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Topic of the Speech:
Development on Thermal Insulation Evaluation Technique on Firefighter Clothing with 3D Fabric Structure

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Dr. Kaoru Wakatsuki is currently an associate professor at Shinshu University, Ueda, Japan. He was previously a research scientist at National Research Institute of Fire and Disaster and his expertise is fire research, investigation and its application to firefighter safety. He graduated Master of Science at fire protection engineering and Doctor of Philosophy at mechanical engineering at University of Maryland, College Park MD, USA. During his PhD study, he was also a guest research scientist in Building Fire Research Laboratory at National Institute of Standards and Technology (NIST), Gaithersburg MD, USA.

He is now serving to several ISO committees (TC61, TC92 and TC94) as an expert in Japan National Mirror Committee. His current research interest is heat and moisture transport within firefighter clothing (banker gear and underwear) with low heat flux exposure and evaluation on skin burn injury at interface between firefighter personal protective equipments, often called compatibility. Prof. Wakatsuki also offers a class for Japanese firefighters on principle of fire behavior and safety during the operation.

ABSTRACT SUBMISSION

-For invited speaker only

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Development on Thermal Insulation Evaluation Technique on Firefighter Clothing with 3D Fabric Structure

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ABSTRACT (NO MORE THAN 500 WORDS:)

The thermal insulation performance of fire protection clothing is mainly evaluated by a fabric test such as ISO 9151. In the test, the test specimen is exposed to heat and flame. Possible skin burn injury has been evaluated with the temperature rise at a copper calorimeter which placed on the test specimen. At present, a firefighter clothing consists of three layers: outer layer, moisture barrier, and thermal liner. The lowermost thermal liner tends to be a three-dimensional structure and have an air layer inside the fabric in order to reduce the heat transfer from the outside. This fabric test may have compressed the air layer within the thermal liner due to the test rig which is the weight of the copper calorimeter and the copper calorimeter mounting plate. Increasing the thickness of the air layer within a thermal liner has the objective to improve the thermal insulation, whereas if the air layer is compressed by the test rig, the test results may be evaluated worse than that of the originally three-dimensional fabric has. Therefore, it is necessary to develop a test method that considers the air layer within the fabric. The objective of this study is to develop an evaluation method to improve the effect of compression of the fabric specimen by the weight of the copper calorimeter and the mounting plate, and understand the thermal insulation effect of air layer within three-dimensional structure at thermal liner.