



**RDECOM**

# Flame and Thermal Resistant Materials Research



**TECHNOLOGY DRIVEN. WARFIGHTER FOCUSED.**

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- Integrating flame and thermal protection into combat uniforms requires multiple and in some cases competing materials properties
  - Enhanced flame and thermal protection
  - Durability
  - Wearability/comfort
  - Ease of signature management
  - Low cost
- To protect against new flame and thermal threats, response of materials to very high heat flux and interactions with blast effects must be considered

- Identify new materials that exhibit
  - high char yield or other mechanisms to impart thermal protection
  - processability into fibers and/or coatings
  - adequate mechanical properties
  - potential for dyeing, printing or other methods to achieve desired signature
- Develop new coating technologies and multi-component fibers
- Study the effects of layering of dissimilar materials
  - thermoplastic materials
  - micro and nanostructured materials
  - nonwovens
- Develop improved test and characterization methods

## ■ 6.1 and 6.2 Internally Funded Programs

- New environmentally benign polysiloxane and borosiloxane materials for fibers, coatings and nanocomposites
- New coatings using bio-inspired templated synthesis and atomic layer deposition onto conventional fabrics
- New materials and test methods for emerging flame/thermal threats
- Improved standing manikin testing and related laboratory evaluation
- Modeling & analysis of flame/thermal protective materials

## ■ Congressionally Funded Programs

- Improved FR materials via microencapsulation technology

## ■ Small Business Innovative Research

- Flame and thermal protection for exposed skin

- Novel reactive FR fibers and thermal insulation materials
- Bi and tri-component fibers
- Reactive FR dyestuffs, inks, and pigments
- Materials characterization and test methodologies for emerging threats
- Accurate burn injury prediction models
- Flame and thermal resistant materials modeling & analysis
- Thermal test facility development



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