

# Textiles that Decontaminate

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*Nanostructured materials expert Sergiy Minko, the Egon Matijevic´ Chair of Chemistry at Clarkson University, has assembled an interdisciplinary team of researchers to explore fabrication and study of synthetic and biomaterials at nanoscale, with a special interest in materials for biomedical application, sensors and molecular electronics. Here, Minko positions a sample in an ellipsometer, which looks at changes in polarized monochromatic light to measure thin film thickness and composition within an accuracy of +/- 0.1 nanometer.*

Newswise — What makes a nanocomposite material “smart”? Consider clothing that can detect the presence of chemical weapons, automatically seal its own pores, and then clean and decontaminate itself. Today the U.S. Department of Defense is funding research for fabric materials that do all these things and are also stronger, more durable, and lighter than current uniforms.

Smart materials are becoming a reality and one of the world’s leading experts in the field is Sergiy Minko, who holds the Egon Matijevic´ Chair of Chemistry at Clarkson University.

Minko’s research explores responsive functional material based on self-assembly in polymer and colloidal systems. By studying the behavior of single molecules and the assembly of a few molecules, Minko explained, researchers are learning how nature assembles and reassembles molecules to achieve certain properties. Certain natural materials are capable of smart

responses via external stimuli such as temperature or an acidic or base environment.

“Skin is a good example of a material capable of smart responses based on outside stimuli,” he said. “The pores open and close based on temperature and humidity and thus help the body to regulate its internal temperature. Our interests are in understanding how nature has programmed these molecules to react this way and then to recreate the process synthetically.”

At Clarkson, Minko has established the interdisciplinary Nanostructured Materials Group with S.V. Babu, professor of Chemical Engineering, and Igor Sokolov, professor of Physics to explore fabrication and study of synthetic and biomaterials at nanoscale, with a special interest in materials for biomedical application, sensors and molecular electronics.

Their research focuses on smart/responsive polymer materials, smart colloids, nanostructured thin polymer films, formation of nanowires and nanoparticles, adhesion, wetting, adsorption regulations, single molecule devices, and combinatorial methods in materials science. Applications include smart pores (membranes), responsive colloids and capsules, microvalves and pumps, environment-responsive lithography, smart textiles, and hydrophilic/hydrophobic switches.

One of Minko’s current projects involves research in self-cleaning fabrics sponsored by the National Textile Center. Made of any common fabric, these materials will utilize a water-repellant, dirt-repellant, environment-friendly coating made of silver nanoparticles. Their wide applications will include hospital and military garments, as well as sportswear, awnings and convertible tops.

Minko’s research is also supported by Procter & Gamble and Xerox, and organizations such as the National Science Foundation, NATO and New York’s Office of Science, Technology and Academic Research (NYSTAR)

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