

# Nanotech in fashion

by Philipp Harper, Special to MSN

With “smart phone” and “smart car” firmly established in the tech lexicon, it's time to add another smart term: smart clothes.

Imagine a garment — shirt, jacket, tie, blouse, dress — that responds to an errant coffee spill by causing the liquid to bead up so that it can be blotted away, while at the same time steadfastly resisting a stain.

Or a garment that detects when the wearer is becoming too hot or too cold and then provides the ventilation or insulation necessary to adjust the temperature. Or one that senses (smells?) when the person inside is getting a bit too odoriferous for his own and others' good and then proceeds to neutralize the offending odor. Or a combat uniform for U.S. troops able to detect a chemical attack and then send an alarm.

Where apparel parts company with other smart technologies is in the mechanism by which intelligent properties are conferred. Smart phones and vehicles are chip-driven, while a smart shirt relies on something called nanotechnology, a term derived from nanometer, a unit of atomic measure.

If you're not yet familiar with nanotechnology, stay tuned because it's considered an up-and-coming trend, one upon which the U.S. government will lavish nearly \$1 billion in R&D funding in fiscal 2005. What it refers to is the tinkering of molecular structures to change or enhance the inherent characteristics of something — a textile fiber, for instance.

Nanotechnology has begun to be applied across the whole range of products, from pharmaceuticals to tennis balls. Only within the last few years has it been used in the textile and apparel industries.

“We're at the very early stage of this evolution,” says Mark Bruten, senior vice president of marketing for Nano-Tex, a leader in the molecular engineering of textiles. Founded just seven years ago, the Emeryville, Calif.-based company licenses its nanotech processes to both specific apparel brands and independent mills.

While nanotechnology's most significant textile inroad has been in the area of khaki apparel — 20 percent of which incorporates some molecular enhancement, Bruten estimates — its more general adoption seems to be right around the corner. According to one report cited by Bruten, within five years nanotech will make itself felt in a full 25 percent of the \$170 billion U.S. apparel industry.

As practiced by Nano-Tex, the molecular enhancement of clothing is a three step process:

- Molecules are designed that have some “performance characteristic” — the ability to repel liquid, for instance.
- Once designed, the molecules are engineered so they'll assemble in a very precise order on the fibers of whatever textile is being enhanced.



- The molecules are permanently attached to the fibers through a heating process.

By working at the molecular level, Bruten says, it's possible to enhance a fabric without compromising any of its inherent qualities, say, the softness and pliability of cotton. This is in contrast to earlier processes that relied on chemical coatings to improve fabrics, usually at the cost of a stiff, non-breathing garment.

So far Nano-Tex has rolled out enhancements that repel liquids, wick moisture from clothing and invest synthetic fabrics with the feel of cotton. More is on the way.

In each case, Bruten says, the guiding principle will be that “clothing should work with us.”

He adds: “We're living, breathing organisms. We move, we sweat. We go from activity to activity. So there are a lot of different ways in which clothing can enhance our lifestyles.” ■

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