

THE INTERAGENCY WORKING GROUP ON FIRE AND MATERIALS

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Polymer research is producing new materials with exceptional properties, and products made with these materials may well replace conventional products where fire performance is a consideration. As this occurs, there are unique opportunities to improve the fire safety of the facilities in which they are used or to maintain a desired level of fire safety as other advantages accrue.

Many Federal agencies with fire performance responsibilities are affected by these advances in polymer and materials science. Government staff have such roles in the development of such materials as: ascertaining their performance and the benefits or hazards that result, and providing the basis for procurement. Applications range from public safety to national security.

Because of this broad interest, Federal scientists and engineers have formed a new Interagency Working Group on Fire and Materials. The mission of the Group is:

To implement a coordinated, long-range, national research effort to understand the fire and thermal behavior of materials and develop advanced materials with improved performance.

The agencies participating in the Working Group have mutual interest in fire and materials and will support cooperative research through the sharing of information and resources with the ultimate goal of improving human survivability and protecting property in severe thermal environments.

Within this mission, the Group intends to:

- develop uniform guidelines for fire performance evaluation of materials for consideration by government agencies;
- provide a mechanism to coordinate and communicate among government, industry, and university research activities;
- analyze current research, development and technology in light of present and projected National needs;
- advance defense/civilian agency dual-use objectives; and
- promote research and development of advanced fire-safe materials by strengthening the case for more government and industrial funding.

To meet these objectives, the Working Group has established five thrusts. The titles, leaders, and intended functions are as follows:

I. **ADVANCED MATERIALS AND PROCESSING** Leader: Richard Lyon, Federal Aviation Administration

Identification and evaluation of commercial fire- and heat-resistant materials.

Research on and development of new resins, films, foams, coatings, additives and composites with significantly improved fire safety and high temperature thermal performance.

Research on process engineering needed to ensure manufacturability of advanced materials and facilitate recycling efforts.

II. **FIRE AND THERMAL PROPERTY TESTING** Leader: Usman Sorathia, Naval Surface Weapons Center

"Encyclopedia" of currently-used fire test methods and their uses.

Basis for broad Federal use of a consistent set of measurements to be used in uniformly specifying materials and products for use in environments at risk from fire or high temperatures.

Identification and measurement of thermal and mechanical properties of materials needed for modeling flammability, heat transmission, and structural performance at elevated temperatures.

Research on, development of methodologies for, and provision of guidance on:

- scaling from bench- to real-scales,
- realistic bench-scale measurement methods,
- measurement techniques for fire environments and materials properties in those environments, and

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- structural performance of load-bearing structures during and after defined fire or thermal insults.

III. DATA BASE FOR MATERIALS' FIRE AND THERMAL PROPERTIES

Leader: Richard Gann, National Institute of Standards and Technology

Format for a broad, searchable matrix of data from diverse tests for a range of materials fire and thermal behavior and properties.

Creation and maintenance of such a data base in a manner that users have ready access.

Criteria and an evaluation protocol for candidate data, followed by a mechanism for adding data to the set.

IV. FIRE AND THERMAL RESPONSE MODELING

Leader: Vernon Nicolette, Sandia National Laboratories and the Federal Aviation Administration

Identification of available fire and thermal response modeling tools (software) that exist and a point of contact for each and compilation of current modeling research and development to promote collaboration among agencies.

Development and advancement of models to understand the behavior of solid materials in complex systems in fire environments and other adverse thermal environments:

- characterization of the fire environments that materials must withstand,
- interaction of the fire environment with a material,
- flammability, heat transmission, and structural performance in a fire or at elevated temperatures, and
- production of enthalpy and combustion products from burning materials.

Predictive capabilities for relating materials/product data from small-scale screening tests to real-scale performance.

Computational modeling for evaluating the relative impact of a material's chemical and physical properties on hazard and risk reduction (sensitivity analysis).

V. HEALTH AND ENVIRONMENTAL RESPONSE

Leader: Douglas Nelson, U.S. Air Force

Compilation and assessment of the hazards of burning, burned, and exploded advanced materials/composites.

Research and exchange of information to:

- expand the knowledge base to support the development of safe procedures for mishap responses,
- determine unusual aspects of the extinguishment of advanced materials, and
- assess the environmental safety and health issues associated with fire-damaged materials.

Several of these projects are now underway. The work will impact staff across the Federal government and will likely show benefits for commercial parties as well. The membership in the Working Group is open to representatives of all Federal agencies. Most of the planned projects will be developed with jointly with appropriate and interested corporations. Interested parties should contact the author at the above address.