

# **'Nanotechnologies for an Optimum Protection and Comfort in Protective Clothing'**

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## **Abstract**

The Laboratory for Protection and Physiology develops and tests new materials for application in sport clothing, protectors and protective clothing, as well as medical textiles.

For instance membranes containing functional nanoparticles can be used to obtain a better selectivity towards chemicals. A sensor-shirt was developed to monitor the electrocardiogram of patients based on electrodes with a plasma coating as finish.

We also investigated the use of Carbon Nanotubes (CNTs) for helmets and hip protectors. Such body protectors have to absorb the energy of the shock during an impact and keep the reaction force under a certain critical value beyond which injuries may occur, while keeping a low weight for an optimum comfort. We have shown that it is possible to improve the mechanical properties of polyurethane foams by reinforcing them with CNTs without compromising their weight.

A last issue that can be solved by nanotechnologies finds its application in the field of medical textiles. In fact, plastic optical fibers for phototherapy or diagnostic are usually made of PMMA, which is brittle and hence not suitable for textile processing. A smart solution to obtain transparent and flexible fibers is to take advantage of the nanophase separation, which can occur during the blending of a homopolymer and a block copolymer.