

In recent years, 'skin-friendliness' in textiles has gone from being an aid in relieving allergies to a coveted attribute in the apparel industry. Every aspect of fabric has been examined in this subject; from the potential harmfulness of antibacterial treatments, to pH-controlling properties.

# Touch friendly

Growing awareness of the development of 'skinfriendly' textiles in recent years has been sufficiently great as to attract the testing abilities of the Hohenstein Institute. In 2009, the institute introduced its 'Skin Friendy' and 'Hypoallergenic' labels so that consumers could have more faith in the claims being made by manufacturers. One online retailer in the UK found its claims being challenged and it was surprising to learn that the company had simply 'borrowed' information from other websites and misinterpreted articles published in the specialist press. Skin allergies such as eczema and dermatitis are common, and if it is possible to produce a fabric that not only helps alleviate symptoms but also soothes the skin, then the benefits, not to mention the marketing potential, of such a fabric are significant.

In September last year, UK-based company Dreamskin Health launched what it describes as the world's first range of hydrating, medical-grade silk garments designed to relieve the itching and irritation of eczema and dermatitis. According to the company, the secret to the new garments is a proprietary biomimetic copolymer matrix which is firmly bound to the surface of the silk and helps to regulate the skin's moisture and temperature regulation functions.

Technical director, Howard Cairns, said at the launch of the apparel range: "We were inspired by looking at how the hydration of modern contact lenses is achieved and realised we could use our fabric engineering knowledge to produce a similar effect in fabric."

The company claims that garments made using this technology offer improved skin hydration and moisture regulation, reduce skin itching and irritation and decrease the contact between skin and irritants such as washing powder residue.

*The safety of antibacterial textiles has been investigated in a field study carried out by the Hohenstein Institute.*

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*The Hohenstein Institute introduced its 'Skin Friendly' and 'Hypoallergenic' labels for textiles in 2009.*

Hohenstein Institute

## Controlling acidity

According to Japanese polyester fibre manufacturing group Teijin, healthy skin has a mildly acidic pH level. In January this year, the group announced that it had developed a new polyester fabric that is gentle on the human skin by stably maintaining its pH level. Teijin claims the fabric is the world's first commercial polyester material to offer pH control.

The company plans to begin selling the new fabric in time for spring-summer 2012 sportswear. It also will be marketed for general apparel and other applications.

The important development here is that Teijin has found a way of controlling the pH level of polyester; before this innovation, fabrics offering pH control were limited to hydrophilic fibres such as cotton, neither of which has the same performance properties for some sportswear as polyester. Before this development, pH control was added to fabrics through post-processing treatment, whereas Teijin achieved its fabric's mild acidity by modifying the polyester polymer, rather than adhering agents to fibres, to enable it to maintain its pH stability after repeated washing and wear. The fabric is not only gentle to skin but also has odour prevention, antibacterial and stain resistant properties, according to the manufacturer.

"The growth of bacteria such as Staphylococcus aureus and Corynebacterium, which cause odours and dry, rough skin, can be selectively controlled by the fabric's mildly acidic state," says a statement from Teijin. "This promotes the growth of beneficial bacteria such as Staphylococcus epidermidis, which helps to protect and maintain healthy skin.

"Alkaline components from sweat, such as ammonia, are quickly absorbed and neutralised by the fabric's mild acidity, which helps to prevent clothing from developing odours." For stain resistance, the fabric's hydrophilic surface enables washing to remove stains caused by sebum, an oily secretion of the skin, which minimises the spread of bacteria and helps to maintain the clothing's cleanliness.

## The antibacterial debate

Earlier this year, textile processing solutions provider Tanatex Chemicals announced a new product, Actipro Probiotic Finish. The company explained that Actipro is a natural solution for combating pathogenic bacteria (disease-causing bacteria) and allergens in textiles, without being destructive to the positive micro-organisms and necessary skin flora. It said the product is something new, safe and effective against undesired growth and reproduction of allergens.

Many textiles trap dust and debris during their use, creating an ideal environment for unwanted

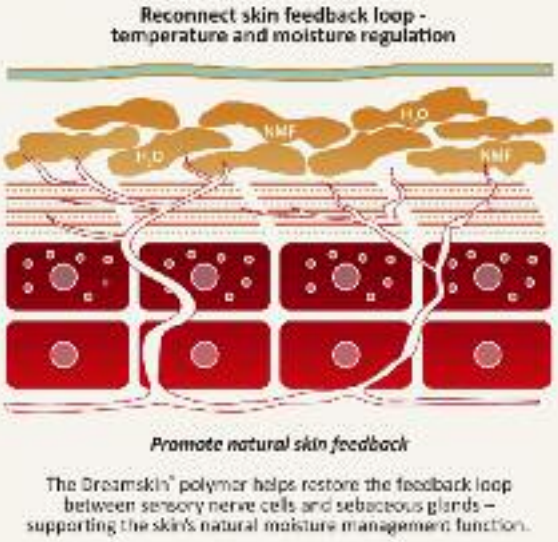
*A prototype of Teijin's pH controlling polyester fabric, which the firm claims also prevents odour and is antibacterial and stain resistant.*

Teijin

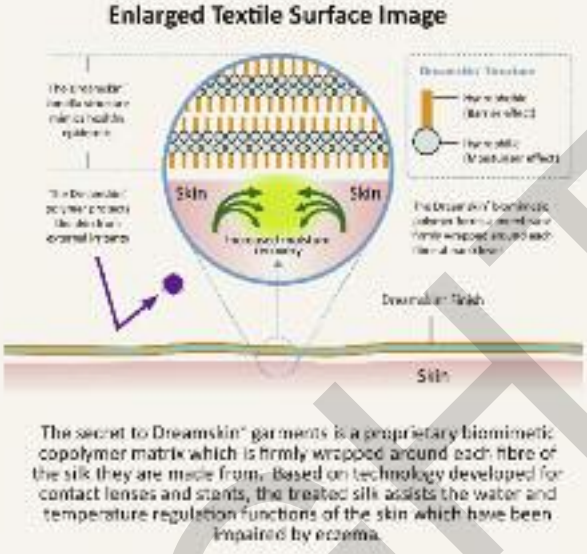


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Dreamskin Effect 3




Dreamskin multi-layer lamella structure




pathogenic bacteria and allergens. Antibacterial products kill the bacteria, but the resistance to those mechanisms is growing, Tanatex said.

On Actipro treated textiles harmful bacteria and fungi are denied the ability to grow or reproduce, the company claims. Johan Cleyman, global project manager at Tanatex says: "Antibacterial products are not the solution to the problem, they are more often reported to create super germs or antibiotic resistance."

However, at the same time that Tanatex launched Actipro, the Hohenstein Institute published the findings of its scientific study into the use of antibacterial chemical fibres in clothing and the possible negative effects on skin flora and the skin's microclimate, which the Institute claims shows that antibacterial clothing is in fact safe.

Nano-particles of silver have an antimicrobial effect and have been used for centuries for purifying drinking water and preventing textiles from becoming colonised by pathogenic or odour-forming bacteria.

"Most of the antimicrobial garments on the market at present contain silver," says a statement issued by the Hohenstein Institute. "Even though silver has a very good image and has been used for decades with no problem in other areas such as for treating drinking water, purchasers of antibacterial clothing have been confused by, in some cases, highly controversial debate and reporting in the media."

A total of 60 healthy volunteers took part in the Hohenstein's study for a period of six weeks. Special t-shirts were made for the survey, with an antibacterial treatment on one side, while the other half served as a non-antibacterial placebo. The t-shirts had to be worn by the volunteers every day for at least eight hours for a period of four weeks, while various parameters for the skin flora and microclimate were investigated each week.

At the beginning of the trial and during and after the tests, researchers identified the types of skin bacteria that were typical of each of the volunteers' natural skin flora. At no time did any pathogenic bacteria occur. The individual differences between the volunteers were all within a normal range when compared with published data on skin flora. No effect by the textile fibres on the skin flora could be detected either in individual volunteers or when the whole group or parts of it were considered.

The results of the Hohenstein Institute's study confirmed that healthy human skin flora are very stable. Most notably, there was no significant difference in the total number of bacteria between the functionalised side and the control side. Nor was there any variation in the individual range of bacteria specific to each volunteer which could be attributed to the functionalised textile fibres. There was also little change in the pH value of the volunteers' skin or in the moisture levels in their skin.

Antibacterial textiles can therefore be classified as safe, according to the Hohenstein Institute.

It remains to be seen whether this means antibacterial apparel will now qualify for the Institute's 'Skin Friendly' and 'Hypoallergenic' labels, which "excludes the possibility of damaging effects on skin cells" and "offers consumers the security of knowing that textiles do not release any allergy-causing substances" respectively, but one thing that can be said for certain is that "skin-friendly" is a term which will surely become ever more prevalent in the sports apparel industry, as brands and manufacturers look for new ways to increase the comfort and overall performance of their products.

*Dreamskin Health claims the polymer in its garments promotes and protects healthy skin.*

*Dreamskin Health*

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