

UNT Materials Research Facility (MRF)

The Materials Research Facility (<https://cart.research.unt.edu/>) is a university shared user research and service facility at the UNT Discovery Park campus that supports scientific research activities through its wide array of sophisticated characterization, fabrication and processing instruments. Substantial funding from the U.S. Army Research Lab (ARL), U.S. Air Force Research Lab (AFRL), the National Science Foundation (NSF), and UNT has led to the development of the MRF facility, a premier research facility focused on satisfying the growing technological and engineering needs of UNT and the North Texas region and beyond. This funding and ongoing university support led to the acquisition of advanced analysis, characterization, fabrication and processing equipment capable of supporting advanced scientific research activities within UNT, with other universities, and local, state and national industries. UNT faculty, staff and students have access to MRF equipment and staff as either independent equipment users or a fee-for-service basis.

The following lists the major pieces of MRF equipment, categorized based on primary application area:

Materials Fabrication and Processing (Nanofabrication Cleanroom Lab):

1. 3000 sq. ft. Cleanroom including a Class 100 lithography area and a Class 10,000 wet processing, dry processing and characterization area.
2. Heidelberg DWL-66s Maskless Lithography laser writer
3. JEOL JSM-7001F SEM and EBL XPG2 pattern generator
4. Laurell WS-650 Mz tabletop spin coater
5. Reactive Ion Etcher (dielectric material)
6. HP61 hot plate
7. Nikon optphot 66
8. UV Ozone cleaner
9. Oerlikon Sputtering and Ion Assist Ebeam system, Oerlikon Leybold Vacuum
10. West Bond Wire Bonder West Bond Inc. 7476D
11. Nanomaster NEE-4000 Dual Ebeam Evaporator
12. Laurell Chemical Processing Stations (WS-1000MH-CP7-D)
13. Trovato 300C OLED fabrication system
14. Wet Benches for Acid, Base & Solvent
15. Denton Vacuum Integrity 26 Thermal Evaporation System
16. AGS Plasma Systems, Inc. RIE MPS-150
17. J.A. Woolam Co., Inc. M-2000V Automated Angle Ellipsometer
18. Kurt J. Lesker PVD-75 RF & DC magnetron sputtering system

Materials Characterization and Analysis (Multidimensional Characterization Lab):

19. Cameca LEAP 3000XHR 3D Pulsed Laser Atom Probe Microscope
20. FEI Tecnai G2 F20 Analytical High Resolution Transmission Electron Microscope (AHRTEM) with EDS, EEELS, EFTEM and STEM-HAADF
21. FEI Nova 200 Focused Ion Beam / Scanning Electron Microscope (FIB/SEM) with EDS, EBSD, Pt GIS and Omniprobe AutoProbe
22. FEI Nova NanoSEM 230 Analytical HRSEM with EDS and EBSD
23. FEI Quanta 200 Environmental Scanning Electron Microscope (ESEM) with SE and BSE detectors up to 20 Torr pressure, and EDS, EBSD, Peltier cold stage, and 1500C

hot stage.

24. Physical Electronics 670xi Scanning Auger Nanoprobe
25. Physical Electronics Versaprobe II Scanning X-ray Photoelectron Spectrometer (XPS) with Ultraviolet Photoelectron Spectroscopy (UPS)
26. Thermo Electron Almega XR Confocal Raman Spectrometer
27. SkyScan 1172 X-Ray Micro Computed Tomography (μ -CT)
28. Rigaku Ultima III X-Ray Diffractometer (XRD) with thin film, grazing incidence, in-plane diffraction, Small angle x-ray scattering (SAXS) with evacuated beam path, 1500°C hot stage with controlled atmosphere (vacuum, inert), pole figure software for texture analysis
29. Veeco Multimode III Scanning Probe Microscope (SPM), with contact and non-contact atomic force, lateral force, tapping mode (air and fluid), force modulation (air and fluid), electrochemical, magnetic force, scanning conductance, and scanning tunneling microscopy.
30. Thermo Electron Nicolet 6700 Fourier Transform Infrared (FTIR) Spectrometer
31. J.A. Woollam Variable Angle Spectroscopic Ellipsometer (VASE)