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Topic of the Speech:
Clothing System Design for Desired Thermal Comfort and Personal Protection

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Professor Lijing Wang received his PhD degree from the University of New South Wales, Australia, and M.Eng and B.Eng degrees from Tianjin Polytechnic University, China. After his PhD completion, he worked as a postdoctoral research fellow in 1999 and 2000 at the Department of Mechanical and Manufacturing Engineering, Department of Aerospace Engineering, and Cooperative Research Centre for Advanced Composite Structures (CRC-ACS) on projects related to 3D textile composite materials, automated manufacturing, and robot vision systems. He then worked more than 8 years as a Research Academic, then Senior Research Fellow at the Centre for Material and Fibre Innovation at Deakin University. He joined the RMIT University School of Fashion and Textiles in 2009.

At RMIT, Prof Lijing Wang currently leads the Smart Textiles research cluster and Saving Lives research stream at Centre for Materials Innovation and Future Fashion. In his research career, he has been the chief investigator in more than 30 research projects funded from national competitive grants, and industry grants. He has more than 230 publications with an H-index of 26. He is an experienced PhD supervisor and he received RMIT Award for Innovative Research Supervision in 2017.

His key research areas of interest are smart and high-performance textiles; wearable technology; protective garments; clothing comfort; fibres and polymers material science, engineering and modelling; material functional design; and clothing supply chain sustainability.

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ABSTRACT SUBMISSION
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Clothing System Design for Desired Thermal Comfort and Personal Protection

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ABSTRACT (NO MORE THAN 500 WORDS:)

Clothing provides a portable comfort environment for human body. When potential hazards are identified within a workplace, personal protective equipment, such as an encapsulated chemical protective suit, body armour, firefighting garment or medical gown, is used to protect its wearer from the threats. Working in the hazards environment, personal protective clothing (PPC) must be worn as a primary uniform over underwear or daily-wear clothing regardless the environment is hot or cold. Protective clothing together with the daily-wear garments form a bulky multilayer clothing system, which results in rapid accumulation of body heat and moisture inside the clothing system, in particular in a hot working environment. The body heat and moisture cannot be quickly moved away from the skin and dissipated into the environment through the clothing system, causing over-retention of internal body heat, thermal stress and thermophysiological discomfort. As a result, the wearer's performance is jeopardized. While thermal comfort is highly desirable for a protective clothing system, the key requirements of PPC are to provide reliable protection. However, reaching an adequate level of protection without any concession on clothing comfort presents two contradictory goals that are difficult to achieve in any PPC system. It is therefore a great challenge to design the PPC for both protection and comfort. This presentation introduces the challenges and efforts of achieving the two contradictory goals, maximum protection with an acceptable level of comfort in PPC design and development. It presents examples of recent advancement of protective clothing material design with consideration of thermoregulation. Typical examples are protective fabrics with the integration of porous silica aerogel particles and hydrophilic superabsorbent polymers. They not only can be used for chemical protective clothing and firefighting garments, but also have improved breathability for thermal comfort. The developed fabrics will be useful for the design and development of an effective PPC system for both protection and thermophysiological comfort.

Keywords: Personal protective clothing design; Thermophysiological comfort; Moisture management; Aerogel; Superabsorbent polymer.