Advanced Materials Laboratory

CENTER FOR ADVANCED ENERGY STUDIES

ODS iron base superalloy powders prepared by mechanical alloying.

Advanced Materials Laboratory (AML)

One of the most significant developments in the world of energy production has been the development of materials designed to withstand heat and pressure at levels that would have been unimaginable 25 years ago. These efficiencies have prolonged the life span of nuclear reactor vessels and turbines, and made reactor fuel rods yield more energy for dramatically longer periods of time.

The Advanced Materials Laboratory (AML) at the Center for Advanced Energy Studies (CAES) is where researchers create and test new materials to ensure they can withstand extreme environments. They also are experimenting with new welding techniques to ensure these materials can be used in commercial settings.

AML offers a broad range of sample preparation capabilities, including processing, structural analysis and properties determination. Specifically, AML provides:

- Radiological and non radiological materials processing (sintering, welding, casting, machining, deposition)
- Determination of materials structure of samples (atomic, nano, mesostructures)
- Analysis of materials properties (e.g. strength, toughness, slow crack growth, diffusion, thermal conductivity, thermal expansion, corrosion resistance).

EXPLORE

Energy and Environmental Research

EDUCATE

Energy and Environmental Education

ENGAGE

Apply Knowledge to Industry

ENABLE

Energy Transitions and Economic Development

CAES Center for Advanced Energy Studies

AML CAPABILITIES

Linked closely with the CAES Microscopy and Characterization Suite (MaCS) and sharing many of the same researchers, AML contains specialized equipment for testing and analysis of both radiological and nonradiological materials.

For nonradiological materials:

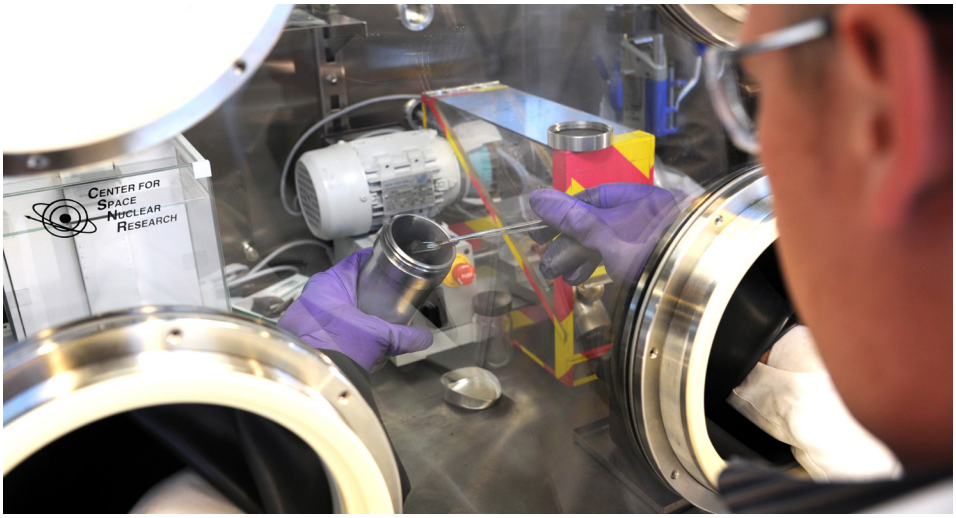
- Gatan PIPS II ion-mill (for preparing TEM samples)
- Fischione twin-jet electrolyte polisher (for preparing TEM samples)
- Gatan PECS (etching and coating, mostly for preparing SEM samples)
- Leco LM247AT Microhardness Tester (Mechanical testing on micron scale)
- CM Rapid Temperature Furnace
- Keyence VH-250L Long Working Distance Microscope (INL's IGSCC programs)
- Retsch PM100 Planetary Ball Mill
- Carver and Dayton Presses

Other sample preparation tools include: low speed/high speed/precision/diamond wire saws, grinders/polishers, scales, fume hood, ultrasonic cleaner, dimpler, hot plates and drying oven.

For radiological materials:

- Argon environment rad sample prep glovebox
- Rigaku SmartLabs high-resolution X-ray diffractometer (XRD)
- Thermal technology high temperature furnace (2000 °C)
- Instron test frame with 5kN and 10kN load cells model 5967 R4847

A researcher uses a medium speed sectioning saw to prepare a sample.



COLLABORATION-BASED INSTRUMENTS

- **Dr. Sinter Spark Plasma Sintering System,** for non-radiological materials. Instrument Lead: Brian Jaques
- **Two stress corrosion cracking systems,** rad and non-rad, respectively, for experiments in boiling water reactor and pressurized water reactor conditions. Instrument Lead: Colin Judge

A researcher uses a glovebox to ready a sample for spark plasma sintering.

About CAES

CAES is a research, education and innovation consortium consisting of Idaho National Laboratory, Boise State University, Idaho State University and the University of Idaho that provides research capabilities, energy-related educational opportunities and assistance to industry to fuel economic growth.

FOR MORE INFO

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