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## **Nanoparticles Help Create "Self-Cleaning" Clothes**

Clemson University researchers are developing a water-repellant coating made of silver nanoparticles that researchers say can be used to make clothing that resists dirt and water and needs less cleaning than conventional fabrics.

According to an American Chemical Society November 22 press release, the patented coating -- a polymer film mixed with silver nanoparticles -- can be permanently integrated into any common fabric, including silk, polyester and cotton.

Such fabrics can reduce expensive dry cleaning bills, the researchers said, and are environmentally friendly. The National Textile Center, a research consortium of eight universities, provided funding for the study from a grant administered by the U.S. Department of Commerce.

The researchers described their work on the "self-cleaning" coating during the 56th Southeast Regional Meeting of the American Chemical Society in Research Triangle Park, North Carolina.

"The coating doesn't actually clean itself, but it does resist dirt much better than other fabric treatments," said research team member Phil Brown, a Clemson University textile chemist in South Carolina.

The coating could be applied to suits, hospital garments, sportswear, military uniforms and outdoor fabrics. It could appear in consumer products within five years, he said.

The text from the American Chemical Society press release follows:

American Chemical Society

Press release, November 22, 2004

[Washington, D.C.]

'Self-cleaning' suits may be in your future

Sending your favorite suit to the dry cleaners could one day become an infrequent practice. Researchers at Clemson University are developing a highly water-repellant coating made of silver nanoparticles that they say can be used to produce suits and other clothing items that offer superior resistance to dirt as well as water and require much less cleaning than conventional fabrics.

The patented coating -- a polymer film (polyglycidyl methacrylate) mixed with silver nanoparticles -- can be permanently integrated into any common fabric, including silk, polyester and cotton, the researchers say. In the long run, it can save time and money by reducing expensive dry cleaning bills. It is also environmentally friendly, they add.

The researchers described their work on the so-called "self-cleaning" coating last week during the 56th Southeast Regional Meeting of the American Chemical Society, the world's largest scientific society, held in Research Triangle Park, N.C.

"The coating doesn't actually clean itself, but it does resist dirt much better than other fabric treatments," explains research team member Phil Brown, Ph.D., a textile chemist with Clemson University in Clemson, S.C. "The concept is based

on the lotus plant, whose leaves are well-known for their ability to 'self-clean' by repelling water and dirt. Likewise, when water is exposed to the treated fabric, the dirt will be carried away more easily. You will still need some water to rinse away dirt and stains, but cleaning will be quicker and less frequent."

Unlike conventional water-repellant coatings, the new coating, which doesn't yet have an official name, is permanently bonded onto the fibers of the fabric and will not wash off, Brown says. In addition, no fluorine-based chemical finishes are used so there are potential environmental advantages, according to the researcher. The research team is also trying to engineer antimicrobial particles into the coating, which could help repel strong odors such as body odor and even cigarette smoke, they say.

Dirt adheres to the fibers of most fabrics. To clean the fabrics, people typically put them in the washer or send them to the dry cleaners. But the water-repellency of fabrics made with the new coating is superior and makes it easier to keep dirt from accumulating, Brown says, because water that is applied to the garment rolls off and takes the dirt with it. Suits made with the new coating could simply be sprayed clean or wiped with a damp cloth to remove the dirt, the researcher says. If desired, the fabric can still be cleaned by conventional means, including washing as well as dry cleaning, without harming the coating, he notes.

In addition to suits, the new coating could be applied to hospital garments, sportswear, military uniforms and rain coats. Other possible applications include awning material for outdoor campers, fabrics for lawn furniture and convertible tops for cars. The coating could appear in consumer products within five years, the researcher estimates.

Prices of clothing and other products treated with the new coating will initially be a bit more expensive than other water-repellant garments, Brown predicts. But he and his associates are currently working on ways to make the coating cheaper.

Self-cleaning fabrics can be made in any color, according to Brown, since the treatment is applied after the fabric has been dyed. If you're concerned that clothes coated with the silver nanoparticles will activate an alarm at an airport security stop, don't worry. The material is unlikely to be detected by conventional metal detectors, he says.

Other researchers involved in the project include team leader Igor Luzinov, Ph.D., a polymer scientist, and George Chumanov, Ph.D., a physical chemist, of Clemson; and Sergiy Minko, Ph.D., a polymer scientist with Clarkson University in Potsdam, N.Y.

The National Textile Center, a research consortium of eight universities, provided funding for this study from a grant administered by the U.S. Department of Commerce.

The American Chemical Society is a nonprofit organization, chartered by the U.S. Congress, with a multidisciplinary membership of more than 159,000 chemists and chemical engineers. It publishes numerous scientific journals and databases, convenes major research conferences and provides educational, science policy and career programs in chemistry. Its main offices are in Washington, D.C., and Columbus, Ohio.