



BEYOND
SURFACE TECHNOLOGIES

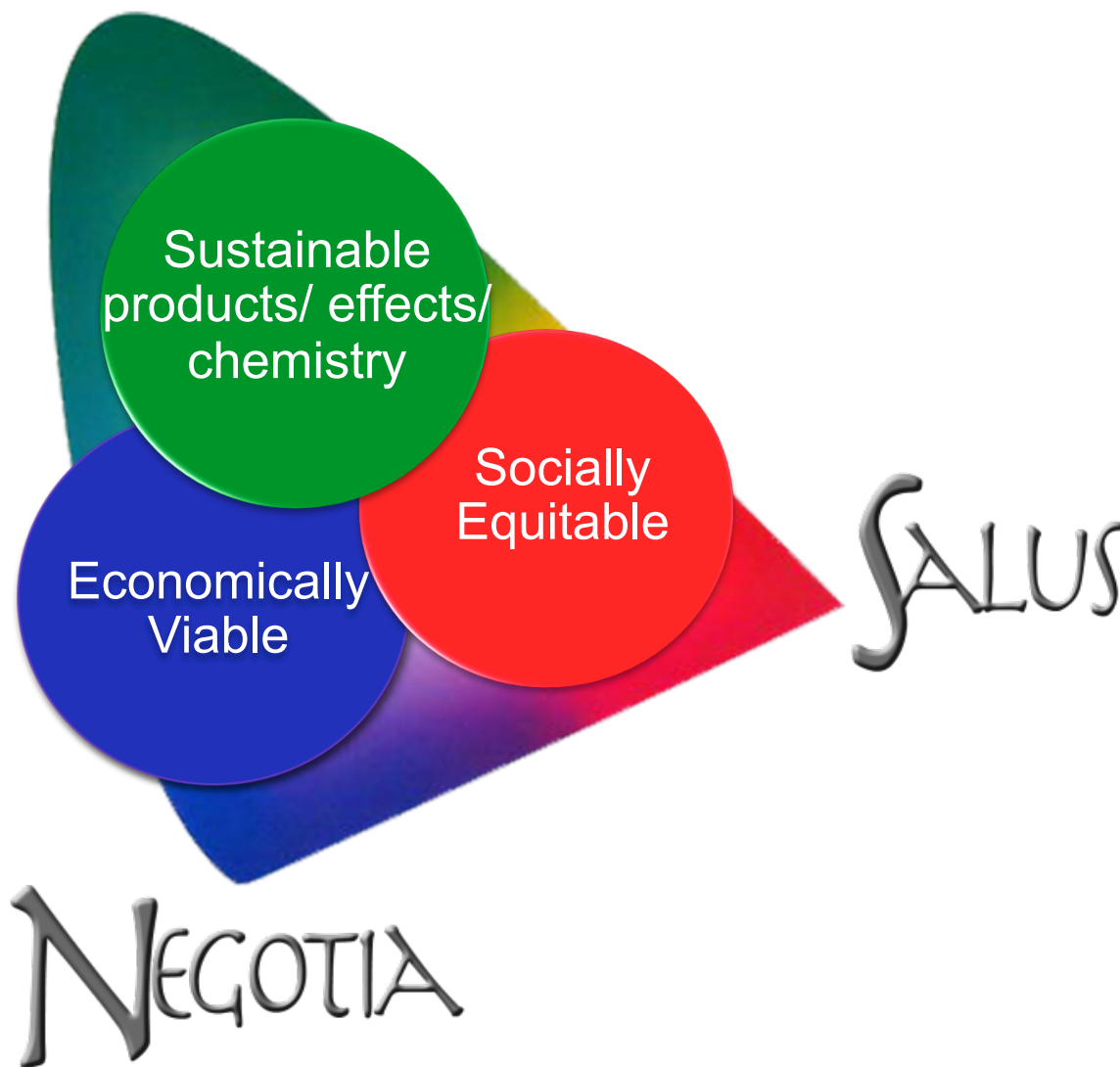
Sustainable functional finishing and beyond

Dr. Mike Rushforth / Lee Howarth
Beyond Surface Technologies AG
IFATCC Stresa 2010

up close and beyond

High Value Effects for Textile Surfaces using Sustainable Technologies





Why is sustainability important to the textile industry?

- The amounts of water and energy used in the production and after-care of textiles

Production	Textile Care
■ Fibre manufacture	■ Washing
■ Yarn & fabric production	■ Tumble drying
■ Colouration	■ Ironing
■ Finishing	
■ End article manufacture	

Lifetime energy consumption
(100% Co.T-shirt)



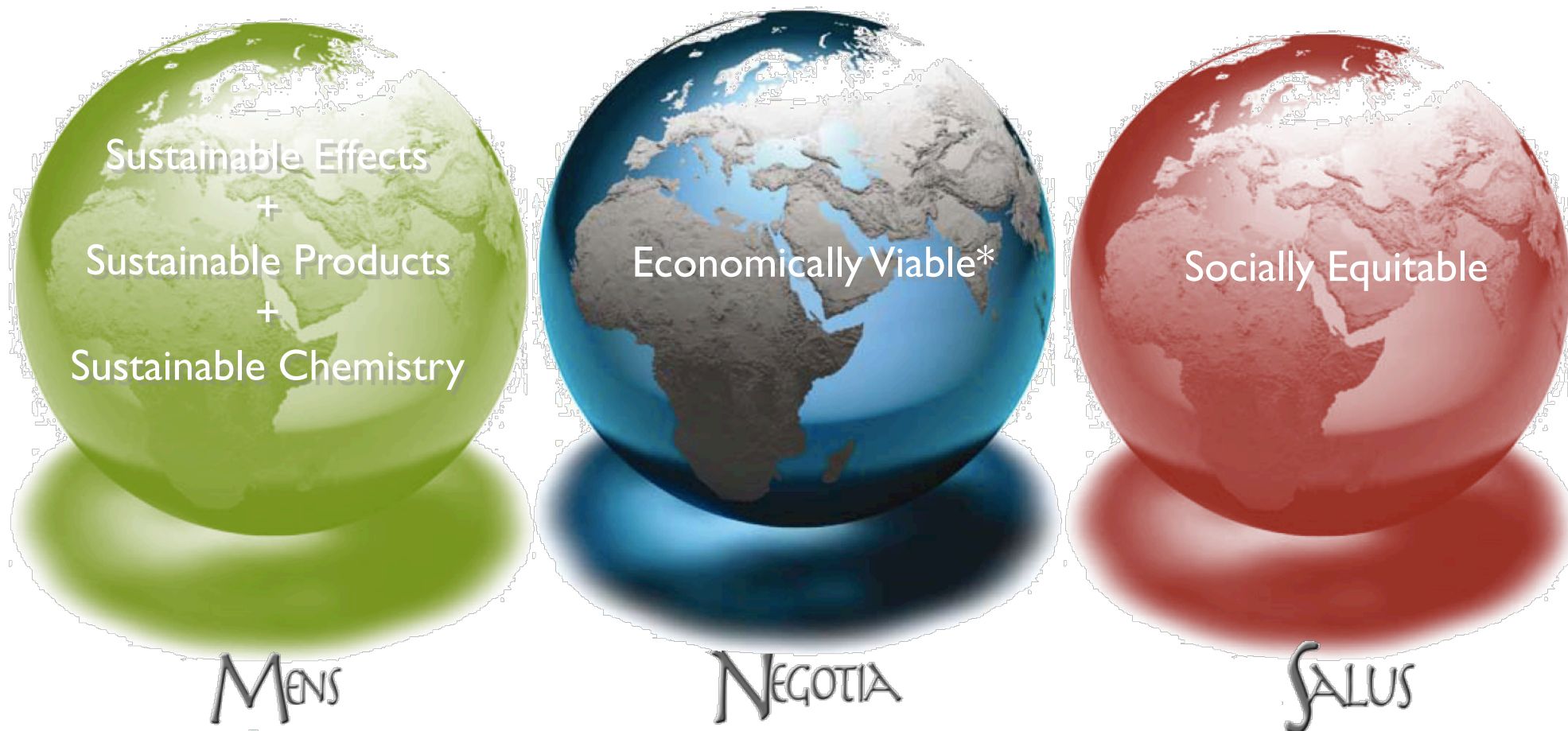
Source
*Well dressed? The present and future sustainability of
clothing and textiles in the United Kingdom*
University of Cambridge Institute for Manufacturing

An uncomfortable truth.....

- The textile processing industry consumes the equivalent volume of more than **50 times** that of Lago Maggiore sea every year
- During the whole life cycle, up to **250 times** the volume of the Lago Maggiore may be consumed

Lake Maggiore Volume 37km^3
Volume of water consumed every year $1,800\text{km}^3$

BST's founding principles....



* Economic viability also means no compromise on performance
Economic viability can be increased by using less chemistry

Sustainable Textile Products



Sustainable Effects



Sustainable Chemistry



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BARRIER

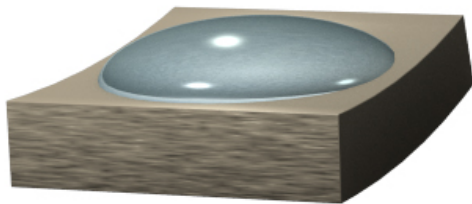
by HEIQ

DRY, CLEAN & GREEN

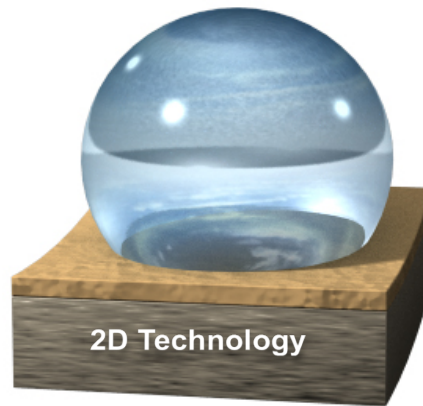


How it Works

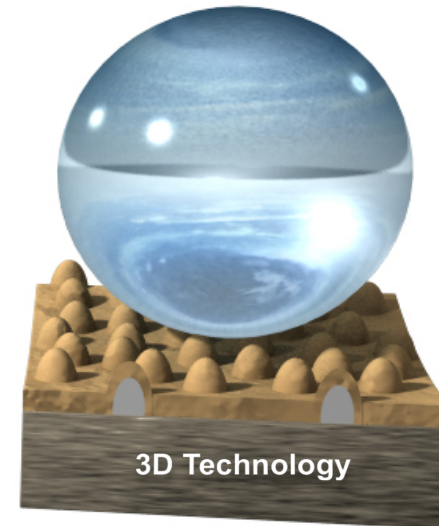
- Surface structure = superior repellency



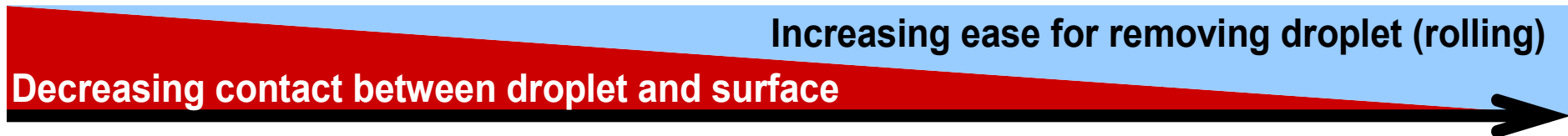
No repellent treatment



Conventional fluorine treatment

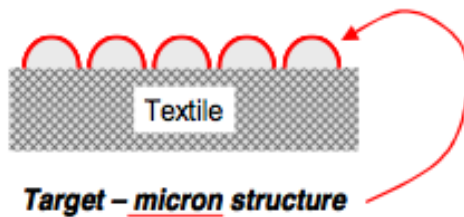
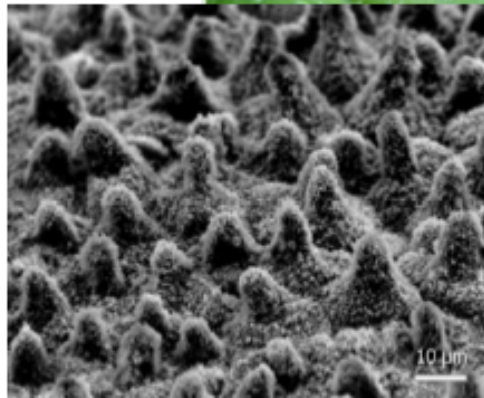


Particle-based treatment
Super-hydrophobic effect

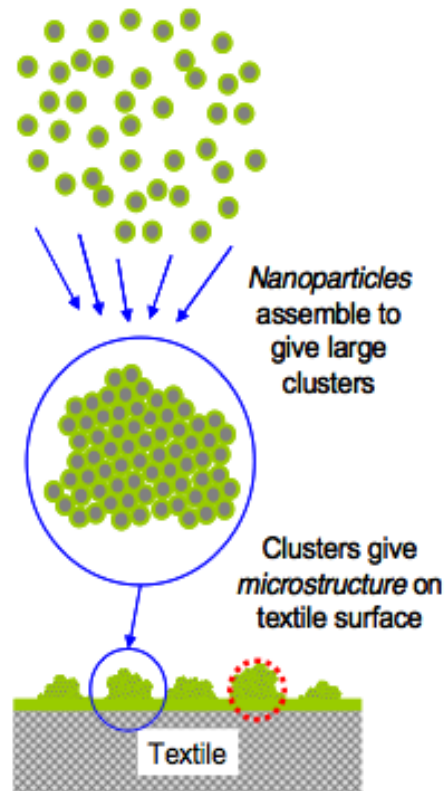


Why is it Different?

Lotus leaf

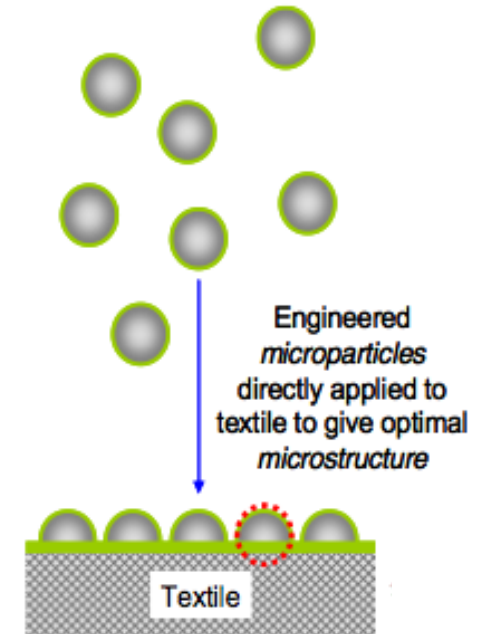


1st Generation

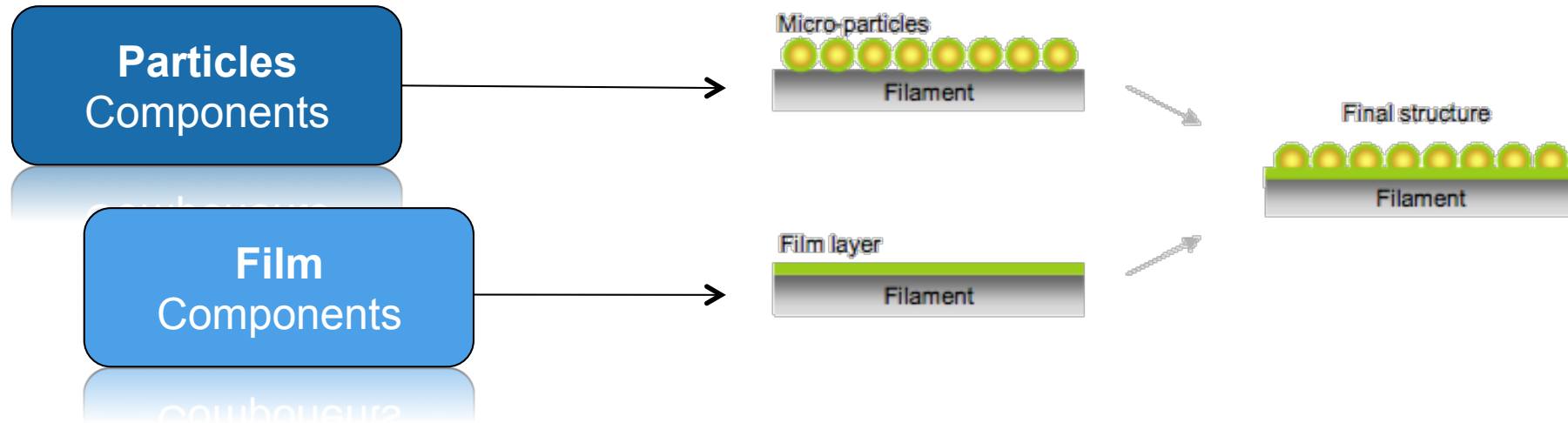


First generation approach

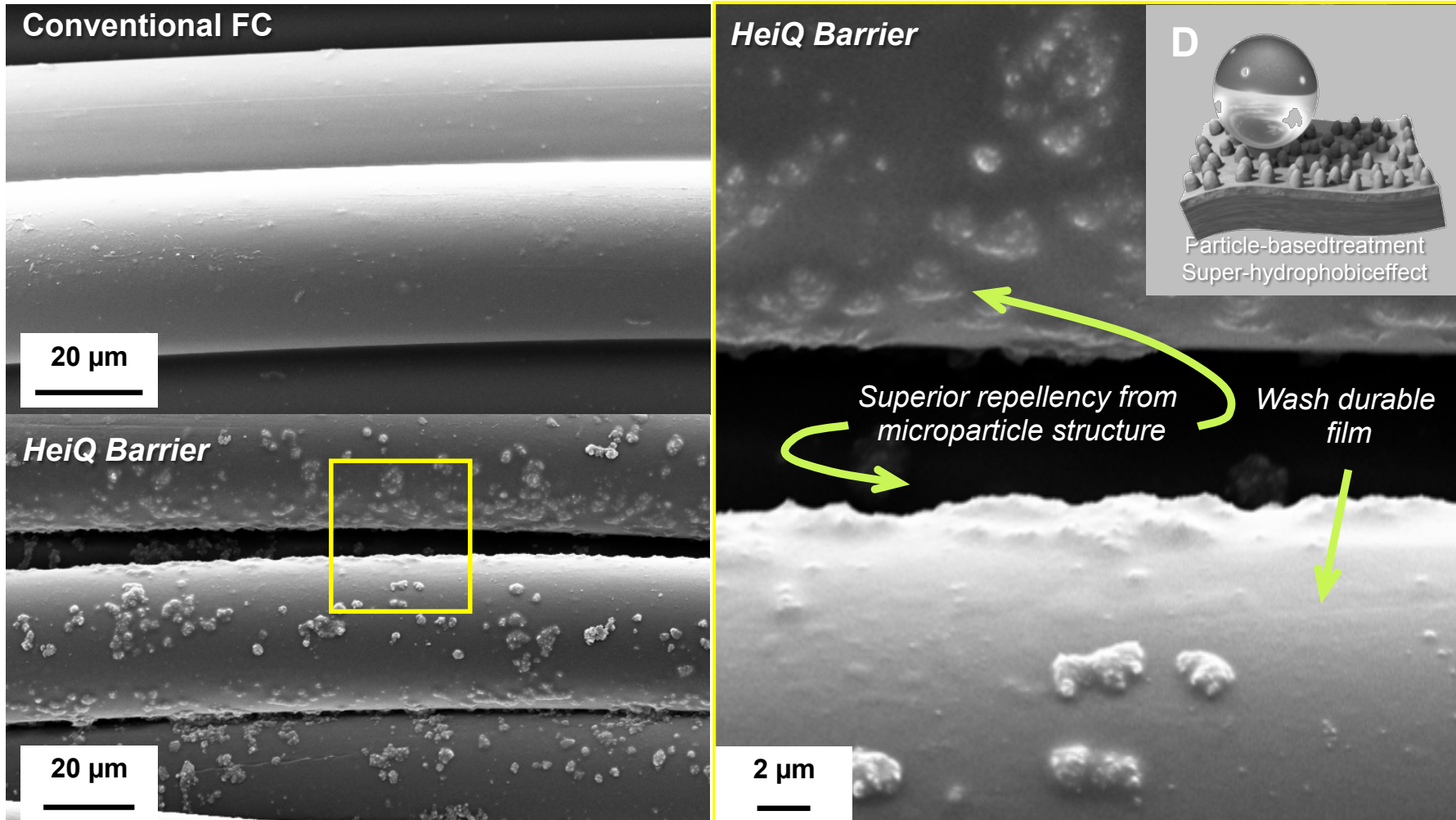
2nd Generation

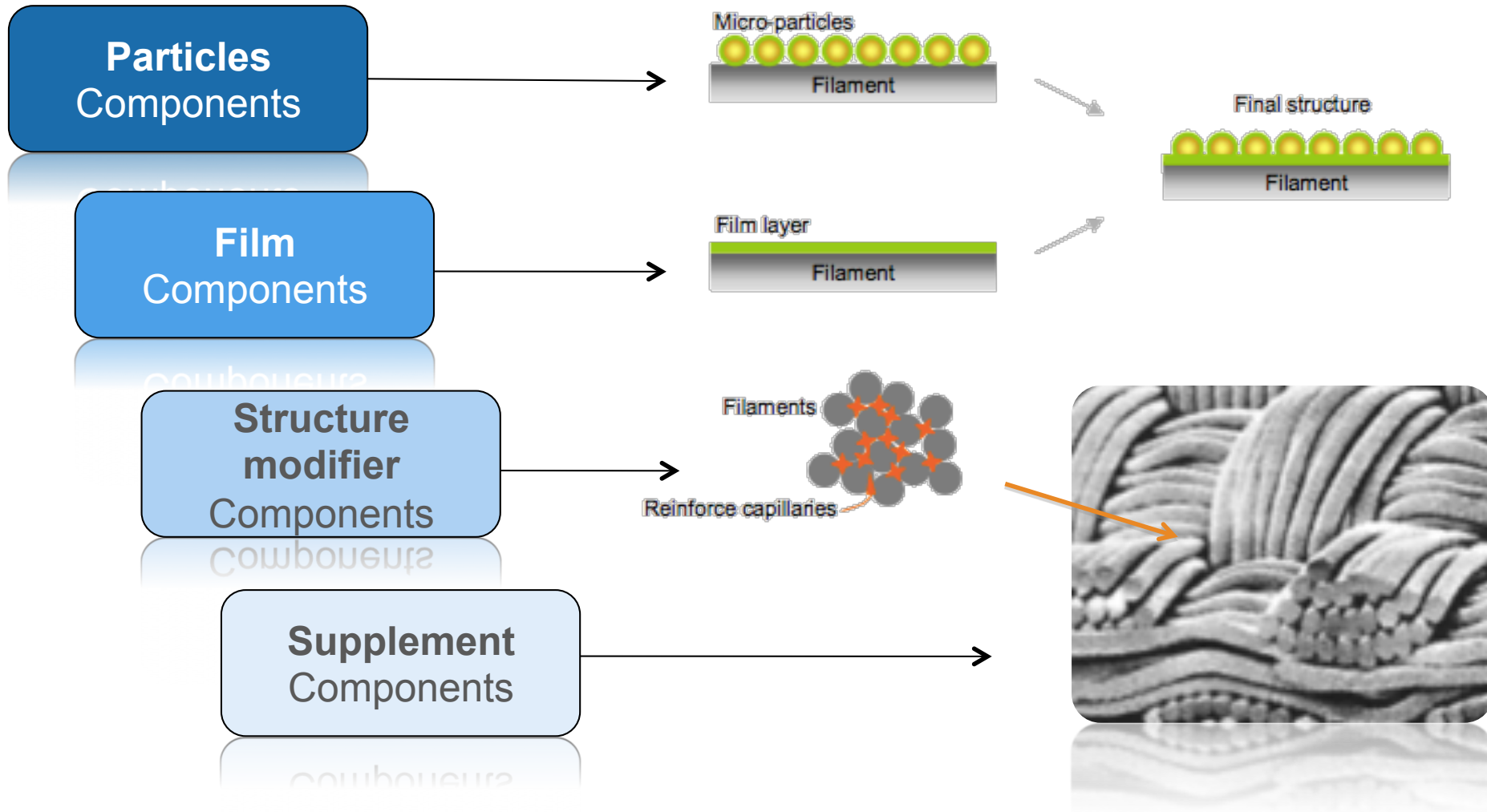


HeiQ Barrier approach



SEM 2D vs. 3D technology





100% Polyester awnings

Sample fabric	Bundesmann Rainy note (/5)				Water up-take (end value) %	Oil test (/8)	Spray rating	Roll-off angle	Water pressure (mbar)
	1 min	10 min	30 min	60 min					
Standard FC	4	3	2.5	1.5	16.58	7	100	18.8	27.5
High performance Barrier	5	5	5	5	5.52	8	100	11.7	33



Polyester/cotton workwear

Product	Technology	Bundesmann rating	Roll-off angle (°)	Contact angle Heptane (°)	Heptane pick-up mg/g
Barrier by HeiQ	Particle system + Fluorocarbon	Original 5 10x wash 5	<20	85 – 90 83 - 87	101 123
Product 1	Particle system + Fluorocarbon	Original 5 10x wash 4	<20	40 – 45 25 - 30	258 285



Sustainable Textile Products



Sustainable Effects



Sustainable Chemistry





PURE

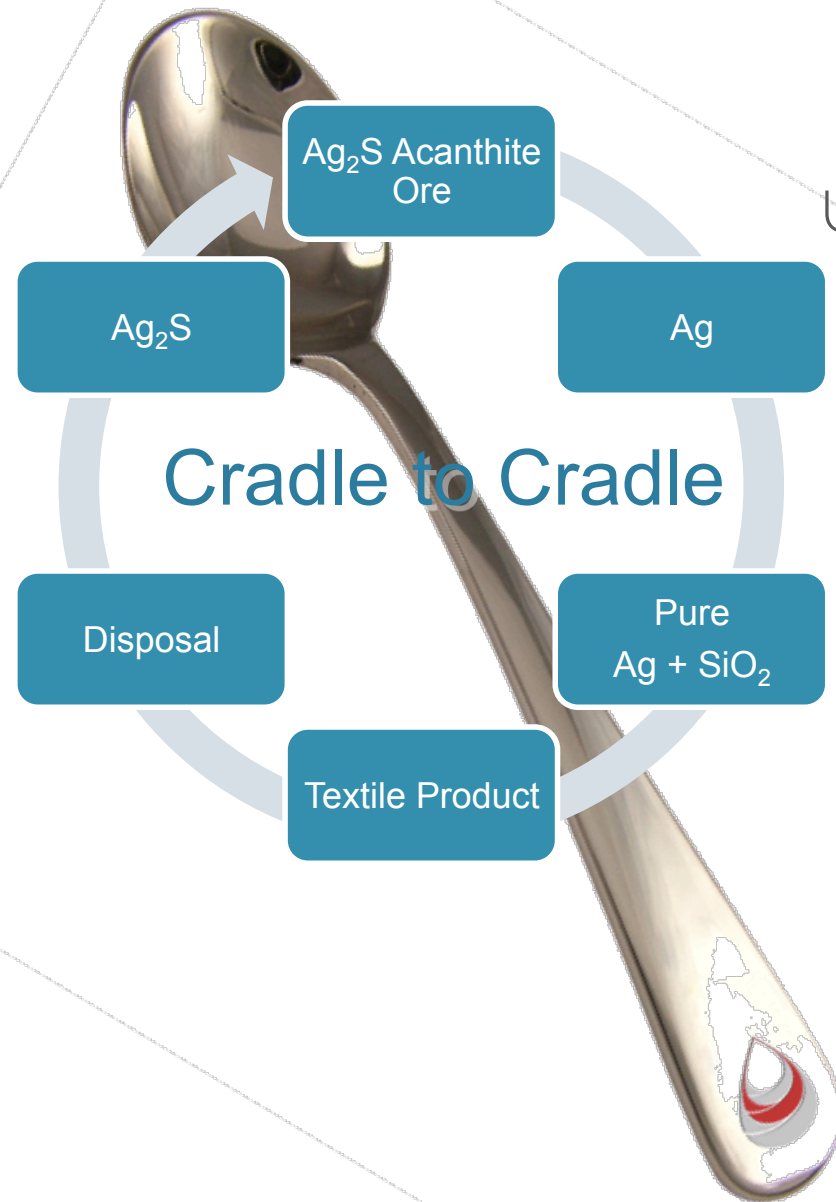
by HEIQ

**NATURALLY FRESH
ODOR-FREE TEXTILES**

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Silver – the sustainable antimicrobial



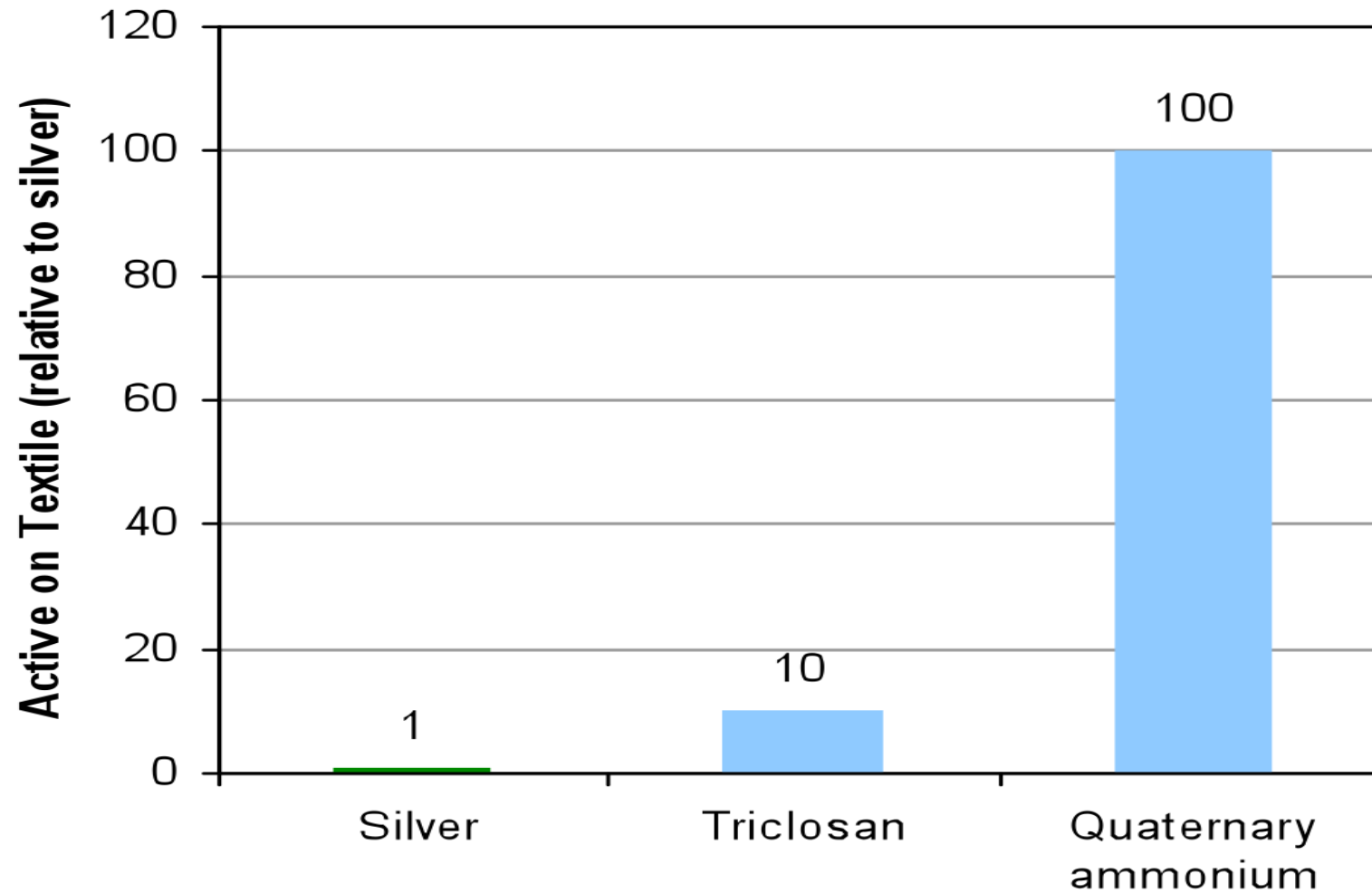
Unique qualities of silver ions:

- Low risk for bacteria resistance^[4]
- Effective in very low concentrations^[3]
- No human toxicity
- Immediately de-activated in effluent sludge /land-fill

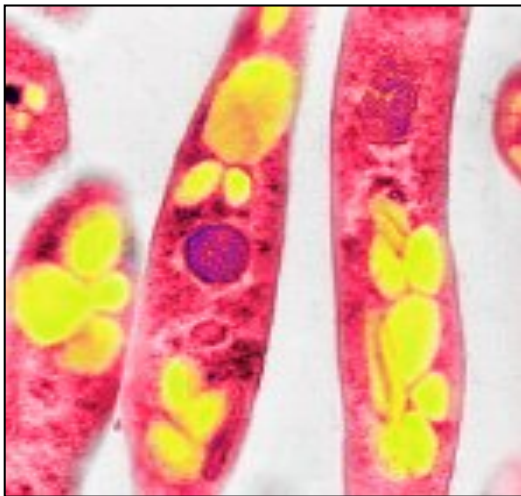
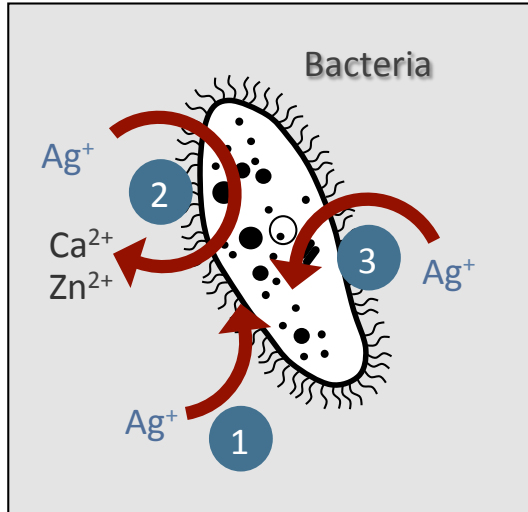
3. Gilchrist T, et al., Biomaterials, 1991, 12: 76-78.

4. Damm, C. et al., Soft materials, 2006, 3:71-88.

Silver – the sustainable antimicrobial



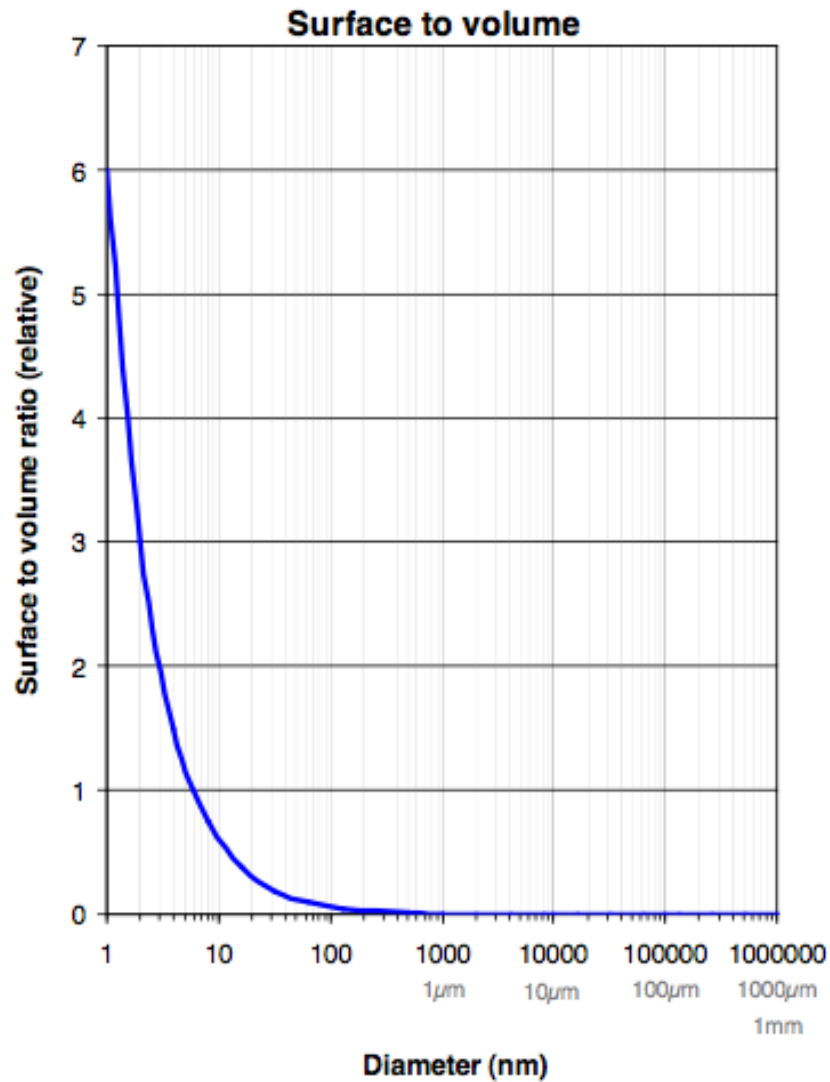
How it works?



- All silver-based antimicrobials act against a broad spectrum of bacteria through the action of silver ions (Ag^+)
- Silver ions interact with bacteria cells through three mechanisms
 - 1 Damage cell membrane^[1]
 - 2 Displace Ca^{2+} and Zn^{2+} ions^[1]
 - 3 Interact with sulphur, oxygen or nitrogen^[2]

1. Sondi I, et al. Journal of Colloid Interface Science, 2004, 275: 177-182.
2. Dowling DP, et al., Thin Solid Films, 2001, 398: 602-606.

Silver Metal – Why go smaller?



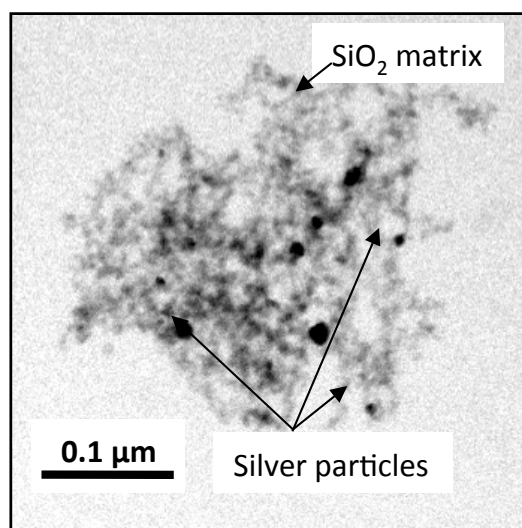
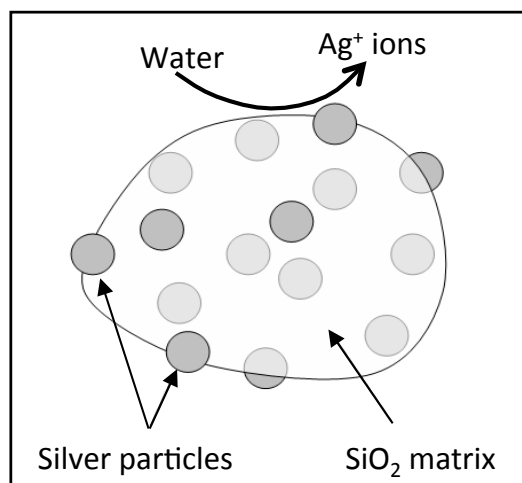
- Ag⁺ release proportional to surface to volume (mass) of the particle

Example: For equivalent Ag⁺ dosing

1 μ m particles 10'000 ppm Ag required

10 nm particles 100 ppm Ag required

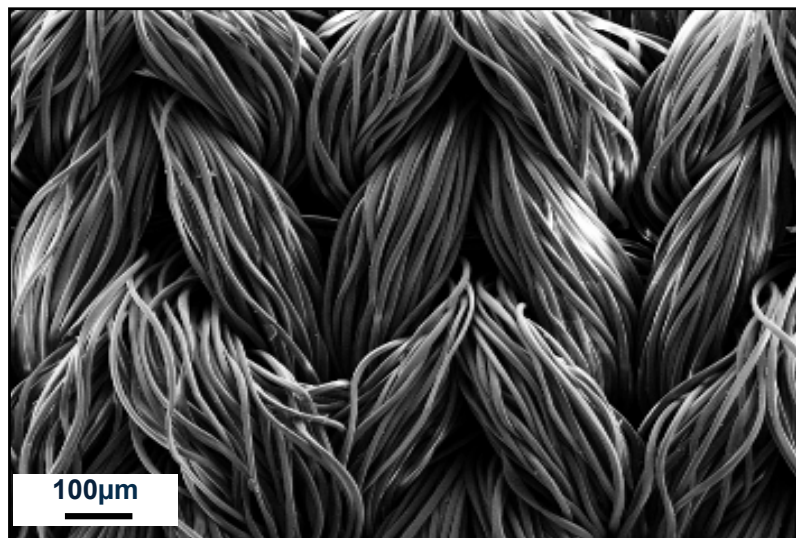
HeiQ AGS-20 TF - Why it's different



- Silver-silica micro-composite particle (20% silver, 80% silica)
- Silver particles supported in a porous amorphous silica matrix
- No agglomeration – strong activity maintained

HeiQ AGS-20 TF - up close

- HeiQ AGS-20 TF is a textile coating formulation containing the HeiQ AGS-20 particle
- The formulation is engineered to show superior durability and highest performance with lowest amount of silver.

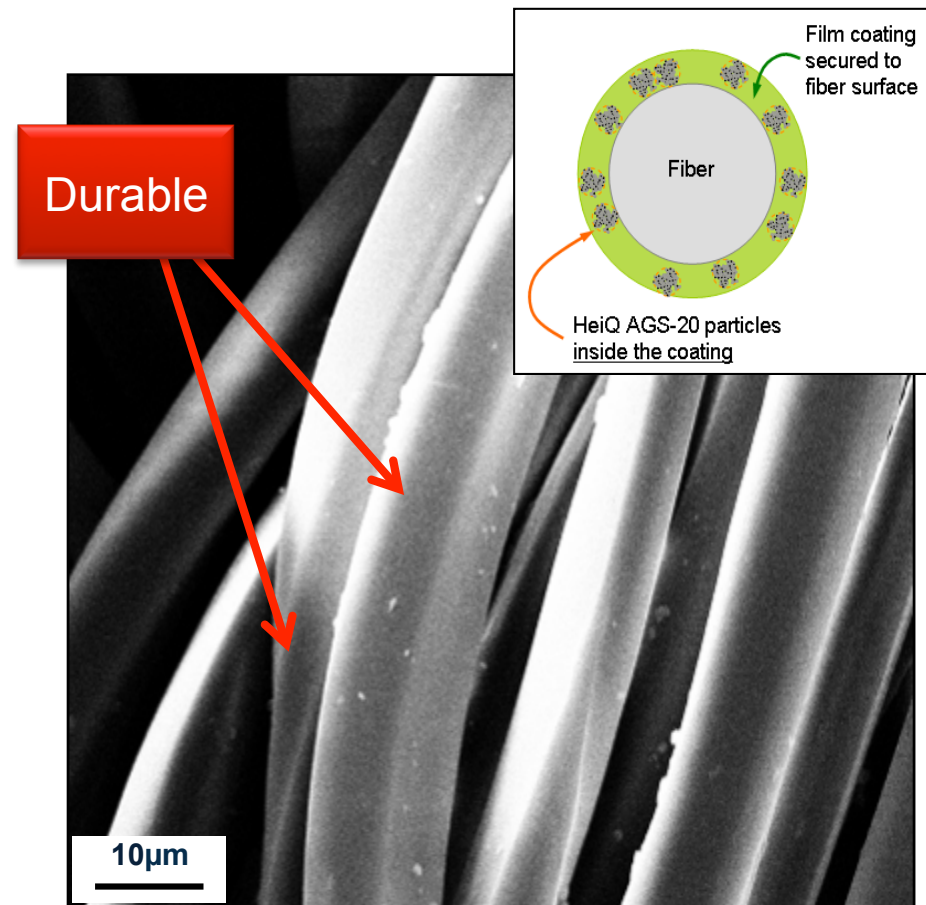


Uniform functional coating layer covering all filaments

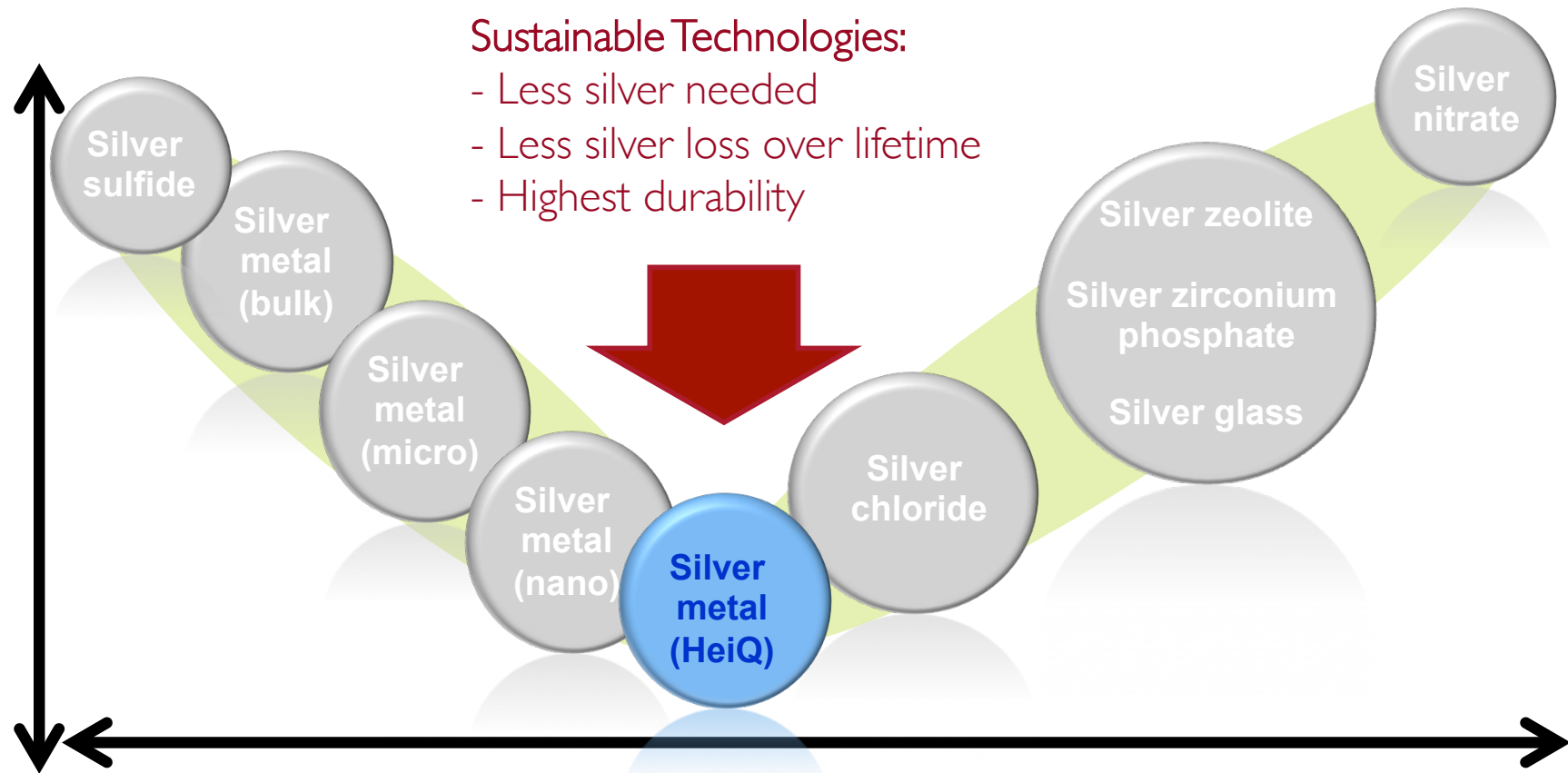
No webbing between filaments

Secure binding of functional micro-particles

No film deterioration after 50 wash cycles



Product performance comparison



The amount of additive to be used in an application is a function of Ag⁺ release and durability

Sustainable textile products



Sustainable effects



Sustainable chemistry



- BST's product line for sustainable feedstock chemistry
- MiDori® products are developed from plant oils derived from Ethicrops®

緑

pron. meh-DOHR-ee

MiDori links high-value effects with sustainable chemistry



Ethicrops by Verdex®

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- Managed using 'Fairtrade' concept
- Plant oils are derived from industrial crops
- Plants do not compete with food crops
- Crops are grown sustainably
- Do not destroy natural habitats



MiDori®緑 - Sustainable chemistry

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- Ethicrops® are already being used in other industrial applications
- Low carbon footprint for oil production



	Seed oil/t	Fossil oil/t
CO ₂ Emissions	-3t	+1.5t
H ₂ O consumption	Negligible	+ 10t



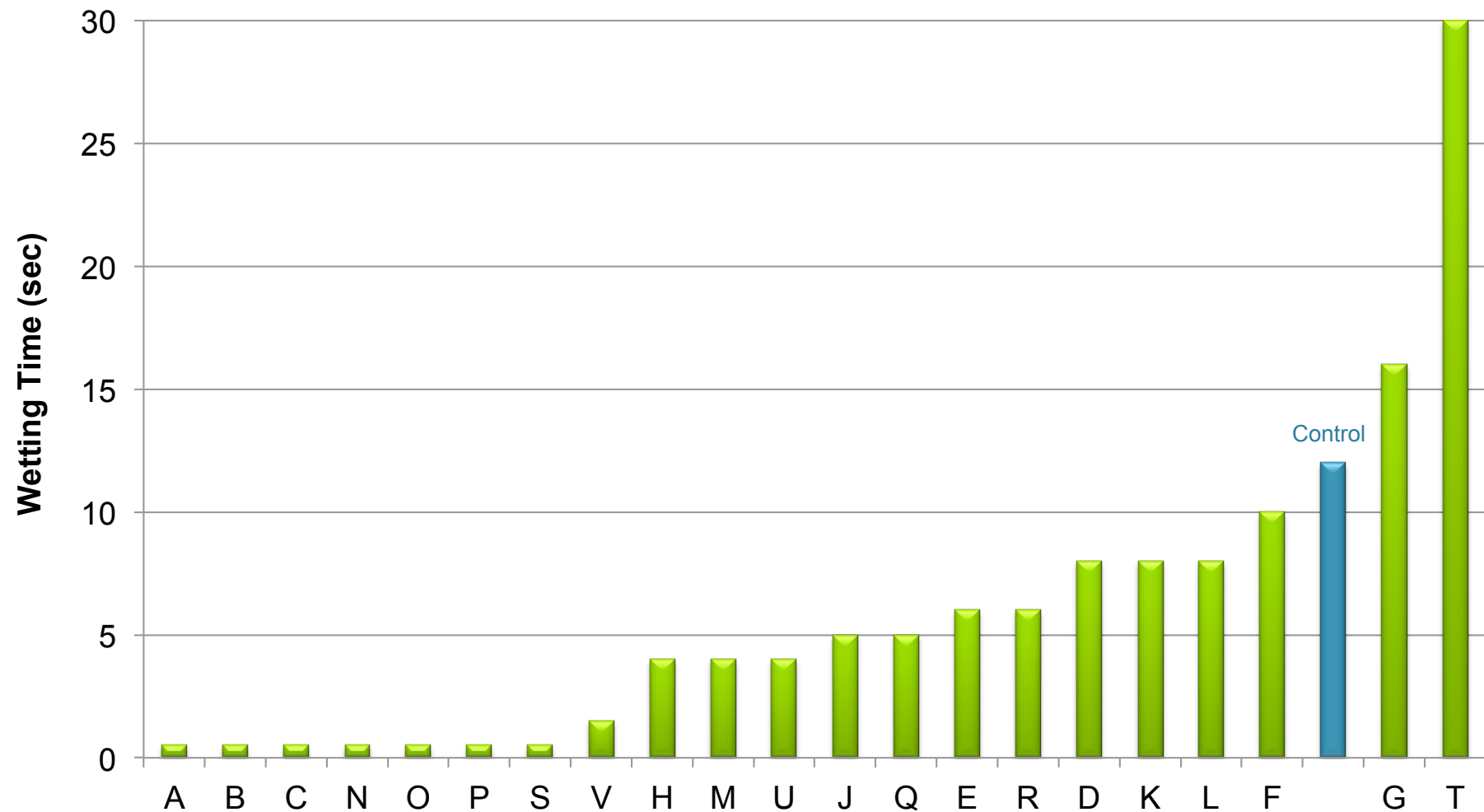
MiDori®緑 - Sustainable chemistry

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- Applications include;-
 - Handle modification
 - Moisture management
 - Water repellency
 - Easy-care enhancement
 - Bio-SMART

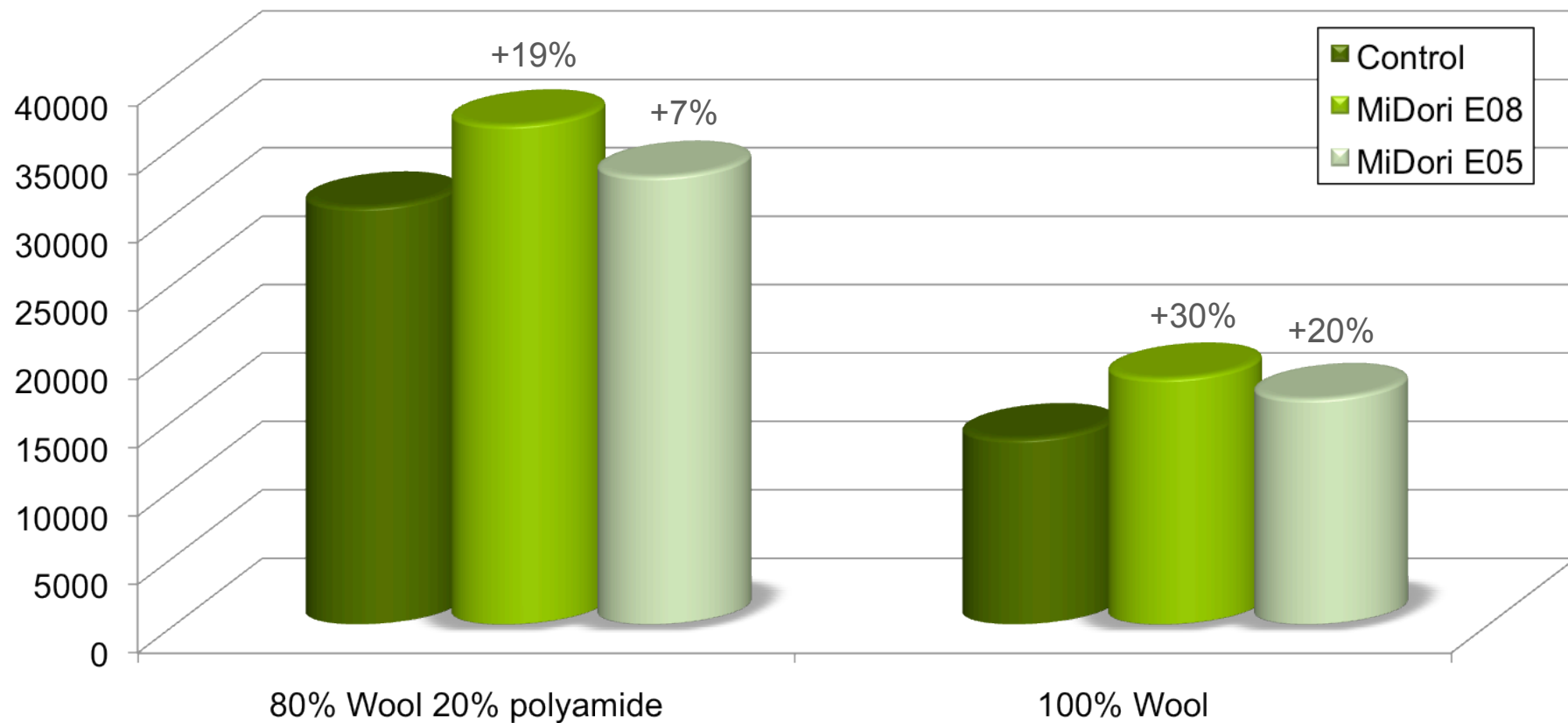


- Water absorption/repellency



MiDori®緑 - Sustainable chemistry

- Physical enhancement (Martindale abrasion)

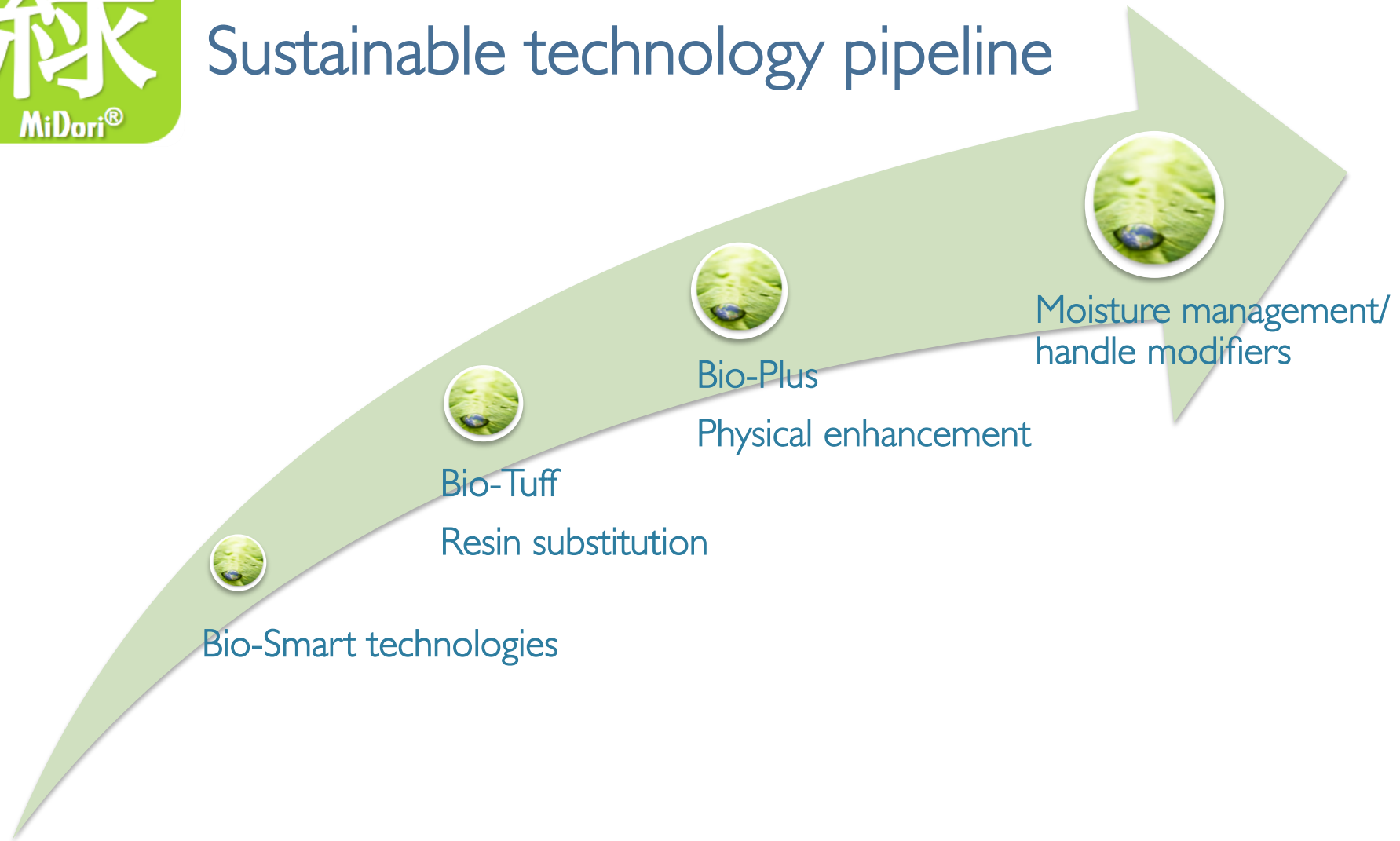




MiDori® 緑

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Sustainable technology pipeline





Beyond Surface Technologies helping to....

*“meet the needs of the present without compromising the ability of future generations to meet their own needs.”**

*United Nations General Assembly (1987)





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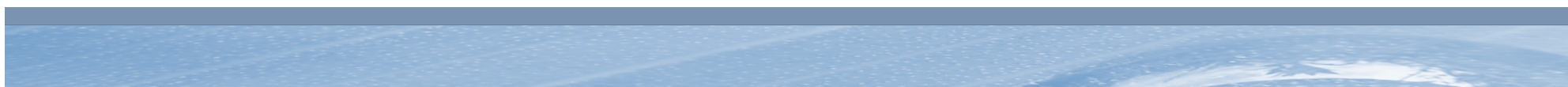
Commercial programs on apparel

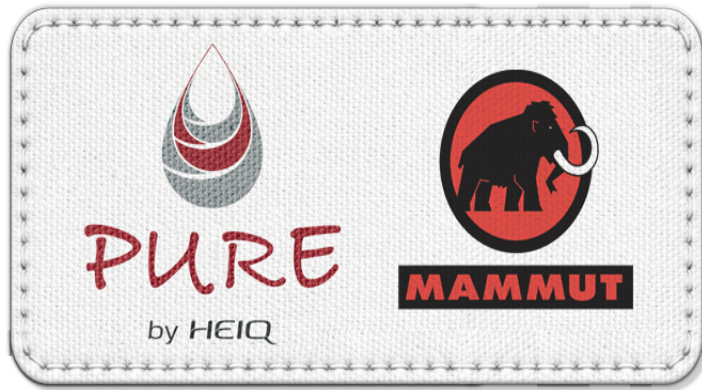
up close and beyond



NATURALLY FRESH ODOR-FREE TEXTILES

Commercial programs on apparel





Pure by HeiQ on
Alpine Underwear

Co-Branding

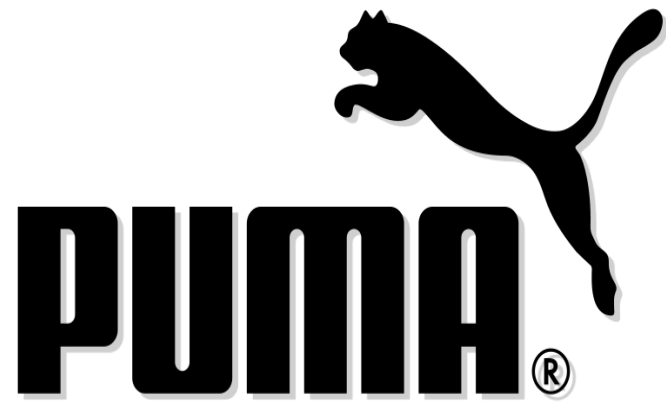




Pure by HeiQ on
Major Product Ranges

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Pure by HeiQ on new 2010
Golf line

Co-Branding



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Pure by HeiQ on Motorbike
safety apparel lining



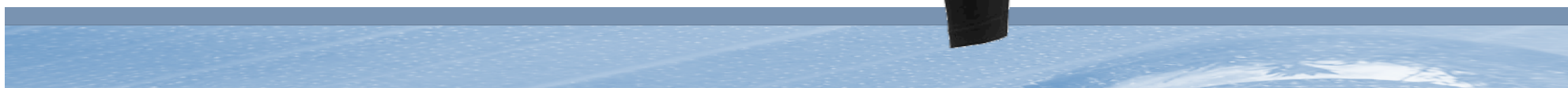
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>X<BIONIC®

FUNCTIONAL UNDERWEAR



Pure by HeiQ on
Functional Underwear





Dry, Clean & Green

Commercial programs on apparel





Barrier by HeiQ on
Sailing Gear





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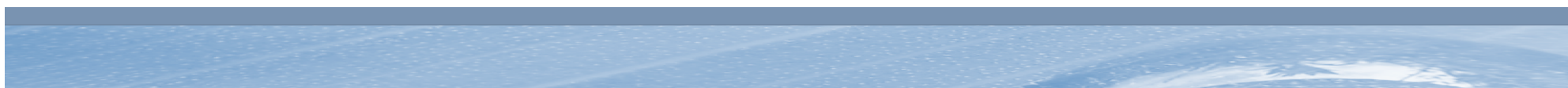
Barrier by HeiQ on German
Olympic equestrian national team





MiDori® 緑

Commercial programs on apparel



ABOUT ECOCHIC

COLLECTION

TV COMMERCIAL

DOWNLOADS

MiDori® on ecoChic lines
for Triumph underwear



Conscience
meets **Fashion!**



Beyond Surface Technologies helping to....

*“meet the needs of the present without compromising the ability of future generations to meet their own needs.”**

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