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## Thermal Storage Materials Laboratory

The Thermal Storage Materials Laboratory at NREL's Energy Systems Integration Facility (ESIF) investigates materials that can be used as high-temperature heat transfer fluids or thermal energy storage media in concentrating solar power (CSP) plants. Research objectives include the discovery and evaluation of candidate fluids and phase-change materials (PCM) to serve as thermal energy storage media in the temperature range of 300°C to 800°C. Knowledge of thermophysical properties such as melting point, heat of fusion, density, viscosity, thermal stability are essential for understanding how candidate materials could be deployed in CSP plants.

### Laboratory Specifications

Within the 950 sq. ft. laboratory samples can be evaluated for melting point, heat capacity, heat of fusion, viscosity, density, thermal stability, and other physical properties using state-of-the-art analytical equipment. The laboratory contains a controlled-environment glovebox for preparation of materials that are sensitive to moisture, oxygen, or trace gases such as carbon dioxide. The lab glovebox and fumehood have HEPA filtration to allow testing of nanofluids and nanomaterial containing samples.

Instrumentation in the laboratory can determine the thermophysical properties of materials at temperatures up to 1,200°C.

### Application Scenarios

The laboratory runs high-temperature instruments for the analysis of thermophysical properties. Small samples of candidate materials are prepared and characterized using differential scanning calorimetry, thermogravimetric analysis, and other specialized analytical methods.

Instrumentation capabilities are being expanded to allow for analysis of samples up to 1,200°C. Higher temperature operation is one method to increase the efficiency and lower the cost of CSP systems.

### Partner with Us

Work with NREL experts and take advantage of the state-of-the-art capabilities at the ESIF to make progress on your projects, which may range from fundamental research to applications engineering. Partners at the ESIF's Thermal Storage Materials Laboratory may include:

- CSP technology developers
- Utilities
- Certification laboratories
- Government agencies
- Universities
- Other National laboratories

### Contact Us

If you are interested in working with NREL's Thermal Storage Materials Laboratory, please contact:

#### ESIF Manager

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### Major Laboratory Equipment

- Differential scanning calorimeter (to 1,200°C)
- Thermal gravimetric analyzer (to 1,100°C)
- High-temperature rheometer (to 1,100°C)
- Densitometer
- Glovebox with HEPA filtration
- Analytical balances and general chemistry supplies
- Controlled atmosphere furnace (to 1,100°C)

