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# THE MORNING CALL

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FRIDAY, APRIL 8, 2005 •

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## Stains, meet your match

Nano-tech clothing stands up to just about anything thrown at it

By Wendy Solomon  
Of The Morning Call

A man invents a suit that resists stains and wear. He brings his revolutionary fabric to the attention of textile executives who, fearing the demise of their industry, try to prevent the miracle suit from ever being produced.

That was the plot of the 1951 movie, "The Man in the White Suit," when stain-resistant, wrinkle-resistant, liquid-repellant, moisture-wicking fabric was wishful thinking.

Today, scientists have turned fantasy into reality with a new breed of high-tech fabrics with remarkable properties. Red wine pours off cotton shirts like rain off a tin roof, lipstick marks fade before your eyes from collars, and mustard splotches sit, but don't seep into children's clothes.

Far from feeling threatened, some clothing manufacturers and retailers are beginning to embrace these so-called performance-enhancing fabrics, one of the fastest-growing segments of the apparel industry. While popular among athletes, performance wear is still relatively unknown among mass consumers. The textile industry hopes to change that.

"It's what I call 'invisible fashion' and is probably the outstanding ongoing development in the last few years," says Jack Herschlag, executive director of the National Association of Men's Sportswear Buyers.

Renee Hultin, president of Nano-Tex, Inc. of the Americas, which has been at the forefront of high-tech fabric treatments, says her company's stain-resistant, water-resistant innovations are the wave of the not-too-distant future.

"We think it's going to be as big as Lycra was five to 10 years ago," Hultin says.

Old Navy, Gap, Eddie Bauer, Brooks Bros., L.L. Bean, Dockers, J.C. Penney, Nike, Champion and Levi Strauss are among about 100 apparel companies that have introduced lines made with these innovative fabrics in recent years.

Some of the innovations use special finishes or fiber blends, but the most high-tech method of them all has been the application of nanotechnology, a burgeoning science in which material is altered on a sub-microscopic or nano scale. A nanometer is the width of three to five atoms.

This probably will mean little to the customer browsing among the clothing racks for a pair of khaki pants. But the idea is that nanotechnology can make fabric stronger, lighter and more resilient. In the late 1990s, scientists at Nano-Tex wanted to find a way to make fabric repel water without affecting the look, feel or breathability of the material, as other processes did. They found that by adding a colorless, odorless chemical to fabric and heating it, tiny particles were created that attached to fibers. The nanoparticles bond to the material and create a shield that prevents food and drink from sticking. The process is done at the textile mill, not at home by the consumer.

Hultin says the particles created in this process are not small enough to be absorbed by the skin. There are reports of other nanotechnology causing brain damage in fish.

We put some clothing treated by Nano-Tex to the test to see how well it performed — and saw some pretty extraordinary results.

"We watched red fruit punch and apple juice bead up like mercury and bounce off a pair of Old Navy khaki pants. We threw hot coffee on a men's cotton oxford cloth shirt from Nordstrom. It practically laughed, threw it back and stained our tester's untreated shirt. Red wine? Please. Blueberries? No chance.

We assaulted the cuffs with mayonnaise and mustard and let them sit. After 10 minutes, we scraped it off and saw only faint shadows. Grass and chocolate stains barely found traction. The lipstick on the collar test was spooky. The pair of red lips faded before our eyes. So if you're kissed at 8 a.m., it's gone by 5 p.m. Our tester re-applied her lipstick and gave it a stronger smooch. The imprint adhered better, but still faded a bit.

We made the soiled garments stand the test of time and didn't wash them until the following day, because face it, that's what happens in the real world, if you're lucky. After a laundering in a gentle cycle with unscented Tide and no pretreatment, the lipstick and permanent marker stains became paler and there was only the faintest trace of spaghetti sauce. Otherwise, they were as good as new.

Nano-Tex says their treatment lasts through 30 to 50 washings, or generally, the life of a cotton garment. The treatment doesn't wash out, rather it's lost when the fibers, to which it's attached, shed normally through laundering. A drawback is the cost that nanotechnology adds to the price of a garment, about \$5 to \$10 more at the retail level.

The apparel industry still needs to convince people clothing made with these special properties is worth buying — whether they're busy parents of toddlers who face a constant mountain of laundry or office workers who spill coffee on their pants and can't run home to change, Hultin says.

Clothing that stresses comfort and ease, such as stain and wrinkle resistance, has a huge advantage in the men's market, according to Herschlag, of the men's sportswear association.

STS Research in 2003 showed 28 percent of men's khaki pants sold in the United States had some sort of stain repellent treatment. Of those who bought them, more than 90 percent said they would buy it again.

NPD Fashionworld predicts that the percentage of treated clothing on the market will jump from 25 percent of all apparel to 50 percent in the next few years.

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