



TECHNOLOGY

Nanotube enabled Thermoregulation Fabric

OVERVIEW

Background

The global active wear market is centered on the value propositions of keeping the wearer dry at a comfortable temperature regardless of external conditions or activity level. Existing active wear technologies for temperature regulation include fabrics and yarns that wick away sweat or fabric weaves to allow for more airflow. Despite the demand for active wear (\$567 Billion at a CAGR of 6.8 %), the market has not developed next generation innovations that further the performance of active wear textiles. Next generation fabrics for high performance applications such as combat troops, firefighters, and professional sports, in addition to consumers seeking additional comfort in a rapidly heating world will require new technological mechanisms to deliver results.

Technology

Researchers from the University of Maryland have invented a self-regulating fabric technology that actively insulates or cools the wearer to achieve an optimum comfort profile. The fabric consists of composite yarns that are designed to dynamically regulate heat exchange in response to wear's thermal discomfort. The working principle of this smart fabric is the electromagnetic coupling between nanotubes within the fibers in response to changes in the relative humidity of skin. When hot/humidity, the yarn shrinks, increasing the electromagnetic coupling between fibers, thus maximizing transmittance of infrared radiation. When cold/dry, the yarn expands to keep the wearer warm. Part of this work was recently published in Science and the data demonstrated the fabric modulated IR transmittance by more than 35% in a response time of less than 60 seconds over a broad humidity range of 5 to 90%. This breakthrough technology promises vast improvement to the thermal performance of a variety of garments.

Benefits

- Automatic cooling without needs of external power
- Bi-directional, adaptive thermal management
- Infrared radiation Tunable fabric

Applications

- Footwear
- Hypothermia Management garments
- Sportswear
- Sleepwear
- Athleisure

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STAGE OF DEVELOPMENT

Prototype (TRL 4)

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Additional Information

INSTITUTION

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PATENT STATUS

Pending

EXTERNAL RESOURCES

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