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Topic of the Speech:

An Approach to Achieve High-performance Protective Gloves: Knowledge Gaps and Recent Advances

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Professor Guowen Song received his Ph.D. degree in Textile Engineering, Chemistry, and Science at North Carolina State University's College of Textiles. He is currently the Noma Scott Lloyd Chair in the Department of Apparel, Event and Hospitality Management (AESHM) in College of Human Sciences in Iowa State University.

Song's academic interest is in functional textile materials and protective clothing and systems to improve human health and safety. His interdisciplinary research includes the study of novel textile materials, system design, the simulation of hazards, PPE contamination, the analysis and prediction of clothing performance, as well as the development of new methods and standards. The fundamental approach is based on understanding the mechanisms associated with heat and moisture transfer between the human body, the clothing/system, and the environment, specifically interactions involving hazards that exist in various end-user scenarios. These studies include lab simulations, instrumented manikin technology, and unique designed human trials, including 3D body scanning and the human motion analysis approach.

Dr. Song has published over 130 scientific papers in peer-reviewed journals and conference proceedings. He authored 3 books and contributed a dozen chapters to books in his field of study.

ABSTRACT SUBMISSION
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An Approach to Achieve High-performance Protective Gloves: Knowledge Gaps and Recent Advances

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ABSTRACT (NO MORE THAN 500 WORDS:)

Gloves, boots, and helmets as subsystems in PPE are critical in responsive operations for firefighters, medical practitioners, law enforcement and military personnel, and industrial and agricultural workers to ensure their safety, health, and wellbeing. Lack of fundamental knowledge of human physiology, working environment, and occupation features resulted in inadequate design and engineering of the current protective gloves. Extreme environmental working conditions, such as cold, damp, and windy conditions, as well as various thermal, mechanical, chemical, and biological hazards, pose critical threats to the wearer. Indeed, the adequately designed protective gloves should provide balanced protection, comfort, and manual performance. To achieve this, a systematic approach is developed that integrates material science, functional and ergonomic design, simulation and modeling, measurement technology and product evaluation, human physiology and kinesiology, and occupational safety and health. The proposed methodology emphasizes the innovative role that engineering can play by integrating modeling, new measurement technology, and human tests into PPE development, functional design, and performance prediction. As a new approach, it will lead to revolutionary advances in PPE development and manufacturing, together with the training and preparation of the next generation scientists and engineers.