

NANO-ENGINEERING RESEARCH CORE FACILITY (NERCF)



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COLLEGE OF ENGINEERING

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Nano-Engineering Research Core Facility

University of Nebraska-Lincoln, City Campus

The Nano-Engineering Research Core Facility was established by the College of Engineering in 2016. The goal of NERCF is to provide a centralized, shared-user core facility that houses state-of-the-art research instrumentation necessary to position the university and the state of Nebraska at the forefront of global research efforts, focusing on advanced manufacturing of materials, nanostructures and nanodevices.

Our Mission

The facility provides high-quality, cost-effective and professional technological services for faculty within the University of Nebraska system and industry across the state of Nebraska and the U.S. The mission of NERCF is to become a regional hub for nano-engineering for advanced manufacturing and characterization.

NERCF equipment and operations are funded in part by the Nebraska Research Initiative and the UNL Office of Research and Economic Development.

CONTACTS / SCHEDULING

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NEBRASKA ENGINEERING ADDITIVE TECHNOLOGY LABS

The **Nebraska Engineering Additive Technology Labs (NEAT)** was established in spring 2018. The purpose of the NEAT Labs is to provide a state-of-the-art regional hub for additive manufacturing technology and to create opportunities for collaborations among academic research and industry.

Capabilities include both powder bed fusion and directed energy deposition hybrid metal additive manufacturing technologies. These systems seamlessly integrate both additive and subtractive functions that allow the part to be machined as it is being built - a capability that is imperative for creating intricate geometries, such as lattice structures and complex internal cooling channels for aerospace applications. Controlled-atmosphere systems allow for the processing of reactive materials.



Two Matsuura Lumex Avance-25 Hybrid Laser Powder Fusion Additive Manufacturing Systems

Integrates both additive and subtractive functions for building parts as large as 10 inch x 10 inch x 7.5 inch

- o Create intricate geometries, such as lattice structures and complex internal cooling channels for aerospace applications.
- o Surface finish of the parts obtained from the process is finer than 10 micrometers without loss of geometric integrity.
- o Process a range of materials from high-reactive magnesium alloys for biomedical applications to contamination-free aerospace grade Nickel-based super alloys like Inconel due to their inert atmosphere capabilities.
- o Material capabilities include: Inconel, Rene, Aluminum and Aluminum Alloys, Titanium and Titanium Alloys, Cobalt-Chrome, Steel (both Stainless and Maraging).



Optomec Hybrid Directed Energy Deposition Additive Manufacturing System

Build large parts (14 inch x 12 inch x 20 inch) at high deposition speeds (0.25 lbs./hr).

- o Controlled atmosphere for building aerospace/ biomedical-grade parts with precise microstructure and finish.
- o Repair damaged/worn parts, remanufacture legacy parts, and add new features to existing parts.
- o Multiple materials can be deposited simultaneously for making functionally gradient parts.
- o Material capabilities include: Steel, Titanium Alloys, Inconel, Aluminum Alloys, Cobalt, Carbon-graphite, Rene, Ceramics, Bronze, Tantalum, Zirconium.



FEI QUANTA 200 ENVIRONMENTAL SEM

The FEI Quanta 200 ESEM is capable of running at low vacuum and allows imaging without the need for a conductive coating. The ESEM is especially useful for non-conductive, biological specimens.

CELL CULTURE LAB



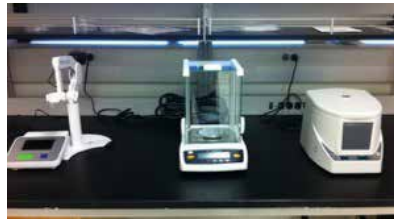
Bio-safety hood



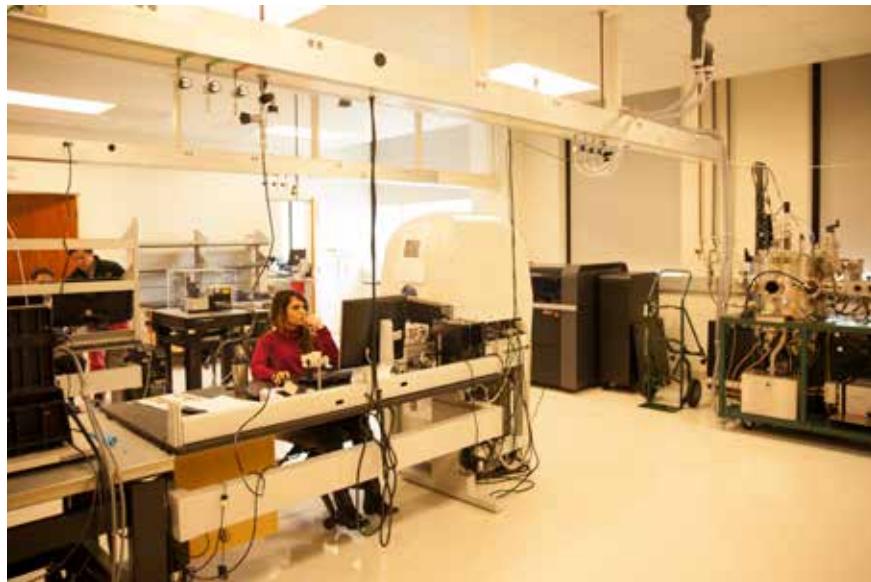
CO₂ Incubator



Shaking bath

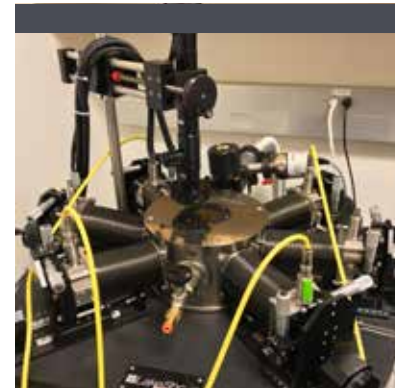


pH meter, Microbalance and Centrifuge



TRAINING

We offer one-on-one in-depth training on the theory and operation of these instruments with different levels, ranging from basic training to advanced techniques to meet your individual needs.



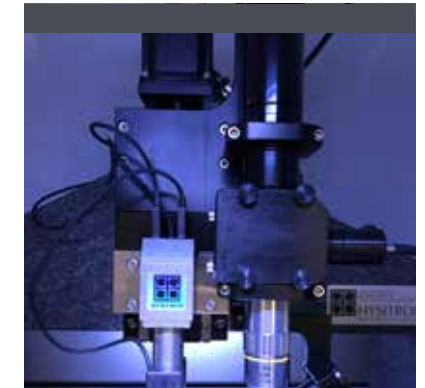
LAKE SHORE CRYOGENIC PROBE STATION

Lake Shore's cryogenic probe station is a six-probe system that is capable of reaching low temperature and high vacuum. The system provides precisely controlled environments for non-destructive measurement of electrical properties.



VERSALAB 3 TESLA CRYOGEN-FREE VSM

VersaLab Cryogen-free vibrating sample magnetometer (VSM) is specifically designed for magnetic characterization up to three Tesla and over a wide temperature range (50 K -1000 K) without the need for liquid cryogenics, cooling water or high power requirements.



HYSITRON TI 950 TRIBOINDENTER

The Hysitron TI 950 TriboIndenter is an automated, high throughput instrument to support numerous nanomechanical and nanotribological characterization techniques.



ASYLUM MFP-3D-BIO AFM

The MFP-3D-BIO provides the highest sensitivity and most accurate images and measurements possible on an inverted optical platform. The MFP-3D-BIO combines optical and AFM in a integrated tool specifically designed for biological samples.



ANASYS INSTRUMENTS AFM+

The afm+ from Anasys is a full-featured atomic force microscope (AFM) with powerful localized nanoscale analytical capabilities that include thermal, mechanical and chemical analysis.



LASER SCANNING MICROSCOPE VK-X200K

The VK-X200K Series combines features of an optical microscope, roughness gauge, laser profilometer, and laser scanning microscope, which can perform non-contact surface profile, surface roughness, and thickness measurements.



ATC FLAGSHIP SERIES SPUTTER COATING SYSTEM RF/DC

The ATC Flagship Series magnetron sputtering systems provide research scale physical vapor deposition that can be configured in either con-focal, normal incidence, off-axis, glancing angle, or a combination of target to substrate orientations.



FEI HELIOS FIB/SEM 660

Helios NanoLab™ 660 combines FEI's most recent advances in field emission SEM and focused ion beam technologies. As FEI's 11th DualBeam™ platform, it is designed to access a new world of extreme high resolution (XHR) 2D and 3D characterization, nanoprototyping, and highest quality sample preparation.



SPARK PLASMA SINTERING SYSTEM

Spark Plasma Sintering utilizes high-amperage pulsed DC current to activate the consolidation and reaction-sintering of materials. The SPS process is able to prepare conductive, non-conductive and composite materials to any level of density.



STRATASYS OBJET500 CONNEX3 3D PRINTER

The Objet 500 Connex3 is an advanced multi-material 3D printing system, which can produce precise, smooth and highly detailed models with vivid colors and many levels of material stiffness for all prototyping needs.



ASTRELLA ULTRAFAST AMPLIFIER LASER SYSTEM

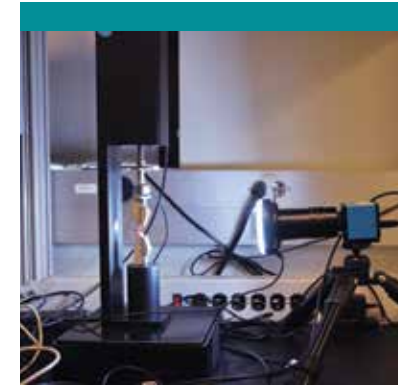
The Astrella laser is a femtosecond laser system that is designed to be very stable with a high beam quality. This laser is effective for research related to light/matter interactions, as well as the functionalization of surfaces.

CELLSCALE BIO-MECHANICAL TESTING SYSTEM



BIOTESTER

A fully equipped biaxial test system built specifically for biomaterials.



UNIVERT

Capable of tension, compression and bending testing at forces up to 200N.



MICROSQUISHER

Compression, tension, bending, indentation, and shear testing test modes.



ENVISIONTEC 3D-BIOPLOTTER

The 3D-Bioplotter System is a versatile rapid prototyping tool for processing a great variety of biomaterials for computer-aided tissue engineering (CATE), from 3D CAD models and patient CT data to the physical 3D scaffold with a designed and defined outer form and an open inner structure.



ANALYSIS NANOIR2

The Ansys nanoIR2-s system is capable of providing high resolution localized infrared (IR) spectroscopy and imaging, along with AFM imaging and metrology. The system will support research associated with organics materials, polymers and materials in life sciences.



ZEISS LSM 800 WITH AIRYSCAN

A confocal laser scanning microscope for fast linear scanning. Add Airyscan, to acquire perfect resolution of 120 nm (in x,y) and 350 nm (in z).