A new PFOA-free (perfluorooctanoic acid) water-repellency product from Nano-Tex is attracting the attention of outdoor clothing brands. The first garments using the new technology will reach the market in spring 2012.



Move away from PFOA continues

Fabric innovation company Nano-Tex, which specialises in nanotechnology-based textile enhancements, has announced what it is calling a major breakthrough in water repellency. Its new product, Aquapel, is, the California-based company claims, "a highly effective and economical approach to water repellency that is completely fluorocarbon free".

Aquapel replaces the traditional fluorocarbon polymer with a hydrocarbon polymer that is, it says, "more ecologically friendly and economically smart". It offers comparable performance–liquid repellency, breathability, durability, and fast drying properties–at less cost, while remaining fluorocarbon- and PFOA-free. Aquapel modifies fabric at the molecular level by permanently attaching what Nano-Tex calls 'hydrophobic whiskers' to individual fibres without altering their feel or breathability. The whiskers lift liquids up, causing them to bead and roll off the fabric surface.

PFOA (perfluorooctanoic acid) is a familiar

Nano-Tex claims Aquapel will enhance the affordability and sustainability of water-repellency technology without affecting performance.

Nano-Tex



There is a chance some early examples of Aquapel garments will be on show at the Outdoor Retailer Summer Market exhibition, Salt Palace, Salt Lake City, in August.

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acronym to most people involved in making or wearing water-repellent apparel. It's a synthetic substance, which manufacturers use to make fluoropolymers for a range of applications, including clothes. The US Environmental Protection Agency (EPA) has a section devoted to PFOA on the frequently asked questions section of its website. The agency has been studying PFOA in detail since 2003, although it has been aware of health concerns around the substance since the 1990s. It insists that the information it has available does not indicate that the routine use of consumer products containing fluoropolymers made from PFOA poses a concern.

Ahead of schedule

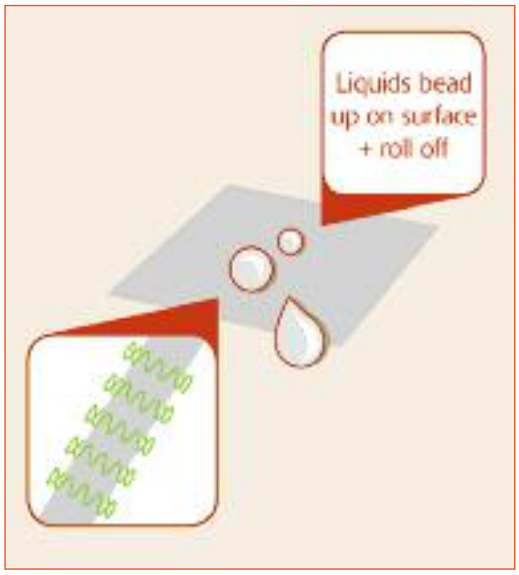
Its efforts to try to understand how PFOA affects health are continuing but in the meantime, it is working with eight chemical manufacturers to encourage them to eliminate PFOA, also called C8, because of its carbon chain-length, from their supply chains by 2015. There are suggestions that these eight manufacturers have worked quickly and that even now C8-based materials are becoming hard to get hold of. There is a transition to C6 (six carbon atoms in the chain) instead. The fluorocarbon polymers made from C6-monomers are PFOA-free, or at least 'PFOA-undetectable' and can provide similar water-repellent functionality for textile applications. But they are expensive because their production involves separating components from longer or shorter chains. Featuring a hydrocarbon polymer rather than a fluorocarbon one is what makes Aquapel more affordable, Nano-Tex argues.

We can sum this up by saying the company wanted to offer a solution that would prove attractive to the market from a performance, environmental and economic point of view. Its senior vice-president for product development, Mark Brutten, says, however, that economy and ecology seem to be the most important aspects. "This depends on the segment the customer is in," he explains. "For outdoor companies, it's the ecological story that seems to be number one. When it's fashion apparel brands, it's the economy."

Nature lovers

Outdoor brands want performance too and, with rising raw material commodity prices, also put importance on costs, especially for their entry-level products. But they are "out in nature all the time", Mr Brutten points out and love the land, the forests, the rivers, the mountains and the oceans deeply.

Fashion apparel brands that are looking at Aquapel also want performance, but with so



Based on a hydrocarbon rather than a fluorocarbon polymer, Aquapel can offer a high level of water-repellency in a cheaper and greener way, manufacturer Nano-Tex claims.

Nano-Tex

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many consumers facing restrictions on the amount of money they can afford to spend these days, price is a very important part of clothing brands' battle to survive in the face of economic constraints. Therefore, if they want to offer water-repellency in a garment, the affordability of any solution they consider is crucial.

For Aquapel to be PFOA-free is nothing new and nothing knee-jerk for Nano-Tex, Mr Brutten continues. He explains that the company began moving from C8 to C6 chemistry, in concert with the programme the EPA was putting in place about five years ago. "As a corporation, we want to have the cleanest chemistry out there," he says, "and this [Aquapel] is just a further step. We stand behind our existing C6 products, but the whole world wants to embrace things that are cleaner and greener, so we asked ourselves if we could go further. That was the motivation for Aquapel."

There is new research all the time, although there are some in the chemical industry who argue that far more studies will be required before anyone can confidently conclude that C6 is concern-free. And in a similarly mysteriously way to chromium VI cropping up in samples of shoes when the leather was tanned using only chromium III, there are suggestions of C6 having the potential to degrade into PFOA as it breaks down in landfill. "Aquapel is about going further so that we know a reaction like this cannot occur, while still delivering a good performance," Mark Brutten says. "That's what we think we've accomplished."

Tests the product has gone through include the water-repellency spray test (test method 22) from the the American Association of Textile Chemists and Colorists (AATCC). For combinations with membrane technology, it's also come through the same organisation's hydrostatic pressure test (test method 127). Nano-Tex is also conducting moisture vapour transfer and air permeability tests to back up its claims about Aquapel having no negative effect on the breathability of fabrics. "We've seen no difference, really, between treated and untreated samples where breathability is concerned," Mark Brutten says. "That's our claim: that we don't harm air permeability. In fact, with cotton fabric, it looks as though the Aquapel has a tendency to enhance the air permeability. We're not sure why. We use the pad-dry cure process, so maybe it's as a result of the fabric going into a liquid bath and then drying off and the effect this has on the weave of the fabric. And because it absorbs less moisture to begin with, Aquapel also increases the drying rate of fabric, making it between 30% and 50% faster in the case of cotton."

Spring debut

Cotton enhancements notwithstanding, the product has a natural affinity with synthetic fibres, so outerwear has been a prime focus as Nano-Tex seeks to bring Aquapel into the mainstream. Tents and backpacks are also possible application areas for outdoor brands, but clothing with Aquapel is scheduled to reach the market in spring 2012 and apparel brands are preparing their offerings now. It is possible, though unconfirmed at the time of writing, that some early products may be on show at the Outdoor Retailer Summer Market exhibition in Salt Lake City (August 4–7). The feel of the fabric will not alter with the addition of the water-repellent technology. Mr Brutten explains: "This is why we use nanotechnology. When you have chemistry on that scale, you can get a durable attachment to the fabric without the need to load the fabric up with chemicals."



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