

Nano Textiles in Hong Kong

-Nanotechnology Center for Functional and Intelligent Textiles and Apparel at Hong Kong Polytechnic University

Hong Kong, one of the most vibrant places in the world, can hardly afford to miss any exciting new technologies that would enhance its local industry competitiveness and bring wealth to the region. Being the second largest exporter of textiles and clothing in the world, Hong Kong continues to search for new technologies to enhance its textile industry global competitiveness. The Hong Kong government and industries have recognized that Nanotechnology will provide powerful tools for industry and economic growth in Hong Kong. The Nanotechnology Center for Functional and Intelligent Textiles and Apparel (NTC) was established on June 1st 2003 at the Hong Kong Polytechnic University funded by the Innovation Technology Fund (ITF) of Hong Kong government. The center is also partially funded by a number of local industries including Artex Fashions Ltd (Asia), Bondex International Ltd (HK), Cha Textiles Ltd, Glorious Sun Holdings Ltd, Link Dyeing Works Ltd, Sun Hing Elastic & Lace Fty. Ltd, and Wah Tai Piece Goods Ltd.

The NTC mission is to

1. Provide research and development infrastructure for textiles and apparel related nanotechnology
2. Develop new nanotechnology and products for functional and intelligent textile materials and apparel
3. Facilitate technology transfer to and collaboration with the industry, and
4. Provide training to postgraduate students and company technical personnel.

The NTC program consists of four subprojects:

1. Nano-structured surface polymerization system
2. System for precise manufacture of nano-particles
3. Patterned electrical textile and devices
4. Nano-structure photonic fibers and fabrics

And its research is targeting to produce fabrics and garments with multiple functions such as UV blocking, anti-microbial, water and oil repellence, nano-coloration and controlled delivering system for fabrics. It also aims to produce intelligent textiles and clothing to sense, react or adapt to the external conditions or stimuli in a pre-programmed manner.

So far the center has achieved the following output:

1. Optimized surface polymerization systems for UV-blocking, stain-, oil-, water-repellent, anti-bacteria finishing of cotton, polyamide and polybenzimidazole fabrics, nano-pigment coloration system.
2. Customer tailored synthesis systems for precise size and sensitivity control of nano-structures for functional finishing and photonic fibers.

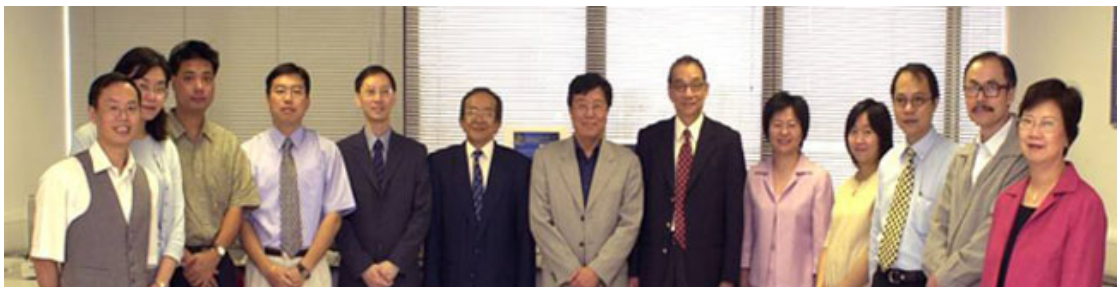
3. Optimized fabrication system for conductive textiles sensing devices for strain, temperature and relative humidity, and a prototype of electrical sensing apparel
4. Prototypes of photonic fibers that can regulate light intensity and color and a prototype of 2-colored display fabric made from such fibers.

Details of NTC R & D activities can be found at its website www.nano-textiles.com.

The Principle Investigator of NTC is Prof. Xiao-ming TAO. The program started on June 1st 2003 and will continue for 3 years with total budget of HKD14.7 million (USD1.9 million). Prof. Tao is also a coordinator of 13 other project leaders (faculty members) in the nanotechnology center program. The center is joined by multi-disciplinary faculty members from the Institute of Textiles and Clothing, Dept. of Applied Physics, Dept. of Applied Biology and Chemistry, and Dept. of Electronics and Information Engineering at the Hong Kong Polytechnic University.

Prof. Tao is a Chair Professor of Textile Technology and also the Head of the Institute of Textiles and Clothing at the Hong Kong Polytechnic University. Prof. Tao graduated with a BEng in Textile Engineering and a first class prize for undergraduate students from the China Textile University in 1982. She gained her PhD in Textile Physics from University of New South Wales, Australia in 1987. She is an elected fellow of the Textile Institute International and the Hong Kong Institution of Textiles and Apparel. She is also a member of several professional societies including OSA, ASME, IEEE and the Hong Kong Society of Materials Research.

Prof. Tao has over 300 scientific publications, including journal and conference papers, research monographs and patents. Her research work has won her scholarships and prizes from USA, Australia, New Zealand, UK, Hong Kong and China. Her current research focuses on advanced fibrous materials and textile technologies.



Group photo of the faculty members of the Nanotechnology Center for Functional and Intelligent Textiles and Apparel (Prof. Tao is 5th from the right)



Photos of some of the laboratories and facilities of Nanotechnology Center for Functional and Intelligent Textiles and Apparel

Smart Junior

Illuminating Textile Display
Flexible illuminating textile display is fabricated using the polymeric optical fibres to achieve both decorative & functional purposes

Thermal indicator
Thermal sensitive ink coated on textile material allows the fabric to sense the change of temperature.

Water Repellent Nano-treatment
Fabric treated with nano-treatment shown excellent water repellence, maintain high air permeability, handle and no harmful effect to human.

Anti-bacterial Nano-treatment (Socks)
The treatment achieves 100% bacteria reduction and protect against Staphylococcus aureus and Klebsiella pneumonia. It passed the AATCC test 100-1999 as well.

UV Sensitive Logo
Using photochromic materials, the transparent embroidery threads can change colour when direct expose to UV light.

Sensing Glove (Right hand)
Conductive fabric sensor can sense large strain deformation, temperature and humidity without inverse effect on handle.

UV Sensitive Printing
Using photochromic materials, the transparent UV sensitive printing can change colour when direct expose to UV light.

UV blocking Nano-Treatment:
50+ (excellent) rating under Australian/New Zealand Standard AS/NZS 4399:1996 can be achieved after 55 washings.

THE HONG KONG POLYTECHNIC UNIVERSITY
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This is Prof. Tao's presentation slide on the Smart Junior, a schematic description of nanotechnology applications on textile and clothing for students and public education (Courtesy of Prof. Tao).



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