

Nanotech Researchers Develop High-Tech 'Smart Textile'

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Researchers at North Carolina State University are using emerging breakthroughs in [nanotechnology](#) to develop layers of "smart textiles" that will not only keep first responders and the military safe without sacrificing comfort or ease of use, but also may have numerous other widespread uses.

Dr. Juan Hinestroza, an assistant professor in the Department of Textile Engineering, Chemistry and Science at NC State, and researchers at the University of Puerto Rico have pioneered a method to develop chemical-resistant textiles by attaching nanolayers to natural fibers.

These layers are only 20 nanometers – or 20 billionths of a meter – thick and made of different polymers that can control what passes through the layer. The process is called selective transport.

“These layers are customized for different chemicals,” Hinestroza said. “We can specifically block warfare agents like mustard or nerve gas, or industrial chemicals, while still allowing air and moisture to pass through to make the fabric breathable.”

Chemicals are blocked, Hinestroza said, when they bind to the polymers of the fibers, which are made of materials that are attractive to the chemical agents.

These fabrics could be made into garments that offer very high levels of protection. “We can attach hundreds of nanolayers to a fiber without

affecting its comfort or usability. This idea has been tried in the semiconductor industry, but hasn't been achieved with flexible fabrics," he said.

The nanolayers adhere to natural fibers by electrostatic force, similar to the way that magnets attract or repel depending on the electromagnetic charge, Hinestroza said.

There are literally dozens of potential uses of this technology involving smart textiles. "Imagine gloves coated with arthritis drugs; military uniforms coated with antibacterial layers to prevent infection in case of wound; antibacterial sheets for submarine bunks to prevent illness spread as these bunks are shared by enlisted personnel; and comfortable protective clothing against several chemical and biological warfare agents," Hinestroza said.

Additional uses could include diapers coated with anti-itching polyelectrolytes as well as tissues coated with anti-allergy medicine, he added.

Hinestroza and his colleagues are funded by the Institute of Textile Technology and recently received a seed grant from the NC State nanotechnology steering committee.

The team's initial work was published recently in the scientific journal *Nanotechnology*.

Source: North Carolina State University

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