Aligned carbon nanotube sheets for faster heat dissipation in firefighter garment

Rachit Malik[1](PI), Noe Alvarez[2], Vesselin Shanov[2], Mark Schulz[1]

[1] Department of Mechanical & Materials Engineering, University of Cincinnati
[2] Department of Chemical Engineering, University of Cincinnati

Firefighting in the United States is becoming more of a profession than it once was. Heat injury is a major issue for firefighters as they wear insulated clothing and cannot shed the heat generated from physical exertion. Early onset of heat stress affects cognitive function which combined with operating in dangerous environment makes heat stress and dehydration a critical issue to monitor. More firefighters die in the line of duty from heart attacks than from any other cause. And slips, trips and falls cause a large number of firefighter injuries. While the origins of heart attack and slip, trip and fall may appear unrelated, previous research suggests that heat stress may be a common causal factor in both heart attacks and slips, trips and falls. Research further suggests that one common, critical factor can potentially mitigate both of these injuries and fatalities: modified personal protective equipment (PPE). This project is aimed at the development of a component of the PPE viz. a cooling vest worn under the turnout gear for more efficient heat dissipation from the body of the firefighter. This will be achieved by incorporating carbon nanotube sheet textile material in between layers of cotton. The carbon nanotube sheet material will also be functionalized by plasma to make it hydrophilic and improve moisture interaction and comfort of the firefighter.

Corresponding author: *Rachit Malik at malikrt@mail.uc.edu*

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