Goodbye to bad bacteria

At a recent IFAI Advanced Textiles conference in Brussels, Gerhard Havranek, head of marketing Trevira CS and strategic business development, Trevira GmbH, gave a detailed and interesting presentation on bioactive fibres for antimicrobial textiles. Since 2004, Trevira has been part of the Indian Reliance Group, the world's largest manufacturer of polyester preliminary products and fibres. Mr Havranek explains that Trevira is a small division focused on specialties, including bioactive fibres for antimicrobial textiles.

While the company believes mattress covers will actually be the largest end application segment for antimicrobial textiles by 2010 with a 23.8% share, sportswear and other clothing items are also important in terms of end uses. Sportswear is expected to account for around 15.4%, protective clothing for around 11.8%, socks and hosiery for around 16.1%, underwear for approximately 6.4% and other clothing for 0.7%. Other applications include medical textiles (15.2%), bedding textiles (5.4%) and linings (5.2%).

According to Mr Havranek, a qualified textile engineer, all textiles contain microbes. These microbes can increase the risk of cross-contamination as well as leading to unwanted odours and discolouration. He explains that silver has been used as an antimicrobial agent for many years and is still used extensively in the medical profession, for example in catheters and in burn treatments. "It's very effective against negative bacteria," he says. Silver ion release works under the same conditions needed for microbial growth: moisture and warmth. And these ions attack microbes at a very early stage.

Built in protection

Because of this, the company decided to develop antimicrobial protection that is built into the polymer backbone. Rather than applying coatings or using any form of after treatment, this means the antimicrobial properties are permanent. The inbuilt protection prevents the build-up of microbes, inhibits the formation of odours and reduces discolouration.



Trevira Bioactive has featured in technical apparel worn by the Spanish basketball team.

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Mr Havranek claims fibres that are inherently antimicrobial, like the ones it produces, offer an "ideal" antimicrobial strength. There is also a low propensity for cells to develop resistance to silver ions. Meanwhile, chemical or silver coatings, where the active agent is coated around the fibre, are said to be very effective initially, but the positive effects are unsustainable.

According to Trevira, inherently antimicrobial fibres offer a range of benefits compared with coated or treated fibres. The company questions the wash resistance of coated fibres and claims that their efficacy continually decreases. Its figures show that even after 50 washes the effectiveness of its inbuilt antimicrobial barrier is 99.5%, while coated fibres are more or less completely ineffective after 50 washes. In fact it is claimed that after a combination of 10,000 Martindale abrasion cycles and just five wash cycles, silver-coated fibres no longer provide any benefit, while the inherently antimicrobial fibre still works at 98% efficacy.

"If the active agent is bonded into the fibre, it can never be washed out," explains Mr Havranek. "It's much more effective after washing than silver coatings." The effectiveness of Trevira Bioactive has been certified by the Hohenstein Institute, also based in Germany.

Tests using the two types of antimicrobial fibres have been carried out for sports textiles as well as for 20 medical and military textiles. According to Trevira, the fibres with built-in antimicrobial protection are much more effective in reducing bacteria levels than coated textiles. Clinical clothing, worn for a full shift and then stored for 16 hours prior to being worn for a second shift, showed a comparative 86% reduced germ count.

Safety first

According to the company, this inbuilt microbial barrier is also very safe because, although the microbes come into contact with the textile, they are destroyed before they come into contact with the skin. The safety of its fibres has been granted Oeko-Tex Standard 100 approval and it has passed cytotoxicity test ISO 10993-5:1993 and skin compatibility test ITV Denkendorf.

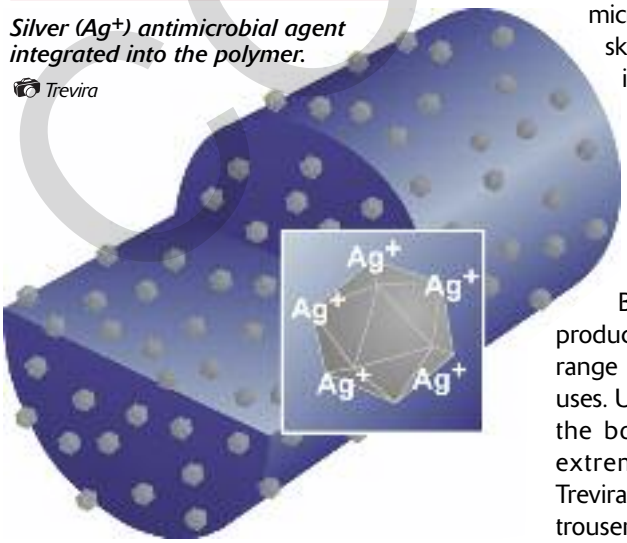
The company claims to have carried out a test that is the first of its kind—designed in cooperation with and performed by the Hohenstein Institute—which it says shows these fibres to be safe in practice. During a six-month trial, 32 volunteers wore t-shirts made in two halves every night. One half was made from Trevira Perform, and the other from Trevira Bioactive. The results showed that Trevira Bioactive had no harmful effect on the skin flora.

The tests showed no change in the total microbe count, no fluctuation in the spectrum of microbes, no change in the pH-value of the skin, no change in skin temperature and no interference with trans-epidermal water loss. On the other hand, the company claims active agents used to coat textiles can cause damage to the skin's natural bacterial flora.



Volleyball team TSV Bayer 04 Leverkusen wearing kit made from Trevira Micro Bioactive.

TSV Bayer 04/Trevira



Silver (Ag^+) antimicrobial agent integrated into the polymer.

Trevira

Sports applications

Because the fibres and yarns Trevira produces are versatile, they can be used in a range of different fabrics for a variety of end uses. Used in active sportswear it can help keep the body dry even when it is subjected to extreme physical pressure. According to Trevira, items such as underwear, t-shirts and trousers remain fresher for longer when they

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Dorina claims its Sport Line bra range provides comfort, optimal moisture wicking and breathability as well as being hard-wearing and easy-care.

Dorina

contain the antimicrobial fibres. The ladies' TSV Bayer 04 Leverkusen volleyball team has reaped the benefits of this technology, as has Spain's national basketball team.

Meanwhile, Munich-based men's and women's underwear brand Dorina has been using the bioactive material in its Sport Line collection in its functional sport bra with seamfree, preformed cups. The back and cups of the bra are made from mesh-elastic Trevira Bioactive material. An elastic warp-knitted fabric is processed over the cleavage and outside breast area to provide the necessary support and positioning. According to the company the bra offers support, comfort, functionality and good fit. It is also hardwearing, permeable to air and quick drying.

Other users of the antimicrobial fibres include: Globetrotter, which uses 100% Trevira Bioactive in its Four Seasons Classic Short for men, among other items in its range; and Bike o'bello, which uses Trevira Micro Bioactive in many of its cycling garments. Globetrotter says: "With its numerous yarn filaments, Trevira offers a surface that is clearly larger than traditional polyester yarns and achieves better function values." The company claims it offers an air cushion between the fine filaments which insulates the body and offers a larger area for moisture to find its way to the surface more quickly. Trevira Bioactive sportswear can also be found at b+d Sportartikel, Maisch Sportswear, Switcher and Comfortrust.

Trevira Bioactive can be processed with cotton, viscose or other polyester fibres into blended fabrics and Mr Havranek explains that this adds "functionality and value" to the finished product. Textiles with inherent antimicrobial action retain the same fabric properties as standard polyester including colour brilliance, good wearability, breathability, good heat and moisture regulation, elasticity and good dimensional stability. They are also durable, easy to clean and are soft to handle. The bioactive element can also be combined with other functional benefits, for example Trevira CS Bioactive is a flame retardant fabric with antimicrobial properties.

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