

"All the News  
That's Fit to Print"

# The New York Times

Late Edition  
New York: Today, scattered showers,  
cooler, high 63. Tonight, partly cloudy,  
low 56. Tomorrow, rain arrives, possi-  
bly heavy, high 67. Yesterday, high 68,  
low 47. Weather map is on Page D8.

ONE DOLLAR

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IN FINAL DEBATE,  
CITIZENS

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## SundayBusiness

Section 3

NOVELTIES

ANNE EISENBERG

### The Chemist's Find: A Way to Shrug Off Spills

**P**ART of what sold James Tirey on a change in attire was the coffee spilled on his legs during a rough flight. "It stayed sticky until it dried," he said, "about mid-Atlantic."

To avoid such incidents, he bought a new pair of pants with an invisible, high-tech surface suited to the exigencies of business travel. These pants look and feel like most others, but the ingenious finish on the fabric is different: it is made of tiny, nanosized particles that repel water, ketchup, honey, blood, vinaigrette and a thousand other potential indignities. With such a surface, he said, "if coffee is spilled on you, it just beads up" or runs off. The pants can be wiped with a paper napkin — even the skimpy cocktail kind handed out on airplanes — leaving the material dry and unscathed.

Mr. Tirey, who lives in northern Virginia, bought his pants, called the Steel Pant, at **Beyond**, a Eugene, Ore., company that makes and sells outerwear for men and women at [BeyondFleece.com](http://BeyondFleece.com). The material is manufactured by the Swiss company **Schoeller Textil**, which makes both the weave and the nanofinish, called NanoSphere. On the **Beyond** Web site, the pants cost \$119, the nanocoating an additional \$15. "It was definitely worth the money," Mr. Tirey said of the purchase.

Nanocoatings engineered for exceptional stain resistance have emerged for a range of garments in the past five years or so, protecting clothing of snowboarders, fly fishers and golfers — and, increasingly, keeping the silk ties and cashmere jackets of the fashionable from harm. Schoeller introduced its first nanocoating three years ago.

While the nanocoating repels liquids, the drape of the material is not affected, said Tom Weinbender, president of Schoeller USA, in Seattle: "You don't know it's there until you spill something on it." Any material can be treated with the coating and then bonded to another fabric with selling points of its own, like warmth, elasticity or dryness, he said. For example, the cloth may be treated on one side with a wicking function that takes away sweat from the body, then bonded to a fabric coated on the face to be highly resistant to water or to oil and other stains. "You get both functions in the same fabric," he said.

**Contourwear**, a women's clothing maker in Alameda, Calif., uses a Schoeller fabric with a NanoSphere coating for its Anywear pants (\$156). Neide Cooley, of Breckenridge, Colo., wore a pair of these pants, she said, for "10 days straight all over Peru." A serious adventure traveler, Ms. Cooley, who is retired, will soon take along her Anywear pants on a three-week horse-and-camel-riding trip to Mongolia with "a group of cowgirl friends," she said. (They plan to ride the camels in the Gobi desert.) The pants, which come in brown, black, green and charcoal, have coin pockets at the hip and passport pockets hidden at both ankles.

With a change of shoes, the pants, which are smartly tailored, will also do for dining out, said Hood Seely-Brown of Lincolnshire, Ill. She bought her Anywear pants nearby, at the golf pro shop at the Exmoor Country Club in Highland Park. After golfing, she said, "I change my shoes and I am good to go out to lunch."

These pants sounded too good to be true. How could a material that felt so normal, with no suggestion of sticky plastic wrap or crinkly laminates, also repel stains? In an informal test, a photographer poured white wine on the pants, first in dribbles, then in confident splashes. I saw that the wine rolled right off. (I tried red myself later, just to make sure.) There was a puddle on the floor, but almost nothing on the cloth — just some beading that wiped off with a tissue. There wasn't any smell, either. I sniffed to make sure before folding them and mailing them back to the manufacturer.

The coating also resists grime. That is part of the reason that Victorinox will be introducing a new line of high-end luggage treated with NanoSphere in September, said Laurie Gilner, president of Travel Gear, a division of the **TRG Group**, in St. Louis, which licenses the Victorinox brand for travel products.

The line of suitcases, called **Tourbach**, is made of a tightly woven nylon from Schoeller that has many twists per inch. "The more you twist those fine pieces of nylon to form the yarn, the harder they are to separate," said Aaron Gorga, lead designer for the luggage. The nanocoating adds another layer of protection. The suitcases come in many forms, including three black, wheeled up-



Tony Cenicola/The New York Times

Liquids are repelled by clothing coated with a nanofinish of microscopic particles.

rights. (The 22-inch is \$550, the 24-inch is \$650 and the 27-inch is \$845.)

Some companies that use Schoeller fabrics order them nanocoated; others use their own fabrics, sending them to the company for the finish. The treatment adds approximately \$1.50 to the cost of a square meter of fabric, depending on the weight and composition of the cloth, among other variables, said Sheree Halleran, a spokeswoman for Schoeller USA in Seattle.

Cliff Goldman, president of **Carnegie Fabrics**, in Rockville Centre, N.Y., produces his own textiles for many types of upholstery, then has them finished by another company that offers nanocoatings, **Nano-Tex**, in Emeryville, Calif.

David Offord, chief scientific officer of **Nano-Tex**, said his company coats a range of fabrics, from the linen in upholstery to the silk in ties. "Our specialty is attaching this chemistry to fiber surfaces so that they are durable for the life of the material," said Dr. Offord, who is a chemist.

In the past, he said, people used coatings that repelled some liquids and dirt, "but in a thick layer which would make the fabric stiff and wash away after repeated home laundries." Instead of building up these thick layers, the company creates a shield of nanometer-sized "whiskers" that stand up perpendicularly to the surface of the fiber. (A nanometer is a billionth of a meter.) The tiny whiskers attract air and repel water, creating a cushion of air between the textile surface and the invading droplets.

**A**S a result of this superhydrophobicity, or extreme water repellence, liquid on a slightly sloping surface slides off without leaving a trace. Ketchup, however, will need to be wiped off. And spilling several bottles all at once may require a bit of running water and a sponge.

The effect is like the workings of the lotus in nature, which repels water and cleans itself amidst the mud, Dr. Offord said.

Scotchgard, a pioneer in treating fabric to make it repel liquids, does not use nanoparticles in its coatings for clothing, but it does use them for other things, like face masks. The nanoparticles provide anti-fogging properties on the shield that covers the face, Colleen Harris, a spokeswoman for **3M**, Scotchgard's maker, said from St. Louis.

Anti-fogging masks, cashmere that defies wine spills and high-performance sports fabrics are just a few recent benefits of a technology built on particles far too small to be seen by the naked eye. It's turning out to be just as Richard P. Feynman, a winner of the Nobel Prize in Physics, envisioned in a prescient lecture in 1959: "There's plenty of room at the bottom," he said, referring to the vast possibilities of engineering and technology at the nano-scale. □

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