

Materials Characterization Capabilities

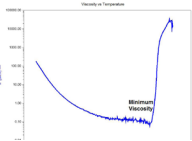
The Materials Characterization Laboratory consists of thermal analysis, mechanical, and spectroscopic characterization facilities. The laboratory is used to establish the basic molecular and microstructure of materials as well as the thermal, optical and electronic macroscopic properties. Key equipment includes a comprehensive thermal analysis facility including NETZSCH, Mettler Toledo, and TA Instruments equipment. The facility contains the latest version of standard thermal analysis equipment such as DSC, TGA, DMA, TMA, and Parallel Plate Rheology, as well as some specialized equipment such as Mettler Toledo's Flash DSC.

Equipment

- NETZSCH Differential Scanning Calorimeter (DSC)
- NETZSCH Light Flash Thermal Diffusivity
- NETZSCH Thermomechanical Analyzer (TMA)
- METTLER DSC
- METTLER TGA/DSC
- METTLER Hotstage-Video Microscopy
- Perkin Elmer – FTIR Spectrometer with microscope
- TA Instruments AR 2000 Rheometer
- NETZSCH Thermogravimetric Analyzer (TGA)
- NETZSCH Advanced Kinetics Software
- NETZSCH Dielectric Analyser (DEA)
- METTLER Flash DSC
- METTLER Dynamic Mechanical Analyzer (DMA)
- METTLER XP2U Balance with sensitivity of 0.0000001g
- TA Instruments DHR Rheometer

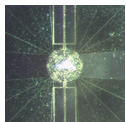
Testing Capabilities

Rheology Testing



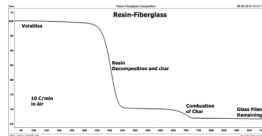
Rheology is used to determine minimum viscosity, pot life and viscosity change during resin curing.

Differential Scanning Calorimetry



DSC is used to determine glass transition of cured composites, optimize time-temperature cure cycles and determine the kinetics of reaction.

Thermogravimetric Analysis



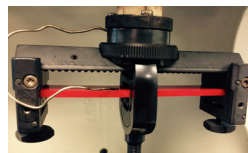
TGA is used for determine volatile, resin and fiber content of composites and prepreg.

Light Flash Thermal Diffusivity



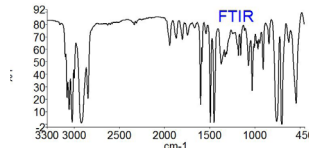
Thermal diffusivity is a measure of the consolidation of the fiber and resin of a composite. Higher consolidation yields higher thermal diffusivity.

Dynamic Mechanical Analysis



DMA is a sensitive method for measuring the glass transition of a highly filled composite. DMA also measures the energy absorbing properties of polymers and composites.

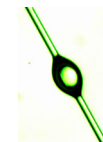
Fourier Transform Infrared Spectroscopy



FTIR analyzes the chemical functional groups present in a prepreg or composite. The FTIR can be used in transmission mode for thin, clear samples. It

can be used in reflection mode for opaque samples, especially for identifying small defect near the surface of composites. It can also analyze surface contaminants of composites.

Hot Stage - Video Microscopy



This equipment allows one to record a microscopic image as the sample is heated in a controlled fashion. This is valuable for observing transient changes in the sample such as: bubble formation, color change (from decomposition), and motion due to stress relaxation.

Technical Contacts: