Nano Spinning Tech For High Value Technical Textiles

Imtiaz Rastgar

NTU Seminar on Technical Textile Highlights Nano Spider Fabrics

Nano-engineered functional textiles are going to revolutionize the clothing that you'll wear. The potential of nanotechnology in the development of new materials in the textile industry is considerable. On the one hand, existing functionality can be improved using nanotechnology and on the other, it could make possible the manufacture of textiles with entirely new properties or the combination of different functions in one textile material

Applications of nanotechnology in textiles

Nanotechnology is having a major impact in the textiles and clothing industries. Hi-tech textiles and clothing are not only for the fashion conscious - they are important to the military and in policing, for first responders and in industries as diverse as healthcare and leisure. Researchers are perfecting ways to produce gate-all-around devices

Already on the market is clothing that contains embedded silver nanoparticles to combat odour through killing bacteria – and this capability has been extended successfully to wound dressings. Several brands of clothing, including designer labels, have incorporated self-cleaning and stain repellent nanotechnologies, very convenient for school clothes and military wear, - and, of course, the less a garment needs to be washed, more beneficial to the environment as more energy and money is saved.

More glamorous applications of nanotechnology include embedding gold and other precious metal nanoparticles into natural fabrics such as wool. The gold nanoparticles impart sensuous colours from pale soft green to amber and beige, depending on the particle size and shape. The colours are stable, and may even provide some antibacterial properties to the fabrics, as an added bonus. Other embedded nanoparticles, such as the ubiquitous titanium dioxide, TiO_2, enables garments that are extremely effective in cleaning the air as the wearer moves about his or her environment. A very attractive concept.

Gold Nanoparticles Impart Sensuous Colours from Pale Soft Green to Amber and Beige

Currently, considerable research is focused on developing electrospinning techniques which produce long fibres of polymer, only nano meters in width, originally developed in an effort to emulate spider silk. The spun, polymer-based nano fibres can be 'loaded' with different additives which could be nanoparticles, enzymes, drugs or catalysts. Some combinations can be antibacterial and sprayed on to wounds as a kind of healing 'web', others can be conductive or form filters or

Polymer-Based Nano Fibres can be 'Loaded' With Different Additives which could be Nanoparticles, Enzymes, Drugs Or Catalysts

membranes, important in water purification. There are as many exciting applications of the ability to spray-on a textile as the imagination can conceive of.

Scientists are also working on nano electronic devices that can be embedded into textiles to provide special support systems for individuals in dangerous professions or sports. Some garments can provide monitoring for several life signs, including temperature and trauma, as well as toxic chemical sensing. Embedded devices can be used for power generation and storage to enable individuals to communicate with the outside world, even when isolated. Very handy for member of the police, military, students on gap-years and even career explorers. Garments with this kind of technology can be vital for the safety of firefighters working in dangerous situations in isolation from their colleagues, or even for skiers or their rescuers to give early warning signs of hypothermia.

Nano Electronic Devices can be Embedded into Textiles to Provide Special Support Systems for Individuals in Dangerous Professions Or Sports

Research is also ongoing into man-made nanofibres where clay minerals, carbon nanotubes or nanoparticulate metal oxides are used to impart new properties. These properties allow the development of garments that are halogen-free, flame retardant, with increased strength and shock-absorbency, heat and UV radiation stability, and even impart brighter colouration, important in situations requiring high visibility. Other work is focused on the very exciting area of inkjet printing onto textiles. This is opening up many possibilities, not just for the customised or localised printing of textiles to an individual design, but inkjet techniques can be used to create flexible electronic materials, sensing materials, and even the materials of the future with printed-on display capabilities.

These Properties Allow the Development of Garments that are Halogen-Free, Flame Retardant, With Increased Strength and Shock-Absorbency, Heat and UV Radiation Stability, and Even Impart Brighter Colouration, Important in Situations Requiring High Visibility

Elmarco's NS LAB is the laboratory electrospinning equipment for efficient nanofiber membrane research and for experimental work. The NS LAB uses the same stationary electrode system as

found in industrial Nanospider™ Production Lines, therefore the results from the work on the NS LAB are easily upscalable to the NS Production Line NS 1S500U, NS 4S1000U or NS 8S1600U, the industrial electrospinning equipment.

Elmarco's electrospinning equipment NS LAB can be configured to work with a wide variety of polymers and to produce a wide range of organic and biodegradable nanofibers. Depending on the polymer used fiber diameters from 80 nm up to 700 nm (+/- 30%) are possible.

National Textile University (NTU) Faisalabad organized the First National Conference on Technical Textiles (NCTT) from 26th to 27th September 2016 at NTU. The conference was jointly organized by National Textile University and NUST, Islamabad. The Objectives of the conference were to create awareness about the Technical Textile, share latest knowledge of technical textiles and to enhance interaction between researchers and professionals working in the field. More than 300 participants belonging to Baluchistan, KPK, Sindh, Punjab and Islamabad affiliated with 13 universities, 75 industries, defense sector organizations, HEC, PNAC attended the conference. Industrial participants include more than 50 CEOs and more than 170 technical directors and general managers. Dr. Yasir Nawab (NTU) and Dr. Muhammad Mujahid welcomed all the guests. Prof. Dr. Tanveer Hussain, Rector National Textile University gave a key note talk on the market of technical textiles, opportunities for textile industry and way out.

National Textile University (NTU) Faisalabad Organized the First National Conference on Technical Textiles (NCTT) from 26th to 27th September 2016 at NTU. The conference was jointly organized by National Textile University and NUST, Islamabad.

Rastgar & Co is authorized representative of Elmarco , Nano fiber equipment in Pakistan http://rastgar-co.com/elmarco-nano-for-life-ns-lab/