



LA Expanding Critical Experimental Resources for Materials & Manufacturing

Louisiana is open for business! The State is continuing to transform advanced manufacturing research, education, and workforce development. The Consortium for Innovation in Manufacturing and Materials (CIMM) has established a dedicated statewide Core User Facilities (CUF), providing a resource center for critical experimental infrastructure that is open to industrial and academic partners.

The CUF is a collection of advanced manufacturing and metrology centers that facilitate collective R&D in additive manufacturing and materials at universities and industry. This unique resource provides sustainable access to state-of-the-art experimental research infrastructure to a broad range of stakeholders, many of which would otherwise not be in the position to afford it.

The State's growing advanced manufacturing and materials industries were thrust into the national spotlight in 2015 after being awarded a highly competitive \$20 million 5-year Research Infrastructure Improvement (RII) Track-1 award from the National Science Foundation (NSF) EPSCoR Program. The award has helped to establish the CUF and



Mr. Ling Fang, a Mechanical Engineering student at LSU, tests the spinning-electrode powder rig in the Materials Manufacturing, Testing, & Evaluation Facility.

the CIMM research collaboration among five of Louisiana's state universities: Louisiana State University (LSU), Louisiana Tech University, Grambling State University, Southern University in Baton Rouge, and the University of New Orleans.

The CUF is comprised of four centers:

Materials Manufacturing, Testing, & Evaluation Facility (MMTEF)

A 6,000 square-foot facility at LSU is capable of non-destructive materials testing and evaluation, thin-film coating and manufacturing, and

metal powder synthesis.

The CIMM team has recently installed a Conceptlaser Mlab selective laser melting (SLM) system, which is fully operational. It has a building volume of 90 mm × 90 mm × 80 mm and can handle various metal powders, including stainless steels, titanium alloys, and CoCrW alloy.

To support laser-based additive manufacturing research, the CIMM team has developed a spinning-electrode rig for making custom alloy powders and is skilled at developing custom powder processing parameters.

The Core User Facilities (CUF) is open to industry: "The CUF leverages sustainable research facilities to avail state-of-the-art experimental research and education infrastructure in advanced manufacturing and materials to researchers and industry customers throughout the State in an efficient and highly collaborative manner. Pooling such resources and sharing across institutional boundaries is the new paradigm to sustain access to modern research infrastructure in environments of limited resources."

- Dimitris Nikitopoulos, Chair of the LSU Dept. of Mechanical & Industrial Engineering and member of the CIMM Leadership Team

Shared Instrument Facility (SIF)

The SIF is a 14,000 square-foot open-access core facility for LSU researchers, regional university scholars, and industrial research technicians. As the LSU main campus core facility, several Ph.D. level technical staff provide access and training on more than 20 different instruments for material characterization ranging from atomic-resolution electron microscopy to near-surface X-ray spectroscopy.

A large part of the mission of the SIF is to provide access to advanced research instruments and continuously update older instrumentation with new technology and capabilities. Over the past year, the SIF has partially funded a new Renishaw Raman three laser spectroscopy system, upgraded the X-ray diffractometer with a triple axis analyzer for detector monochromation, and worked with CIMM to replace the Kratos X-ray Photoelectron Spectroscopy (XPS) with a newer generation Scienta Omicron XPS.

The SIF has established relationships with over 20 different industrial and federal agency clients that utilize the center for resolving complex material-related problems.

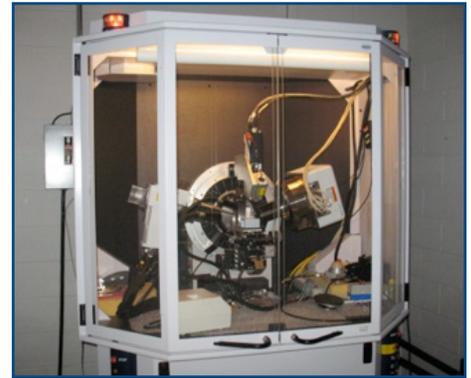


Nano-Machining FIB and SEM at the Shared Instrumentation Facility (SIF) at Louisiana State University.

Previous work that has been performed for these clients include enhancing more efficient drug delivery methods, assisting with material quality control issues, understanding corrosion and mechanical failures and preventative measures, determining mechanical defects during component manufacturing, and identifying foreign materials or quality checks on main supplier materials. Several of these projects have resulted in industrial-academia collaborative projects.

Advanced Manufacturing and Machining Facility (AMMF)

This 8,000 square-foot facility at LSU houses equipment for multi-axes micro-milling, additive manufacturing of plastics and metals, injection molding, computer numerical con-



X-Ray Diffractometry tool at the Institute for Micromanufacturing (IfM) at Louisiana Tech University.

trol automation (CNC), and welding.

Institute for Micromanufacturing (IfM)

The IfM at Louisiana Tech University features a 48,000 square-foot laboratory and a 5,000 square-foot clean room with equipment for materials characterization, measurements, nano-fabrication and evaluation, and optical microscopy.

As a member of the CUF and through CIMM collaborations, the Kratos XPS system is being transferred from the SIF to the IfM to serve the needs of academic and industrial researchers in northern Louisiana.

For more information, visit the CUF website at: <http://lsu.edu/eng/mie/cuf/>