Sustans® Fiber
made with DuPont™ Sorona®
EVOLUTION OF POLYMERIC MATERIALS

- Bakelite 1909
- 1st Synthetic Polymer
- Polystyrene
- Neoprene
- PVC
- PET
- Polyurethane
- Modacrylic
- Triacetate
- Vinyon
- Polypropylene
- Adiprene
- Polyureas
- Nylons
- Dinitriles
- PBI & PBO
- Novaloid
- Polyimide
- Boron
- LCP, HTN
- Alpha-Alumina
- Kevlar® Aramid
- Kapton® Polyimide
- Lycra® Polyurethane
- Nomex® Aramid
- Delrin® Polyacetal
- Dacron® Polyester
- Teflon® Fluoropolymer
- Nylon 6,6

Year

- 1920
- 1930
- 1940
- 1950
- 1960
- 1970
- 1980
- 1990
- 2000
- 2010

Polylactic Acid
Sorona®

Dupont logo
1. US DuPont & Haixing Kaisheng Technology Strategic Partnership
✓ DuPont strategic cooperation partner
✓ Use DuPont™ Sorona® polymer derived from natural and renewable plants
✓ Unique clean manufacturing process of brand-new bio-based fiber Sustans®
✓ The only producer of stretch staple fiber Sustans® made with DuPont™ Sorona®
2. SUSTANS®
From natural plant starch material

Before

Oil, petroleum → Refining process → Chemicals & intermediates → Polymer → Plastics

Now

Renewable sources → Biological process → Medicine, solvents and pesticides → Fiber → Coating materials
Environmental, unique clean production process

Two microorganisms convert sugar to PDO stepwise

Starch glucose → Glycerol → PDO
Yeast
Germ

Catalyst Sb-free

+ PTA

Sorona® Polymer

Renewable crops
Starch glucose

DuPont plant for PDO

Haixing Plant
Sorona® chip
Polymerized
Bio-based PDO

Clean spinning process
Sustans®

Biological enzyme fermentation
Sustans® is developed successfully with the DuPont USA which is currently the only bio-based high technological material for heat preservation in the world used in winter-proof coats. By combining DuPont Sorona® that comes from crops natural renewable resource with our unique clean production process, Sustans® fiber represents perfect combination of bio-technology fiber innovation. Sustans® is fluffy, high warmth, high elasticity, soft hand feel and more convenient and flexible to use. Its ecological and environmental contributions are strong support to the sustainable growth of textile industry and it’s a revolutionary innovation to Textile & Apparel industry.
DuPont™ Sorona® received Oeko-Tex® Standard 100 certification, the stringent Class I. DuPont™ Sorona® renewably sourced polymer is one of the first 11 products approved to use the United States Department of Agriculture (USDA) new product label on certified bio-based products.
Sustans® fiber special structure

Sustans® fiber for heat preservation — Natural 3D spiral structure
- Soft and full hand feel
- High bulkiness accommodates more motionless air
- Motionless air can’t form heat convection with reducing heat loss.
- Superior recovery with long-lasting effect for heat preservation.

Regular polyester hollow fiber
- Hard hand feel
- Not being conductive to the storage of air with easily disappearing for its curl
- Poor recovery and easy deformation.
SUSTANS® uses

Dupont™ Sorona®

Sustans®

Fabrics
+ Cotton Wool Linen Synthetic fiber Others
Denim Leisure Jacket Uniforms Shirt Knitwear

Home Textile
Sustans Wadding Molded Sustans
Quilt Pillow Cushion Mattress Sofa Home furnishing

Garment Filler
Sustans Fiber Ball Sustans Down-like Sustans Wadding
Cold weather gnt Work and professional gnt Baby gnt Sleeping bags Sport and tourist gnt
3. SUSTANS® Fabric
Unique structure and crystal habit offer Sustans® fiber special properties if it is stressed as strain deformation is workable firstly at the lower molecular weight of crystallization. When removing stress, as crystallization locked and fiber can recover natural status.

The Stretch Principle of SUSTANS® vs SPANDEX

Spandex molecular chain before stretching

Spandex molecular chain after stretching

Sustans molecular chain before stretching

Sustans molecular chain after stretching
Performance of SUSTANS® fabric

1. Good Comfort Stretch and Recovery
2. Natural Soft Hand Feel & Fluffy
3. Excellent Dimensional Stability
4. Good Even Fabric Surface and Wrinkle Resistance
5. Good Quick-dry and Moisture Absorption
Stretch recovery of SUSTANS® fabric vs. cotton/spandex

**Recovery Property Comparison between Sustans Fabric & Cotton/Spandex**

<table>
<thead>
<tr>
<th>Elongation 15%, stretching 10 times</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sustans/Cotton</td>
</tr>
<tr>
<td>Cotton/Spandex</td>
</tr>
<tr>
<td>Stretch Recovery (%)</td>
</tr>
<tr>
<td>79.6%</td>
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<tr>
<td>67.2%</td>
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</tbody>
</table>

**Stretch Recovery Comparison between Sustans Fabric & Cotton/spandex**

*Under Different Conditions*
Washing shrinkage of SUSTANS® fabric vs. cotton/spandex
Easy care/anti-wrinkle of SUSTANS® fabric vs. cotton/spandex

Wearing 12hrs, after hung 30min

With Sustans® fabrics
With Cotton/spandex

Wearing 12hrs, after hung 60min

With Sustans® fabrics
With cotton/spandex
Good quick-dry and moisture absorption
SUSTANS® can be blended with all kinds of staple fibers such as cotton, wool, silk, line etc and it’s your best choice!
SUSTANS HANGTAG

SUSTANS®

Derived from DuPont® Sorona®
Sustans® fiber offers excellent benefits to fabrics

> Soft hand feeling
> Dimensional stability
> Partially renewably sourced
> Comfort stretch and recovery
> Less wrinkle, shape retention

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DuPont® Sorona® is environmentally friendly derived from renewable sources and it contributes to sustainable development.

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4. SUSTANS® Fillers
Garment Filler

Sustans Fiber Ball:
- strong washable,
- machine filling,
- no sticking out of filament
- super high warmth and heat preservation

Sustans Down-like Type S:
- more fluffy,
- machine filling

Sustans Fiber Ball:
- eco-friendly
- 100% hypo allergic
- no smelling

Sustans Wadding:
- high warmth retention
- no water vapor permeability

Sustans Down-like Type L:
- more fluffy,
- manual filling
- soft
- fluffy
- excellent hand feeling
- very light
- stretch recovery
- crush resistance
- washable

Sustans Wadding:
- homogeneous distribution,
- no sticking out of filament
- heat preservation
- very light
Down-Like S Type

- Environmentally friendly, odorless
- High heat preservation
- Silk soft and bouncy touch, fluffy
- Washable, no fabric penetration
- Machine filling
- Quilt size ≤ 6cm
Down-Like L Type

- Environmentally friendly, odorless
- High heat preservation
- Silk soft and bouncy touch, fluffy
- Washable, no fabric penetration
- Manual filling
- Quilt size $\leq 10$cm
Sustans Fiber Ball

- Environmentally friendly, odorless
- High heat preservation
- Silk soft and bouncy touch, fluffy
- Washable, no fabric penetration
- Machine filling
- Quilt size ≤ 8cm, suggest gsm ≥ 250g
Thermal resistance for fiber ball vs. down

*300g Sustans fiber ball can reach the same CLO value as 200g down.
Clo value for Sustans fiber ball vs. regular fiber ball
Sustans Padding

- Environmentally friendly, odorless
- High heat preservation
- Silk soft and bouncy touch
- More fluffy than regular padding
- Washable, no fabric penetration
- Weight: from 20gsm to 400gsm
Clo value of Sustans padding vs. regular padding
SUSTANS CHARACTERISTICS

- Excellent hand feel
- Softer and more fluffy
- Lighter

Comparison of bulkiness for wadding insulation in the same weight/m2
GARMENT FILLER

Infant baby garment

Professional wear

Business

Sports and Movement
**SUSTANS CHARACTERISTICS**

- Supreme warmth retention
- Perfect heat preservation

<table>
<thead>
<tr>
<th>Products</th>
<th>Heat Insulation ratio</th>
<th>CLO Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wadding insulation for Sustans®</td>
<td>86.73%</td>
<td>3.81</td>
</tr>
<tr>
<td>Wadding insulation for general polyester</td>
<td>73.63%</td>
<td>1.693</td>
</tr>
<tr>
<td>For well-known brand</td>
<td>77.40%</td>
<td>2.51</td>
</tr>
</tbody>
</table>

The higher clo value, the better effect for heat preservation
SUSTANS CHARACTERISTICS

- More motionless air accommodating
- Heat loss reducing
- Water vapor permeability
- Keep human body a warm, dry and comfortable feeling

Infrared imaging meter for temperature contrast imaging

Structural sketch map for heat preservation and water permeability
SUSTANS CHARACTERISTICS

- Good washing property (tests from DuPont R&D center, Donghua University and ITS, international authoritative testing organization approved)
- Free from bacteria and mites
SUSTANS CHARACTERISTICS

- Can be blended with other textile materials: wool, silk and down
- No sticking out of filament
DuPont wins the 2015 Bio Business Award for Breakthrough Bio-Based Technology Platform at the World Bio Markets Conference awards ceremony in Amsterdam

Sorona® is one of the first 11 products approved to use the United States Department of Agriculture (USDA) new product label on certified bio-based products

DuPont™ Sorona® Receives Oeko-Tex® Standard 100 Certification class 1

Sorona® passed Japan BP certification
All SUSTANS® hangtags have been licensed to use co-branded special hangtag SORONA, managed and distributed by DuPont.
5. SUPPORT FOR OUR CUSTOMERS
THANKS!