



Kratos SRE has developed a number of unique facilities and procedures dealing with specific problems encountered in the applications of structural, insulative, and ablative materials. Engineers and chemists in the Chemistry and Physics of Materials laboratory have extensive experience characterizing materials and understanding their behavior in a variety of applications.

■ **Material Chemistry**

- Moisture specific weight loss
- Moisture absorptivity
- Oxidative mass loss from oxygen adsorbing materials
- Kinetics of decomposition and gasification
- Thermogravimetric weight changes at heating rates up to 3000°C/minute

■ **Material Physics**

- Swelling
- Open, Closed, and Total porosity
- Pyrolysis Gas compressibility
- Dielectric constant and loss tangent up to 1000°C (1832°F)

■ **Mass Transport Characteristics**

- Moisture and solvent diffusion
- Molecular diffusion through membranes
- Gas and liquid permeability of consolidated media
 - › Cryogenic (-423°F) to 2760°C (5000°F)
 - › Over sixteen orders of magnitude in permeability
 - › As a function of material direction
 - › Hydrogen, Oxygen, Methane, Nitrous Oxide and Inert Gas
- Pore evolution as a function of environmental history
- Permeability of unconsolidated media
- Gas permeability as a function of combined applied mechanical stress and temperature
- Cryogenic permeability under biaxial and tetra-axial strain or load including mechanical and thermal cycling
- Permeability in an oxidizing environment from cryogenic to 1425°C (2600°F)
- Diffusivity and Tortuosity as a function of temperature, stress and material direction

In addition, facilities have been developed which are capable of reproducing and studying the pore pressure induced delamination and plylift failure events under a variety of controlled conditions.

