Acteev®

Permanent, Natural No-odor Protection in Athleisure and Athletic Wear

ASCEND® PERFORMANCE MATERIALS

Acteev®

Permanent, Natural No-odor Protection in Athleisure and Outdoor Wear

ASCEND PERFORMANCE MATERIALS®

Acteev

Agenda

- Introductions
- What is Acteev?
- The Acteev difference
- Sustainability
- Acteev in action

The Acteev Difference

Acteev

What is Acteev?

Acteev combines durable nylon 6,6 with safe, natural zinc for permanent antimicrobial, anti-odor protection.

Innovative
Winner of ISPO Textrends Top 10 Award and Outdoor Retailer Innovation Award, and protected by more than 100 patents globally.

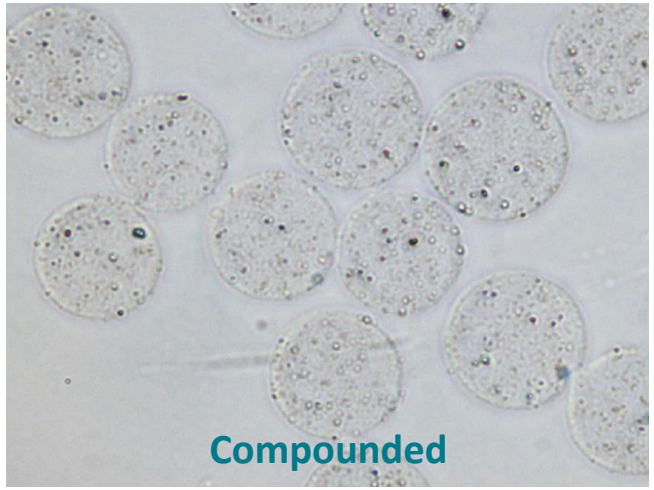
Permanent
Protected with zinc ion technology embedded into the matrix of polyamide 66 to provide permanency, preventing it from washing out like some topical treatments.

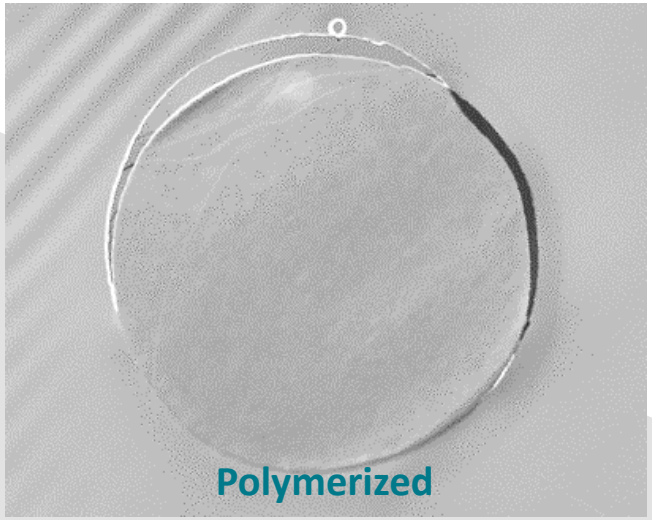
Design friendly
Yarn made with Acteev behaves like standard nylon 6,6, which means it can be dyed any color – including black, deep shades and pastels, with no unwanted heather streaks or yellowing. Additionally, it can easily be constructed into any type of knit or woven fabrics, including blends.

Natural zinc to stop odor
Active zinc ions eliminate odor-causing bacteria. Plus, zinc is a natural mineral required by the human body, and the active ingredient in Acteev is listed by the FDA as GRAS – Generally Regarded As Safe – and registered with the EPA.

Sustainable
Acteev is available made of up to 30% plant-based feedstock or as a carbon-neutral offering. Plus, Acteev yarns are made of one of the strongest polymers in the industry – nylon 6,6 – and are built to last, not disposable and quick to hit the landfill.

A novel solution: embedded active ingredients





Nylon 6,6 with embedded zinc offers long-lasting protection with no compromise in processing or performance.

- Acteev's active ingredients are added during the polymerization process, leaving them evenly dispersed at the molecular level.
- Because they are well-distributed, the embedded zinc ions are always available to combat the growth of odor-causing bacteria and microbes.
- The result is a high-performance, durable, anti-odor nylon 6,6 that can be dyed like standard polyamides.

Sustainability

Acteev

Meeting your sustainability goals

Acteev

Responsible stewardship of every molecule

Reduced emissions

Our investment of more than $200 million toward the reduction of greenhouse gas emissions helps benefits you and your customers – and the planet.

Carbon neutral

Our fibers and nonwovens are available as 100% carbon-free. And our investments allow us to pass along carbon neutrality to your final product.

Plant-based polymer

Bio-based products are ISCC+ certified with up to 30% renewable feedstock, and options with up to 70% renewable feedstock are coming soon.

Powered by nature

Our active ingredient is based on zinc, a natural mineral required by the human body used in everything from baby products to breakfast cereal.

Built to last

Acteev yarns are made of nylon 6,6 – one of the most durable fibers available. Apparel made with Acteev remains odor-free for the life of the garment.

A second life for textiles

Our partner company, Circular Polymers by Ascend, recycles nylon, polypropylene and polyester into high-performance polymers.

Renewable plant-based feedstocks

Acteev

- Acteev will be available made with up to 30% renewable biobased feedstock.
- Using plants rather than nonrenewables supports our goal of creating lasting, meaningful sustainability solutions.
- Coming soon: options made with up to 70% renewable feedstock

Third-party certified

Receive a certificate from the International Sustainability & Carbon Certification program ISCC PLUS to ensure traceability and chain of custody.

Globally recognized

Gain expanded access to international markets that are increasingly recognizing ISSC PLUS as the standard of choice for industry sustainability certifications.

Same great quality

Count on the same process reliability and product performance as fossil fuel-based nylon but with a lower carbon footprint.

Our sustainability purpose

Acteev

Empowering People

- Upholding ethical and fair business practices
- Providing safe and healthy work environments
- Offering careers that develop with training and opportunity
- Creating a culture that values differing views and backgrounds
- Supporting our communities

Innovating Solutions

- Developing materials that help our customers achieve their sustainability goals
- Creating products with lower environmental impacts
- Helping solve critical challenges in renewable and low-emissions technologies
- Sourcing ethical and sustainable raw material and logistics resources

Operating Without Compromise

- Reducing waste, emissions and water use throughout our operations
- Maximizing the quality of our products
- Using resources efficiently
- Disposing of waste responsibly
- Shifting to cleaner energy sources, including cogeneration and solar power

Acteev in Action

Independent testing results

Independent laboratories have tested this technology for efficacy against common bacterial and fungal strains.*

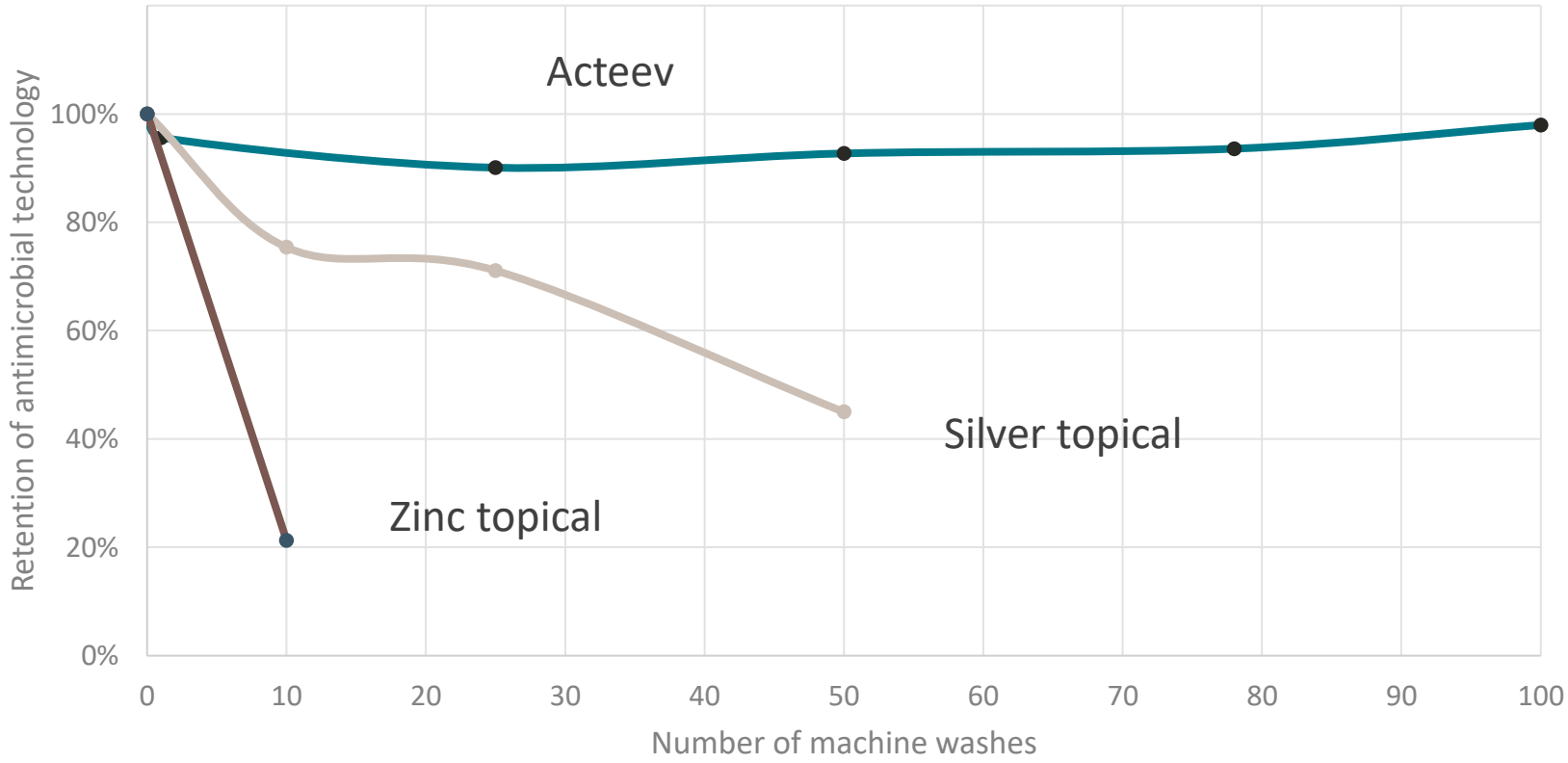
Microbe	Test Method
Staphylococcus aureus	ISO 20743
Klebsiella pneumoniae	ISO 20743
Escherichia coli	ASTM E3160
Aspergillus brasiliensis Penicillium funiculosum Chaetomium globosum Trichoderma virens Aureobasidium pullulans	ASTM G21

***Acteev's antimicrobial technology is embedded to protect the product. The product does not protect users or others against disease-causing bacteria, viruses, germs or other organisms.** Bioefficacy data (including antibacterial and antifungal) cannot be used on marketing materials, packaging or digital content in association with Acteev even when referencing Acteev. Regulations in other countries may differ. This presentation is for discussion purposes only. Consumer-facing literature and claims need to follow the appropriate regulatory and legal validation and review process. Testing conducted on various end forms. Please refer to technical data sheet for data on specific products.*

Permanent protection – even after laundering

Even after 100 washes, Acteev retains its efficacy.

Topical treatments begin to fade as soon as the first few launderings.



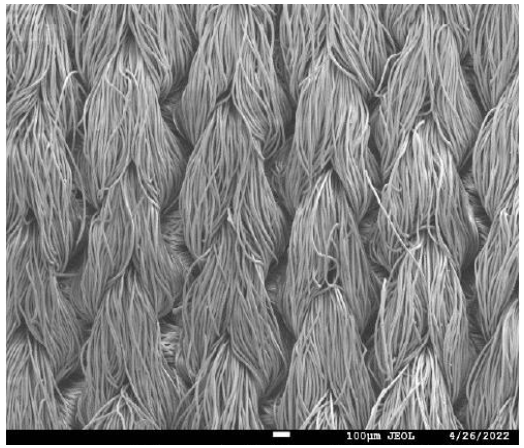
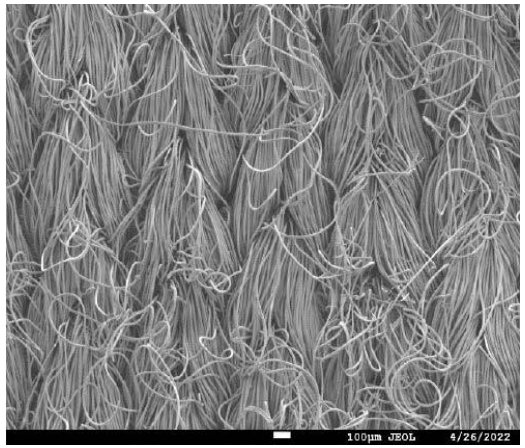
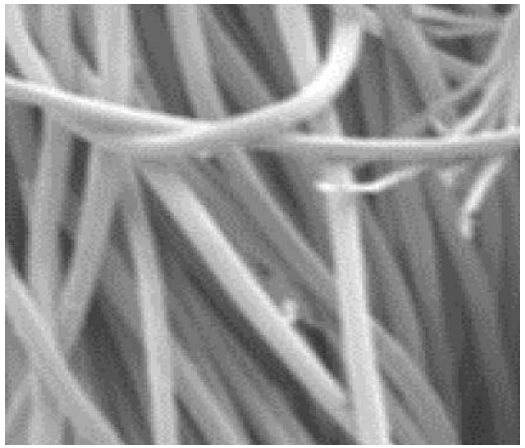
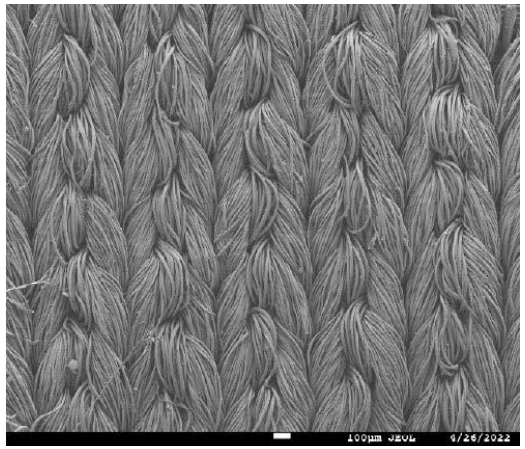
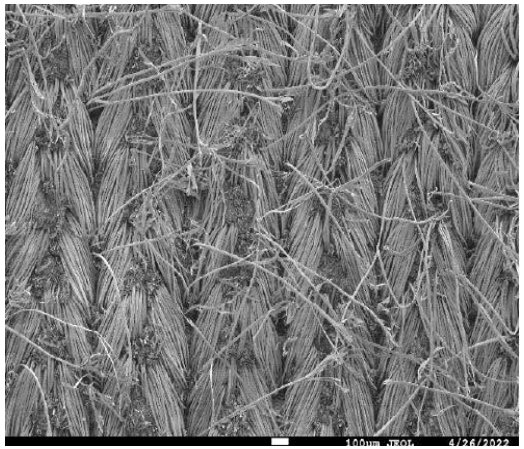
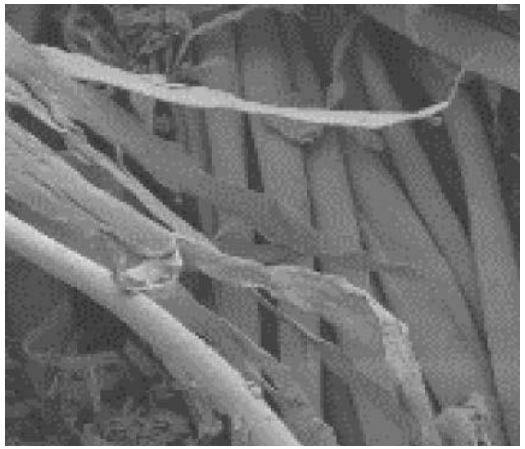
Test method: AATCC LP01

More durable than polyester

Polyester shows more breakage and mass loss after 100,000 abrasion test cycles.

Test method:
ASTM D4966, Option 3

Each fabric contains 8% spandex

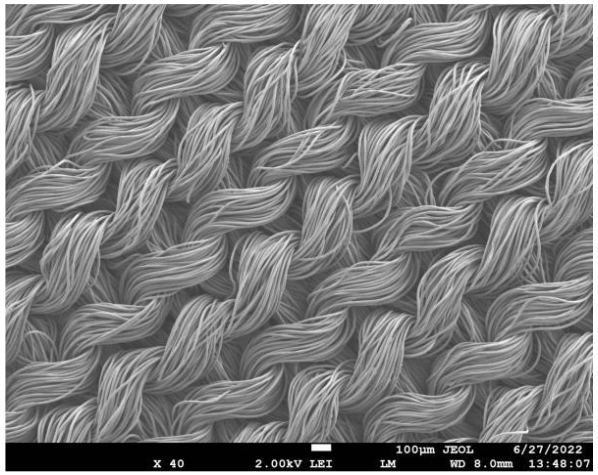
	SEM images of unabraded fabric	SEM images after 100,000 cycles	SEM images after 100,000 cycles, higher magnification
Acteev			
Polyester			

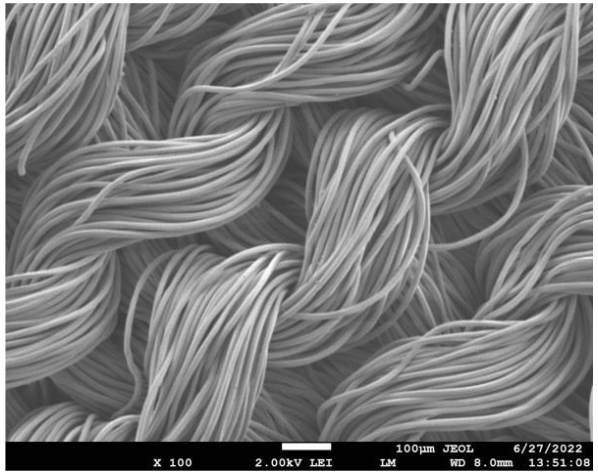
Performs in real-world conditions

One tester wore a shirt made with Acteev once per week while working out, and then washed and dried the shirt in his home appliance.

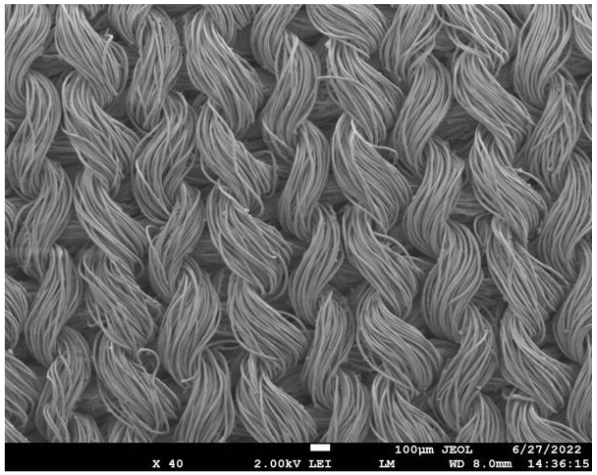
After nine months of wear, only one broken fiber was observed.

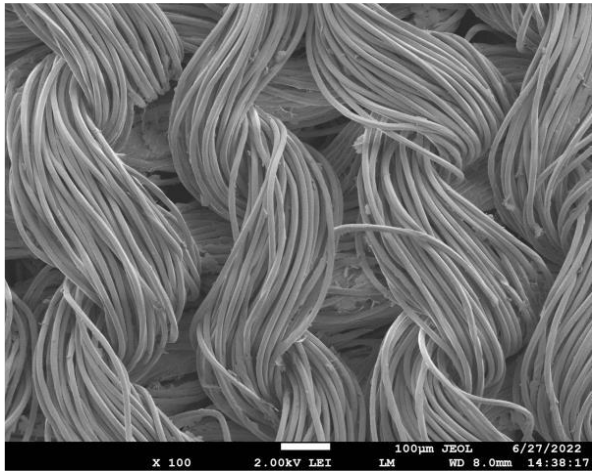
New shirt





After 9 months of wear





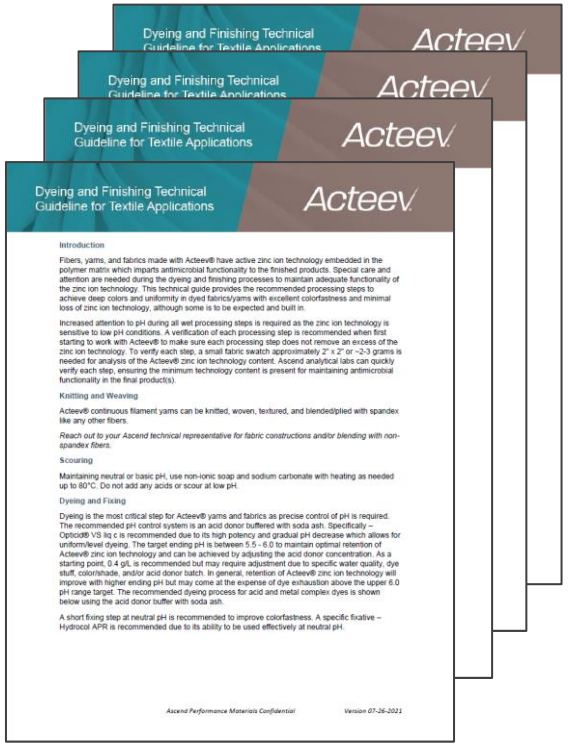
Less odor than polyester

The same tester alternated the Acteev shirt with a similar athletic-style shirt made of polyester.

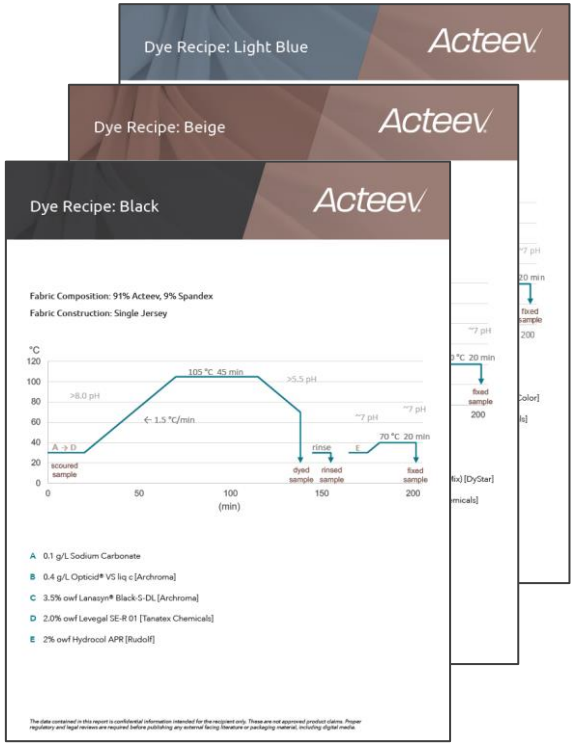
After 9 months, the polyester shirt had a noticeable unpleasant odor, while the Acteev shirt remained odor-free.

Fabric mill support

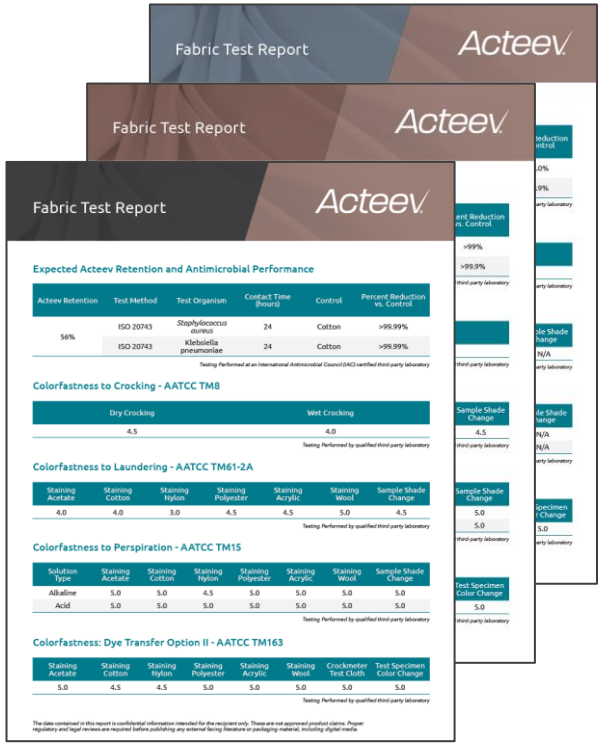
Our experts provide complete toolkits for dyeing Acteev as well as technical support throughout the process



General guidelines



Validated shade formulations



Formulations performance

Award-winning innovation

Acteev

ISPO Textrends Top Ten

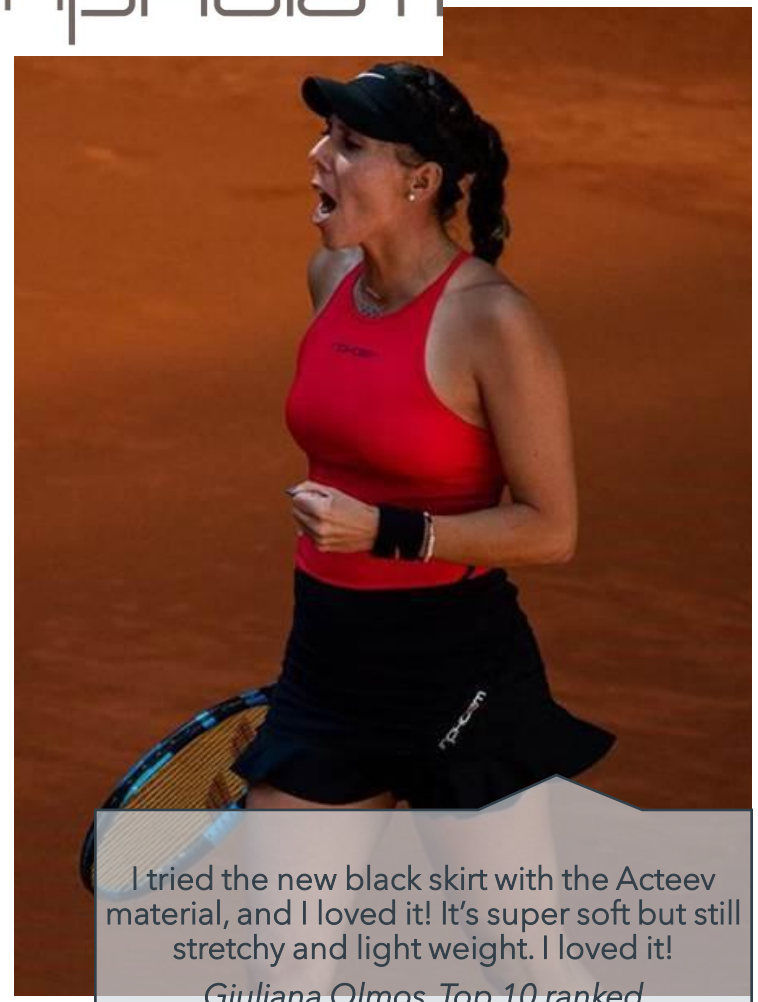
Outdoor Retailer Innovation Award

SPE Innovations Award Finalist

Customers love Acteev

Acteev

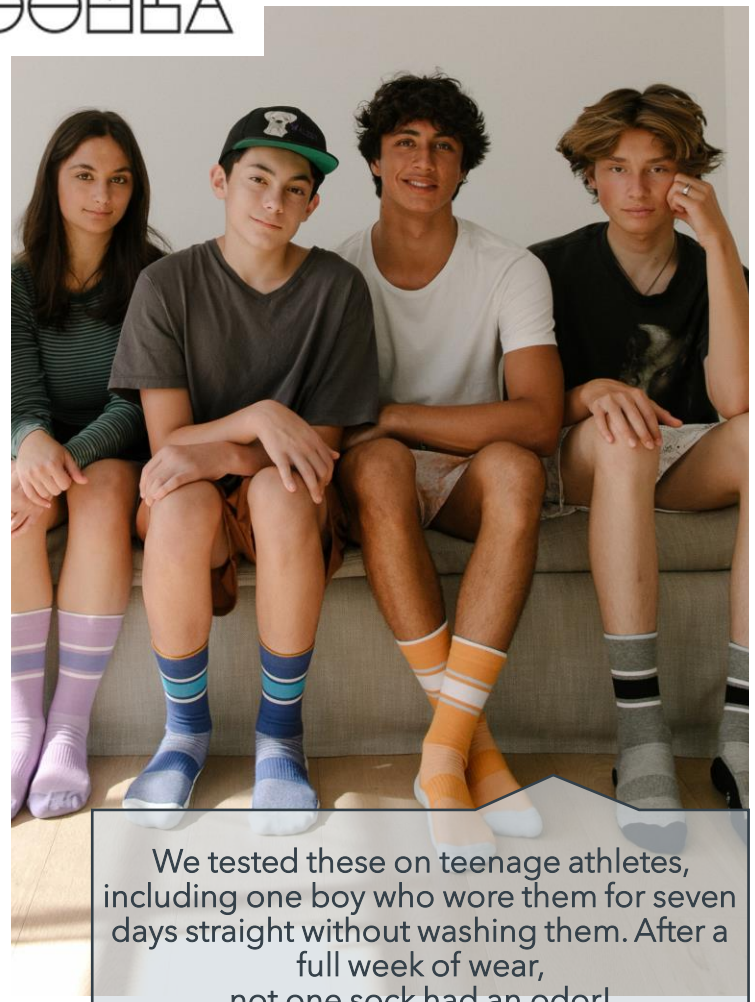
INPHORM



I tried the new black skirt with the Acteev material, and I loved it! It's super soft but still stretchy and light weight. I loved it!

Giuliana Olmos, Top 10 ranked professional Women's Tennis Association tennis player

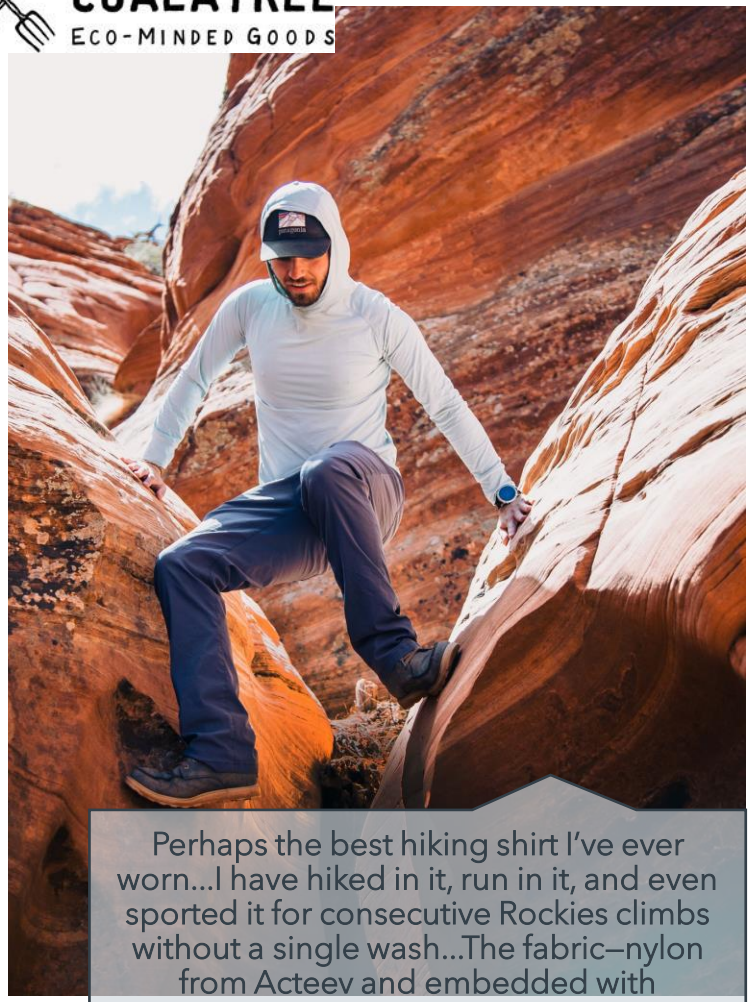
OOMLA



We tested these on teenage athletes, including one boy who wore them for seven days straight without washing them. After a full week of wear, not one sock had an odor!

Cara Netterson, M.D., Founder of OOMLA

COALATREE
ECO-MINDED GOODS

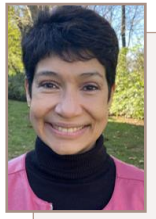


Perhaps the best hiking shirt I've ever worn...I have hiked in it, run in it, and even sported it for consecutive Rockies climbs without a single wash...The fabric—nylon from Acteev and embedded with antimicrobial zinc—is still as buttery soft and smell-free as the day it arrived.

Outside Magazine

Backed by science

Acteev Medical Advisory Board



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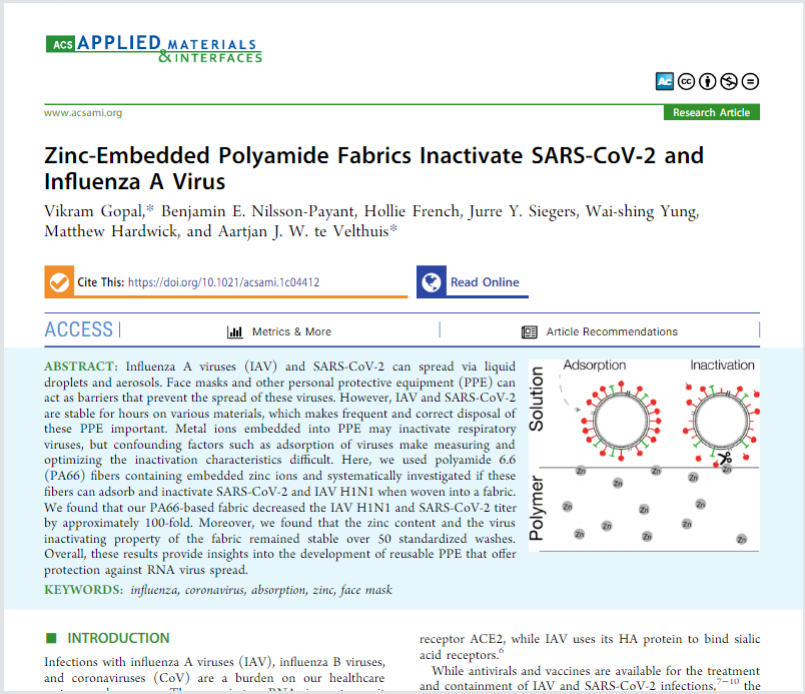

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Research Article

Zinc-Embedded Polyamide Fabrics Inactivate SARS-CoV-2 and Influenza A Virus

Vikram Gopal,* Benjamin E. Nilsson-Payant, Hollie French, Jurre Y. Siegers, Wai-shing Yung, Matthew Hardwick, and Aartjan J. W. te Velthuis*

Cite This: https://doi.org/10.1021/acsami.1c04412 Read Online

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ABSTRACT: Influenza A viruses (IAV) and SARS-CoV-2 can spread via liquid droplets and aerosols. Face masks and other personal protective equipment (PPE) can act as barriers that prevent the spread of these viruses. However, IAV and SARS-CoV-2 are stable for hours on various materials, which makes frequent and correct disposal of these PPE important. Metal ions embedded into PPE may inactivate respiratory viruses, but confounding factors such as adsorption of viruses make measuring and optimizing the inactivation characteristics difficult. Here, we used polyamide 6.6 (PA66) fibers containing embedded zinc ions and systematically investigated if these fibers can adsorb and inactivate SARS-CoV-2 and IAV H1N1 when woven into a fabric. We found that our PA66-based fabric decreased the IAV H1N1 and SARS-CoV-2 titer by approximately 100-fold. Moreover, we found that the zinc content and the virus inactivating property of the fabric remained stable over 50 standardized washes. Overall, these results provide insights into the development of reusable PPE that offer protection against RNA virus spread.

KEYWORDS: *influenza, coronavirus, absorption, zinc, face mask*

INTRODUCTION

Infections with influenza A viruses (IAV), influenza B viruses, and coronaviruses (CoV) are a burden on our healthcare

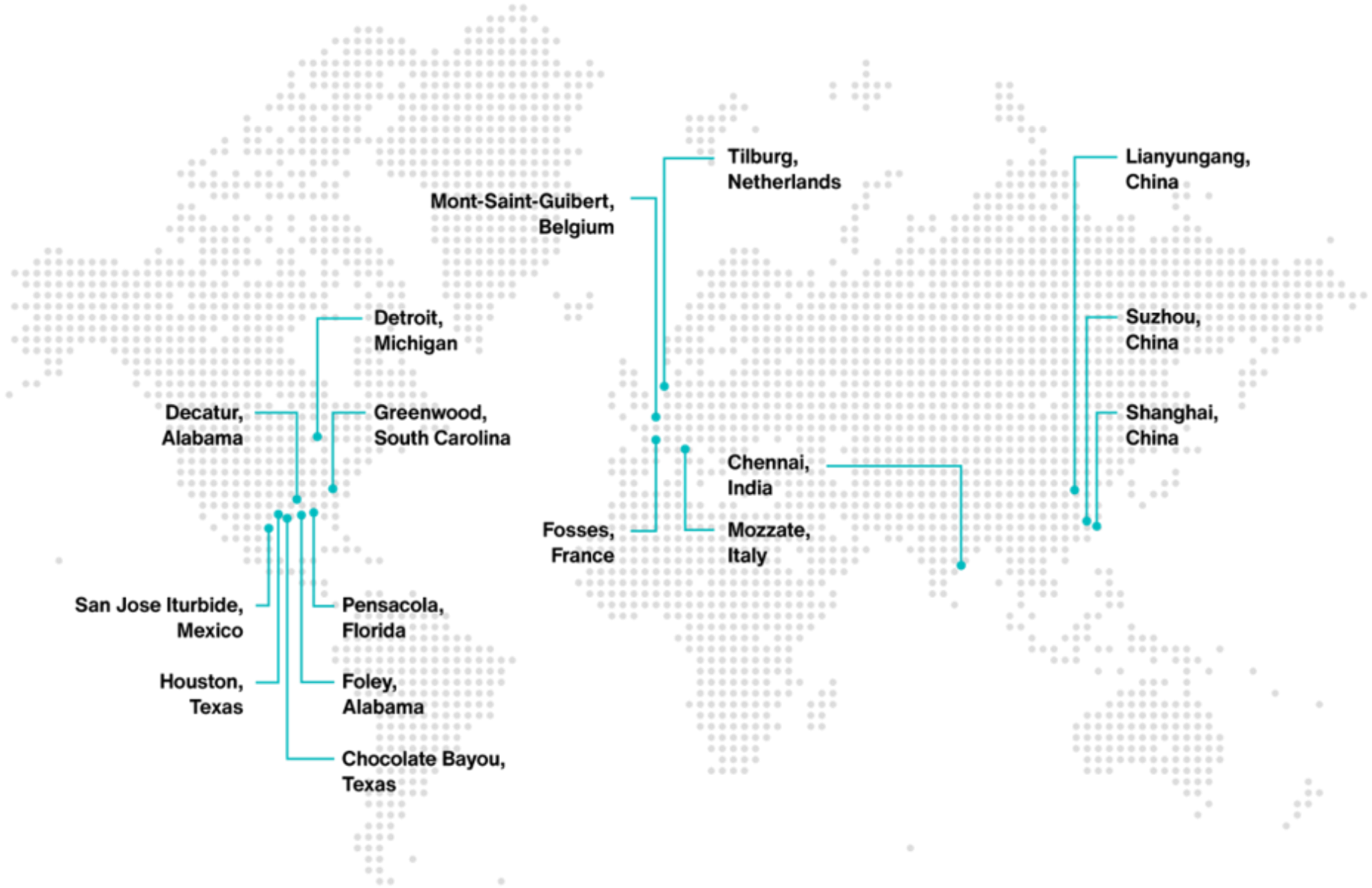
receptor ACE2, while IAV uses its HA protein to bind sialic acid receptors.[6]

While antivirals and vaccines are available for the treatment and containment of IAV and SARS-CoV-2 infections,[7−10] the

Ascend Performance Materials

- World’s largest fully integrated polyamide 6,6 resin manufacturer with $3.2 billion in annual revenue
- 70-year history in revolutionizing safety in everyday products
- Decades of experience in high-performance life-critical fiber applications such as air bags and tire cords
- Top 100 USA exporter
- Inventor of Acteev zinc-based technology covered by more than 100 patents worldwide

Global reach, worldwide excellence



Polymer production:
U.S.A.

Yarn production:
U.S.A. and Asia

Fabric mill partners:
Americas and Asia

Headquarters:
Houston, Texas

*This product does not protect users or others against disease-causing bacteria. This presentation is for discussion purposes only. Consumer-facing literature and claims need to follow the appropriate regulatory and legal validation and review process.