TBIS

Topic of the Speech:
Enhancing Thermal Management by Using Thermo-Reflective Materials

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Dr. Mohanapriya Venkataraman is a passionate textile material scientist working as an Assistant Professor at the Department of Material Engineering, Faculty of Textile Engineering, Technical University of Liberec, Czech Republic. Hailing from Chennai, India, she holds a Ph.D. and multiple Post-graduation in Textile Material Engineering, Fashion Technology, and Garment Manufacturing Technology. Her teaching and research areas include Textile Materials, Thermodynamic Analysis, Micro and Nanoporous Materials, Heat Transfer, Polymers, and Composites. Before her endeavor into academics and research, she was an senior executive in Material Quality Assurance at an International Textile behemoth. She is certified in ISO, Lean Six Sigma, 5S, Kaizen, and Silver plus Limited brands testing.

She is a leader and member of multiple international research projects funded by the EU, the Technology Agency of the Czech Republic (TA ČR), and the Czech Science Foundation (GA ČR). She has authored over 90 scientific papers in peer-reviewed journals; 100 conference publications; 20 keynote speeches; 35 book chapters, and 4 books. She has won international recognition as an “Outstanding Researcher” in multiple forums like SGS, TBIS, etc., and is a Guest Editor for Polymers and Coatings journals. Associate Editor of the Journal of Fiber Bioengineering and Informatics (JFBI). She is a nominee to be a panel member in the Czech Science Foundation (GA ČR). She was recently profiled in TA.DI magazine of Technology Agency of the Czech Republic (TA ČR) as 1 of 3 female researchers as an example breaking the stereotype of a traditional scientist.

She is an ambassador for INOMICS and “Study in the Czech Republic” initiatives. She is passionate about woman empowerment and the environment. She lives in Prague, Czech Republic, with her husband and two sons.

ABSTRACT SUBMISSION
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Enhancing Thermal Management by Using Thermo-Reflective Materials

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ABSTRACT (NO MORE THAN 500 WORDS:)

Individual heat regulation is necessary for human comfort and function. Warming, cooling, and adaptive thermoregulation—all essential for carrying out daily activities—are included in thermal management. Human comfort is in the temperature range of 20 to 27 ^{o}C and the relative humidity range of 35 to 60%. Extreme heat or cold can overwhelm the body's coping systems for physiological thermoregulation, causing lethal situations due to body heat and sweat from vigorous activities. The human body produces electromagnetic radiation having maximum of around 10 µm, which when combined with clothing, greatly lowers the temperature under clothing, enhancing the effectiveness of thermal insulation in adverse weather situations. Textiles with far-infrared (FIR) properties return heat radiation to the human body. There are many different subjects covered, ranging from how the body produces heat to how radiation travels through the skin to do so. At the molecular level, FIR has significant rotational and vibrational impacts that may have positive health consequences. Generally, after receiving heat from the body or sunshine, FIR textiles are made to convert that energy into 4-to 14-micrometer-wavelength FIR radiation and return it to the body. The growing need for clothing that is warm, cozy, light, and healthful can be satisfied with FIR textiles. This study's primary goal is to outline the process for producing the FIR reflective textile layer, which is a component of multilayer textile constructions with improved thermal protection. Utilizing the lightweight polyester nonwoven structure Milife, which has the advantageous qualities of low fiber diameters, superior shape stability, and comfort, a copper nanolayer was deposited to create the active FIR reflecting surface. Corrugated multilayer systems with polypropylene nonwoven fabric and a FIR reflecting layer as an active layer were prepared. The properties like morphology, air permeability, infrared spectrum characteristics (copper-coated milife), and thermal properties were analyzed and evaluated. The FIR reflective textile layer created, as part of multilayer textile structures, was observed to have enhanced thermal protection.

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