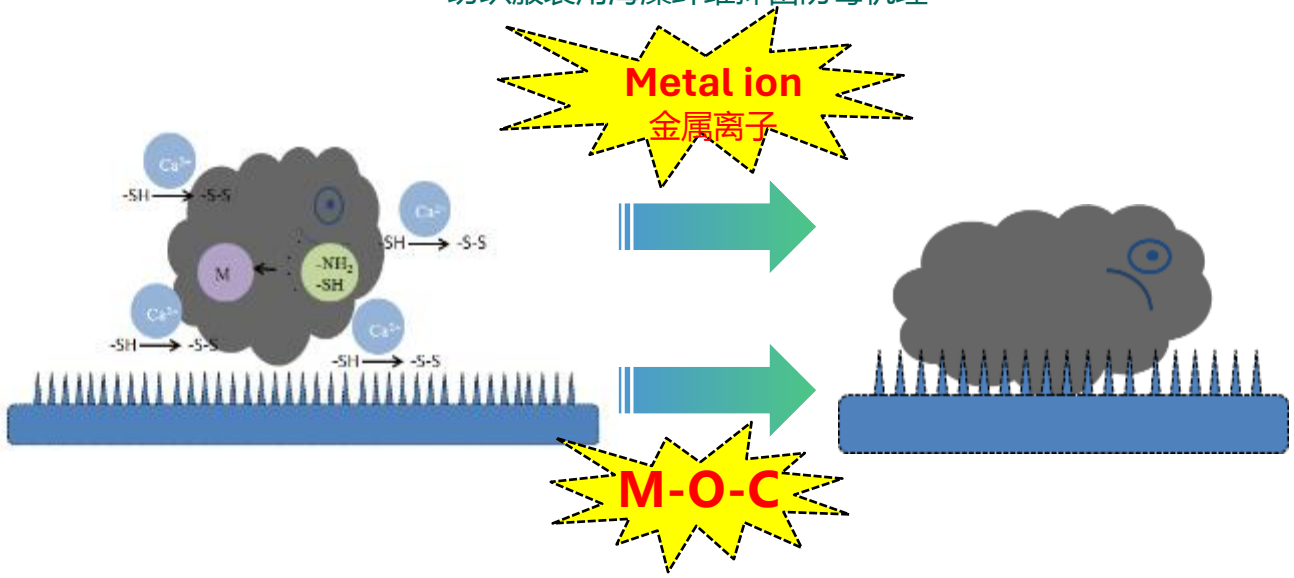
Technological breakthrough: flame-retardant, antibacterial, and mildew resistant multifunctional dyeable and spinnable fibers 技术突破：阻燃抑菌防霉多功能可染可纺纱纤维

Enhancing the antibacterial ability of alginate fibers through inorganic salt crosslinking, and the metal ions with M-O-C groups have a synergistic antibacterial effect.

无机盐交联剂提高了海藻纤维的抑菌能力，金属离子+M-O-C 基团抑菌协同作用

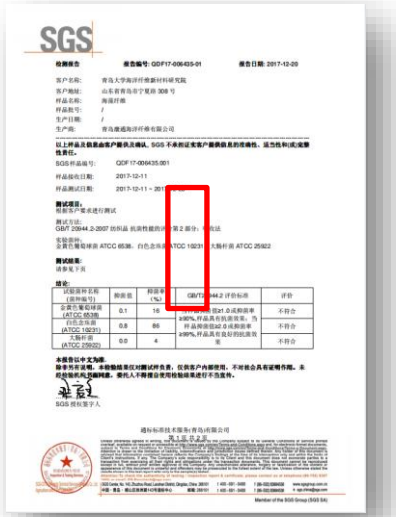
The Mechanism of Antibacterial and Fungal Prevention of alginate fiber Used in Textile and Clothing

纺织服装用海藻纤维抑菌防霉机理



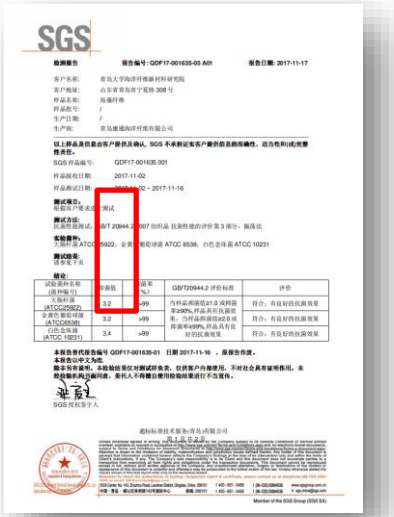
Antibacterial activity of ordinary fibers

普通纤维抑菌率



The fiber antibacterial rate of this project

本项目纤维抑菌率（> 99%）



02 Industrialization of alginate fiber

Technological breakthrough: preparation technology and equipment for flame retardant, antibacterial, and mold resistant multifunctional dyeable and spinning fibers—Colorable

技术突破：阻燃抑菌防霉多功能可染可纺纱纤维制备技术及装备—可染色

Developed dyeable alginate fibers that can be dyed with commercial dyes

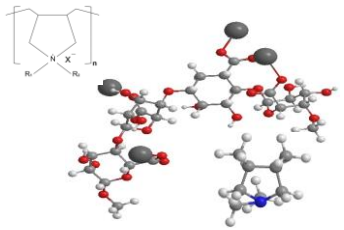
研发了可染色海藻纤维，可用商品染料染色

Maintaining the characteristics and functions of fibers, solving the problem of dissolving ordinary fibers during dyeing

保持了纤维的特性及功能，解决了普通纤维染色时溶解的难题

Modification of alginate fiber structure

海藻纤维结构改性



Dyeable long tow

可染长丝束

Fiber fixation rate>95%, with a washing fastness of level 4 or above

纤维固色率＞95%，水洗牢度达 4 级以上

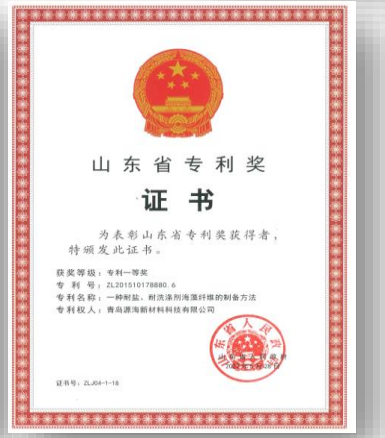
02 Industrialization of alginate fiber

➢Since 2016, 39 domestic and international authorized invention patents have been obtained, including 15 directly related patents. 2016年来获国内、国际授权发明专利 39 项，直接相关 15 项。

➢ 4 national and industry standards 国家标准、行业标准4项

- China Patent Silver Award (2023).
- China Textile Industry Federation Patent Technology Progress First Prize (2016), Gold Award (2021).
- Shandong Province Technology Invention First Prize (2017), Patent First Prize (2022) .

中国专利银奖（2023）、中国纺织工业联合会专利科技进步一等奖（2016）、金奖（2021），山东省技术发明一等奖（2017）、专利一等奖（2022）



03 Promotion and application

Application promotion 应用推广

Textile clothing
纺织服装




Biomedical
生物医疗

Health care
卫生护理




Flame retardant
阻燃工程

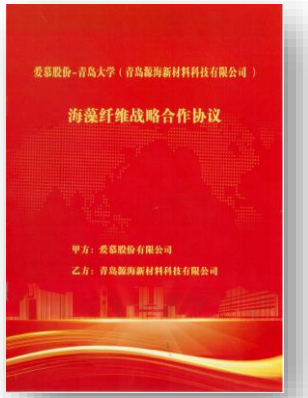



03 Promotion and application

Application promotion 应用推广

The sales and application of fibers downstream of the industrial chain have received good evaluations from users for performance and benefits. 开展纤维的销售、应用，纤维性能和效益受到了良好的评价。

Cooperation：Aimu Group & Qingdao University
爱慕股份-青岛大学海藻纤维战略合作

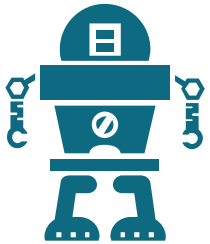


Industrial technology cooperation
产业技术合作

04 Development planning

Build products in textile, biomedical, health care and flame retardant engineering.

构建纺织服装、生物医疗、卫生护理及阻燃工程等多个领域产品。



Research and development of key equipment and technology.

研发关键设备与技术。

In-depth study of bio-based materials, develop new polysaccharide extraction technology

深入多种类生物基材料的研究，开拓新型多糖提取技术。

THANKS!