The fire, smoke and toxicity (FST) factors of composite materials are becoming major considerations in the adoption and maintenance of composite structures. Polymeric materials are highly combustible due to their chemical structures and, therefore, are inherently flammable. Conventional methods to improve fire resistance of polymeric composite materials are expensive due to the high cost of resin systems, filler materials and high temperature insulation products. They may have an adverse effect on the environment by releasing toxic gas from the combustion of the added fire retardants.

The Georgia Tech Manufacturing Institute is developing innovative fire retardant composite materials and manufacturing technologies with significantly improved FST retardant properties. This is achieved through the application of hybrid carbon nanomaterials.

Research Goals
- Develop fire retardant nanomaterial sheets (hybrid buckypaper fireshield) using carbon nanotubes (CNTs), carbon nanofibers (CNF) and hydroxide (e.g., magnesium hydroxide nanoparticles) for improved FST performance
- Develop cost-effective manufacturing processes for applying the hybrid buckypaper to produce fire retardant composites
- Explore applications of the hybrid buckypaper fireshield

Current Projects & Research Highlights
- Development and optimization of hybrid buckypaper
- Characterization of FST properties of hybrid buckypaper fireshield
- Composite manufacturing with hybrid buckypaper fireshield
- Demonstration of FST performance of composites with hybrid buckypaper fireshield skins

Industry Benefits
- New class of lightweight, low-cost, fire-resistant materials meeting requirements for military or critical applications with improved FST and structural properties
- Cost-effective, fire-retardant composite manufacturing technique for large structures

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