

Invisible, yet beautiful.

*N*ANOFront™

TEIJIN FIBERS LIMITED



# A Super fiber is born

A world first. 700 nanometer ultra fine polyester nanofiber "Nanofront™".

Not simply new; if we realize the true potential of a material, rather than just the novelty, to what extent can fabric evolve?

Continuous research and development and state-of-the-art nanotechnology at Teijin answers the question.

Now we have the world's first 700 nanometer ultra-fine polyester nanofiber "Nanofront™".

The new "Sea/Island" composite spinning technology has solved the problem of unstable quality associated with conventional mass-production nanofibers.

The surface area of Nanofront™ woven in long fabric structure could be tens of times greater than conventional fibers.

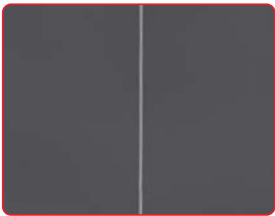
This enhances water absorption, slip resistance, and opaqueness.

The texture feels soft to the skin, and irritation is reduced dramatically.

Suitable for a variety of applications, including functional sportswear, innerwear, skin care products, antibacterial filters, precision grinding cloth, etc.

Teijin opens the future for fibers with "Nanofront™".

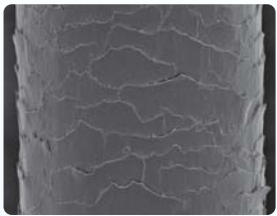
▶ Diameter is 700 nanometers. Section area is 1/7500 the area of a hair.



Nanofront™ (fiber diameter:700nm)

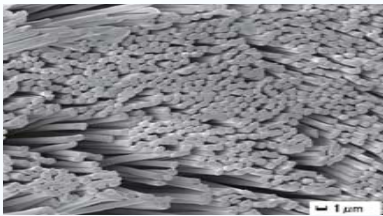


Microfiber (fiber diameter:2μm)

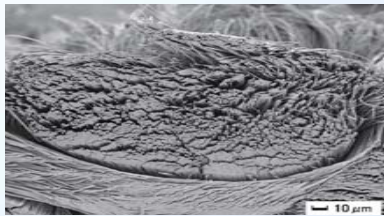


Hair (diameter:60μm)

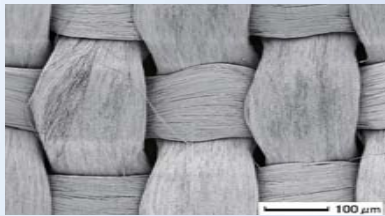
○Nanofront™ Photo taken by an electron microscope



Fiber cross-section



Textile cross-section

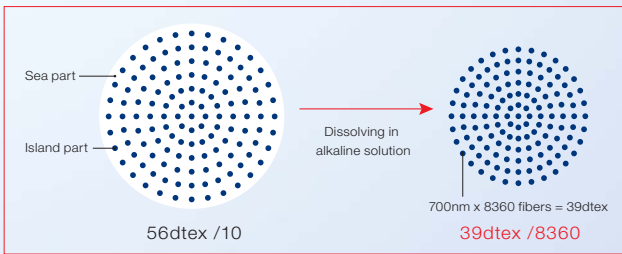


Textile surface

▶ Fine but filaments with superlative strength and uniformity

Property	Unit	Before reduction	After reduction
Denier/filament count	dtex/filament count	56dtex/10	39dtex/8360
Diameter of single filament	nm	23000	700
Strength	cN/dtex	4	4.8
Elongation	%	20	30
Shrinkage in boiling water	%	10	-

▶ With Teijin' s unique 'New Sea/Island Separatable Fiber Technology'





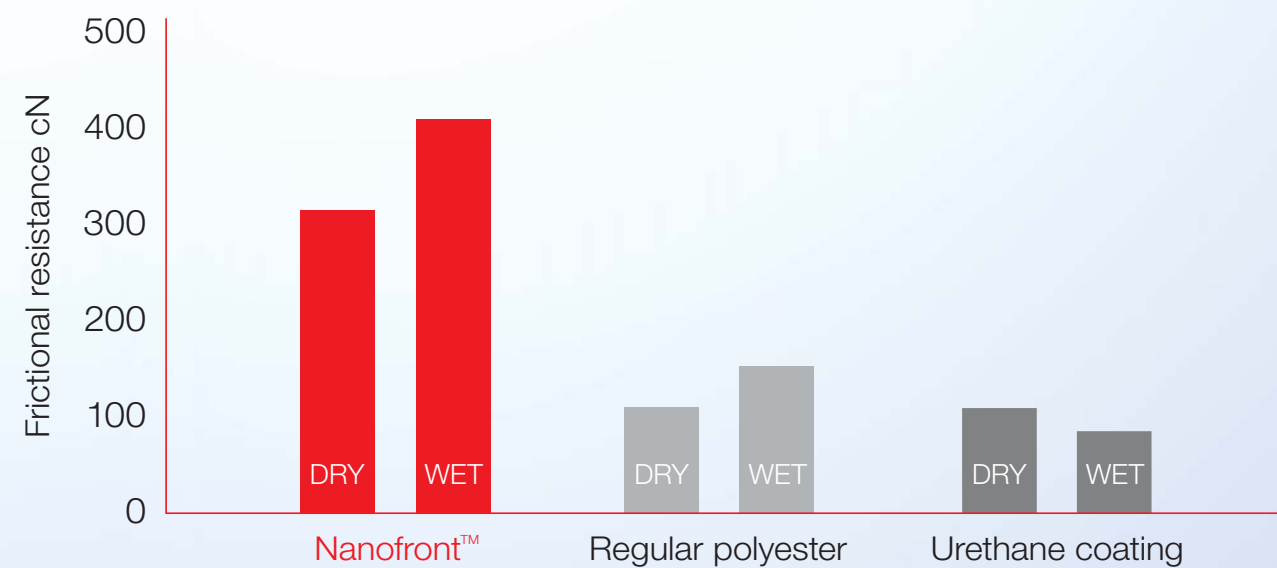
〈Because it is Nanofront™〉

## ▶ Slip-resistant

The surface area of Nanofront™, with a 700 nm diameter, is tens of times greater than normal fibers. Furthermore, since the nano-scale unevenness of the fabric surface generates greater frictional force, it exhibits a great gripping power.

The perfect fit makes the fiber suitable for gloves, innerwear, supporters, etc.

● DRY-WET Frictional Resistance Test





〈Because it is Nanofront™〉

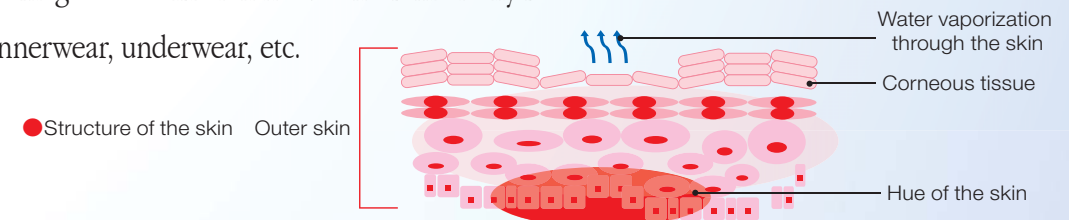
## ▶ Gentle on the skin

The flexibility of fibers is inversely proportional to the 4th power of the size of a fiber.

For example, compared to regular polyester fiber (15 $\mu$ m in diameter), Nanofront™ is 200,000 times more flexible.

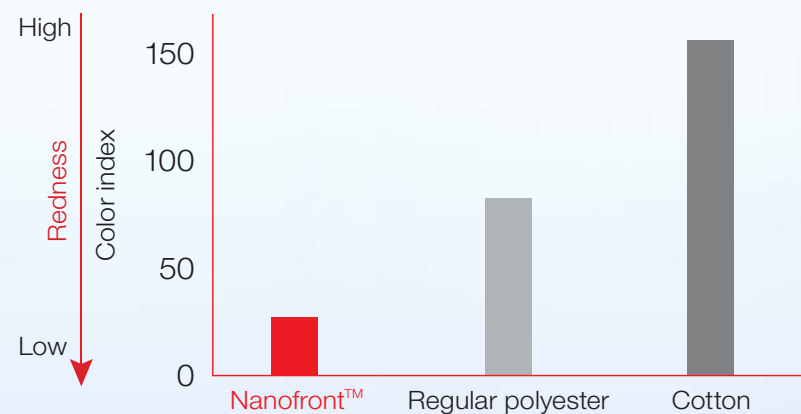
Because of the soft texture, skin damage due to friction has been dramatically reduced.

It is ideal for skin care products, innerwear, underwear, etc.



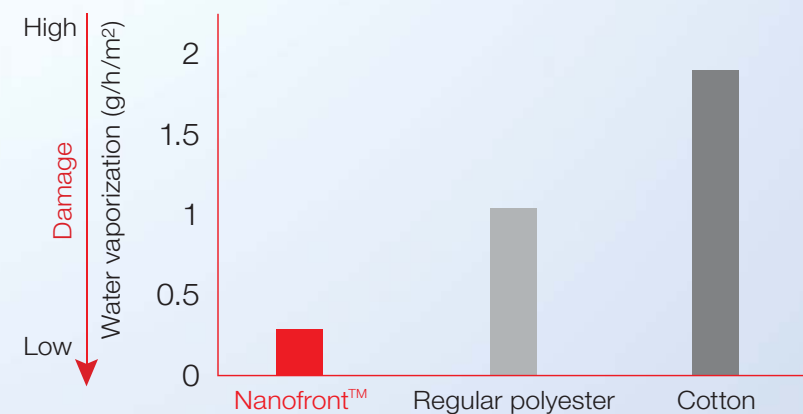
### ● Changes in the hue of the skin (Measured using Mexameter® MX18)

When the skin is damaged, it turns red as hemoglobin floods the blood vessels.



### ● Changes in water vaporization through the skin (Measured using Tewameter® TM300)

Removing the corneous tissue on the skin increases water vaporization from inside the skin.



*NANOFRONT™*



〈Because it is Nanofront™〉

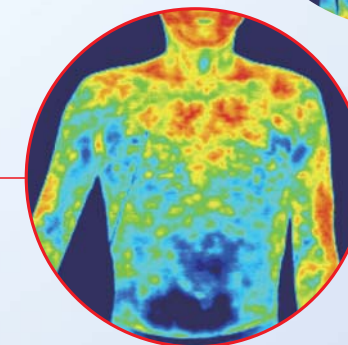
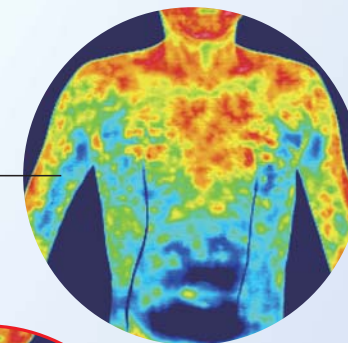
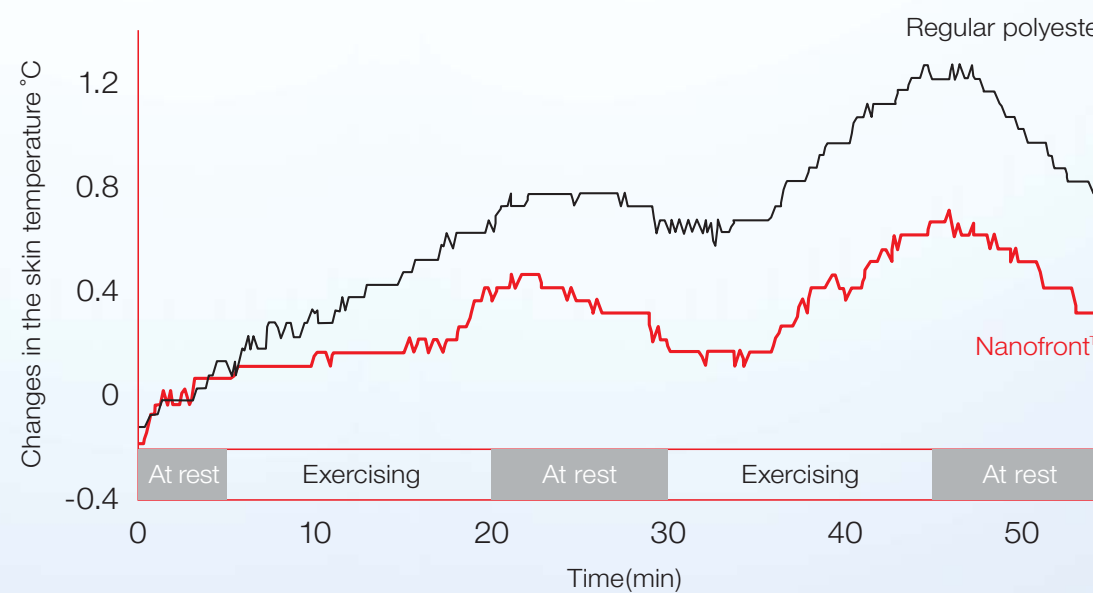
## ► Comfortable

Since thinner fibers increase the vaporization area, Nanofront™ with 700 nm diameter has excellent cooling property.

It absorbs and diffuses sweat quickly and prevents increases in body temperature.

Furthermore, because of the capillary tube effect and the absorbability of the fibers, it exhibits excellent water absorption and water retention properties. It is ideal for sportswear.

● A comparison of increases in body temperature







〈Because it is Nanofront™〉

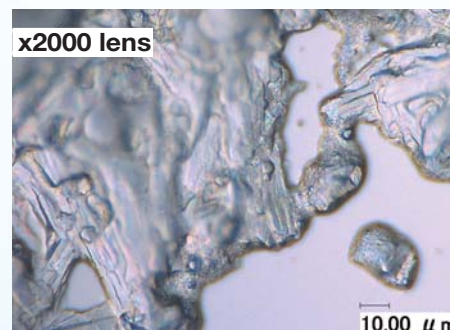
## ► Easy to wipe

In general, it is not possible to wipe off oil films several microns thick with conventional fibers.

At 700 nm diameter- a lot thinner than oil films and micro-dust,  
and the clearance between fibers, Nanofront™ makes wiping easy.

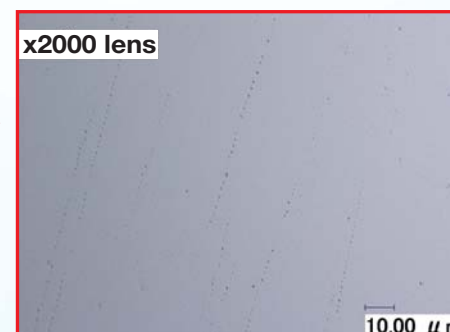
It is recommended for wiping cloths, sebum removal, etc.

● Optical photo (x2000 magnification)

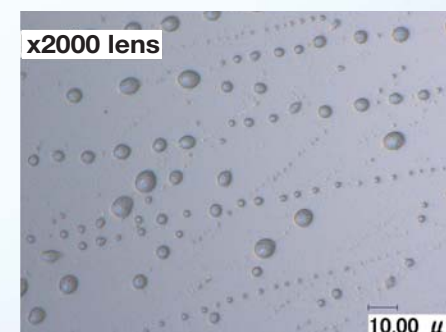


Stain before wiping

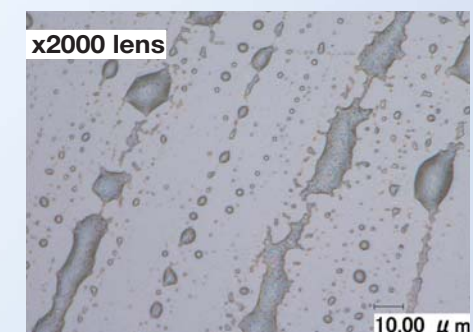
► ► ► ► ►  
Residual stain  
after wiping



Nanofront™



Product A  
from another manufacturer



Product B  
from another manufacturer

<Wipe off conditions> ●Friction knob dia: 3cm ●Pressure: 5g/cm<sup>2</sup> ●Wiping motion: Zig zag wiping, 5 back-and-forth motions ●Analysis area: 4cm<sup>2</sup>(2cm×2cm)

Stain = Diamond paste (Composition : Carbon black, beef fat super hardened oil, and liquid paraffin)



〈Because it is Nanofront™〉

## ▶ Opaque

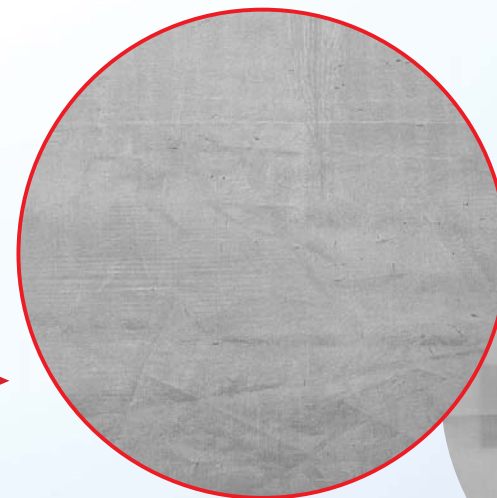
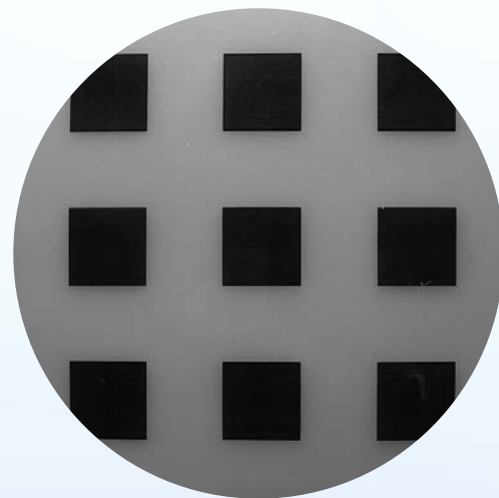
Nanofront™ realizes excellent diffusion and deflection properties with its 700 nm diameter nanosize fibers.

It is very thin but offers less transparency, making it hard to see through the textile.

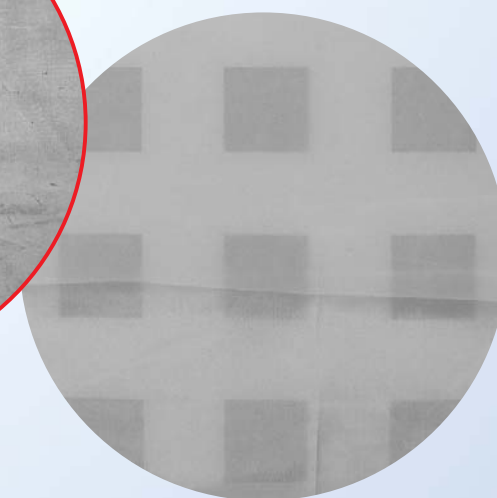
As nanosize fibers effectively fill all the narrow spaces, they also function as a barrier.

This makes it ideal for curtains, uniforms, interior materials, etc.

● A comparison of transparency



Nanofront™



Regular polyester