

The Work Wear of Tomorrow

The new factory building of the Smartfiber AG will be taken into operation in October. The enterprise was hived off the Thüringisches Institut für Textil- und Kunststoff Forschung e.V. (TITK) in September 2005. The range of products amongst others includes Smartbioclean, antimicrobial cellulose fibers.



At the beginning stands the manufacturing of Bluewish, an innovative household cloth of fleece, of which already 70.000 pieces were delivered to the USA. Project manager Dr. Hardy Markwitz of the TITK thinks the cellulose products developed in the TITK are especially useful for the fields of work wear and PSA, but also for the manufacturing of medical textiles.

Already in the middle of the eighties the research department of the then Chemiefaserkombinat in Rudolstadt began to develop an environmentally sound method for the forming of cellulose, which today is known as "Alceru" ("Alternative Cellulose Rudolstadt"). In the process the cellulose is formed into N-Methyl-Morpholin-Oxide (NMMNO). The initially 50 per cent moisture content of the suspension is reduced to 10 till 12 per cent. Thus emerges a physical solution, which can be spun. Independent of that at this time with Lyocell in Austria and Tecel in Great Britain adequate products came into the market. The two manufacturers merged 2002. Dr. Markwitz: "We were looking for new market niches. The method, that is to say, is very suitable to functionalize cellulose fibers." Thus micro-milled solids can be added to the spin solution and securely attached to the fiber matrix. In doing so the cellulose fibers remain with certain features.

The antimicrobial effect of silver ions is generally known. By furnishing textiles with silver ions they are protected against bacterial contamination. Thus for example arising off odors can be prevented. New in this context is the use of cellulose fibers, that are equipped with up to 8% of silver ions. The project manager: "Cellulose is a pure natural product, which is distinguished by the ability to absorb water and to swell as well as to be breathable." The material can be used during the manufacturing of mixtures of textiles and fibers. As a rule 2 to 3 percent of Smartbioclean, perhaps in a fabric of cotton and polyester, are enough to get antimicrobial results. Thus also efficiency during production is guaranteed.

During the phase of development the TITK co-operated with the spinning company of Kulmbach. "We approached to the optimal mixing ratio together. After initially using a yarn of 89% cotton and 11% silver fibers eventually an admixture of only 2% met our requirements with regard to an optimal antimicrobial effect with simultaneous efficiency", reports Dr. Markwitz. Out of this product since 2005 stockings for diabetics are made by the company Lindner Socks in Hohenstein-Ernstthal.



Prior to this tubular knitting from this yarn was tested in the laboratories of the company Fresentus and the Textilforschungsinstitut Hohenstein for its antimicrobial effects. Doing this neither *Staphylococcus aureus* nor *Staphylococcus epidermis*, *Klebsiella pneumoniae* or other bacteria were spared. Even after 80 cycles of washing at 95° C as much silver ions were released as with new textiles. Dr. Markwitz: "The bioactive effect sustained in its entirety." Enough reason for a producer to test the material for its suitability to manufacture underwear for people ill with neurodermatitis.

Also in the fields of work wear, medicine and care the project manager sees good perspectives for using silvered textiles: "On any place that demands severe hygiene cellulose fibers, equipped with the 'Alceru'- method, may be used." The spectrum thus reaches from manufacturing of food, hospitals and care homes to highly sensitive OP-areas.

However there is one limitation: "The production of pure white fabrics is impossible since silver darkens under the impact of light. Therefore a coloring up to middle shades is recommended", the project manager explains. But meanwhile even members of the classical "white" jobs like to show colors. The proportion of 2 to 3 percent silver fiber does not have negative effects on special equipment like i.e. protections against flames. Dr. Markwitz states: "The fiber can be mixed with any desired component." And in addition it has the advantage that the techniques in the factories do not have to be changed.