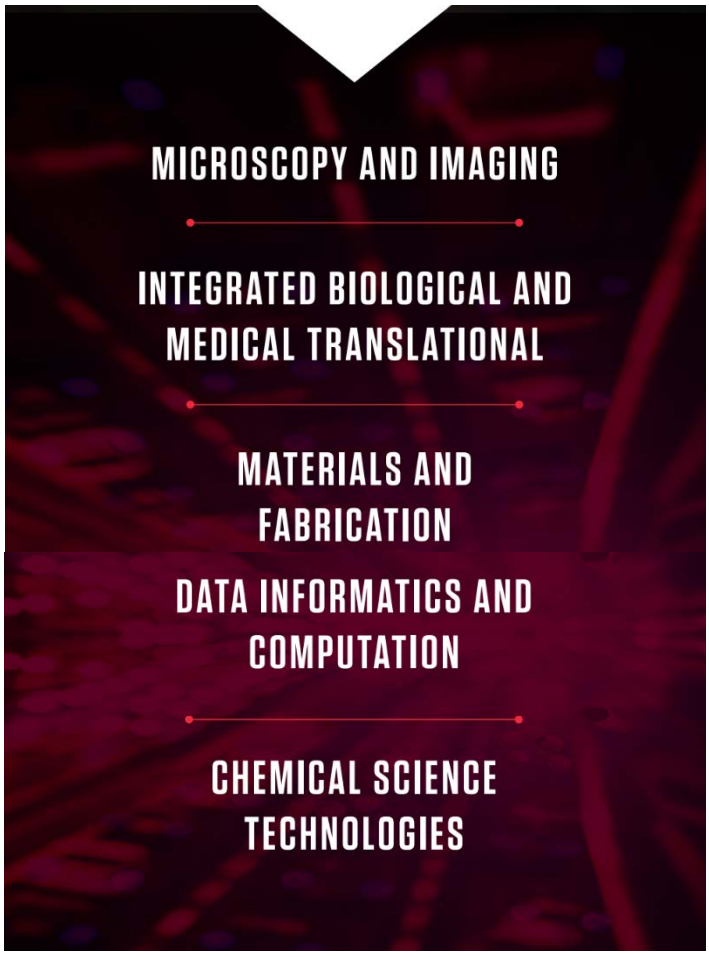
TEXAS A&M UNIVERSITY

CORE FACILITIES



vpr.tamu.edu/research-resources/core-facilities

TEXAS A&M UNIVERSITY

TEXAS A&M UNIVERSITY
CORE FACILITIES

Thematic Areas

Core facilities are an essential part of Texas A&M University's research infrastructure providing critical resources for groundbreaking research. Ensuring more efficient resource utilization, shared research facilities are a cost-effective way to leverage research expertise and specialized instruments. Core facilities provide dedicated space and specialized scientific equipment. Additionally, staff scientists provide field-specific expertise, research services, technical support, and training of graduate students and research staff. Core facilities primarily serve Texas A&M researchers, though many facilities welcome outside users from the broader scientific and industrial community. Texas A&M offers more than 50 core facilities that can be generally categorized into the five thematic areas described below.

Microscopy and Imaging

Cores in this area focus on advanced imaging techniques including light microscopy, electron microscopy, and other modalities spanning the spectrum of scale from visualization of proteins to whole animal imaging.

Integrated Biological and Medical Translational

Cores in this area focus on advanced equipment and techniques associated with human, animal, and plant biological and medical research.

Materials and Fabrication

Core facilities in this area focus on synthesis and fabrication of different materials, including polymers, metals, ceramics and composites and on characterization of their structural and physical properties using a wide range of different characterization methods.

Data Informatics and Computation

Cores in this area focus on empowering research and discoveries by providing access to computational hardware, software, and application expertise across the spectrum of data sciences.

Chemical Science Technologies

Cores in this area focus on state-of-the art sample collection and chemical analysis using resources including a mobile environmental sampling van, high volume size-resolved particle samplers, mass spectroscopy, Raman spectroscopy, and other analytical techniques.

Name of Core Facility	Director	Thematic Area
Center for Advanced Imaging	Michael Mancini	Microscopy and Imaging
College of Dentistry Research Core	Shannon Kramer	Microscopy and Imaging
Image Analysis Laboratory	Robert C. Burghardt	Microscopy and Imaging
Integrated Microscopy and Imaging Laboratory	Andreea Trache	Microscopy and Imaging
Microscopy and Imaging Center	Kristen Maitland	Microscopy and Imaging
Pre-Clinical Imaging Core	Jiang Chang	Microscopy and Imaging
AgriGenomics Laboratory	David Stelly	Integrated Biological and Medical Translational
Animal Genetics Laboratory	Rytis Juras	Integrated Biological and Medical Translational
Antibody & Biopharmaceutics Core	Praveen Rajendran	Integrated Biological and Medical Translational
COM Cell Analysis Facility	Laura West	Integrated Biological and Medical Translational
Comparative Medicine Program	Robert Rose	Integrated Biological and Medical Translational
Flow Cytometry and Cell Sorting Core	Margie Moczygemba	Integrated Biological and Medical Translational
Flow Cytometry Facility	Gus Wright	Integrated Biological and Medical Translational
High Throughput Research and Screening Center	Peter Davies	Integrated Biological and Medical Translational
Human Clinical Research Building	Richard Kreider	Integrated Biological and Medical Translational
Integrated Metabolics Analysis Core (IMAC)	Arul Jayaraman	Integrated Biological and Medical Translational
Molecular Cytogenetics Laboratory	Terje Raudsepp	Integrated Biological and Medical Translational
Molecular Genomics Core	Andrew Hillhouse	Integrated Biological and Medical Translational
Multi-Crop Transformation Facility	Marco Molina	Integrated Biological and Medical Translational
Protein Production Core	Magnus Hook, Wen Liu	Integrated Biological and Medical Translational

Rodent Preclinical Phenotyping Core	Sunja Kim	Integrated Biological and Medical Translational
Systems and Synthetic Biology Innovations Hub	Joshua S. Yuan	Integrated Biological and Medical Translational
Texas A&M Institute for Genomic Medicine	Ben Morpurgo	Integrated Biological and Medical Translational
AggieFab Nanofabrication Facility	Arum Han	Materials and Fabrication
Biomedical Engineering Shared Laboratories	Amanda Myatt	Materials and Fabrication
IODP Core Scanning Laboratory	Jennifer Hertzberg	Materials and Fabrication
Materials Characterization Facility	Miladin Radovic	Materials and Fabrication
Materials Development and Characterization Center	Ibrahim Karaman	Materials and Fabrication
National Center for Therapeutics Manufacturing	Zivko Nikolov	Materials and Fabrication
National Corrosion and Materials Reliability Laboratory	Raymundo Case	Materials and Fabrication
Soft Matter Facility	Svetlana Sukhishvili	Materials and Fabrication
SQUID Magnetometer	Nattamai Bhuvanesh	Materials and Fabrication
X-Ray Diffraction Laboratory	Francois Gabbai	Materials and Fabrication
Crop Genome Editing Laboratory	Michael Thomson	Data Informatics and Computation
Genomics and Bioinformatics Service	Charlie Johnson	Data Informatics and Computation
Laboratory for Molecular Simulation	Michael B. Hall	Data Informatics and Computation
Rigor & Reproducibility Core	Kurt Zhang	Data Informatics and Computation
Smart Grid Control Room Lab	Tom Overbye	Data Informatics and Computation
TIGSS Bioinformatics Core	Wesley Brashears	Data Informatics and Computation
Center for Atmospheric Chemistry and the Environment	Sarah Brooks	Chemical Science Technologies
Chemistry Mass Spectrometry Facility	Klaudia Kocurek	Chemical Science Technologies
Collaborative Resource in Biomolecular NMR	Joshua Wand	Chemical Science Technologies

Elemental Analysis Laboratory	Bryan E. Tomlin	Chemical Science Technologies
Geochemical and Environmental Research Group	Anthony Knap	Chemical Science Technologies
NMR/ESR Facility of the Chemistry Department	Janet Bluemel	Chemical Science Technologies
Nuclear Science Center	Sean McDeavitt	Chemical Science Technologies
Radiation Effects Facility	Henry Clark	Chemical Science Technologies
Stable Isotope Geosciences Facility	Chris Maupin	Chemical Science Technologies

TEXAS A&M UNIVERSITY

CORE FACILITIES

MICROSCOPY AND IMAGING THEMATIC AREA

Microscopy and Imaging

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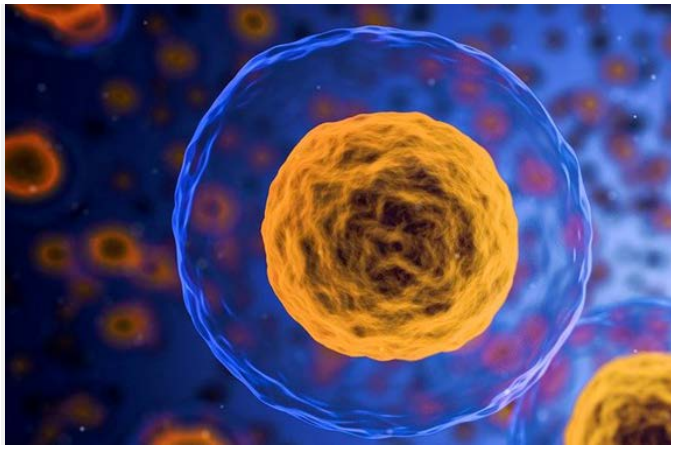
CORE FACILITIES

IBT Center for Advanced Imaging, Houston, TX



Emerging Technologies Building

The goal of the joint IBT-BCM Center for Advanced Imaging is to develop a framework to support multi-investigator, multi-institutional grants using advanced imaging technology to accelerate drug discovery and therapeutic development through leading edge R&D and screening via live and fixed cell confocal and deconvolution microscopy, and fully-automated high throughput microscopy.

CONTACT

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https://ibt.tamu.edu/cores/advanced-imaging/index.html

TEXAS A&M UNIVERSITY
CORE FACILITIES

IBT Center for Advanced Imaging, Houston, TX

EQUIPMENT

W1-Yokogawa/Nikon Live cell Imaging Spinning Disk Confocal:

- single dual-disk scanhead, 7 lasers, fast FRAP/Optogenetics scanner, 7 channel wide field DIC/fluorescence, high resolution/high sensitivity sCMOS (BSI) camera, live cell incubator, color camera and high content imaging module.

Nikon A1si:

- Spectral Confocal with 5-Channels, TIRF upgrade, wide field ratiometric imaging (fura2, etc), EM-CCD camera and live cell incubator.

DeltaVision Elite:

- deconvolution microscope with hi-res, hi-speed sCMOS camera and live cell incubator.

Image Analysis Workstation:

- Nikon NIS-Elements advanced research image analysis, deconvolution with batch processing and Image J (FIJI)

TEXAS A&M UNIVERSITY
CORE FACILITIES

College of Dentistry Research Core

Dallas, Texas

The College of Dentistry Research Core includes multiple facilities such as the Histology Core Facility, a Microscopy Facility, and an Animal Resource Unit, as well as general shared core equipment. This facility provides oversight and technical support for the major shared equipment. It is staffed by experienced, full-time technicians who oversee the cores housed in the main Texas A&M College of Dentistry building in the Sciences building as well as the fourth floor of the College of Dentistry within the Department of Biomedical Sciences.

CONTACT

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https://dentistry.tamu.edu/research/research-resources.html

TEXAS A&M UNIVERSITY
CORE FACILITIES

College of Dentistry Research Core

EQUIPMENT

Agilent 2100 Bioanalyzer

Beckman J2-21 centrifuge

Beckman GS-6R tabletop centrifuge

Beckman L-60 Ultracentrifuge

BioRad CFX96 real-time PCR instruments

Buehler Isomet low speed saws

Buehler grinding and polishing devices

Eppendorf refrigerated microcentrifuge

Instron Models 1125: Struers FM-7 digital microhardness tester

JEOL JSM-6010LA SEM

Labconco Freezone 2.5 L Freeze Dry System

Leica SP5

Leica CTR 6500 UV-laser capture microdissection microscope

Leica DMRXE microscope

Leitz 1512 microtome

LI-COR Odyssey Infrared Imaging System

Microm HM 500 M Cryostat

Millrock lyophilizer

Molecular Devices 96 well plate reader

MTS Load Cycle tester

Nanodrop 2000

New Brunswick shaking incubator

Nicolet iS10 ATR-FTIR

Nikon epifluorescent microscope

Nucleovision image station

Slide Scanning Olympus VS 120-S5

Packard Cobra auto-gamma counter

Packard 1900 TR liquid scintillation counter

PELCO Biowave Microwave

Perkin Elmer 1450 Luminescence Counter

QuantiFluor TM-P fluorometer

Robocast Assisted Deposition System EBD-2011-05

ScanCo MicroCT 35 Scanner

Shimadzu DSC-50

Shimadzu TGA-50

Shimadzu TMA-50H

Techcut low speed saws

Thermo Scientific Savant SPD 1010 Speed-Vac Concentrator

THINKY Centrifugal mixer

VIP Tissue Tek processing station

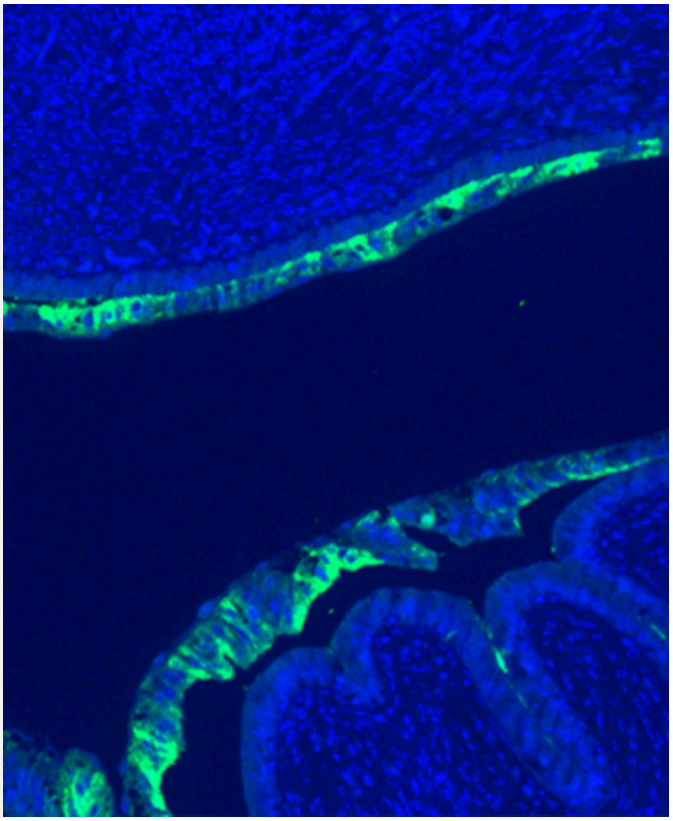
Tricontinent Multiwash 3 plate washer

Universal 320 centrifuge

VWR UV 6300 PC Double Beam Spectrophotometer

TEXAS A&M UNIVERSITY
CORE FACILITIES

Image Analysis Laboratory-Veterinary Medicine & Biomedical Sciences



The mission of the Image Analysis Laboratory is to provide advanced imaging technologies and image analysis tools for a broad range of life sciences research. This includes vital imaging of cellular processes within cells, tissue explants, and organoids at BSL-2 biosafety level, as well as a variety of support services for transmission electron microscopy of biological samples. Support services include individual and group instrument training, workshops, assistance with sample preparation, BSL-2 cell culture facilities, and formal instruction in a graduate lecture/lab course, Optical Microscopy and Live Cell Imaging.

CONTACT

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Image Analysis Laboratory-Veterinary Medicine & Biomedical Sciences Website

TEXAS A&M UNIVERSITY
CORE FACILITIES

Image Analysis Laboratory-Veterinary Medicine & Biomedical Sciences

EQUIPMENT

ARIVIS workstation:

- High-performance interactive 3D / 4D rendering on standard PCs and laptops with 3D Graphics Support
- Intuitive tools for stitching and alignment to create large multi-dimensional image stacks
- Powerful Analysis Pipeline for 3D /4D image analysis (cell segmentation, tracking, annotation, quantitative measurement, and statistics, etc)
- Easy design and export of 3D / 4D High-resolution Movies
- Seamless integration of custom workflows via Matlab API and Python scripting
- Data sharing for collaboration

Axio Imager.M2 Motorized Upright Microscope:

- Fluorescence LED Illumination – DAPI, GFP, Cy3, Cy5
- Axiocam 506 color camera and Axiocam HRm(opens in a new tab)
- Automated Multichannel, Z-Stacks, Motorized X-Y Stage for Automated Large Region Tiling
- Objectives: 1.25x, 5x, 10x, 20x, 40x, and 63x with phase and DIC optics
- Apotome.2 Optical Sectioning Slider
- ZEN Blue version 2.3 Software

Zeiss Cell Discoverer 7:

- Laser lines at 458, 477, 488, 514, 543 and 633 nm
- Petri dishes, chamber slides, multiwell plates, plastic or glass, thin or thick vessel bottoms, low skirt or high skirt plates.
- Definite focus, Incubation (Temperature & CO2) and motorized stage
- Zen Blue software complemented with Arivis software

Zeiss ELYRA S.1 Superresolution Microscope:

- Zeiss Axio Observer Z1 Microscope fully motorized
- Laser Lines: 405nm, 488nm, 561 and 643 nm
- Incubator for temperature and CO_2 control
- 3 and 5 grid rotation
- Zen software
- Workstation for Super resolution with 3D Visart, FRET, FRAP and Physiology modules
- Objectives: Plan-Apo 10X/0.45, Plan-Apo 63X/1.4oil, Plan-Apo 100X/1.4oil

Zeiss LSM 780 NLO Multiphoton Microscope:

- 34 Ch spectral GaAsP detection multiphoton microscope
- Laser lines at 458, 477, 488, 514, 543, and 633 nm
- Coherent Chameleon Ultra Ti: Saphire (720-950nm) pulsed laser
- Definite focus, Incubation (Temperature & CO2), and motorized stage
- Zen software FRET, FRAP, Physiology, and 3D VisArt modules
- ISS two-channel FCS and Fast FLIM
- Objectives: Plan-Apo 10X/0.45, Plan-Apo 20X/0.8, Plan-Apo 40X/1.4oil, C-Apo 40x/1.2water, Plan-Apo 63X/1.4oil
- Airy Scan detector with detection area consisting of 32 single detector elements, each of which acts like a very small pinhole.
- 1.5x better resolution than any classic confocal instruments.

TEXAS A&M UNIVERSITY
CORE FACILITIES

Image Analysis Laboratory-Veterinary Medicine & Biomedical Sciences

Zeiss TIRF3:

- Zeiss Axio Observer Z1 Microscope fully motorized
- Two cameras: High resolution AxioCam MRm and Roper S/W PVCAM
- Laser Lines: 405nm, 488nm, 514 nm, 561 nm
- Incubator for temperature and CO_2 control
- AxioVision 4 Software

Zeiss 510 META Confocal Microscope:

- Zeiss Axiovert 200 MOT microscope
- Laser lines at 458, 477, 488, 514, 543, and 633 nm
- Z-stack collection, spectral emission profiling, and separation
- Multi-time, Physiology, FRET, FRAP software
- Two confocal channels, one spectral detection channel (META), two channels non-descanned detection, and one transmitted light channel
- Objectives: Plan-Neofluar 10x/0.3 NA, Plan-Apochromat 20x / 0.8 NA,Plan-Neofluar 40x / 0.85 NA, , Plan-Neofluar 40x / 1.30 NA Oil, Plan Apochromat 63x / 1.4 NA Oil, C-Apochromat 40x / 1.2 NA Water

Zeiss Stallion Digital Imaging Workstation:

- Xenon fluorescent light source, 300 W with rapid switching (<2 msec) between excitation wavelengths
- Synchronization hardware (TTL-based)
- Shutter for transmitted light (25 mm)
- Incubator with CO2 and temperature Control
- 2 x CoolSnap HQ Camera with external ventilation
- Stallion software
- Ratio/FRET Software Module
- Antivibration table

Zeiss Digital Imaging Workstation:

- Zeiss Axioplan Microscope with motorized Z-stage and system components for brightfield, darkfield, phase contrast, DIC, and fluorescence
- Zeiss Axiocam HRc color camera with up to 13-megapixel resolution (4140 x 3096) in each color channel

FEI Transmission Electron Microscope:

- High-resolution TEM with top entry stage
- High-Voltage range: 40 to 100kV in steps of 10kV
- Intensity zoom: allows for constant screen brightness at different magnifications
- Intensity limit: prevents electron beam intensity overload on sample
- Magnification: 25 – 200000 x
- Automatic saving of full exposure sequence
- Integrated Dual Pentium PC with Windows operating system

Veritas Microsdissection System:

- UV Laser Cutting and LCM :
  - UV Laser Cutting ideal for non-soft tissues and capturing large numbers of cells
  - LCM (IR Laser) ideal for a single cell or a small number of cells
- Stage, optical movement, cameras, filters, and objectives are completely computer and software controlled
- Microdissection process is documented and archivable
- Unlimited slide processing in batch mode.
- High-sensitivity, variable integration time, color CCD video camera
- Inverted microscope with 4x, 10x, 20x, and 40x objectives

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Image Analysis Laboratory-Veterinary Medicine & Biomedical Sciences

ImageXpress Pico & BioTek Cytation 7:

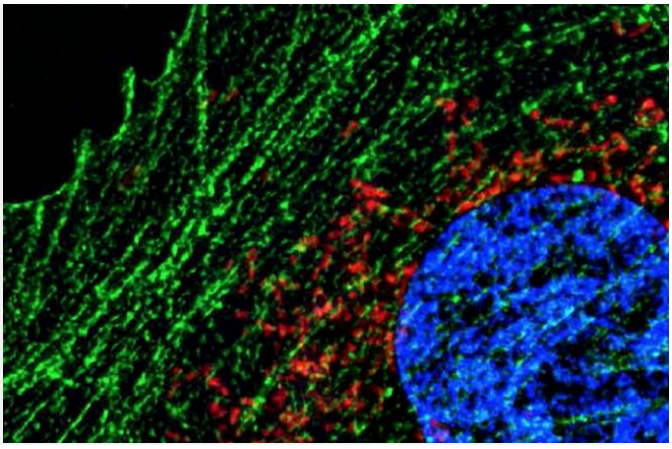
- Different Sample Holders: Plates, Slides
- Read Method: Live preview imaging with digital confocal, Kinetic, well-area scanning
- Luminescence wavelength range: 300 – 700nm
- Fluorescence wavelength selection: Five channels with images, spectral scanning without imaging
- Absorbance: 200 to 999 nm, tunable in 1 nm increments, available for well scanning
- Temperature control up to 50° C
- Uses CellReporterExpress Software with Windows 10, Gen 5 ver 3.09

Cryostar NX70 Cryostat:

- LCD touch-screen and joystick controls
- User-adjustable LED lighting
- Motorized and manual sectioning
- Vacutome for generating wrinkle-free sections
- Integrated height adjustments for users
- Rapid response temperature control
- Novel knife carrier feed with better sectioning quality
- Optional Cold disinfection for complete surface disinfection

TEXAS A&M UNIVERSITY
CORE FACILITIES

Integrated Microscopy and Imaging Lab



Medical Research and Education Building II

The mission of the IMIL is to support research progress and grant development by encouraging researchers to explore advanced imaging modalities and to incorporate them into their existing research programs.

The IMIL provides technical expertise and cutting-edge microscope systems to support the research of faculty and staff of Texas A&M University Health Science Center, Texas A&M University, and all other campuses. The IMIL includes six microscopy rooms, supporting facilities, and an image processing station.

Technical staff is available to train and assist with design, implementation, and analysis of experiments as well as assist in troubleshooting.

CONTACT

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https://medicine.tamu.edu/imil/index.html

TEXAS A&M UNIVERSITY
CORE FACILITIES

Integrated Microscopy and Imaging Lab

EQUIPMENT

Olympus Fluoview FV3000 Confocal Laser Scanning Microscope:

- Olympus IX83 fully motorized inverted microscope with ZDC laser-based autofocus
- Resonant scanner for high-speed acquisition and galvanometer scanner for high definition
- Automated microscope stage
- 4 High-Sensitivity GaAsP detectors
- Tokai hit stage-top live-cell incubation chamber
- Transmitted detector for Brightfield/DIC image acquisition
- Analog and digital in-out box for synchronization with external devices

Olympus VS120 Virtual Slide Scanning System

- 100-slide capacity for high throughput Imaging
- Transmitted light brightfield and epi-fluorescence scanning
- Automated sample identification and focus.
- Advanced stitching for tiled montage images
- Fluorescence light source: LED Lumencor SOLA
- Digital monochrome camera: Hamamatsu ORCA Flash4.0 V2
- Color camera: 2/3” CCD camera, 3.45 µm x 3.45 µm pixel size
- Fluorescence filters:
  - DAPI ZERO LED: Ex392/23, Em447/60, Dichroic409 (DAPI, AF405, BFP, Pacific Blue)
  - FITC ZERO LED: Ex474/27, Em525/45, Dichroic495 (FITC, GFP, Cy2, AF488)
  - MCherry ZERO LED: Ex578/21, Em641/75, Dichroic596 (mCherry, TexasRed, mRFP)
  - Cy5 ZERO LED: Ex635/18, Em680/42, Dichroic652 (Cy5, AF647, APC)

Leica SP2 Confocal Laser Scanning Microscope

- Leica DMIRE-2 motorized inverted microscope
- AOBS spectral confocal scanning head
- R9624 Hamamatsu Photonics PMTs

Nanofluor II Integrated Microscope System

- IX-81 Olympus inverted microscope with focus stabilizer
- Yokogawa CSU-22 motorized confocal scanning head
- Ultra-fast spinning disk confocal with Z-piezo control (up to 100 frames per second)
- TIRFM (Total Internal Reflection Fluorescence Microscopy) attachment
- Atomic Force Bioscope SZ closed loop I
- Ar/Kr gas laser

Olympus Fluoview FVMPE-RS Multiphoton Laser Scanning Microscope

- Upright microscope with gantry frame, optimized for intravital imaging with a large space for live animals and experimental equipment
- Inner-focus articulating nosepiece will image at any angle
- Dual wavelength laser with a tunable range from 680 nm to 1300 nm and a fixed wavelength line at 1045 nm enables simultaneous multi-color, multiphoton imaging
- Resonant scanner for high-speed acquisition and galvonometer scanner for high definition
- 2 High-Sensitivity GaAsP detectors

TEXAS A&M UNIVERSITY
CORE FACILITIES

Integrated Microscopy and Imaging Lab

Imaging Workstation

Only current users analyzing images taken on IMIL microscopes are allowed to use this resource

- Dell Precision 5820: Intel® Xeon® 3.70GHz, 128 GB RAM, and NVIDIA Quatro P4000 8GB
- Bitplane Imaris 9.8
- Olympus CellSens
- ImageJ/FIJI
- QuPath

Histology Laboratory

Only current users preparing samples for imaging experiments on IMIL microscopes are allowed to use these facilities

- Fridge – ThermoScientific 20LFEETSA (4C)
- Freezer – ThermoScientific Forma 900 series (-80C)
- Chemical hood – Venturi Supreme Air
- Cryostat – Leica CM1850
- Microtome – Thermo/Microm HM 355S
- Tissue processor – Thermo/Microm STP 120
- Tissue embedding center- Thermo/Microm Shandon Histocenter 3
- Vibrotome – Leica VT1000P
- Floatation Workstation Smart Waterbath-TBS-FWS

Cell Culture Laboratory

Only current users preparing samples for imaging experiments on IMIL microscopes are allowed to use these facilities

- 2 Biological safety cabinets – NuAire NU-540-400
- 6 Incubators – NuAire CO2 water-jacketed - NU-5800/E-12
- Fridge – ThermoScientific TSXSeries (4C)
- Freezer – ThermoScientific 20LFEETSA (-20C)
- Freezer – ThermoScientific Forma 900 series (-80C)
- Waterbath – Precision, model 51221054
- 2 Inverted Microscopes – Zeiss Invertoskop
- Centrifuge- Eppendorf 5810

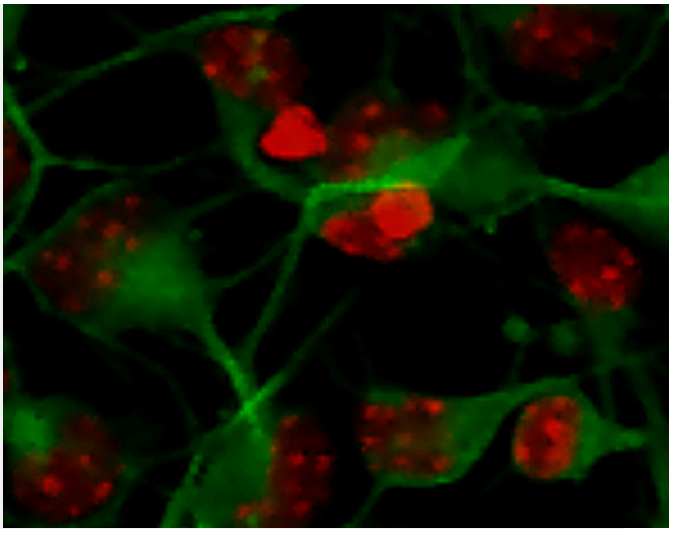
Tissue Prep Laboratory

Only current users preparing samples for imaging experiments on IMIL microscopes are allowed to use these facilities

- Fridge – ThermoScientific 20LFEETSA (4C)
- Freezer – ThermoScientific 20LFEETSA (-20C)
- Dissecting Microscope – Zeiss Stemi 2000-C
- Biological safety cabinet – Forma Scientific CCI 1240-4

TEXAS A&M UNIVERSITY
CORE FACILITIES

Microscopy and Imaging Center



Interdisciplinary Life Sciences Building

The Microscopy & Imaging Center serves a wide range of faculty and students at Texas A&M University in addition to researchers from outside of the university. Our mission is to provide current and emerging technologies for teaching and research involving microscopy and imaging in Life and Physical Sciences on the Texas A&M campus and beyond, training and support services for microscopy, sample preparation, in situ elemental/molecular analyses, as well as digital image analysis and processing. We are promoting cutting edge research in basic and applied sciences through research and development activities, as well as quality training and education through individual training, short courses and formal courses that can be taken for credit.

CONTACT

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https://microscopy.tamu.edu/

TEXAS A&M UNIVERSITY
CORE FACILITIES

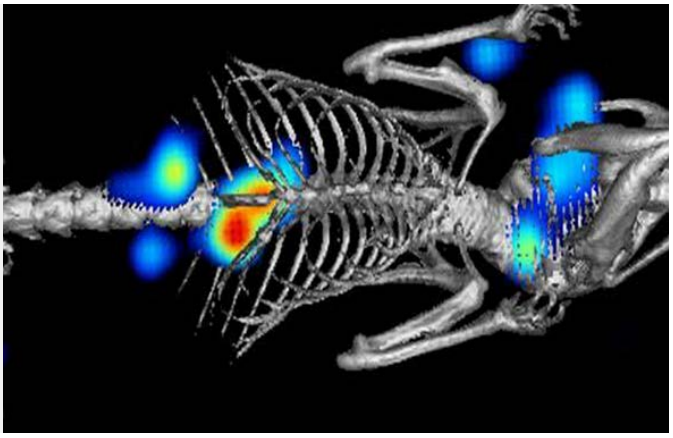
Microscopy and Imaging Center

EQUIPMENT

- **Leica DM6B:** Upright motorized microscope with fluorescence, phase contrast, DIC, polarization, and image stitching.
- **Zeiss Axiophot:** This light microscope is equipped for bright field (transmitted and reflected), phase contrast, transmitted and reflected polarization, Nomarski differential interference contrast microscopy.
- **FEI Tecnai G2 F20 ST FE-TEM-Materials:** Morphological, crystallographic, and elemental analysis of bulk and nanoscale materials.
- **FEI Tecnai G2 F20 Cryo FE-TEM:**
- •Z-contrast dark-field STEM imaging using HAADF detector
- •Oxford instruments EDS detector
- •EELS (Electron Energy Loss Spectroscopy) for elemental mapping and high contrast zero energy loss imaging of thicker samples
- •Automated collection of tilt series for room temperature or cryo-electron tomography in TEM or STEM mode
- **JEOL 1200 TEM:** Provides excellent contrast for biological as well as materials samples with double condenser projection lens and bright/dark field imaging.
- **FEI Quanta 600 FE-SEM:** The Quanta 600 FEG is a field emission scanning electron microscope capable of generating and collecting high-resolution and low-vacuum images.
- **Tescan Vega SEM:** Investigation of non-conductive samples is possible in the variable pressure mode and the Oxford EDS detector allows for the characterization of elements in a sample.
- **Leica Cryo GP 2:** For vitrification of macromolecular complexes and nanocomplexes used in cryo-TEM imaging.
- **Pelco Easiglow Glow Discharge Apparatus:** This machine is used to render EM grids with a support film more hydrophilic to improve dispersion of aqueous samples for TEM imaging.
- **Cressington 308 Evaporative Coater:** This coater is for carbon coating of samples for SEM by applying a coating of mica to produce carbon support film for TEM.
- **Cressington 208HR Sputter Coater:** This coater is equipped with a turbo molecular pump and is dedicated for coating high resolution imaging on the Quanta FE-SEM.
- **Cressington 108 Sputter Coater:** This instrument is used for coating of samples for scanning electron microscopy. It is currently set up for coating with gold.
- **Diener Zepto Plasma Cleaner:** This plasma cleaner equipped with argon and oxygen gas supply is used to clean surfaces and cause surface activation for bonding polymers. It may also be used for cleaning glass coverslips for TIRF microscopy.
- **Pelco Biowave:** This is a sophisticated cold microwave oven that permits efficient and effective fixation, embedding, staining, and immunostaining.
- **Fischione Model 1010 Ion Mill:** Precision ion milling and polishing system for TEM specimens.
- **American Optical Heavy Duty Sliding Microtome:** For sectioning of hard and tough samples for light microscopy such as wood and bone.
- **Microm Rotary Microtome:** For sectioning of wax-embedded samples for light microscopy.

TEXAS A&M UNIVERSITY
CORE FACILITIES

IBT Pre-Clinical Imaging Core-Houston, TX



Institute of Biosciences and Technology
Houston, TX

The purpose of the Pre-Clinical Imaging Core is to provide a platform to support investigators using state-of-the-art dynamic molecular and anatomical imaging technology to accelerate a broad spectrum of basic and pre-clinical studies via non-invasive, live and in vivo fluorescence, bioluminescence and micro-ultrasound imaging system.

- **PerkinElmer IVIS Spectrum In Vivo Imaging System:** integrated with 2D optical and 3D optical tomography in one platform, ideal for longitudinal monitoring of disease progression, tumor tracking, cell trafficking and gene expression patterns in living animals.
- **Fujifilm-Visual Sonics Vevo 3100:** powerful combination of high frame rates and advanced image processing system, ideal for pre-clinical imaging including disease development, tumorigenesis progression, angiogenesis, hemodynamic changes, animal model phenotype characterization.

CONTACT

Jiang Chang, *Director*
jiangchang@tamu.edu
713.677.7603

https://ibt.tamu.edu/cores/pre-clinical/index.html

TEXAS A&M UNIVERSITY

CORE FACILITIES

INTEGRATED BIOLOGICAL AND MEDICAL TRANSLATIONAL

Integrated Biological and Medical Translational

Cores in this area focus on advanced equipment and techniques associated with human, animal, and plant biological and medical research.

Name of Core Facility	Director	Thematic Area
AgriGenomics Laboratory	David Stelly	Integrated Biological and Medical Translational
Animal Genetics Laboratory	Rytis Juras	Integrated Biological and Medical Translational
Antibody & Biopharmaceutics Core	Praveen Rajendran	Integrated Biological and Medical Translational
COM Cell Analysis Facility	Laura West	Integrated Biological and Medical Translational
Comparative Medicine Program	Robert Rose	Integrated Biological and Medical Translational
Flow Cytometry and Cell Sorting Core	Margie Moczygemba	Integrated Biological and Medical Translational
Flow Cytometry Facility	Gus Wright	Integrated Biological and Medical Translational
High Throughput Research and Screening Center	Peter Davies	Integrated Biological and Medical Translational
Human Clinical Research Building	Richard Kreider	Integrated Biological and Medical Translational
Integrated Metabolics Analysis Core (IMAC)	Arul Jayaraman	Integrated Biological and Medical Translational
Molecular Cytogenetics Laboratory	Terje Raudsepp	Integrated Biological and Medical Translational
Molecular Genomics Core	Andrew Hillhouse	Integrated Biological and Medical Translational
Multi-Crop Transformation Facility	Marco Molina	Integrated Biological and Medical Translational
Protein Production Core	Magnus Hook, Wen Liu	Integrated Biological and Medical Translational
Rodent Preclinical Phenotyping Core	Sunja Kim	Integrated Biological and Medical Translational
Systems and Synthetic Biology Innovations Hub	Joshua S. Yuan	Integrated Biological and Medical Translational
Texas A&M Institute for Genomic Medicine	Ben Morpurgo	Integrated Biological and Medical Translational

TEXAS A&M UNIVERSITY
CORE FACILITIES

AgriGenomics Laboratory

Agronomy Field Lab Building 0954

The primary goal of the AgriGenomics Lab (AGL) is to assist graduate students, staff and faculty launch, economize and expedite their research, especially when it involves DNA extraction and quality checks, targeted genotyping and DNA content analysis. We also will, as needed, facilitate usage of complementary cores and assist with research planning and data analysis. AGL members have free lab access and reduced costs for services as well as one-on-one training and advising with AGL staff. Texas A&M system users can purchase services at a cost-effective rate. This service is especially useful for investigators interested in exploring new techniques, and obtaining pilot data sets for external funding proposals. Non-system members are also welcome to set up projects using AGL facilities.

CONTACT

David Stelly, *Director*

stelly@tamu.edu

Robert Vaughn
979.458.6954

http://agl.tamu.edu/

AgriGenomics Laboratory

EQUIPMENT

- **PHERAstar® Microplate Reader: FRET capable with KlusterKaller software**
- **Denovix DS-11 spectrophotometer / fluorometer: For nucleic acid and protein quantity and quality measurements**
- **BD Accuri C6 flow cytometer**
- **Advanced Analytical fragment analyzer**
- **Hydrocycler: high capacity thermocycler (8×96-well plates or 16×384-well plates)**
- **Bioer GenePro 96-well thermocycler**
- **ABI Veriti 384-well thermocycler**
- **SPEX 1600 MiniG plate homogenizer: tubes or plates**
- **Apricot Designs i-Pipette 96: semi-automated plate replicator**
- **Nuaire refrigerated centrifuge**
- **Labnet Accuseal semi-automated plate sealer**
- **Thermofisher Barnstead Nanopure® water filtration system**
- **Labconco FreeZone® 6L freeze dryer**

TEXAS A&M UNIVERSITY
CORE FACILITIES

Animal Genetics Laboratory

Veterinary Research Building 1197 Room 225

The Animal Genetics Laboratory offers DNA genotyping used for identification, parentage verification, and determination of specific homozygous/heterozygous gene mutations in animals. The analysis provides useful information for diseases, coat colors, as well as physical traits. Currently, the lab provides routine services for testing horses, donkeys, and cattle. Our turn-around time for delivering results once samples are received is two weeks. Our lab will provide you with detailed results specific to the tests requested. Clients must send pulled hair samples with at least 30-60 hair follicles attached. We also accept blood and semen samples however, you need to contact the director Dr. Rytis Juras before sending samples other than hair.

CONTACT

Rytis Juras, *Director*
rjuras@tamu.edu

979.845.6524

https://vetmed.tamu.edu/animalgenetics/

TEXAS A&M UNIVERSITY
CORE FACILITIES

IBT Antibody & Biopharmaceutics Core-Houston, TX

Institute of Biosciences and Technology

ABC is a fee-for-service antibody core facility created to have far-reaching impact on research by generating customized polyclonal and monoclonal antibodies tailored to meet the specific needs of individual research programs, including engineering of monoclonal antibodies.

Services:

- Rapid production and purification of monoclonal antibodies from hybridoma cell lines
- Fluorescent labeling of antibodies
- Isotyping, affinity determination, maturation and humanization
- Optimized antibody engineering

CONTACT

Praveen Rajendran, *Director*
prajendran@tamu.edu
713.677.7803

https://ibt.tamu.edu/cores/abcore/index.html

TEXAS A&M UNIVERSITY
CORE FACILITIES

College of Medicine Cell Analysis Facility-Texas A&M Health Science Center

Medical and Educational Research II Building

The College of Medicine Cell Analysis Facility (COM-CAF) at the Texas A&M Health Science Center (TAMHSC) provides cell analysis and cell sorting services for research in the TAMHSC and Texas A&M community and is managed by the Department of Microbial Pathogenesis and Immunology.

CONTACT

Laura West, *Director*
lwest@tamu.edu

Robbie Moore
rmoore@tamu.edu

https://medicine.tamu.edu/centers/caf.html

TEXAS A&M UNIVERSITY
CORE FACILITIES

College of Medicine Cell Analysis Facility-Texas A&M Health Science Center

EQUIPMENT

Cytek Aurora 5L:

- 5-laser configuration:UV (355nm)Violet (405nm)Blue (488nm)Yellow-Green (561 nm)Red (640 nm)
- 64 fluorescent detectors (16 UV, 16 Violet, 14 Blue, 10 Yellow-Green, and 8 Red)
- Equipped with optional plate loader

BD Fortessa X-20:

- 4 Lasers: Violet (405), Blue (488), Yellow-Green (561), Red (640)
- 16 fluorescent channels
- Multi-parametric and high-resolution phenotypic and functional characterization on a per cell basis.
- Equipped with optional plate loader

BDFACS Aria III:

- Violet (405)
- Blue (488)
- Yellow-Green (561)
- Red (640)
- 13 fluorescent channels
- Up to 4-way bulk sorting
- ACDU attachment for sorting into well plates or slides
- Single Cell Index sorting

Miltenyi gentleMACS Octo Dissociator:

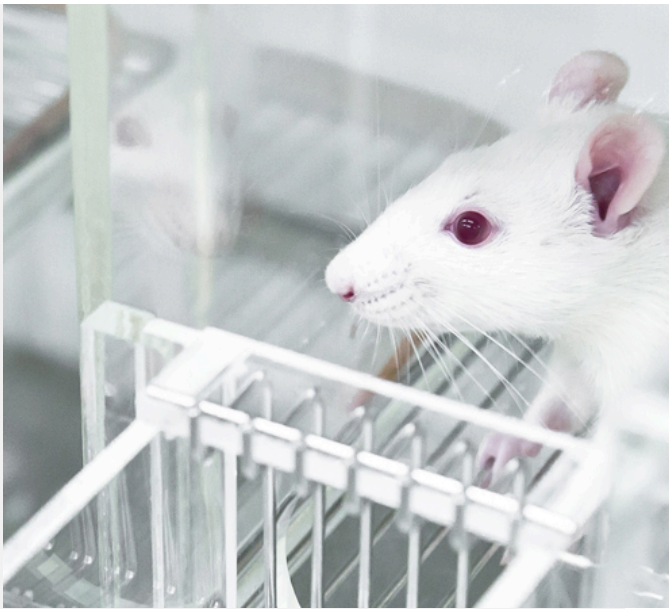
- Semi-automated dissociation of tissues into single-cell suspensions or homogenates
- Optimized, pre-set programs
- Kits optimized for specific tissue types: mouse, human or rat-tumor, heart, neural tissue, spleen, lung, lamina propria, muscle, epidermis, liver and others

Seahorse XFe96 Analyzer:

- 96-well plate format
- Measure OCR and ECAr of live cells
- Measure mitochondrial function
- Quantify ATP production
- Generate a metabolic phenotype within one hour
- Measure glycolytic rates in live cells
- Flexible assay design

TEXAS A&M UNIVERSITY
CORE FACILITIES

Comparative Medicine Program



The program's facilities and services are available for all Texas A&M campus affiliated faculty, staff, and students who have been approved to conduct animal research by the Institutional Animal Care and Use Committee (IACUC). CMP is accredited by the Association for the Assessment and Accreditation of Laboratory Animal Care (AAALAC) through its affiliation with other AAALAC-accredited Texas A&M programs. CMP facilities offer housing and care for most standard laboratory animals. Specialized housing can be provided for biohazard projects and hazardous chemical projects. Varying degrees of animal isolation are available. Housing for large animal species is limited; however, various other campus animal care facilities can provide housing for large animals. CMP also offers a variety of services to institutional personnel. Additional information is available as one-page summaries of the Attending Veterinarian role and the Comparative Medicine Program overview.

CONTACT

Robert Rose, *Director*
rrose@tamu.edu

Gabrielle Kapp, *Director*
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979.845.7433

https://vpr.tamu.edu/comparative-medicine-program/cmp-administration/

TEXAS A&M UNIVERSITY
CORE FACILITIES

IBT Flow Cytometry and Cell Sorting Core-Houston, TX

Institute of Biosciences and Technology
Houston, TX

The IBT Flow Cytometry and Cell Sorting Facility (FCCSF) provides diverse, technically sophisticated flow cytometry and cell sorting services, as well as the scientific expertise necessary to integrate this technology into research projects (Dr. Moczygemba).

CONTACT

Margie Moczygemba, *Director*
mmoczygemba@tamu.edu
713.677.8114

https://ibt.tamu.edu/cores/flow-cytometry/index.html

TEXAS A&M UNIVERSITY
CORE FACILITIES

IBT Flow Cytometry and Cell Sorting Core-Houston, TX

EQUIPMENT

BD Biosciences FACSFusion Cell Sorter:

- uses electrostatic droplet-based, high speed technology for isolating any combination of fluorescently labeled cell markers
- equipped with 4 lasers (405 nm, 488 nm, 561 nm, and 640 nm) and 15 filters for experiments requiring up to 15 multicolor analysis
- variety of nozzle sizes/pressure configurations for sorting all types of cells including fragile ones
- can sort up to 50,000 events/second in temperature-controlled sample and collection chamber
- certified to perform BSL2 level sorting of single cells into 96 well plates, as well as bulk sorting into two or four tubes

BD Biosciences LSRII analytical flow cytometer:

- equipped with 4 lasers (405 nm, 488 nm, 561 nm, and 640 nm) and 13 filters suitable for experiments requiring up to 13 color analysis plus forward and side scatter data acquisition
- users have access to FlowJo data analysis software to customize their data analysis

Intellicyte iQue Screener Plus:

- will provide access to high throughput flow cytometry analysis for drug discovery research
- will support plate-based sampling systems (96- or 384-well plates) that can be integrated with plate-handling robotics and automated cell culture and liquid-handling peripherals
- when fully automated, flow cytometry workstations have a maximal throughput capacity of up to 72 separate 384-well plates per day, this is a 50-100 fold improvement over the throughput of conventional flow cytometers

Flow Cytometry Analyses Commonly Performed:

BD Biosciences FACSFusion Cell Sorter:

- Flow Cytometry Analyses Commonly Performed:
- BD Biosciences FACSFusion Cell sorter:
- cell sorting from cell lines, primary cells and disaggregated tissues
- immunophenotyping, cellular cytotoxicity assays, apoptosis detection, kinetic studies, receptor endocytosis, cell cycle analysis, bacterial analysis, and others as needed.

TEXAS A&M UNIVERSITY
CORE FACILITIES

Flow Cytometry Facility-Veterinary Medicine & Biomedical Sciences

VMR Addition 257

The mission of the College of Veterinary Medicine Cytometry and Cell Sorting Core Facility at Texas A&M is to provide the highest quality flow cytometry data, data analysis and cell sorting services for the faculty and staff of the Texas A&M University System and surrounding universities and companies. We currently provide training for flow cytometer (analyzer) use and data analysis using the FlowJo software. We also provide staff-assisted flow cytometry (analyzer) data acquisition, cell sorting, and data analysis. The core provides experimental design and consultation services. We also welcome collaborations on a case by case basis.

CONTACT

Gus Wright, *Director*
gwright@cvm.tamu.edu
979.458.9859

https://vtpb.tamu.edu/flow-cytometry/

TEXAS A&M UNIVERSITY
CORE FACILITIES

Flow Cytometry Facility-Veterinary Medicine & Biomedical Sciences

EQUIPMENT

Beckman Coulter Moflo Astrios Cell Sorter:

- 3 lasers: 405, 488, and 640nm
- 11 detectors

Luminex Amnis Cell Stream:

- 3-lasers: 405, 488, and 642nm
- 13 detectors
- 96-well plate auto-sampler
- High gain mode for small particle analysis.

Luminex Amnis Image Stream Imaging Flow Cytometer:

- 4-lasers: 405, 488, 561, and 642nm
- 10 fluorescence channels and 2 brightfield channels
- 20x, 40x, and 60x objectives
- 96-well plate auto-sampler
- High gain mode for small particle analysis.

BD Accuri C6 Flow Cytometer:

- 2 lasers: 488 and 640nm
- 4 detectors

TEXAS A&M UNIVERSITY
CORE FACILITIES

IBT High Throughput Research and Screening Center-Houston, TX

Institute of Biosciences and Technology
Houston, TX

A unique resource providing researchers from Texas A&M and the Texas Medical Center with access to state-of-the-art tools to support the discovery of new drugs and new treatments for some of the most devastating diseases of our time. The Combinatorial Drug Discovery Program resides in the Texas A&M Health Science Center's Institute of Biosciences and Technology. This core provides industry standard high throughput screening and microscopy capabilities to scientists carrying out chemical and genomic biochemical and drug discovery research. The core supports investigators from all of the institutions in and around the Houston/Galveston region and with pharmaceutical and biotechnology partners. The core provides many benefits, such as access to an automated infrastructure that is capable of supporting both biochemical and cell-based screens. The core also provides ready access to a collection of nearly 60,000 drugs, investigational agents and small molecules. Our collections of test agents include current FDA-approved clinical candidates and off-patent drugs exhibiting the 'drug-like' qualities of acceptable solubility, desirable ADME/toxicology properties and adequate bioavailability. These properties are important for rapid advancement of new agents into successful preclinical and clinical trials by discovering new therapeutic vulnerabilities alone or in combinations. We also have collections of mechanistically annotated informer sets that are pathway specific modulators for studying mechanism of action. The core also has collections of natural products and diverse sets of small molecules that can be interrogated for new target discovery. The greatest benefit of the core; however, is its fulltime professional staff. The screening team is composed of highly experienced biologists, biochemists, pharmacologists and bio-informaticians with pharmaceutical industry and academic experience. Each project is individually evaluated and a team of scientists from the core is created to fit the specific needs of the project from assay development through primary, secondary and orthogonal screening. The team is committed to providing an integrated and highly collaborative program with every investigator.

CONTACT

Clifford Stephan, *Director*
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713.677.7456

https://ibt.tamu.edu/cores/high-throughput/index.html

TEXAS A&M UNIVERSITY
CORE FACILITIES

IBT High Throughput Research and Screening Center-Houston, TX

EQUIPMENT

- **Labcyte Echo 550:** acoustic dispenser integrated into an Access workstation with a Cytomat cell culture incubator and Thermo Scientific Multidrop Combi.
- **Tecan Evo 200 workstation:** capable of 96, 384 tips transfer as well as pintools, integrated with Tecan multimode readers M1000pro and two 222-plates capacity Liconic incubators, RT and humidity controlled cell culture.
- Two dual arm **Beckman-Coulter Biomek FXP platforms**, **Beckman NX P**. Both the **Tecan Evo200** and **Beckman FXP** workstations have both a 96-channel and variable spanning 8-channel pipettor as well as pin tool capabilities. The peripherals include a temperature and humidity controlled cell culture incubators and consumables storage system from Cytomat and Liconic, **BioTek ELx405** and DTX.
- **Tecan Hydrospeed** microplate washer and Multidrop Combi system with stackers.
- Several **Multidrop Combi** integrated to our automation workstations as well as stand alone
- Multimode microplate reader: **BioTek Synergy Neo2** with plates loader

All cell based growth, viability and multiplexed high-content imaging studies are performed using our primary screen platform in conjunction with our imaging systems which provide high-performance laser-based, confocal, high-content analysis for 2D, 3D, and spheroids cultures

- **GE Healthcare IN Cell Analyzer 6000:** a self-contained unit with an integrated Kindex plate handler, 90 plates capacity from Process Analysis & Automation Ltd., United Kingdom. This system is capable of collecting images from slides to 1536well plates and more that 200,000 wells per day, from 4x – 40x air lenses (field-of-view at 10×: 2.78 mm2) and is capable of automatically switching from low to high magnification without additional system setup.
- **Molecular Devices ImageXpress:** Micro confocal microscopes: is integrated with a Cytomat cell culture incubator for continuous live cell imaging 24hrs a day. The microscope has a large CMOS camera and is capable of 5 colors fluorescence imaging with 2x – 40x air lenses (field-of-view at 10×: 1.96 mm2). The platform is capable of imaging from slides to 1536well plates and is capable of collecting images from more than 200,000 wells per day.

In addition to expertise, we have built significant computational infrastructure to handle the large volume of data produced in phenotypic screening. Key computations systems include: A dedicated image analysis server with 40 logical processors, 192 GB of RAM, GPU processor, and 20 Tb of local storage; 4 peripheral workstations each with at least 10 logical processors, 64 GB of RAM, and a GPU; A centralized data server with a storage capacity of 100Tb. All computational resources can be utilized as a single unit using server management and task automation tools in Pipeline Pilot.

Statistical services:

- Assay design optimization
- Assay performance evaluation
- Data normalization and integration
- Exploratory analysis
- Development of automated classifiers using state-of-art machine learning techniques

Image analysis services:

- Development of custom image analysis
- Upscaling of established protocols
- Experience with monolayers, organoids, spheroids, and time lapse data

Bio- and Chemi- informatics support:

- Chemical space profiling
- Quantitative structure activity relationship
- Biomarker discovery
- Knowledge base mining
- High dimensional data embedding

TEXAS A&M UNIVERSITY
CORE FACILITIES

IBT High Throughput Research and Screening Center-Houston, TX

Key software and programming languages:

- Pipeline Pilot from Biovia
- Matlab from Mathworks
- Prism from Graphpad
- R programming language
- Python programming language
- IN Cell Developer from GE Life Sciences
- MetaXpress from Molecular Devices
- ImageJ from NIHs
- CellProfiler from the Broad Institute
- Excel from Microsoft

Key Computational Infrastructure:

- Dell T630 server with dual Xenon processors, 192 GB RAM
- 4 peripheral workstations each with at least 10 core Xenon processor, 64 GB RAM
- Centralized 100 Tb data storage server
- Server integration software

TEXAS A&M UNIVERSITY
CORE FACILITIES

Human Clinical Research Facility

Human Clinical Research Facility

In addition to housing a center and several labs, the HCRF also serves as a Human Clinical Core facility that can collect data for faculty members on a fee for service basis. The following shows some of the base services offered. Faculty needing services not listed can contact Dr. Kreider to discuss the feasibility and costs of adding other services.

CONTACT

Richard Kreider, *Director*
rbkreider@tamu.edu
979.845.1498

https://hcrf.tamu.edu/

TEXAS A&M UNIVERSITY
CORE FACILITIES

Human Clinical Research Facility

EQUIPMENT

Services:

- Exercise and Rehabilitation Training Facilities
- Large Conference Room / Lecture Area
- Offices for faculty, staff, and research assistants
- Data Storage Area
- 12 Bed Facility for Overnight Research Studies
- Metabolic Kitchen
- Rehabilitation area
- DEXA and Resting Energy Expenditure Rooms
- Medical Exam & Procedure Rooms
- Comprehensive Wet Lab Facilities

Clinical Population Services:

- Phlebotomy Venipuncture
- Indwelling Catheter
- Hourly Blood Collection from IV Catheter
- Continuous Glucose Monitoring
- Nursing Supervision
- Height / Weight/BMI
- Resting Cardiovascular Hemodynamics and Respiration
- Body Composition and Bone Density Assessment (DEXA)
- Lung function
- Handgrip
- Resting Energy Expenditure
- Isokinetic Strength Testing (KinCom)
- Gait Analysis
- Dietary recall (24h)
- Neuropsychological Testing
- 6 Minute Walk Test
- Balance Assessment
- Exercise Rehabilitation (Group Rehab Sessions/month)

Clinical Population Recruitment:

- Recruitment for Clinical Study – chronic diseases
- Recruitment for Clinical Study – Healthy
- Screening for Clinical Study

Healthy Population Services:

- Recruitment – Apparently Healthy
- Entrance Criteria – Apparently Healthy
- Phlebotomy Venipuncture
- Phlebotomy (Finger Stick)
- Muscle Biopsy
- Fat Biopsy
- Urine Assessment
- Saliva Assessment
- Height / Weight / BMI
- Bioelectrical Impedance (BIA)
- Skinfold Body Composition
- Body Composition and Bone Density Assessment (DEXA)
- Resting Energy Expenditure
- Submaximal Exercise Test
- Flexibility Test
- ECG Stress Tests
- Cardiopulmonary Stress Test
- Endurance Capacity Test
- Anaerobic Capacity Test
- Isotonic Strength Assessment
- Isokinetic Strength Testing (KinCom)
- Algometer Pain Assessment
- Dietary Record (4-d)
- Cognitive Function / Psychological Inventory Assessment
- Exercise Training (3 sessions per month/group training sessions/hours)

General Analyses/Services:

- CBC w/Differential Panel
- Comprehensive Serum Panel (Enzyme Panel)
- Comprehensive Serum Panel (Full Comprehensive)
- Comprehensive Serum Panel (Glucose & Lipid Panel)
- Hormone Analysis (e.g., ELISA or EIA) – Average Kit Cost
- Hormone Analysis (e.g., ELISA or EIA) – High Cost Kit

Human Clinical Research Facility

- Hormone Analysis (e.g., ELISA or EIA) – Low Cost Kit
- Amino Acid Analysis (Outside Lab)
- Sample Handling & Preparation
- Sample Storage (Freezers)

General Services:

- IRB Preparation (Apparently Healthy Study Population)
- IRB Preparation (Clinical Population Study)
- Record Storage
- Scheduling
- Data Entry / Analysis
- Study Management
- Nursing Consultation
- Off-site Particicipant Monitoring / Data Collection
- Data & Safety Monitoring (per hour)
- Consulting (per hour)
- Study/Exam Room or Training Facility Access (per hour)

TEXAS A&M UNIVERSITY
CORE FACILITIES

Integrated Metabolomics Analysis Core

Biochemistry & Biophysics 402

- Open access core facility available to all Texas A&M users for Metabolomics service and research
- Different levels of service from drop-off to collaborative projects
- Training for Texas A&M postdoctoral fellows and students to use the state-of-the-art instrumentation in support of specific projects
- Short courses and workshops on advances in metabolomics

CONTACT

Arul Jayaraman, *Lab Manager*
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979.845.4832

https://imac.tamu.edu/

TEXAS A&M UNIVERSITY
CORE FACILITIES

Integrated Metabolomics Analysis Core

EQUIPMENT

TSQ Altis Liquid Chromatography—Mass Spectrometer (Thermo Scientific):

- offers improvements in the ion source, mass analyzer and RF electronics to offer high sensitivity, reduced noise, and more data points with high SRM rates compared to previous generation instruments. Segmented quadrupoles enhance ion transmission and consistency to ensure superb sensitivity. This triple quadrupole mass spectrometer is used for Targeted Metabolomics (Quantification). We use Trace Finder Software for data analysis which allows for an array of capabilities in performing targeted screening and quantification.
- TSQ 8000 EVO Gas Chromatography – Mass Spectrometer (Thermo Scientific) is another triple quadrupole instrument and is used for both Targeted and Untargeted Metabolomics.High-performance interactive 3D / 4D rendering on standard PCs and laptops with 3D Graphics Support
- Intuitive tools for stitching and alignment to create large multi-dimensional image stacks
- Powerful Analysis Pipeline for 3D /4D image analysis (cell segmentation, tracking, annotation, quantitative measurement, and statistics, etc)
- Easy design and export of 3D / 4D High-resolution Movies
- Seamless integration of custom workflows via Matlab API and Python scripting
- Data sharing for collaboration

Q-Exactive Plus Orbitrap Liquid Chromatography—Mass Spectrometer (Thermo Scientific):

- This system is a High Resolution Accurate Mass instrument and has the ability to routinely and confidently identify, quantify, and confirm in a single analysis using a single mass spectrometer. This high resolution mass spectrometer is used for Untargeted Metabolomics (Discovery). We use Compound Discoverer software series for data acquisition, analysis and small molecule identification.

TSQ Quantiva Liquid Chromatography—Mass Spectrometer (Thermo Scientific):

- uses active ion management to exceed even the most stringent analytical requirements with high sensitivity, speed, and dynamic range. Selected reaction monitoring (SRM) uses collision-induced dissociation which is used as a means to increase selectivity. This triple quadrupole mass spectrometer is used for Targeted Metabolomics (Quantification). We use Trace Finder Software for data analysis which allows for an array of capabilities in performing targeted screening and quantification.

TSQ 8000 EVO Gas Chromatography—Mass Spectrometer (Thermo Scientific):

- another triple quadrupole instrument and is used for both Targeted and Untargeted Metabolomics.High-performance interactive 3D / 4D rendering on standard PCs and laptops with 3D Graphics Support

ANALYSIS METHODS

LC-MS Standard Targeted Protocols:

- 1. Amino acid analysis
- 2. Aromatic amino acid metabolism pathway analysis
- 3. Curcumin and metabolite analysis
- 4. Single compound methods for hydroxyproline, various drugs and other compounds
- 5. PFA’s and other environmental contaminants
- 6. Bile acids
- 7. Cinnamic acid metabolism
- 8. Catecholamines
- 9. Benzoic acid metabolites / polyphenols

Integrated Metabolomics Analysis Core

LC-MS Standard Untargeted Protocols:

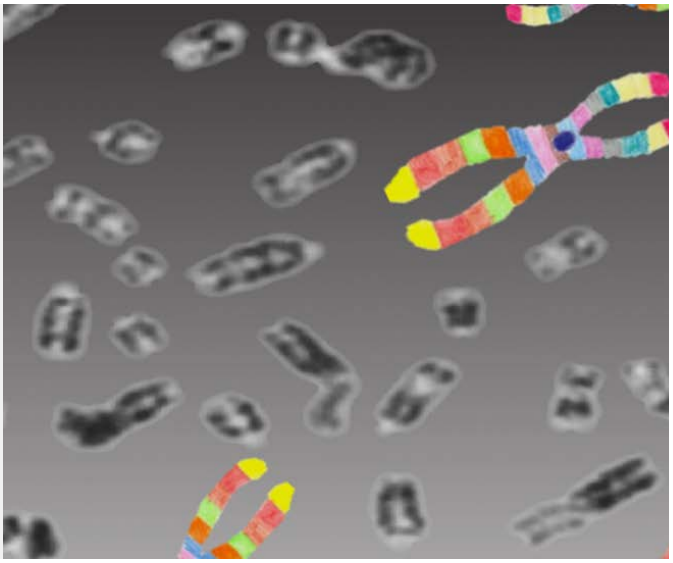
- 1. Standard reverse phase analysis – Amino acids and metabolites, secondary metabolites
- 2. Standard HILIC – Sugar phosphates, carboxylic acids and amino acids
- 3. Extended reverse phase analysis – Compound and degradant analysis, metabolite identification
- Custom methods – We are always excited to develop new methods for specific applications

GC-MS Standard Targeted Protocols:

- 1. Short chain fatty acids
- 2. Fatty acid methyl ester analysis
- 3. Sterol analysis
- 4. Single compound methods for farnesol, p-cresol and various other compounds.34 Ch spectral GaAsP detection multiphoton microscope

TEXAS A&M UNIVERSITY
CORE FACILITIES

Molecular Cytogenetics Laboratory



VMR Building Room 314

For chromosome analysis, we use both traditional and state-of-the-art techniques and carry out tests for all domestic animals and a broad range of wild species, including non-mammalian vertebrates. Analyses are done either for a fee or on a collaborative basis.

Available Services:

- Karyotyping from blood, tissues and cell lines
- Karyotyping with routine staining or G-banding of chromosomes
- Molecular cytogenetic analysis using Fluorescent In Situ Hybridization (FISH)
- FKBP6 Genotyping — Test for Thoroughbred stallion subfertility from blood or hair follicles

CONTACT

Terje Raudsepp, *Director*
traudsepp@cvm.tamu.edu

https://vetmed.tamu.edu/molecular-cytogenetics/

TEXAS A&M UNIVERSITY
CORE FACILITIES

TIGSS Experimental Genomics Core

Genomics Core houses various instruments and lab equipment to support genomics-based research and is located in Reynolds Medical Building 446A and VMR Addition 266. Training and experimental support is available.

CONTACT

Andrew Hillhouse, *Associate Director*
hillhouse@tamu.edu

https://genomics.tamu.edu/genomics-core/

TEXAS A&M UNIVERSITY
CORE FACILITIES

TIGSS Experimental Genomics Core

EQUIPMENT

- **Maxwell 16 (Promega):** The Maxwell 16 Integrated System combines compact instrumentation, optimized automated methods, prefilled reagent cartridges, service and support to save time.
- **Qubit Fluorometer (Life Technologies):** Easy to use fluorometer for a variety of DNA, RNA and protein assays.
- **CFX96 Touch Real-Time PCR Detection System (Bio-Rad):** 96 well real time PCR system with six-channel detector with quick set up runs. Monitors amplification traces in real time.
- **Tape Station (Agilent):** The Bio-Plex Pro Wash Station eliminates manual wash steps from Bio-Plex Assays, making them as easy as ELISAs.
- **Bio-Plex Pro Wash Station (Bio-Rad):** The Bio-Plex Pro Wash Station eliminates manual wash steps from Bio-Plex Assays, making them as easy as ELISAs.
- **GentleMACS Octo Dissociator (Miltenyi):** Automated tissue processing to dissociate target tissue into single cell suspensions.
- **Cytation 5 (BioTek):** Cell imaging multi-mode microplate reader that combines automated digital microscopy and conventional microplate detection.
- **MinION (Oxford Nanopore):** Oxford Nanopore DNA sequencer for real time, long-read, and low cost sequencing.
- **10X Chromium:** Chromium Single Cell 3' performs deep profiling of complex cell populations with high-throughput digital gene expression on a cell-by-cell basis.
- **Countless Cell Counter (Life Technologies):** Generates automated cell and viability counts in as little as 30 seconds.
- **epMotion 5075 Fluidi Handling Robot (Eppendorf):** Easy to program liquid handling robot that can be used for any molecular application that can be automated including NGS library generation, PCR setup, and nucleic acid extraction.
- **Bio-Plex 200 (Bio-Rad):** A suspension array system that supports analysis of protein and nucleic acids in a multiplex solution detection up to 100 biomolecules in a single sample.
- **High Performance Computing:** The TIGGS High Performance Compute Cluster is tailored for bioinformatics and computational Biology applications, sequence assembly, alignment and analysis and many more.
- **Digital PCR System** for absolute quantification of target DNA or RNA molecules using EvaGreen and probe-based Droplet Digital PCR.
- **iScan (Illumina):** Scanner and associated equipment that supports the Illumina's broad portfolio of genetic analysis assays for genotyping, CNV analysis, DNA methylation, and gene expression profiling.
- **MiSeq (Illumina):** Next-gen sequencer for small sequencing projects requiring longer read length. Ideal for bacterial genomes.
- **NextSeq 500 (Illumina):** Next-gen sequencer for small to mid-scale sequencing projects of genomes, exomes, or transcriptomes.
- **C1 Single-Cell System (Fluidigm):** The C1 Single Cell Auto Prep system employs an innovative microfluidic technology to rapidly isolate and prepare individual cells for genome and transcriptome analysis.
- **Biomark HD (Fluidigm):** Integrated fluidic circuits (IFCs) for automating real-time or end-point read PCR reactions in nanoliter volumes.

TEXAS A&M UNIVERSITY
CORE FACILITIES

Multi-Crop Transformation Facility

The facility is located within the Borlaug Center (IPGB), established in June 2017, with an exclusive laboratory space that accommodates bench spaces, equipment, growth chambers, light room and staff. Under a BSL-1 permit the facility maintains different Agro-bacteria strains, reporter genes, freezers (-80 °C and -20°C), refrigerate centrifuge and shaker, spectrophotometer, stereoscopes (8), fluorescence imaging system, laminar flows (3), PDS-1000/He gene gun, accesses to Plant Growth Facility and barcode traceability system.

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https://ipgb.tamu.edu/services/multi-crop-transformation-facility/

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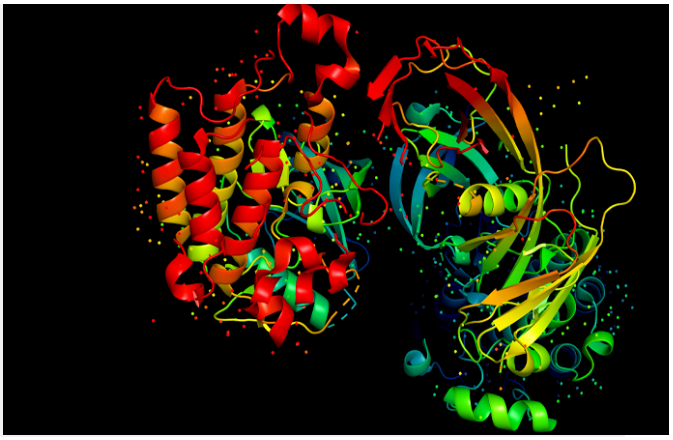
IBT Protein Production, Characterization, and Molecular Interaction Core-Houston, TX



Institute of Biosciences and Technology
Houston, TX

Protein Production, Characterization and Molecular Interaction (PPCMI) at Texas A&M Institute of Biosciences & Technology is dedicated to providing expression and purification services of functional proteins at a scale that meets the quantity and purity benchmarks for structural, biophysical, biochemical, and therapeutics studies. Services range from the scale-up of existing protocols to the development of de novo expression and purification strategies. Currently, the PPC employs bacteria and yeast host systems with a view to expanding into mammalian host systems. The PPC specializes in systematic method development for expressing and purifying challenging proteins. Currently, the core facility is equipped with an ÄKTA Pure FPLC system, a Microfluidics M-110P cell homogenizer, and a cell culture suite. In addition, the PPC is furnished with all the standard laboratory equipment like refrigerated console shaker/incubators, an Avanti J-E centrifuge, Optima XPN-80 ultracentrifuge, and an Eppendorf D30 UV-vis spectrophotometer to expedite scale-up of protein production and purification. Also, the PPC is equipped with a Mosquito LCP and a Dragonfly screen optimizer for automated protein crystallization screening, optimization, and scale-up, as well as a Biacore T200 (SPR) and a MicroCal PEAQ-ITC for high-quality characterization of molecular interactions in terms of kinetics, affinity, specificity, comparability, immunogenicity, and thermodynamics.

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https://ibt.tamu.edu/cores/protein-production-core/index.html

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IBT Protein Production, Characterization, and Molecular Interaction Core-Houston, TX

EQUIPMENT

New Brunswick's I26 incubated and refrigerated console shakers:

- capable of large scale expression of recombinant proteins in bacterial and yeast expression systems.

Microfluidics' Microfluidizer M 100P:

- capable of large scale and high-efficiency cell lysis.

Beckman Coulter's Avanti J-E centrifuge and Optima XPN-80 ultracentrifuge:

- capable of large scale and high-efficiency cell lysate separation and membrane preparation.

ZGE Healthcare's ÄKTA Pure chromatography system:

- a flexible and intuitive purification system for proteins, peptides, and nucleic acids from microgram levels to tens of grams of target product in research applications.

TTP Labtech's Mosquito LCP:

- automated protein crystallization screening, optimization, and scale-up.

TTP Labtech's Dragonfly screen optimizer:

- enables complex assay gradients or optimization screens to be rapidly and accurately prepared, even with viscous liquids, while eliminating cross-contamination.

GE Healthcare's Biacore T200:

- a versatile system for high-quality characterization of molecular interactions in terms of kinetics, affinity, specificity, comparability, immunogenicity, and thermodynamics.

Malvern's MicroCal PEAQ-ITC:

- allows direct, label-free in solution measurement of binding affinity and thermodynamics in a single experiment, enabling the accurate determination of binding constants, reaction stoichiometry, enthalpy, and entropy; provides a complete thermodynamic profile of the molecular interaction.

The list below summarizes our comprehensive service offerings at the core facility:

- Custom cloning service (Genomic DNA clone; cDNA clone; genetic engineering)
- Site-directed mutagenesis (Single mutation and multiple mutations in a single construct; library of random mutants)
- Expression optimization tests
- Pilot scale protein expression and purification
- Large-scale protein production
- Co-expression and purification of protein complexes
- Protein refolding from inclusion bodies
- Tag removal for purified recombinant proteins
- SDS-PAGE & Western Blot assays for expressed recombinant proteins
- Size-exclusion chromatography (GE Healthcare's prepacked SEC columns from analytic scale Superdex increase to production grade Superdex) on ÄKTA Pure system
- Affinity chromatography (GE Healthcare's prepacked affinity columns, i.e. HisTrap HP, StrepTrap HP, GSTrap HP, MBPTrap HP) on ÄKTA Pure system

TEXAS A&M UNIVERSITY
CORE FACILITIES

TIGSS-Rodent Preclinical Phenotyping Core

Laboratory Animal Care Building

The Rodent Preclinical Phenotyping Core (RPPC) houses various instruments to measure and quantitate mouse physiology and behavior. We offer a wide variety of state of the art equipment to help expedite comprehensive research in many fields, including Behavior, Cardiovascular, Cancer, Chemical, Metabolic, and Skeletomuscular. Training and experimental support is available.

With our extensive experience in preclinical phenotyping using a variety of mouse and other small animal models, we can help guide you at every step in your translational research. At the planning stages, we provide consulting to determine the optimal molecular, physiological and behavioral assays to address your research goals. We maintain a wide suite of equipment supporting metabolic skeletomuscular, immune, cardiovascular, behavioral, cancer and molecular assays for detailed phenotyping of animal models, and provide access for generating preliminary data for new grant applications. We also provide access to a unique mouse genetic reference population, the collaborative cross which enables investigations into the genetic bases and health and disease-related traits and environmental responses.

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https://genomics.tamu.edu/preclinical-phenotyping/

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TIGSS-Rodent Preclinical Phenotyping Core

EQUIPMENT

ARIVIS workstation:

- **Cytek Aurora:** The Cytek Aurora is a prodigy incorporating a unique combination of patent-pending innovative technologies that takes flow cytometry to the next level of performance and flexibility.
- **Protein Simple-Jess:** Jess automates traditional Western blotting while maximizing multiplexing with multiple detection channels. Automation of protein separation and immunodetection eliminates many of the tedious, error-prone steps of traditional Western blotting which limit data quality. Just load your samples and reagents into the microplate and Jess separates your proteins by size, and precisely manages antibody additions, incubations, washes and even the detection steps. Come back to fully analyzed western blotting results on 24 samples in 3 hours. Go further with multiplexing—her fluorescent detection channel and RePlexing capabilities get you all the information you need on your samples in one run. Jess automated western blot system—she's like multiplexed Western blot meets ELISA in one.
- **DxC 700 AU:** The DxC 700 AU Chemistry Analyzer is the latest innovation in reliable chemistry systems. The DxC 700 AU is used to calculate the concentration of certain metabolites, electrolytes, proteins and/ or drugs in samples of serum, plasma, urine, or other body fluids.
- **Digigait:** Digigait Analysis System is the most widely applicable and comprehensive gait analysis instrumentation available. It can measure voluntary and treadmill walking, hopping and running speeds, gait analysis on inclines, and many other parameters. It offers high throughput, highly accurate data collection and analysis.
- **OsmoPro Multi-Sample Micro-Osmometer:** The OsmoPRO features a convenient carousel design that handles up to 20 samples, an intuitive touchscreen interface, and industry-leading performance. The OsmoPRO only requires 20ul and can test urine, plasma, serum, and stool osmolality.
- **Abaxis VetScan VSPro Chemistry Analyzer:** The VETSCAN VSpro is a state-of-the-art specialty analyzer that offers a growing test menu. The PT/aPTT and fibrinogen tests currently offered on the VETSCAN VSpro delivers uncompromising accuracy from a small sample size with an amazingly simple and intuitive user interface.
- **Radial Arm Maze:** The radial arm maze is a test for spatial, working, and reference learning and memory in mice and allows for several sophisticated testing protocols. For example, animals might be learning the location of a food reward in one of the arms by relying on cues inside or outside the maze, or memorizing which turns to take from their starting point.
- **Barnes Maze:** The Barnes maze is a well-known paradigm to study spatial learning and memory. This maze consists of a circular table with circular holes around the circumference. The goal is for the animal to reach the box that is positioned beneath one of the holes with the aid of visual cues. A food reward in the goal box can help the training process. In some experiments, the surface of the table is brightly lit, serving as an aversion stimulus that motivates the mouse or rat to find (and hide in) the goal box.
- **Leica ASP300 Tissue Processor:** The Leica ASP300 is designed for routine clinical and research histopathology and is an innovative, smart processor for paraffin infiltration of tissue. This processor is capable of running 300 cassettes in a metal basket and 252 cassettes in a microwaveable plastic basket.
- **Rotarod Test for Mice:** The Rotarod Test is used to assess motor coordination or fatigue resistance on mice and rats using one unit in a safe and humane way. The animals are placed on textured drums to avoid slipping. When an animal drops onto the individual sensing platforms below, test results are recorded digitally and displayed on the front panel.
- **Leica EG1150 Tissue Embedding:** The Leica EG1150 modular tissue embedding center incorporates two separate components, the Leica EG1150 C cold plate, and the Leica EG1150H heated paraffin

TIGSS-Rodent Preclinical Phenotyping Core

dispensing module. The independent modules offer the flexibility to arrange embedding workflow in either direction to suit an individual's needs.

- **Leica Rotary Microtome 2165:** The highly versatile LEICA RM 2165 fully motorized rotary microtome is both suitable for routine applications in the medical laboratory and for semi-thin plastic sectioning required in biomedical research or material science applications.
- **TubeWriter 360:** Any tube, any vial, any size: The TubeWriter 360 prints on anything that will fit under the printhead including the side or top of any tube, vial, histology cassette, microscope slide, cryovial, and more. Never go back to messy handwriting or sticky lab labels again.
- **Open Field Monitoring System:** Open Field monitoring system for behavior analysis.
- **EchoMRI-100H:** EchoMRI-100H for body composition analysis of whole body fat, lean, free water, and total water masses in live animals weighing up to ~100 grams. No anesthesia is required.
- **Stortz Rodent Endoscope:** For use in small animal endoscopy for various diagnostic, surgical, and orthopedic indications
- **Heart Monitoring ECGenie:** The Mouse Specifics, Inc.'s ECGenie is a rapid non-invasive solution for recording electrocardiograms (ECGs) in awake mice, rats, and guinea pigs. Applications include arrhythmia detection, health monitoring, and drug screening in fragile transgenic and knockout animals, including newborn pups.
- **TSE Phenomaster:** TSE Phenomaster measures food/water intake, activity monitoring, and calorimetry/O2/CO2 measurements.
- **Hatteras Diuresis Cages:** Unique nonwetting polymethylpentene funnel and cone design automatically separates feces and urine for accurate metabolic monitoring without urine wash-over. Exterior collection tubes are set in a chiller system set to maintain samples at 450 F and are easily removed without disturbing the animal.
- **Morris Water Maze:** The Water maze is a well-known paradigm to study spatial learning and memory. The maze consists of a large circular tub filled with water and a hidden floating platform. The water serves as an aversion stimulus to motivate the mouse or rat to find a means of escape. The goal of the animal is to reach the platform with the aid of visual cues placed around the maze.
- **Small Animal Stereotaxic System:** Small animal stereotaxic system provides researchers with not only greater ease, but more accurate readings than the vernier scales commonly found on other designs.
- **Three Chamber Monitoring System:** Three-chamber sociability monitoring system for behavior analysis.
- **Shuttle Cages with Shock Floor:** Fully modular Habitest configuration for active and passive Avoidance experiments in rodents. With Habitest, users can create an endless variety of test environments, instantly and seamlessly reconfiguring for an endless variety of experimental modalities.
- **Vevo 3100 Ultrasound:** With a powerful combination of high frame rates and advanced image processing, the Vevo 3100 reduces speckle noise and artifacts while preserving and enhancing critical information.
- **TRU SCAN Activity Monitoring System:** The TRU SCAN system is a versatile and simple system to monitor open field activity. Coulbourn's TRU SCAN arenas feature a slide-out floor/drop pan for easier maintenance.
- **Rotarod Test Rats and Mice:** The IITC Rotarod Test is used to assess the effect of drugs on the motor coordination or fatigue resistance on mice and rats using one unit in a safe and humane way. The animals are placed on textured drums to avoid slipping. When an animal drops onto the individual sensing platforms below, test results are recorded digitally and displayed on the front panel.
- **Hatteras Mouse Multi Channel Blood Pressure Analysis System:** The MC4000 Multi Channel Blood Pressure Analysis System is a non-invasive instrument designed to help researchers efficiently and effectively obtain accurate blood pressure measurements on mice and rats.
- **Coulbourn Habitest System:** HABITEST is designed to make it possible to implement most behavioral test protocols in a single system of modular test arenas using modular

TIGSS-Rodent Preclinical Phenotyping Core

stimulus and response devices. Applications span the behavioral gamut, including mazes and runways, operant conditioning, spatial activity, ergometry, active and passive avoidance, fear conditioning, place preference, feeding and drinking and many more.

- **Chatillon Force Measurement:** The Chatillon Grip Strength allows investigators to test the maximum force of a mouse's grip which will be stored on the display. This test can be completed in less than a minute and can provide mechanical information about one's mice.
- **Abaxis VetScan VS2 Chemistry Analyzer:** Abaxis VetScan VS2 Chemistry Analyzer is a state-of-the-art chemistry, electrolyte, immunoassay and blood gas analyzer that delivers uncompromising accuracy from just two drops of whole blood, serum or plasma.
- **Abaxis VetScan HM5 Hematology System:** The Abaxis VetScan HM5 Color Hematology System is a fully-automated, five-part differential hematology analyzer displaying a comprehensive 22-parameter complete blood count (CBC) with cellular histograms on an easy-to-read touch-screen.

Behavioral Equipment:

- Barnes Maze
- Three Chamber Sociability
- Coulbourn Habitest System
- True Scan Open Field
- Noldus Open Field
- Water Maze
- Radial Eight Arm Maze

Cancer/Cardiovascular Equipment:

- ECGenie
- Storz Rodent Endoscope
- SomnoSuite

Chemical Equipment:

- Abaxis VetScan HM5
- Abaxis VetScan VS2 Chemistry Analyzer
- Abaxis VetScan VSpro
- OsmoPro Multi-Sample Micro-Osmometer

Histological Equipment:

- Leica EG1150 Embedding Station
- Leica Rotary Microtome 2165
- TubeWriter 360

Metabolic Equipment:

- Hatteras Diuresis Metabolic Cage System
- Hatteras MC4000 Blood Pressure Analysis System
- TSE Phenomaster
- Skeletomuscular Equipment
- Digigait System
- EchoMRI 100H Body Composition Analyzer
- Grip Strength
- ITC Life Science Rotarod

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CORE FACILITIES

Systems and Synthetic Biology Innovations Hub

The Synthetic and Systems Biology Hub integrates a biodesign core, a high-throughput screening core, an implementation core, and a characterization and scale-up core. The four core functions were built with state-of-the-art instruments and extensive expertise. The instruments include colony picker, BioLector Pro high-throughput fermenter, Imaging system, HPLC, nanoLC-MS/MS, larger fermenters, and others. The platforms integrate to achieve biodesign, high-throughput screening, high-throughput fermentation, proteomics, systems biology analysis, and scale-up of biomanufacturing and fermentation capacity.

EQUIPMENT

- SpectraMAX i3x/300 imaging cytometer: imaging system and plate reader
- Qpix 420: colony picking
- BioLector Pro: high throughput fermentation
- Eppendorf Bioflo 120: 2L fermentation
- Ultimate 3000: HPLC

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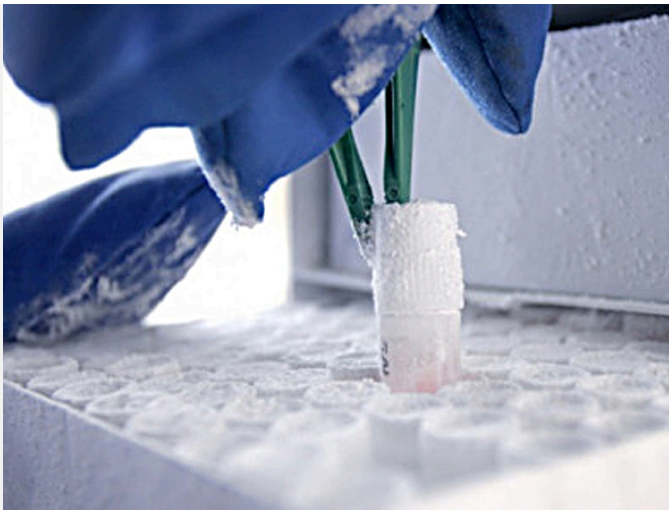
Texas A&M Institute for Genomic Medicine



Texas A&M Institute for Genomic Medicine

The Texas A&M Institute for Genomic Medicine (TIGM) is an essential resource for any researcher looking to obtain genetically modified mice and cell lines quickly and with favorable intellectual property (IP) terms. Our resources include the world's largest gene trap library of ES cells in the C57BL/6N mouse strain and a constantly expanding repository of cryopreserved germplasm of knockout lines. TIGM provides both engineered cell clones and mice as well as other transgenic core services including CRISPR/Cas9-based genome modifications within the Texas A&M system and to the public and private international research community.

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Texas A&M Institute for Genomic Medicine

MOUSE TRANSGENIC SERVICES

ARIVIS workstation:

- Basic Pronuclear/Cytoplasmic Injection (including CRISPR/Cas9)
- Pronuclear Injection, other strains (C57BL/6, etc.)
- Pronuclear Injection of BAC DNA
- Blastocyst Injection
- Sperm Cryopreservation
- Embryo Cryopreservation:
- Rederivation via IVF (live mice)
- Rederivation via IVF (sperm samples prepared using Jax or more recent protocol)
- Rederivation via IVF (sperm samples prepared using other protocols)
- Rederivation via Embryo Transfer
- Frozen Embryo Transfer
- Live Embryo Transfer
- Colony maintenance
- Gene Targeting via Homologous Recombination (constitutive, conditional or knock-in) Services include:
    - Targeting vector construction and designing of the screening strategy
    - Transfection of ES cells and confirmation of targeted clones
    - ES cell blastocyst injection
    - Chimera Breeding
    - Genotyping protocol design and confirmation

EQUIPMENT

- Imaging
    - ultra-high resolution imaging and dual-energy x-ray absorptiometry (Faxitron Ultra Focus Digital Radiography)
    - high-resolution X-ray CT (Scanco Viva40 MicroCT)
- Physiology systems
    - *DEXA* for bone density analysis

Additional services:

- Pathology
    - Gross Observations
    - Organ Tissue Weights
    - Histopathology
- Expression studies
    - Taqman
    - Microarrays
- Electroporation services
    - linearization/purification/ electroporation of targeting construct
    - isolation/expansion of drug-resistant colonies in 96-well format (at least 2 plates)
    - preparation of cell pellet plates in 96-well format and expansion of all targeted mouse cell line clones as specified by the customer
    - Identification of targeted clones by PCR
    - Expansion of targeted ES cell clones

We can work with various non-primate cell lines. More Resources can be located at https://www.tigm.org/resources/.

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CORE FACILITIES

MATERIALS AND FABRICATION

Materials and Fabrication

Core facilities in this area focus on synthesis and fabrication of different materials, including polymers, metals, ceramics and composites and on characterization of their structural and physical properties using a wide range of different characterization methods.

Name of Core Facility	Director	Thematic Area
AggieFab Nanofabrication Facility	Arum Han	Materials and Fabrication
Biomedical Engineering Shared Laboratories	Amanda Myatt	Materials and Fabrication
IODP Core Scanning Laboratory	Jennifer Hertzberg	Materials and Fabrication
Materials Characterization Facility	Miladin Radovic	Materials and Fabrication
Materials Development and Characterization Center	Ibrahim Karaman	Materials and Fabrication
National Center for Therapeutics Manufacturing	Zivko Nikolov	Materials and Fabrication
National Corrosion and Materials Reliability Laboratory	Raymundo Case	Materials and Fabrication
Soft Matter Facility	Svetlana Sukhishvili	Materials and Fabrication
SQUID Magnetometer	Nattamai Bhuvanesh	Materials and Fabrication
X-Ray Diffraction Laboratory	Francois Gabbai	Materials and Fabrication

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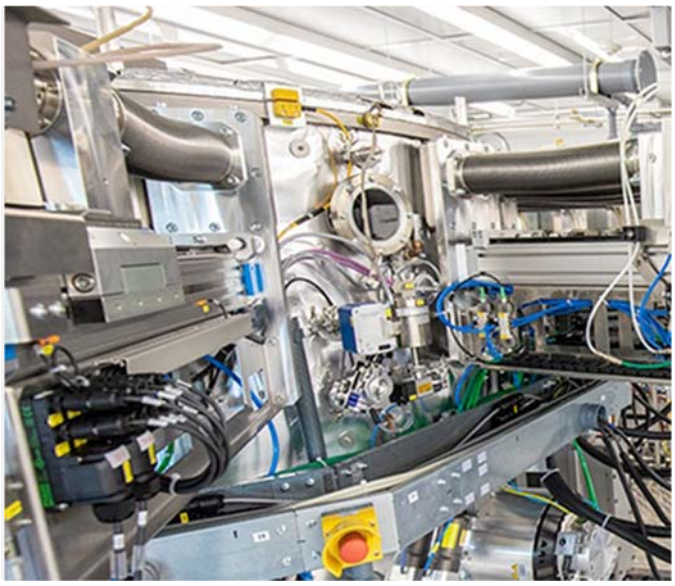
AggieFab Nanofabrication Facility



Giesecke Engineering Research Building

The AggieFab Nanofabrication Facility (AggieFab) has state-of-the-art equipment for a wide range of micro- and nano-scale fabrication of diverse materials. The main supporters of the facility are the Department of Electrical and Computer Engineering, TEES, and the Office of the Vice President for Research. Additional support is received from the Departments of Mechanical Engineering, Material Science and Engineering, Chemical Engineering, and Biomedical Engineering.

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https://aggiefab.tamu.edu/

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CORE FACILITIES

AggieFab Nanofabrication Facility

EQUIPMENT

Nanoscribe Photonics GT2 high-resolution 3D printer:

- a maskless photolithography system that allows direct photolithography on any type of substrate (e.g., photomasks, semiconductors, glass, polymers, crystals, and flexible films) using a laser. Nanoscribe Photonic Professional GT2 uses Two-Photon Polymerization (2PP) to produce micro- and nanoscale structures with nearly any 3D shape. Photonic Professional GT2 systems combine flexibility and ease in design with a straightforward operation allowing it to be seamlessly utilized in multi-user facilities. High-speed 3D spatial microfabrication control allows user to print a broad range of structures at scales, speeds, and spatial controls that have not been previously realized.

SUSS MA6:

- a mask aligner designed for high-resolution photolithography at the micrometer scale. Wafer size: up to 4", Mask size: up to 5", Wavelength range: 350 – 450 nm, Exposure source: Hg lamp 350 W, Exposure contact: Soft, Hard, and Vacuum, Resolution: down to 1 µm, Alignment method: Top Side Alignment (TSA)

EVG 610 Double-Sided Mask Aligner:

- a semi-automated mask aligner capable of double-sided lithography. Mask size: 4 inches or 5 inches, Substrate size: Small pieces and 2-inch, 3-inch, and 4-inch substrates, Wavelengths available:365 nm, 405 nm, and 435 nm, Resolution: > 1 um with optimum process conditions. The resolution also depends on the operating mode.Top-side and bottom-side alignment capabilities, UV light uniformity of +/- 3% from LED lamp during exposure.

BIDTEC SP100 Spin Coater:

- used for coating photoresist on samples with various sizes. The user can specify the rotations per minute (RPM) that are needed to uniformly spread the photoresist they are applying. Spin rate: up to 5000 RPM, Sample size: approximately 1″ wafer pieces to 4″ wafers.

FEI HELIOS NANOLAB 460F1 Dual-Focused Ion Beam (FIB):

- a DualBeam focused-ion beam (FIB) instrument capable of adding/removing materials at the nanometer scale and indicating the structure/composition. In AggieFab, it is tasked with nanomachining complex 3D structures using electron beam-induced deposition (EBID), ion milling and material manipulation. It is also used to prepare ultrathin samples for atomic scale analysis during transmission electron microscopy (TEM). Simultaneous imaging of secondary electron (SE) and backscattered electron (BSE) signals, Resolution: 0.7nm @ 1kV, opt WD (SEM), Resolution: 4.0nm @ 30 kV, coincident WD (FIB), Integrated EasyLift nanomanipulator for in-situ manipulation, High throughput TEM prep recipes, SDD Energy Dispersive Spectroscopy (EDS) capable, Flipstage 3 for faster STEM imaging

TESCAN MIRA3:

- FE-SEM equipped with electrostatic blanker and DrawBeam software in order to write features on photoresist with dimensions of a few tens of nanometers. Wafer Size: up to 20×20 mm, Source: Schottky Field Emission Gun, Acceleration voltage: 0.2-30 kV, Minimum electron beam spot size: ~ 2.5 nm, Minimum Electron beam current: ~10 pA, Import formats: GDSII and CAD

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CORE FACILITIES

AggieFab Nanofabrication Facility

Zeiss Orion Plus 5015 Helium Ion Microscope/NanoFab:

- the world's first helium ion microscope, and it is used to either fabricate delicate sub-10nm structures or generate high-resolution images of the device. Scanning Ion Microscope, Gas Field Ion Source (GFIS) technology

Cressington 108 Manual Sputter Coater:

- This tool is used to deposit a thin conductive layer of gold on nonconductive samples for subsequent scanning electron microscopy (SEM) analysis.

MTI RTP:

- (B2 on schematic) is a compact rapid thermal processing tube furnace that is designed for annealing wafers coated with metallic films and metal samples up to 1000°C. Tube: 4" O.D. quartz tube. Maximum Temperature: 1000°C (for <10/min). Working Temperature: 400°C (continuous), 600°C (< 1 hour). Suggested Normal Heating Rate: 10-25°C /sec. Maximum Heating Rate: 50°C /sec. Constant Temperature zone: 4″ (+/-1°C) @ 1000°C

MTI D3:

- The MTI furnace (B3 on schematic) is a compact rapid thermal processing tube furnace that is designed for annealing wafers coated with metals and metal samples up to 1200°C. Tube: 2" O.D. quartz tube. Maximum Temperature: 1200°C (for <1 hour). Continuous Working Temperature: 1000°C. Suggested Normal Heating Rate: ≤10°C /min. Maximum Heating Rate: 40°C /min (low temp) and 10°C /min (high temp). Constant Temperature zone: 2.3″ (60mm) (+/-1°C) @ 900°C.

MTI D2:

- The MTI RTP is a compact rapid thermal processing tube furnace that is designed for annealing semiconductor wafers and wafers coated with insulating films (not metals), such as SiO and SiN, up to 1000°C. Tube: 4" O.D. quartz tube. Maximum Temperature: 1000°C (for <10/min). Working Temperature: 400°C (continuous), 600°C (< 1 hour). Suggested Normal Heating Rate: 10-25°C /sec. Maximum Heating Rate: 50°C /sec. Constant Temperature zone: 4″ (+/-1°C) @ 1000°C

Tystar Low Pressure Chemical Vapor Deposition (LPCVD) system:

- used to deposit high- and low-temperature silicon oxide and low-stress silicon nitride. Tube 1: NH3 and Dichlorosilane (DCS) are used to deposit low-stress Silicon Nitride up to 900C. Tube 3: O2 and Silane (4% SiH4/Argon) are used to deposit low-temperature Silicon Oxide up to 700C

ASM P8200/P3000 Atomic Layer Deposition (ALD) tool:

- used to deposit various advanced high-k dielectric materials (hafnium oxide and hafnium silicate), high-k dielectric capping layers for metal gate work function tuning, high-speed aluminum oxide, conformal passivation layers, and high-k dielectric materials for micro-electrical mechanical systems (MEMS) applications. Wafer size: up to 8". Solid source delivery with precise control over conversion of solid to gas to be delivered to the reactor. Laminar gas flow. Isothermal reactor. Available gases: N2 and ArLCD touch-screen and joystick controls

Lesker PVD 75 Electron Beam Evaporation 1 tool:

- a metal thin film deposition system based on the electron beam evaporation technique. The ability to control the deposition rate, obtain a film with low contamination, and obtain very high deposition rates are the advantages of electron beam evaporation. Deposition materials: Al*, Au, Cr*, Cu*, Mo, Ni*, Pt, Ta, Ti*, and W (* provided by AggieFab). Other materials can also be deposited upon request

AggieFab Nanofabrication Facility

by a user and approved by the Material Review Board (MRB). Deposition orientation: Evaporation Up. Deposition sources: 4 pocket (multilayer deposition). Film thickness controller: Quartz Crystal Microbalance (QCM). Substrate size: up to 200 mm. Substrate rotation: up to 20 rpm

Lesker PVD 75 Electron Beam Evaporation 2 tool:

- a metal thin film deposition system based on the electron beam evaporation technique. The ability to control the deposition rate, obtain a film with low contamination, and obtain very high deposition rates are the advantages of electron beam evaporation. Deposition materials: Al*, Au, Cr*, Cu*, Mo, Ni*, Pt, Ta, Ti*, and W (* provided by AggieFab). Other materials can also be deposited upon request by a user and approved by the Material Review Board (MRB). Deposition orientation: Evaporation Up. Deposition sources: 4 pocket (multilayer deposition). Film thickness controller: Quartz Crystal Microbalance (QCM). Substrate size: up to 200 mm. Substrate rotation: up to 20 rpm LCD touch-screen and joystick controls

Oxford Plasmalab80Plus:

- used to conduct plasma enhanced chemical vapor deposition (PECVD) of high-quality SiOx, SiNx, and SiOxNy for a wide range of applications including photonics structures, passivation layers, and hard masks. Deposited films: SiOx and SiNx. Wafer size: up to 8”. Temperature: up to 400°C. Power: 300W 13.56MHz RF generator. Available gases: SiH4, NH3, N2O, N2, O2, and CF4. Total gas flow: 150 – 3000 sccm. Pressure: 200 – 2000 mTorrLCD touch-screen and joystick controls

Lesker PVD 75 DC Sputtering:

- a thin film deposition system based on direct current (DC) sputtering. Conductive target materials can be sputter deposited in DC mode. Target materials: Al*, Cr*, Cu*, Mo, Nb, Ni*, Pt, Ta, Ti*, and W (* provided by AggieFab). Other materials can also be deposited upon request by a user and approved by the Material Review Board (MRB). Deposition orientation: Sputter Up. Substrate size: up to 150 mm. Substrate rotation: up to 20 rpm.

Lesker PVD 75 RF Sputtering tool:

- deposits thin films with the RF sputtering technique. The RF mode of sputter deposition is used to deposit thin layers of insulating materials. Target materials: Al2O3, AlN, ITO, Si, SiO2*, TaN, and TiN (* provided by AggieFab). Other materials can also be deposited upon request by a user and approval by the Material Review Board (MRB). Deposition orientation: Sputter Up. Substrate size: up to 150 mm. Substrate rotation: up to 20 rpm LCD touch-screen and joystick controls

MINIBRUTE Oxidation/Anneal Furnace:

- an atmospheric furnace which is used for dry and wet oxidation of silicon wafers. Wafer size: 25-slot wafer carrier up to 3”. Gas cabinet: O2, N2, and steam generator available. Computer-controlled system Tube 1: up to 3-inch wafers, up to 1200C, and N2 and O2 available; this tube is generally used for metal anneals on Si and sintering processes. Tube 2: up to 3-inch wafers, up to 1200C, and N2, O2, and water bubbler are available; this tube is used for oxidation and Si/SiO2/SiNx only. Tube 3: up to 4-inch wafers, up to 1200C with shield, and N2, O2, and water bubbler are available; this tube is used for oxidation and Si/SiO2/SiNx only.

PDS 2010:

- a vacuum system used for the vapor deposition of Parylene polymer onto a variety of substrates. The clear polymer coating provides an extremely effective chemical and moisture barrier and has a high dielectric constant and mechanical strength. The Parylene process sublimates a dimer into a gaseous monomer. The monomer then polymerizes at room temperature onto the
- substrate. At the vacuum levels used, all sides of the substrate are uniformly impinged by the

AggieFab Nanofabrication Facility

gaseous monomer, resulting in a conformal coating.
- Key Features:
- Wafer size: From small pieces up to 8”
- Can load non-flat samples
- Rotating Platter/sample holder
- Rough Vacuum
- Mechanical Chiller
- Semi-Automatic Run Mode

Clustex 100sp physical vapor deposition (PVD) tool:

- sputters thin films onto substrates that have a diameter up to 4”. The substrate can be coated either by one magnetron sputtering target or simultaneously by up to three magnetron sputtering targets. The process chamber is equipped with 20 magnetron targets. There are 16 RF and 3 DC sputtering heads as well as an ion source. Substrate temperature: up to 1000°C using a ceramic heater. Available gases: N2, Ar, and O2. Approved Target Materials: SiO2, W, VO2, Nb2O5, Si, TiN, Al2O3, Ir, NbO2, HfO2, V, TiO2, Ru, V2O5, Hf, Ti, Al, Cu, MgO, and SrTiO3. The approved materials list will change over time. Please contact the AggieFab staff with questions.LCD touch-screen and joystick controls

Tegal Plasmaline 421:

- a dedicated resist asher. Sample configurations: Non-flat samples can be processed and large pieces may be run individually (in a horizontal configuration). Substrate materials: Silicon, III-V semiconductors, glass, and metal substrates may be processed; multiple wafers can be processed in a cassette. RF power: 50-150 W. Process gases: O2 and ArLCD touch-screen and joystick controls

Nordson March CS-1701:

- a reactive ion etching (RIE) system that is excellent for silicide etching and anisotropic etching of nitrides, oxides and polyimides. Wafer size: up to 6”. Power: 600 W maximum from a 13.56 MHz RF generator. Available gases: Ar, N2, O2, and CF4

Oxford Plasmalab 100:

- Inductive Coupled Plasma Reactive Ion Etching (ICP RIE) tool. It is a multipurpose fluorocarbon-based system that provides users anisotropic etching of silicon, silicon oxide, and other dielectric materials. High etch rates are achieved by the presence of high ion and radical densities. Wafer size: up to 4”. Load-locked chamber. Temperature: -100 °C to 400 °C. Power: 400 W 13.56 MHz RF generator. ICP power: 200 – 2500 W. Total gas flow: 10 – 150 sccm. Pressure: 20 – 2000 mTorr. Helium backside cooling. Helium pressure: 0 – 30 Torr. Available gases: SF6, CHF3, He, Ar, and O2.LCD touch-screen and joystick controls

STS ICP RIE:

- a high density plasma reactive ion etcher which is used for anisotropic high aspect ratio deep trench etching in silicon. Wafer size: up to 4”. Load-locked chamber. Power: 400 W 13.56 MHz RF generator. ICP power: 20 – 2500 W. Helium backside cooling. Available gases: SF6, CHF3, C2F6, He, Ar, O2.

120D Laser Engraver:

- a CO2 laser-based machining tool that can engrave and cut on various materials, typically plastic. The machine is capable of controlling the laser power and writing speed, which allows controlling the depth of cutting. Dual-tube laser: Currently have one 60W laser tube installed. The second 60W tube can increase the total power to 120W, enabling engraving/cutting metals. Area: 18” x 32” Engraving Area. Resolution: Around 100 um line width (u: use special character micro). Structure Design File Type:‘.dwg’ format. Material Category: Most plastic

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Roland MDX-50:

- benchtop automatic milling system suitable for rapid prototyping. It can be used to mil various plastics and other soft materials, but not metal. Engraving is also possible. Feature size for this milling machine is dependent on the drill bits, but sub-100 micrometer features can be milled. Automatic Tool Changer. Target Materials: Plastic & Milling foam. Substrate Size: 9*12.0*3.9 in. Mechanical Resolution: 01mm/step. Rotary 4th axis also available. File format: Accepts STL files LCD touch-screen and joystick controls

Perfactory 3 Mini/Multi-Lens:

- F=60mm lens, Build Area: 90 x 67.5 x 230 mm, Enhanced Resolution Mode (ERM) Voxel Size XY: 39 micrometer, Dynamic Voxel Thickness Z = 15 to 50 micrometer, Resolution: SXGA+ 2800 x 2100, Materials: Currently loaded with htm 140v2-green (Tensile Strength:60 MPa; Tg: 61°C), R11-red resign also available (tensile strength: 50 MPa; Tg: XXX)

Envision One cDLM Mechanical:

- Build Envelope: 180 x 101 x 175 mm (7.09 x 3.98 x 6.9 inches), Build Speed: up to 45mm/hour (material dependent), Native XY resolution: 93um, XY resolution with Contour Gray scaling: 60um, Dynamic Z resolution: 50um to 150um (material dependent), Data Handling: STL format, Material: E-model light Peach color (Tensile strength: 55Mpa, Viscosity: 150cP at 30 degree).

Laurell Spin Coater:

- designed to spread photoresist at a user specified RPM. Sample Sizes: Up to 3″ wafers. RPM limits: 100 to 8,000 RPM.LCD touch-screen and joystick controls

Baxter drying ovens:

- allow users to dry their samples during the lithography process or store cleaned glassware after use. There are two ovens, one of which has a nitrogen environment. Typical temperatures: 95 F and 135 F. Temperature range: 0 F to 350 F

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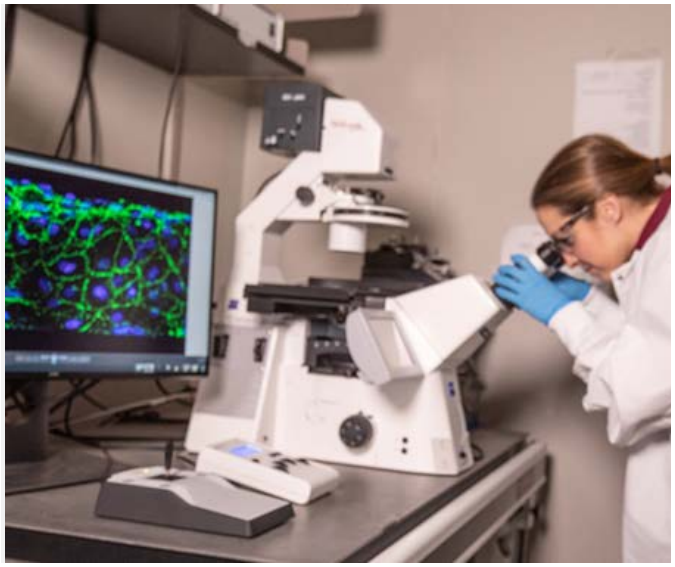
Biomedical Engineering Shared Laboratories



Emerging Technologies Building

The Biomedical Engineering Shared Laboratories are a collection of controlled access labs that house various equipment shared amongst the biomedical engineering faculty. The main purpose of these facilities is to provide more cost-effective resources for the research groups and to minimize duplication of equipment within the department. User fees for the equipment are assigned on a cost-recovery basis. Equipment training is required prior to use and gaining lab access. Equipment is available to other Texas A&M University departments and external users, however priority is given to biomedical engineering students.

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https://engineering.tamu.edu/biomedical/research/facilities/shared-equipment.html

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Biomedical Engineering Shared Laboratories

EQUIPMENT

3D-Bioplotter System:

- can fabricate scaffolds using a wide range of materials, including soft hydrogels over polymer melts and hard ceramics. The system is designed to support the development of tissues and devices vital to the success of regenerative therapies, controlled drug release and patient-specific implants.

3D Printer-Hyrel:

- allow for “sculpting” objects by a concurrent combination of material deposition (through laser sintering), removal (machining) and shaping (forming). It is capable of working with multiple metals simultaneously, being able to mix and match four simultaneous metallic powders to create complex shapes and combinations of materials that can be precisely tailored.

3D Printer-XYZ Da Vinci:

- This printer works with PLA, ABS, Flexible and Tough PLA materials with a filament diameter of 1.75 mm. The build area is 200 x 200 x 190 mm, layer resolution of 100-400 microns, XY positioning precision of 12.5 microns and supports .stl, .3mf, .3w, .nkg files.

Autoclave:

- An autoclave is a pressure chamber used to sterilize equipment and supplies by subjecting it to highly pressurized saturated steam.

Biological safety cabinets:

- HEPA-filtered laminar air cabinet that protects the user, product and the environment.

Centrifuges:

- Tabletop centrifuges are capable of reaching speeds of 14,000 rpm (5810R) and 15,000 rpm (5424) with a maximum liquid density of 1.2 kg/dm3.

CO2 laser:

- Tabletop centrifuges are capable of reaching speeds of 14,000 rpm (5810R) and 15,000 rpm (5424) with a maximum liquid density of 1.2 kg/dm3.

Confocal Microscope—Molecular Devices IXM:

- The IXM provides improved quantification for live or fixed cell assays. This imaging system features a unique confocal technology to explore more physiologically relevant, complex three-dimensional models including spheroids, tissues and whole organisms and to generate publication quality images at high throughput for samples in slides or one to 1536 well microplates.

Confocal Microscope—Nikon EZC1:

- Upright confocal microscope that can do brightfield and fluorescent microscopy as well as confocal reflectance imaging. The system includes 20x, 60x, 100x water dipping objectives, a 5 mW Green (543.5 nm) laser, a 150 mW Blue (457-514 nm) laser and green/red filter cube sets.

Cytation 5 Imaging Reader:

- The Cytation 5 Imaging Reader combines automated digital widefield microscopy with conventional multi-mode microplate reading in a unique, patented design.

Deionized (DI) Water:

- This system offers fast dispensing of DI water with adjustable flow rate and real-time quality monitoring.

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Differential Scanning Calorimetry (DSC):

- Differential scanning calorimetry uses heat transfer to measure properties of a sample such as thermal stability and heat capacity.

Dynamic Mechanical Analysis (DMA):

- Dynamic Mechanical Analysis measures mechanical properties of materials as functions of time, temperature and frequency (dual/single cantilever and compression).

Ellipsometer:

- An ellipsometer is used for routine measurements of film thickness and refractive index by measuring changes in polarization as light reflects or transmits.

Ethylene Oxide Sterilizer:

- FDA approved, room temperature sterilizer that utilizes ethylene oxide gas as the sterilant. A standard cycle is 12 hours with a two hour bag ventilation cycle. A 24 hour additional aeration option is available for gas absorbent items. Users must provide sterile wrap or pouches for their items. All other consumables are provided.

Excimer Laser:

- An excimer laser is a form of ultraviolet laser of the noble gas halide type used for micromachining.

Fluorescence Microscope—Nikon:

- This manual inverted microscope is intended for use in microscopic observation and in the micromanipulation of living cells and tissue using diascopic (transmitted) and episcopic (reflected) illumination. Objectives: 4x, 10x, 20x and 40x.

Fluorescence Microscope—Zeiss:

- This manual inverted microscope is intended for imaging cell culture in petri dishes, chamber slides or multiwell plates, as well as fixed slides. Contrast techniques include Brightfield, Phase Contrast, DIC (20x only), Fluorescence with LED light source. Objectives: 5x, 10x, 20x and 40x, compatible with coverslips/plastic vessels. Fluorescence Filter Sets: 43, 38, and 49. Axiocam 503 mono camera.

Fourier-transform infrared spectroscopy (FTIR):

- Fourier transform infrared spectroscopy is used to measure absorption and transmission peaks of the components in a sample.

Fourier-transform infrared spectroscopy (FTIR) with Attenuated Total Reflection (ATR):

- An attenuated total reflection accessory on Fourier-transform infrared spectroscopy is used for measurement of solids and liquids.

Gel Doc EZ Imager:

- A gel doc is an automated gel imaging instrument for DNA gels and fluorescence imaging on a couple of different filter options.

Glassware Washer:

- Freestanding glassware washer dryer with a wide chamber and 3 levels.

Goniometer:

- A goniometer uses contact angle measurements in order to know surface properties of materials when interacting with water.

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Instron:

- The instron allows for mechanical testing of samples using 1000N load cell to test compression and tension LCD touch-screen and joystick controls

Lyophilizer:

- A lyophilizer is a benchtop freeze dryer used to freeze the material and reduce the surrounding pressure so that the frozen water will sublimate from solid phase to gas phase. This is most often used in samples that will be imaged under SEM and need to preserve their structure.

Microtome:

- A microtome is a tool used to cut extremely thin slices of material.LCD touch-screen and joystick controls

NanoDrop OneC:

- Microvolume UV-VIS spectrophotometer that can quantify and qualify DNA, RNA and protein samples in seconds with only 1-2 µL, and obtain full-spectral data. This equipment also has a cuvette option.

Nanoparticle Tracking Analysis (NTA):

- Nanoparticle Tracking Analysis visualizes and analyzes particles in liquids using the relationship between Brownian motion to particle size by scattering laser light and recording video for analysis. This can be used to see extremely small particles (down to 10 nm).

Plasma Cleaner:

- A plasma cleaner removes organic contaminants, renders surfaces hydrophilic, promotes adhesion, etc. using O2 chemical reactions in a chamber.

QCM:

- The quartz crystal microbalance measures the frequency and mass of a sample. The crystal has a certain frequency and as proteins stick to the crystal they will change this value which will correlate to the mass.

Rheometer:

- Rheometers are used to find stress, strain, modulus or viscosity data using a cone and plate with set parameters such as shear, temperature, oscillation, etc.

Scanning Electron Microscope (SEM):

- In a Scanning Electron Microscope, the surface of a specimen is scanned by a beam of electrons that are reflected by a secondary or backscattered detector to form an image.

Slide Scanner:

- Slide scanners digitalize slide images to scan, view and share on a cloud server.LCD touch-screen and joystick controls

Spectrophotometer:

- A spectrophotometer utilizes a high-intensity xenon lamp and dual-beam optical geometry. The instrument fires pulses of light only when taking a measurement and provides strong illumination from the UV to the near-IR region of the spectrum.

Sonicator:

- A sonicator is a programmable system ideal for small volume liquid processing through sound energy. This unit is capable of processing 0.5-15ml volumes of a substance. Applications include cell disruption, protein extraction, and DNA shearing/ChIP assay for durations of 1 second to 10 hours.

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Sputter Coater:

- A sputter coater is used to coat non-conducting samples with a conductive gold layer for standard SEM imaging.

Thermocycler:

- Standalone Polymerase Chain Reaction (PCR) machine that has a 0.2mL tube block for up to 25 samples.

Thermogravimetric Analysis (TGA):

- Thermogravimetric Analysis measures weight changes of a sample as a function of time or temperature under a controlled atmosphere (under nitrogen). It is usually for measuring thermal stability or composition.

Ultracentrifuge:

- This centrifuge delivers fast, efficient separations from samples as small as 175 µl up to 32.4mL at speeds up to 150,000 RPM and more than 1,000,000 x g.

UV Cure Box:

- A compact microprocessor controlled UV flood curing system.

UV Transilluminator Plate:

- The UV Transilluminator Plate provides brilliant back illumination of transparent materials placed on a filter area designed to illuminate and increase fluorescence.

Vacuum ovens:

- Vacuum ovens are primarily used for desiccating, vacuum embedding, plating and electronic component processing.

Vibratome:

- The vibratome performs high-quality sectioning with a range of 1 to 40 mm.LCD touch-screen and joystick controls

Western Blot Scanner:

- The Western Blot Scanner delivers industry-standard digital imaging technology to capture publication quality images.

Zetasizer:

- A zetasizer is used to measure size (through dynamic light scattering) and zeta potential of nanoparticles in solution.

SHOP EQUIPMENT

Bandsaw:

- Model G8146Z Blade speeds: 105-2100 fpm Blade size: 1/8 – 3/4″ Cutting height: 10 1/4″ | Cutting capacity left of blade: 15 3/4″ | Table size: 23 5/8″ long x 21 11/16″ wide x 38″ high x 2″ deep | Table tilt (left / right): 15 degrees / 45 degrees

Bench Grinder:

- Model G0596 | 8″ wheels

CNC Mill:

- Model Super Mini Mill | Vertical machining center: 16″ x 12″ x 10″ | Tool holder: 40 taper | 7.5 hp vector drive | Max spindle speed: 10000 rpm | Tool changer: automatic 10 station carousel | Max table weight: 500 lb

Combination Sander:

- Model G1183 | 12″ sanding disc | speed: 5000 fpm | belt arm tilt: 0-90degrees | 6″ x 48″ sanding belt | speed: 3450 rpm | table tilt: +/- 40degrees

Biomedical Engineering Shared Laboratories

Drill Press:

- Model G7948 | 12 speeds: 210, 310, 400, 440, 630, 670, 1260, 1430, 1650, 2050, 2350, 3300 rpm | Chuck: 1/64 – 5/8″, JT3 key | Swing: 20″ | Drilling capacity: 1 1/4″ steel | Spindle travel: 4 3/4″ | Table: size: 18 3/4″ long x 16 3/4″ wide x 1 1/2″ thick | swivel around center: 270 degrees | swivel around column: 360 degrees | maximum movement: 22″ | tilt

Horizontal Bandsaw:

- Model G0717 | Blade speeds: 83, 132, 170, 235 fpm | Cutting capacities: Angle cuts: 45-90 degrees | Vise jaw: 13 1/4 & 8″ depth x 4 15/16″ height | Rectangular @ 90degrees: 8 7/8″ width x 15 3/4″ height | Round @ 90degrees: 8 7/8″ | Rectangular @ 30degrees: 9 13/16″ width x 8 7/16″ height | Round @ 30degrees: 8 7/16″ | Rectangular @ 45degrees: 6

Hydraulic Press:

- Model 908 025-2 | Capacity: 25 tons | Horsepower: 2 | RPM: 1800 | Ram speed: pressing – 15, returning: 35 | Width between uprights: 32.75″ | Width between table channels: 7.25″ | Ram to table (min-max): 11.75″-46.75″ | Ram travel: 10″

Mill:

- Series 1. Range: – Table travel (x-axis): 36″ / 914mm – Saddle travel (y-axis): 12″ / 305mm – Quill travel (measured z-axis): 5″ / 127mm – Knee travel (un-measured z-axis): 16″ / 406mm – Ram travel: 12″ / 305mm – Throat distance (min-max): 6.75-18.75″ / 171- 476mm – Table to spindle nose gage line (min-max): 2.5- 18.25″ / 65-463mm

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International Ocean Discovery Program XRF Core Scanning Facility

International Ocean Discovery Program

The XRF Core Scanner Lab at IODP is part of the Gulf Coast Repository (GCR), located on the campus of Texas A&M University. The lab has been in operation since late 2008, when the first core scanner arrived.

Currently, the lab houses two Avaatech XRF Core Scanners. The scanners can accommodate split section halves, discrete samples (loaded into holders), rock slabs, and many other forms of material if the instruments are configured properly. The only requirements for good sample analyses are: (1) the material surface must be relatively flat, (2) the material must be able to fit inside the machine (there are height, width, and length limits), and (3) the material must be able to be held firmly in place during the analyses. If you wish to analyze materials other than standard core section-halves, please contact us to determine whether we can configure the instrument accordingly.

In addition to the two core scanners, the lab houses a section-half image logger (SHIL) for collecting high-resolution, section-length images and RGB profiles.

The XRF Core Scanners are each capable of generating up to 50 kVp of accelerating voltage and up to 2 mA of current. In theory, we can measure any element that has an absorption edge (K or L shell) less than 50 keV. In practice, we can't measure elements lighter than Mg (Z=12) due to strong material absorption, and we can only measure elements heavier than Ce (Z=58) if they are present in very high concentrations (so we can observe L-lines).

Many other elements are difficult to detect due to strong peak interference. Chlorine, for example, is difficult to measure using our instruments because the Cl K-peak significantly overlaps with the Rh L-peaks. Other elements are difficult to measure due to overlaps with characteristic peaks of more abundant elements and overlaps with spectral artifacts. If you're interested in measuring specific elements, please talk to the Lab Manager.

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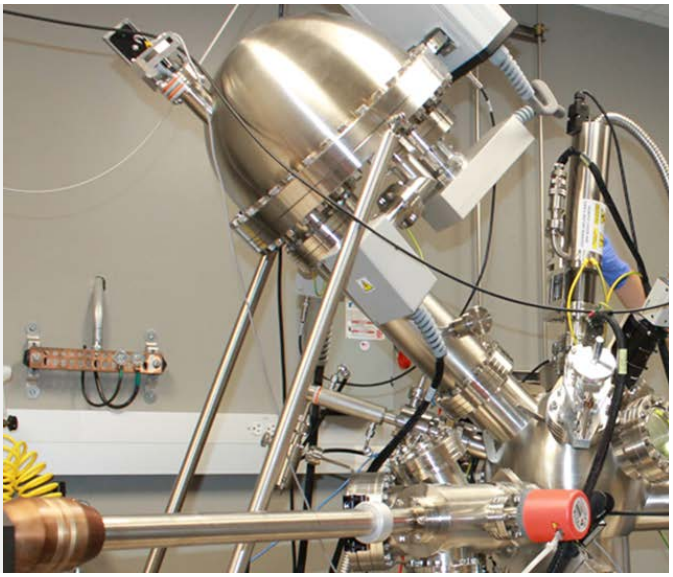
Materials Characterization Facility



Giesecke Engineering Resesarch Building

The Materials Characterization Facility (MCF) at Texas A&M University is a core user facility supported by the Office of the Vice President for Research, the College of Engineering/TEES and the College of Science. The MCF provides researchers in the Texas A&M community with access to high-end instrumentation essential for fundamental studies of the surface and interfacial properties of materials, such as ion and electron based spectroscopies, electron, optical and scanning probe microscopies. The MCF is staffed by research scientists with expertise in these areas, and they provide fundamental research training to students and faculty on our instrumentation as well as consolation of measurements needs and data interpretation. Beyond Texas A&M, the MCF also supports collaborative research projects with outside industrial users. Beyond research training, the facility also supports educational activities involving lab tours, workshops, hands on demonstrations, outreach and broader impact related activities through our open house and lunchtime seminar series.

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Materials Characterization Facility

EQUIPMENT

Scanning Electron Microscope JEOL JSM7500F:

- an ultra-high-resolution cold field emission scanning electron microscope (FE-SEM) equipped with a high brightness conical FE gun and a low aberration conical objective lens; conventional in-chamber Everhart-Thornley and through-the-lens secondary detectors, low angle back-scattered electron detector (LABE), IR-CCD chamber camera, Oxford EDS system equipped with X-ray mapping and digital imaging.

Focused Ion Beam (Xe plasma source, Tescan FERA-3 Model GMH):

- Dual beam Focused Ion Beam Microscope equipped with: Schottky Field Emission Electron Source; SE, BSE detectors; Integrated Plasma Ion Source (Xe) Focused Ion Beam (FIB); DrawBeam Basic Electron and Ion Beam Lithography Software; Motorized Retractable Panchromatic Cathodoluminescence Detector (350-650 nm spectral range); MonoGIS Gas Injection System (Platinum); Standard EBSD with a NordlysNano high sensitivity camera and 3D EBSD capabilities; Integrated Time-of-Flight Mass Spectrometer (TOF-SIMS).

Focused Ion Beam (Ga source, Tescan LYRA-3 Model GMH):

- Dual beam Focused Ion Beam Microscope equipped with: Schottky Field Emission Electron Source; SE, BSE detectors; STEM (dark and bright field imaging); EBIC imagining system (electron beam induced conductivity); fully integrated Canion Ga LMIS Focused Ion Beam column; 5-Reservoir Gas Injection System: W deposition, Pt deposition, Insulator (SiOx) deposition, Enhanced Etching (H2O), Enhanced or selective etching of Si, SiO2, Si3N4, W (XeF2); SmarAct 3-axis (XYZ) Piezo Nanomanipulator and controller; Beam Deceleration Mode for imaging at low voltage; Standard EDS Microanalysis System with X- MaxN 50.

Electron Microprobe (EPMA):

- The Cameca SXFive has an LaB6 source and is equipped with EDS,and CL detector. The instrument has five spectrometers with the following crystal configuration: (1) LTAP and LPET; (2) TAP, PET, PC0, and PC2; (3) LPET and LLiF; (4) PET, LiF, PC1, and PC3; (5) LPET and LLiF.

Themis Titan TEM:

- The Titan Themis3 300 S/TEM is a high-resolution transmission electron microscope with spherical aberration correctors (Cs) for both the image and probe optics system, resulting in resolution limits below 1 Å between 60 and 30 kV in both TEM and STEM mode. The high brightness electron gun (X-FEG) is equipped with a monochromator to improve energy resolution in combination with a high-sensitivity SDD X-ray spectrometer (Super-X) and a high-resolution post-column energy filter (GIF Quantum). Additional capabilities: energy filtered TEM (EFTEM) imaging, high-resolution electron energy-loss spectroscopy (EELS), energy-dispersive X-ray spectroscopy (EDXS), and electron tomography. The Titan Themis3 300 can also be used to perform in situ experiments using special TEM specimen holders.

Picoindentors:

- The in-situ PI 95 TEM/PI 85 PicoIndenters are full-fledged depth-sensing nanoindenters capable of direct-observation of nanomechanical tests inside the TEM and SEM respectively. Both PicoIndenters provide quantitative force-displacement data which can be time-correlated to real-time events in the TEM/SEM videos.

In-situ/Ex-situ Tensile Stage:

- In-situ thermo-mechanical testing module for SEM with EBSD. The Kammrath & Weiss in-situ thermo-mechanical testing module allows dynamic microstructural observations in SEM at high temperatures under different

Materials Characterization Facility

mechanical loading conditions. The loading stage is equipped with gear boxes, covering the range of 1-150 µm/s velocities. The loading stages are capable of performing tension, compression and bending tests using a 10KN as well as 500N load cells. The stage is equipped with the adaptation for EBSP measurements and also has a heating sub-stage capable of heating specimens mounted on the loading apparatus up to 1000 oC.

Precision Ion Polishing System II (PIPS Model 695):

- The precision ion polishing system (Gatan PIPS™) II is an Ar+ ion mill system which provide thinning, polishing as well as cleaning for transmission electron microscope (TEM) sample preparation. The PIPS II system is incorporated with the X, Y positioning stage for precise centering of the milling target with cold stage. It also includes a 10” touchscreen for ease of use and increased control and reproducibility of the milling process. The digital zoom microscope monitors the polishing process in real time, plus the color images can be stored in DigitalMicrograph® (DM) software for review and analysis while the sample is in the TEM.Xenon fluorescent light source, 300 W with rapid switching (<2 msec) between excitation
wavelengths

XPS/UPS:

- Omicron XPS/UPS system with Argus detector uses Omicron’s DAR 400 dual Mg/Al X-ray source for XPS measurements and the HIS 13 He UV source for UPS measurements. Electron analysis can be done with Omicron’s 124 mm mean radius electrostatic hemispherical dispersive energy analyzer with the 128-channel micro-channel plate Argus detector with 0.8 eV resolution. This system is also equipped with a CN10 charge neutralizer to reduce charging on samples such as polymers and an NGI3000 Argon ion sputter gun for surface cleaning.

Nanoindenter:

- The TI 950 Triboindenter is equipped with performech Advanced Control Module which provides great performance for nanomechanical testing. It is equipped with integrated dual head testing for low load and high load performance that enables testing at the nano/micro scale levels for both hard and soft materials. It has improved lateral measurements for thin film samples, xSol high temperature stage having the range of 20 °C up to 800 °C, extended displacement stage – suited for testing adhesive and compliant samples. In addition, it has a fluorescence microscope option capable of performing both standard bright-field and fluorescence imaging, NanoDMA and Modulus Mapping for quantitative measurements of viscoelastic nanomechanical properties from the in-situ SPM imaging and TriboEA for acoustic emission signals from fracture or deformation.

AFM-IR:

- The Anasys Instruments nanoIR2-sTM combines nanoscale chemical characterization AFM-IR (Atomic Force Microscopy–Infrared Spectroscopy) with optical property mapping sSNOM (scattering Scanning Near Field Optical Microscopy). AFM-IR provides the spatial resolution of AFM with chemical analysis capabilities of infrared spectroscopy (IR). An AFM probe is used to locally detect the thermal expansion of sample(s) resulting from absorption of infrared radiation at the resonant wavelength. IR spectra are then collected by measuring the cantilever oscillation amplitude as a function of IR wavelength, creating a unique chemical fingerprint with nanoscale spatial resolution. The s-SNOM technique uses a metallized AFM tip to enhance and scatter radiation from the tip in proximity to the sample. The scattered radiation carries information about the complex optical properties of the sample under the metallized tip.

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Materials Characterization Facility

Imaging Ellipsometer:

- The Nanofilm EP3-SE is a high-precision, auto-nulling spectroscopic imaging ellipsometer in the PCSA configuration with ellipsometric resolution of up to Δ ±0.002 deg and Ψ ± 0.001 deg and accuracy of ±0.1 deg. It is equipped with a Xenon arc lamp, allowing spectroscopic ellipsometric scanning from 365-1000 nm at 46 wavelengths—a useful capability for the determination of optical properties for complex films and stacks. Additionally, a CCD camera allows for the capture of optical and ellipsometric images.

CAMECA ion microprobe:

- The CAMECA IMS 4f ion microprobe is a tool for investigating isotopic composition in the chemical, material, geological and biological sciences. All elements (H to U) can be detected in depth profiling, surface, bulk and microanalysis modes. Detection limits are in the ppb range with depth resolution of 10 nm and lateral resolution of ~3 µm. Typical applications include in-depth compositional analysis of high-performance materials, isotopic ratios in terrestrial/extraterrestrial specimens, localization/imaging of 13C- and 15N-labeled molecules in biological materials.

Dimension Icon AFM:

- This AFM is equipped with Peak Force Tapping using ScanAsyst for topography and phase images; contact mode; force imaging for elastic properties of materials from force curves plots; intermittent mode (tapping) for topography and phase images; imaging in a liquid environment; peak force TUNA for topography, current images, current-voltage (I-V) plot; Peak Force Quantitative NanoMechanics for modulus, adhesion, deformation and dissipation measurements; magnetic force microscopy for long range magnetic forces on the sample surface and a Peltier heater/cooler stage with the range of -20 °C up to 200 °C.

Spectrofluorometer:

- The PTI QuantaMaster series spectrofluorometer is a modular system with capabilities for measuring many luminescence phenomena for both liquid and solid (film or powder) samples. It is equipped with a Xenon arc lamp for collecting steady state emission spectra and a pulsing Xenon lamp for measuring phosphorescence lifetimes. Additionally, several LED sources are available at specific wavelengths that can be attached for collecting fluorescence lifetime measurements. FelixGX software can be used to collect and analyze excitation and emission scans, excitation and emission ratios, time-based scans for single samples or up to 10 dyes simultaneously, lifetime measurements, and quantum yield.

UV-Vis-NIR spectrophotometer:

- The Hitachi U-4100 UV-Vis-NIR spectrophotometer is a highresolution spectrometer capable of measuring absorbance, transmittance, and reflectance of both liquid and solid (film) samples from 175-3300 nm.

Raman confocal microscope:

- The Horiba Jobin-Yvon LabRam IR system provides highly specific spectral fingerprints which enables precise chemical and molecular characterization and identification. It offers optimal confocal spatial and depth discrimination down to 1 µm, two laser options (632 nm and 785 nm), and automated XYZ mapping. The spectrometer is equipped with two gratings and an open electrode CCD with enhanced quantum efficiency in the spectral range 450 – 950 nm.

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FTIR spectrometer:

- The Thermo Nicolet 380 FTIR spectrometer is equipped with a standard transmission stage that holds various sample preparations. It has diamond tipped ATR stage for measurements ranging from 3000 to 200 cm-1 with spectral range of 7800 to 350 cm-1 and 0.9 cm-1 spectral resolution.

DXS 500 optical microscope:

- The DXS 500 is an optical microscope by Olympus America. It can be used with the Tensile Stages or independently. It provides 2D, and 3D views of surfaces; Enables variety of ways to view the samples such as brightfield, darkfield, mix [BF + DF], differential interference contrast (DIC) and polarized light. It is also equipped with panorama system to automatically stitch images of large areas in real time.

LA—960S:

- The LA-960s unit features a wide measurement of particle size distribution ranging from 10nm to 5000 µm. The Method Expert in LA-960s enables guided and automated tests with the option to choose values for refractive index, concentration, ultrasonic dispersion, pump speed, as well as duration of measurement. Particle size distribution measurement is used for quality control for materials such as ceramics, cement, drugs and polymers. LA-960s is equipped with accessories for suspensions, emulsions, powders, pastes, gels and creams.

SA-9601:

- The SA-9601 is a surface area analyzer which brings exceptional speed and convenience to BET surface area analysis. SA-9601 can be used to acquire gas adsorption and desorption curves. This information is then used to calculate total surface area according to the known BET theory. Reactivity, dissolution, catalysis, and separation are some of the properties that can be directly correlated to the surface area of a material. It provides single-point surface area measurements with total surface area 0.1 to 50 m2 ; and specific surface area 0.01 to > 2000 m2 /g.

Thermal mechanical analysis (TMA):

- The thermo-mechanical analyzer measures changes in the dimensions of a sample as a function of time, temperature and force in a controlled atmosphere. TMA can measure the coefficient of thermal expansion along with the glass transition temperature (Tg). Creep and stress relaxation analysis, and softening and melting points can be measured for solids (soft or rigid samples) under various modes of operation in a temperature range between -150 to 1000 °C, with force range of 0.001 to 1 N.

Differential scanning calorimetry (DSC):

- The capabilities of this DSC include a temperature range from -90 to 400 °C with a sensitivity of 1 µW for measuring the glass transition temperatures (Tg), melting points, crystallization, heat flow, thermal history, kinetics (isothermal crystallization) and degree of cure.

Dielectric spectroscopy:

- The Novocontrol Alpha impedance analyzer is equipped with Quatro cryosystem for dielectric studies with capacitance range of 1fF – 1F, a frequency range of 3 µHz to 20 MHz, and a temperature range of -160 to 400 °C with nitrogen gas cooling/heating. It can accommodate solid pellet, foil, and non-volatile liquid samples.

Hot Disc thermal conductivity analysis:

- The Transient Plane Source (TPS) Hot Disc is equipped to measure the absolute thermal conductivity 0.005 to 1000 W/mK, and the thermal diffusivity with autocalculation of heat capacity of bulk and directional (axial & radial) materials including solid, liquid, paste, and powder.

MISCELLANEOUS SAMPLE PREPARATION TOOLS

- LADD carbon evaporator
- Cressington 208 HR Sputter Coater
- Struers LaboPol-5 sample polishing table with “automatic” arm attachment
- Diamond polish for the LaboPol-5 table of 1µm, 6µm, and 9µm
- Mirror plate for sandpaper polishing (1200 grit and 600 grit paper available)
- Diamond Band Saw
- Press (for pressed powder samples)
- Buehler hot mounting press
- Nikon SMZ800N stereomicroscope
- Nikon LV100 petrographic microscope
- Epoxy disk preparation area with all needed supplies
- Dedicated computer for offline data processing
- Epson Perfection 800 Photo for high quality scans of samples
- LectroPol-5 Electropolisher: Most commonly used for electrolytic polishing and etching of metallographic specimens
- TenuPol-5 Electropolisher: Most commonly used for electrolytic thinning of specimens for TEM
- UV Sample Cleaner: ZONE SEM II: The ZONE II SEM Desktop Specimen Cleaner uses UV-based cleaning technology to minimize or eliminate hydrocarbon contamination for electron microscopy imaging.
- UV Sample Cleaner: ZONE TEM II: The innovative ZONE TEM II Desktop Sample Cleaner uses UV-based cleaning technology to minimize or eliminate hydrocarbon contamination for electron microscopy imaging. ZONE TEM II offers easy-to-use cleaning for pre-analysis sample preparation, ensuring the best possible data from our TEM samples.

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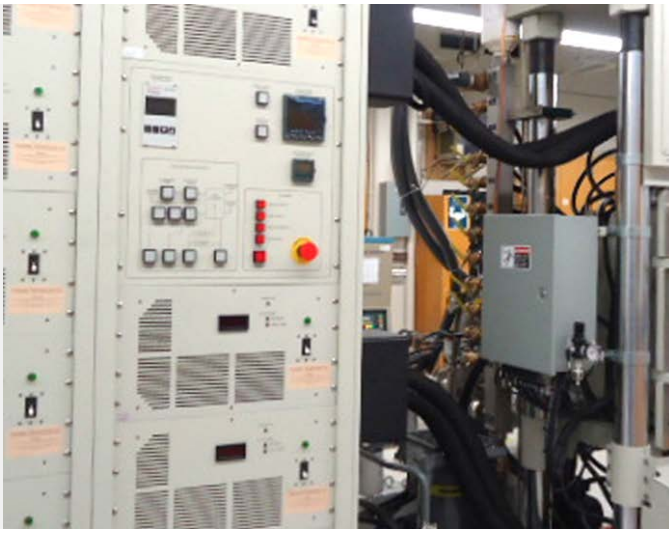
Materials Development and Characterization Center



The Texas A&M Materials Development and Characterization Center was established in 2008 as a part of the Materials Science and Engineering graduate program, now a stand-alone department. It is a user facility serving materials researchers at Texas A&M University College Station campus, and other Texas A&M System members, various universities and industry. MDC 2 houses the fabrication and characterization instrumentations required for fundamental science research as well as applications as new materials and devices. The Center interacts with multiple users such as multiple departments in the Texas A&M University community, the US National Labs, US Army, Navy and Air Force, and commercial companies for research and development.

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Materials Development and Characterization Center

EQUIPMENT

Squid VSM:

- The system offers unique versatility in materials research by measuring the Magnetic moments as a function of Magnetic Field(0 to 7 Tesla), Temperature (2 K to 400 K) and time through its capabilities over highest quality data acquisition. It allows automated magnetic moment measurement for automated control over magnetic field, temperature and time changes. Its sensitivity to measure magnetic moment of the range of 10-8 emu and capability to cool the sample from room temperature to 2 K within 30 minutes makes the system unique.

BRUKER D8 X-ray:

- Cu sealed tube X-ray Source
- Third generation Gobel Mirror provides the X-ray highest flux density
- Dynamic Scintillation detector and Sol X detector also available
- System is designed for easy and failsafe operation
- High performance optics provide the optimum resolution for each application and sample
- Centric Eulerian Cradle provides advantage for texture, micro diffraction investigation
- 5 inch vacuum chuck
- Thermally controlled stage for measurement from Room Temperature to 1100 °C
- Rietveld Refinement analysis

Spark Plasma Sintering System:

- SPS is high speed powder consolidation process
- High amperage pulsed DC current is used to activate the consolidation and reaction-sintering of materials
- Full density and controlled porosity
- Pre-forming and binders NOT necessary
- Retains nanometric particle structure
- Fast cycle times
- Powder-to-part net and near-net shapes
- Minimal grain growth
- Ease of use
- Max. Temp.: 2200 °C
- Max. Ramp Rate: 200 °C/minute
- Max. Pressure: 100 Mpa
- Die size(dia): 20 to 50 mm

Glove Box:

- The OMNI-Lab's glovebox provides a working volume of inert atmosphere nearly free of moisture and oxygen. The glovebox is a hermetically sealed, stainless steel enclosure with a full-view window. Installed is a right side mounted 15″ inside diameter antechamber with an interior and exterior entry/exit airlock door, used for passing materials in and out without disturbing the glovebox atmosphere. All materials are passed in and out of the glovebox on a sliding tray installed in the antechamber.
- 9″ diameter glove ports and butyl rubber gloves, mounted in the full-view window, provide easy access to all areas of the glovebox. Two standard customer interface connections are located on the left side of the glovebox. Electrical connections inside the glovebox are provided with a standard duplex receptacle box on the lower right side.
- It provides optional moisture and oxygen analyzers mounted on the control panel. There are 2 models of each type of analyzer. The basic analyzers provide autoranging displays from 10 ppm to percent ranges. The moisture and oxygen analyzers are also available in models with added user adjustable setpoints for audio alarm activation

Vacuum Tube Furnace:

- Max. Temperature: 1500 °C
- Max. Ramp Rate: 15 °C/Minute
- Vacuum: 10 exp(-4) Torr

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Materials Development and Characterization Center

Arc Melter System:

- Edmund Buhler´s Arc Melting system provides following features:
- Multi-purpose button and groove crucibles in a copper base plate.
- Highly reliable, hydraulic heavy-duty hoist.
- Contactless high-voltage, high-frequency arc ignition.
- Water-cooled, double-walled high vacuum chamber.
- Motor driven, water-cooled tungsten electrode which can be moved freely above the crucibles.
- Excellent observation of the melting process through two viewing ports.
- All important control functions are integrated in the head of the electrode and ensure safe and convenient operation.
- Complete pumping system and supply units.
- Powerful generators for melting quantities of up to 500 g and approx. 4000°C (400 and 800 A).
- Special design of the vacuum chamber for large batches up to
- approx. 500 g or for in situ casting of the molten alloys.
- Manipulator for turning small samples in situ.

Differential Scanning Calorimeter:

- The Differential scanning calorimeter (TA instruments model Q 2000) system offers unique versatility in materials research by determining the temperature and heat flow associated with material transition as a function of time and temperature (minus 183 °C to 725 °C) through its capabilities over auto sampler and auto temperature control during quality data acquisition. The SDT Q600 provides simultaneous measurement of weight change (TGA) and true differential heat flow (DSC) on the same sample from ambient to 1,500 °C. It features a field-proven horizontal dual beam design with automatic beam growth compensation, and the ability to analyze two TGA samples simultaneously. DSC heat flow data is dynamically normalized using the instantaneous sample weight at any given temperature

Keyence VHX-2000 Optical Microscope:

- The VHX-2000 Digital Microscope is designed to alleviate the shortcomings of traditional, optical light microscopes – shallow depth-of-field, short working distance, lack of portability and versatility, sample limitations. This system is equipped with a CCD camera, 17″ LCD monitor, light source, controller, analysis/reporting software and a motorized XY stage along with motorized Z-axis lens control which helps to improve the speed and efficiency of the inspection process. This system has a capability of a wide ranged microscopic observation with magnification range from 50x – 1000x. Other features are as follows:
    - 360 degree observation
    - 2D/3D imaging and measurement capability, including automated measurement tools
    - High-speed image stitching
    - Super Resolution imaging mode
    - High Dynamic Range [HDR]
    - Depth composition function for full-focus imaging
    - 54 megapixel 3CCD camera

MTS Compression Testing System:

- The MTS compression system (model MTS insight 30 SL) is comprised of load frame with force capacity of 1kN to 300kN with minimum test speed 0.001 mm/min. and maximum speed 500 mm/min. The position resolution is 0.001 mm. It is DC 4 Quadrant Motor driven system. This system is controlled by TestWorks software which provides fully automatic machine control, data acquisition and also temperature control in the range of minus 80 C to 300 C.

MR7 laser 3D Printer:

- Manufacturing smaller components
- Building up structures directly from powders-metals, alloys, ceramics or composites

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Materials Development and Characterization Center

- Multiple material capabilities
- Rapid setup- make a new alloy in ten minutes
- create graded material samples
- 300 mm cubed work envelop
- 3 axes motion controlled
- 1kW Fiber laser
- Class I laser Enclosure hermetically sealed to maintain Oxygen level below 10 ppm
- Highly controlled atmosphere to ensure no impurity during deposition
- Four powder feeders

TEXAS A&M UNIVERSITY
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National Center for Therapeutics Manufacturing

National Center for Therapeutics Manufaturing, NCTM

The National Center for Therapeutics Manufacturing (NCTM) is an interdisciplinary workforce education and research center serving the global biopharmaceutical and vaccine manufacturing industries. A member of the Texas A&M Engineering Experiment Station, the NCTM develops and delivers customizable instructor-led, computer-based, and hands-on learning to expose the student to various aspects of cell culture and basic molecular biology, aseptic processes and microbiology, upstream and downstream processing of biological materials including viruses, monoclonal antibodies and other recombinant proteins, as well as industrial bioanalytical methods. NCTM also provides enabling technologies to academic/medical researchers and start-ups through its blended infrastructure of academic, scientific, and industrial expertise and complete range of bench-to-pilot and Phase I scale bioprocess and analytical equipment. Our capabilities include:

- Media screening to improve cell line productivity
- Expression systems including bacteria/yeast/mammalian/algae/insect lines
- Protein expression and purification
- Process development/optimization support
- Analytical methods development and characterization

CONTACT

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National Center for Therapeutics Manufacturing

PROCESS DEVELOPMENT AND UPSTREAM PRODUCTION

- This 2,000 square foot cGMP BSL2 suite is subdivided to accommodate to multiplatform processes from bacteria (E. coli, etc.) to various mammalian cell (CHO, VERO, BHK, etc.) expression systems. Activities in this suite include upstream process development and manufacturing up to pre-clinical and Phase I scale. We have bioreactors from 1L to 100L working volumes, including single use, stainless steel, and wave-type systems that will also accommodate perfusion.

Equipment:

- New Brunswick BioFlo® 610 Stainless steel 125L bioreactor
- New Brunswick BioFlo® 310 fermentors with 5 and 14L vessels
- Sartorius BIOSTAT® Cultibag rocking bioreactor with RM 20 and RM50 platforms
- Sartorius BIOSTAT® B Plus 10L bioreactor
- Cell Culture Company AutovaxID® perfusion bioreactors
- Sanimatic UltraFlo 45 CIP skid
- Microfluidics M-110P homogenizer
- CEPA® Z41 tubular bowl continuous centrifuge
- Beckman Coulter Avanti high speed floor centrifuges
- YSI 2900D biochemistry analyzer
- Sartorius BioSealer® and BioWelder®

PROCESS DEVELOPMENT AND DOWNSTREAM PRODUCTION

- This 2,700 square foot suite enables our downstream purification process development and manufacturing activities (see this lab's equipment listed in the yellow side bar). The processes supported in this area include clarification, normal flow filtration, tangential flow filtration and chromatography methods from benchtop to pilot scale production appropriate for pre-clinical to Phase I. Additionally, early formulation studies can be conducted as well as liquid vial filling from a few hundred to several thousand vials. Early stage lyophilization studies can also be conducted in this suite.

Equipment:

- GE ÄKTA Pilot chromatography system
- GE ÄKTA Avant 25 chromatography system
- GE AxiChrom™ and BPG column housings
- Spectrum Labs KrosFlo® Research IIi TFF systems
- Spectrum Labs MiniKros Pilot TFF system
- Millipore Pellicon® TFF cassette and mini cassette assemblies
- Watson Marlow 720UN (66 LPM) peristaltic pump
- Millipore Millistak+® Pod depth filter holder
- Millipore Integritest® 4 filter integrity tester
- Hyclone™ SU process liquid mixer and containers (50, 100, 200L)
- Mettler Toledo PUA579 1000 lb. floor scale with ramp
- Labconco Freeze Zone 2.5L lyophilizer
- M&O Perry Industries P-1540 vial filler
- QSonica Q500 Sonicator

ANALYTICAL METHODS DEVELOPMENT AND PRODUCT TESTING

- This 2,700 square foot suite houses instrumentation to support various analytical assays used in both quantifying and analyzing biomolecules and potential contaminants (see this lab's equipment listed in the yellow side bar). As a Texas A&M Center, we also have access to vast resources throughout Texas A&M University including centers containing extensive mass

National Center for Therapeutics Manufacturing

spectrometry and flow cytometry systems to analyze cells and biomaterials.

Equipment:

- Dionex UltiMate® 3000 HPLC system with PDA and charged aerosol device detectors
- Biotek Synergy™ H1 multi-mode plate reader
- Biotek ELx50 ELISA plate washer
- Bio-Rad ChemiDoc™ MP gel and Western blot imaging system
- Tecan Freedom EVO® liquid handling system
- FortéBio BLItz® system
- GE ÄKTA Micro chromatography system with analytical sizing columns
- GE SimpliNano systems
- GE Sievers 900 TOC analyzer with auto sampler
- Bio-Rad C1000 Touch™ thermal cycler
- Beckman Coulter DU730 UV-VIS spectrophotometer
- Lighthouse Worldwide Solutions Solair 3100 airborne particle counters
- Millipore MAS-100Eco® air samplers

CELL CULTURE LAB

- This 600 square foot suite houses equipment and supplies to support aseptic handling of cell culture operations associated with cell line selection, maintenance, and scale-up activities (see this lab's equipment listed in the yellow side bar). Some of the processes performed in this lab include cell freeze/thaw, cryopreservation, cell banking, cell expansion and seed train propagation.

Equipment:

- Labconco Class II, Type A2 biosafety cabinets
- New Brunswick Galaxy® 170S CO2 incubators
- Cell Culture Company Multi6™ and Primer™ perfusion bioreactors
- Nova Biomedical BioProfile® 400 chemistry analyzer
- Thermo Fisher CryoExtra™ 20 LN_2 storage vessel
- Thermo Fisher Neon® transfection system
- Eppendorf 5810R centrifuges
- Bio-Rad TC20™ automated cell counters
- Olympus IX53 inverted fluorescence microscope with camera
- Carl Zeiss Primovert inverted microscopes
- Leica DM750 upright microscopes

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National Corrosion and Materials Reliability Laboratory

Center for Infrastructure Renewal

Through research, education and training, the National Corrosion & Materials Reliability Lab (NCMRL) provides solutions to the corrosion needs of industry and government in order to maximize asset life, production efficiency and worker safety. The goal is to preserve and extend the integrity of the structures, such as buildings, bridges, pipelines, roads, ports and off-shore platforms that can be continuously occupied and operational during the entire design life of current or new civil infrastructures. The NCMRL conducts state-of-the-art research, development, testing and assessment of corrosion-resistant materials, corrosion mitigation strategies, corrosion sensors and asset life prediction tools.

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https://cir.tamu.edu/facilities/national-corrosion-materials-reliability-lab/

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National Corrosion and Materials Reliability Laboratory

EQUIPMENT

Atmospheric Corrosion:

- 2 Fog chamber LF 8151 QS Model test chambers, which can be instrumented for electrochemical evaluation

Advanced surface electrochemistry characterization:

- Scanning Kelvin Probe
- Scanning Vibrating Electrode Technique
- Localized Electrochemical Impedance Spectroscopy
- Scanning Electrochemical Microscopy
- Benchtop scanning electron microscope JCM 600 Plus Model
- Inverted metallurgical microscope equipped with a camera Eclipse MA 100 Model
- Macroscope equipped with a camera SMZ 745T Model
- Upright metallurgical microscope equipped with a camera

Coating system evalutation and testing laboratory:

- Gamry Reference 600 potentiostats
- Gamry 600+ potentiostats
- Faraday cages (custom made)
- Suitable coating testing cells (Gamry model)
- Cortest type Proof rings adapted for electrochemical testing
- Miniflow loop (10 lt/min) with tests cells adapted for electrochemical and MIC evaluation

General corrosion severity evaluation:

- Pine rotating disk / cylinder electrodes systems (Bi-potentiostat control)
- Thermostatic control equipment and three electrode cells of different custom configurations

Extreme service conditions materials selection laboratory:

- Cortest Autoclave with 5 lt capacity, made with Hastelloy C-2000, rated at 6000 psia and 350°F, this autoclave can operate as exposure weight loss or electrochemical testing configuration
- Cortest electrochemical Autoclave system, with 1 lt capacity and with 3 electrode probes, rating 3000 psia at 600°F, vessel made from Hastelloy C-2000
- CERT frames capable up to 10.000-pound force. This are instrumented to perform slow strain rate, constant load and ripple testing following applicable standards
- CERT high pressure testing frame equipped with a C-2000, 1 lt capacity autoclave designed for electrochemical testing and pressure rings to support a tensile test. This frame can also perform slow strain rate, constant load and ripple load testing
- Gamry 600+ and Interface 1000 potentiostats, and ancillary equipment to develop electrochemical testing at room conditions with thermal control. The tests can be performed with H2S/CO2 simulating sour environments
- Hydrogen permeation electrochemical cells (Devanathan – Starchuski type) for study of hydrogen diffusivity at room conditions following ASTM G148 or under CO2/H2S conditions simulating sour environments

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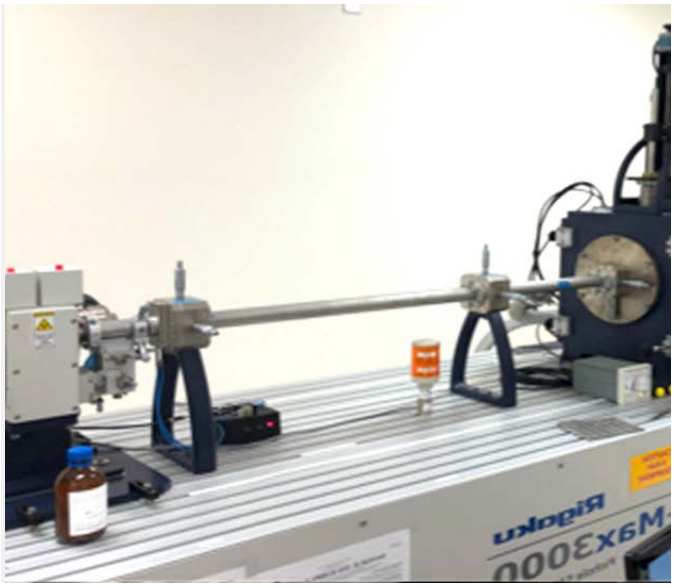
Soft Matter Facility



1313 Research Parkway

The new Soft Matter Facility (SoMF) is the user facility focused on characterization of multifunctional soft materials. The establishment of SoMF is funded through the Research Development Fund and represents multiple colleges and centers across the university actively involved in soft materials-related research, including the Colleges of Engineering, Science, and Agriculture & Life Sciences at Texas A&M university.

The facility will initially include four instrumentation suites based on the soft-matter-centered research areas which will be unified by the general theme of characterization of hierarchically structured multi-component, multifunctional soft materials: Molecular Characterization, Processing & Mechanics, Thin Films & Interfacial Analysis, and Nanostructure Characterization.

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Soft Matter Facility

EQUIPMENT

Nanoscale Structures:

- Small-angle X-ray Scattering: Rigaku S-Max 3000

Molecular Characteristics:

- Gel Permeation Chromatography (GPC): Tosoh Ambient Temp GPC with DMF, Tosoh Ambient Temp GPC with THF, Tosoh Ambient Temp GPC with water, Tosoh High Temp GPC with TCB (trichlorobenzene)

Thin films and Interfaces:

- Size and Zeta Potential Measurements: Malvern Zetasizer Nano ZS
- Langmuir-Blodgett & Langmuir-Schaefer: KSV NIMA Medium LB Trough

Processing & Mechanics:

- Microcompounder: Thermo Scientific HAAKE MiniCTW
- Injection Molder: Thermo Scientific HAAKE MiniJet Pro
- Dynamic Mechanical Analysis (DMA): TA Instruments DMA 850
- Rheology: TA Instruments DHR-2 Rheometer
- Differential Scanning Calorimetry (DSC): TA Instruments DSC 2500
- Thermogravimetric Analysis (TGA) with Mass Spectrometry: TA Instruments TGA 5500, TA Instruments Mass Spectrometer
- Hysitron Biosoft In-Situ Indenter: Bruker Biosoft Indenter
- Instron Tensile Tester: Instron 6800

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SQUID Magnetometer

We are a full service Superconducting Quantum Interference Device laboratory offering state of the art instrumentation for the analysis of solid materials. Our services include magnetic analysis for Chemistry, Material Sciences and Pharmaceuticals. We are staffed by trained Ph.D. scientists who employ the most up to date SQUID techniques. Please feel free to contact us about your magnetic needs.

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TEXAS A&M UNIVERSITY
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SQUID Magnetometer

EQUIPMENT

Quantum Design MPMS3 SQUID Magnetometer:

- Cryogen Free with EverCool®
- Multiple Measurement Modes
- DC Scan
- VSM (Vibrating Sample Magnetometer) Scan
- AC Susceptibility Scan
- Temperature Range: 1.8 – 400K
- 7 Tesla Magnet (-70 kOe to +70 kOe)
- Ultra low field ± 0.05 G with a 7 T magnet

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X-Ray Diffraction Laboratory

Welcome to the X-ray Diffraction Laboratory in the Department of Chemistry at Texas A & M University. We are a full service X-ray Diffraction laboratory offering state of the art instrumentation for the analysis of solid materials. Our services include single-crystal and powder diffraction for Chemistry, Material Sciences and Pharmaceuticals. We are staffed by trained Ph.D. scientists who employ the most up to date diffraction and X-ray techniques. Please feel free to contact us about your diffraction needs.

The X-ray Diffraction Laboratory maintains one of the best equipped X-ray Diffraction Labs in the world. The lab maintains 3 Micro-focus IuS sources, a Venture PHOTON 2, QUEST PHOTON 2, 2 Bruker single-crystal APEXii CCD Diffractometers, 1 Bruker GADDS/Histar diffractometer, and 4 Bruker powder diffractometers

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X-Ray Diffraction Laboratory

EQUIPMENT

Venture Bruker-AXS Venture IUS CMOS Kappa X-ray Apex2Diffractometer:

Specifications

- Kappa D8 Goniometer
- Copper IuS micro-focus source
- Oxford Cyrosystem Low Temperature Attachment
- Temperature range RT – 100K
- APEX3 data collection software
- CPAD detector (Photon III)
- WINDOWS 10 computer control
- Crystal Size Limits 10-100 microns
- Average turn-around time 2-3 Weeks
- Users : Faculty, Staff and Graduate Students
- Training : Standard Safety and Instrument Use

Crystal Size

- Loop diameter: 500 microns
- Fiber diameter: 20 microns

Quest Bruker-AXS CPAD IuS copper source kappa X-ray diffractometer:

Specifications

- Kappa D8 Goniometer
- Copper IuS micro-focus source
- Oxford Cyrosystem Low Temperature Attachment
- Temperature range RT – 100K
- APEX3 data collection software
- CPAD detector (Photon III)
- WINDOWS 10 computer control
- Crystal Size Limits 10-100 microns
- Average turn-around time 2-3 Weeks
- Users : Faculty, Staff and Graduate Students
- Training : Standard Safety and Instrument Use

Crystal Size

- Loop diameter: 500 microns
- Fiber diameter: 20 microns

Apex 21 Bruker-AXS ApexII Three-Circle X-Ray Diffractometer

Specifications

- Three-circle D8 Goniometer
- Molybdenum X-ray Radiation
- Oxford Cyrosystem Low Temperature Attachment
- Temperature range RT – 100K
- APEX3 data collection software
- CPAD detector
- WINDOWS 10 computer control
- Crystal Size Limits 100+ microns
- Average turn-around time 1-2 days
- Users : Faculty, Staff and Graduate Students
- Training : Standard Safety and Instrument Use

Crystal Size

- Loop diameter: 500 microns
- Fiber diameter: 20 microns

Apex22 Bruker-AXS ApexII Three-Circle X-Ray Diffractometer

Specifications

- Three-circle D8 Goniometer
- Molybdenum Sealed Tube and Copper IuS X-ray Radiation
- Oxford Cyrosystem Low Temperature Attachment
- Temperature range RT – 100K
- APEXII data collection software
- CMOS Detector
- WINDOWS 10 computer control
- Crystal Size Limits 100+ microns
- Average turn-around time 1-2 Days
- Users : Faculty, Staff and Graduate Students
- Training : Standard Safety and Instrument Use

X-Ray Diffraction Laboratory

Crystal Size

- Loop diameter: 500 microns
- Fiber diameter: 20 microns

Bruker-AXS Quest Eco Three-Circle X-Ray Diffractometer

Specifications

- For use with radioactive materials
- Three-circle D8 Goniometer
- Molybdenum X-ray Radiation
- Internal Water Chiller
- Oxford Cyrosystem Low Temperature Attachment
- Temperature range RT – 100K
- APEX4 data collection software
- Photos 2 detector
- WINDOWS 10 computer control
- Crystal Size Limits 100+ microns
- Average turn-around time 1-2 days
- Users : Faculty, Staff and Graduate Students
- Training : Standard Safety and Instrument Use

Crystal Size

- Loop diameter: 500 microns
- Fiber diameter: 20 microns

Bruker-AXS D8 Advanced Bragg-Brentano X-Ray Powder Diffractometer

Specifications

- D8 Goniometer
- Lynxeye PSD
- Copper X-ray Radiation
- Commander collection software
- APEXII data collection software
- WINDOWS 10 computer control
- Powder Samples
- Average turn-around time 2-3 hours
- Users : Faculty, Staff and Graduate Students
- Training : Standard Safety and Instrument Use

Bruker-AXS D8 Vario X-ray Powder Diffractometer

Specifications

- D8 Goniometer
- Ni Filter
- Lynx eyePSD
- Copper X-ray Radiation
- Commander collection software
- WINDOWS 10 computer control
- Powder Samples Flat bed
- MTC Oven 30C to 1000C
- Average turn-around time 1-2 days
- Users : Faculty, Staff and Graduate Students
- Training : Standard Safety and Instrument Use

Bruker-AXS D8 Vario X-Ray Powder Diffractometer

Specifications

- D8 Goniometer
- Ni Filter
- Lynxeye PSD
- Copper X-ray Radiation
- Commander collection software
- WINDOWS 10 computer control
- Powder Samples Flat bed
- Average turn-around time 1-2 hours
- Users : Faculty, Staff and Graduate Students
- Training : Standard Safety and Instrument Use

Bruker-AXS D8 Davinci X-Ray Powder Diffractometer

Specifications

- D8 Goniometer
- Twin/Twin Optics (Bragg-Brentano or Parallel)
- No Filter
- Lynxeye PSD XTE

X-Ray Diffraction Laboratory

- Copper X-ray Radiation
- Commander collection software
- WINDOWS 10 computer control
- Powder Samples Flat bed
- Average turn-around time 1-2 hours
- Users : Faculty, Staff and Graduate Students
- Training : Standard Safety and Instrument Use

Bruker-AXS D8 Endeavor X-ray Powder Diffractometer

Specifications

- D8 Goniometer
- 66 sample tray (for multi-sample analysis)
- No Filter
- Lynxeye PSD XTE
- Copper X-ray Radiation
- Commander collection software
- WINDOWS 10 computer control
- Powder Samples Flat bed
- Average turn-around time 1-2 hours
- Users : Faculty, Staff and Graduate Students
- Training : Standard Safety and Instrument Use

Oxford Helix: Helium Cryostat

Specifications

- Helium gas cryostat
- Temperature Range 30-300K
- He usage 1 tank of bottled He gas per 18 hours
- Setup 1 week notification
- Average turn-around time 1-2 days
- Users : Faculty, Staff and Graduate Students
- Training : Standard Safety and Instrument Use

TEXAS A&M UNIVERSITY

CORE FACILITIES

DATA INFORMATICS AND COMPUTATION

Data Informatics and Computation

Cores in this area focus on empowering research and discoveries by providing access to computational hardware, software, and application expertise across the spectrum of data sciences.

Name of Core Facility	Director	Thematic Area
Crop Genome Editing Laboratory	Michael Thomson	Data Informatics and Computation
Genomics and Bioinformatics Service	Charlie Johnson	Data Informatics and Computation
Laboratory for Molecular Simulation	Michael B. Hall	Data Informatics and Computation
Rigor & Reproducibility Core	Kurt Zhang	Data Informatics and Computation
Smart Grid Control Room Lab	Tom Overbye	Data Informatics and Computation
TIGSS Bioinformatics Core	Wesley Brashears	Data Informatics and Computation

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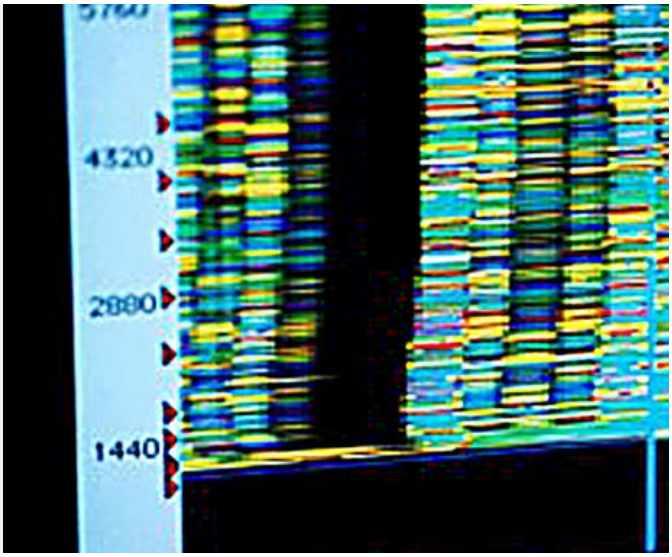
CORE FACILITIES

Crop Genome Editing Laboratory



The Crop Genome Editing Laboratory (CGEL) was established by Texas A&M Agrilife Research in 2017 to optimize CRISPR/Cas-based genome-editing techniques and provide gene editing services for crop improvement. CGEL works closely with AgriLife Research partners at the Genomics and Bioinformatics Service Lab and the Multi-Crop Transformation Facility to apply CRISPR technology across a wide range of key crops, including rice, wheat, sorghum, cotton, peanut, and potato. We are currently working on 13 projects from the AgriLife Research Gene Editing Seed Grant program, along with research activities funded by the Texas A&M X-Grants initiative through the President's Excellence Fund.

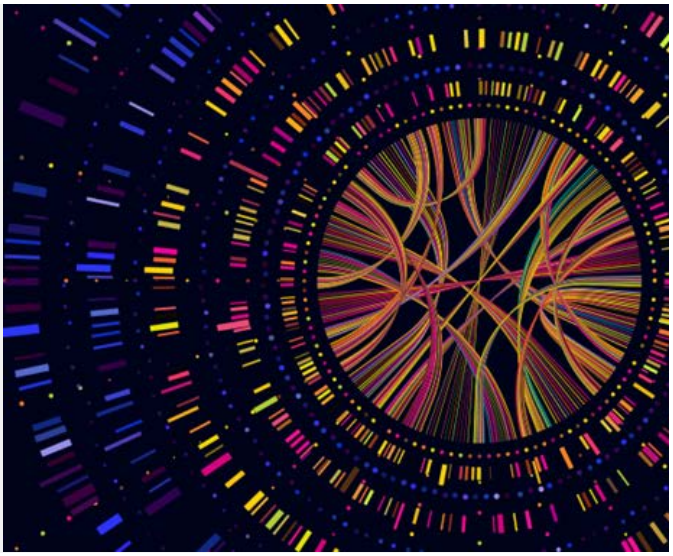
CONTACT

Michael Thomson, *Director*
m.thomson@tamu.edu
979.845.7526

https://agrilife.org/cgel/

TEXAS A&M UNIVERSITY
CORE FACILITIES

Genomics and Bioinformatics Service



Room 250, Centeq Building A

We have already sequenced more than 100 different species (not counting metagenomic projects), over 1000 samples/month processed and we add about one new project every day. A key element of NGS is the high-quality library preparation. The protocols and equipment used by our team can accommodate a range of needs. Our quantitative and computational analytical unit sits at the cutting edge of bioinformatics research—we use the latest tools and develop improvements to correct short comings with these tools.

CONTACT

Charlie Johnson, *Director*
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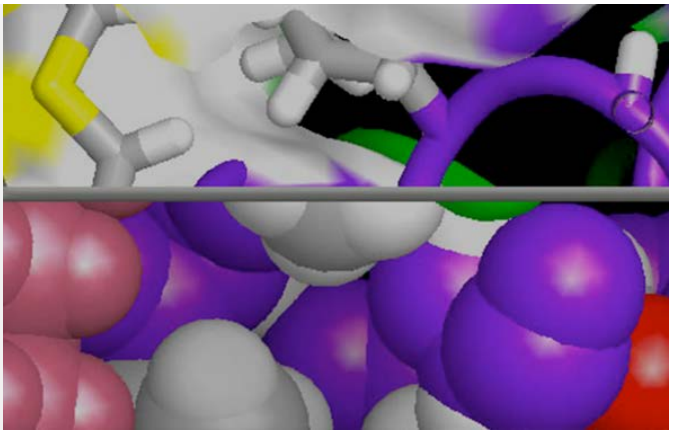
979.862.3262

https://www.txgen.tamu.edu/

TEXAS A&M UNIVERSITY
CORE FACILITIES

Laboratory for Molecular Simulation



Emerging Technologies Building

The Laboratory for Molecular Simulation (LMS) is Texas A&M University's core user facility for molecular modeling. It is supported by user contributions and by the Office of the Vice President for Research, College of Science, College of Engineering/TEES, and College of Agriculture & Life Sciences. The mission of the LMS is to bring molecular modeling closer to the experimental scientist by offering training to both new and advanced users. Cutting edge molecular modeling software is available through the LMS to perform quantum calculations on "small" molecular or solid systems and molecular mechanics/dynamics modeling for large systems such as proteins, DNA, nanomolecules, polymers, solids, and liquids. The LMS is also committed to expanding the incorporation of molecular modeling into Texas A&M University undergraduate and graduate courses by providing support for faculty that wish to incorporate molecular modeling into their course material.

BIOVIA Materials Studio Visualizer and the following modules: Conformers, Forcite Plus Parallel, Gaussian Interface, QSAR+, Reflex, VAMP, MS Pipeline Pilot Collection, Adsorption Locator, Amorphous Cell, Blends, Compass, GULP, Mesocite, Mesodyn, Sorption, Synthia, CASTEP, DFTB+, DMOL3, NMR CASTEP, ONETEP, QMERA BIOVIA Discovery Studio Visualizer and the following modules: Analysis, Biopolymer, Catalyst Conformation, Catalyst Score, CHARMm, DMOL3 Molecular, MMFF (Merk Molecular Force Field), Protein Refine, QUANTUMm (QM/MM – DMOL3/CHARMm), Catalyst DB Build, Catalyst DB Search, Catalyst Hypothesis, Catalyst SBP, Catalyst Shape, CFF (Consistent Force-Field), De Novo Evolution, De Novo Ligand Builder, Flexible Docking, LibDock, LigandFit, LigandScore, Ludi, MCSS (Multiple Copy Simultaneous Search), MODELER, Protein Docking: ZDOCK and RDOCK, Protein Families, Protein Health, Sequence Analysis, X-ray. Schrödinger Schrödinger suite of software: Maestro, CombiGlide, Glide, Liaison, Strike, QikProp, Canvas, LigPrep, BioLuminate GUI, Prime, Qsite, MacroModel, ConfGen, Jaguar, pKa Predictor, Epik, SiteMap, and PIPER. CCG MOE: Molecular Operating Environment, One fully integrated drug discovery software package, including structure-based design, fragment-based design, pharmacophore discovery, medicinal and biologics applications, protein and antibody modeling, molecular mechanics/dynamics, cheminformatics and QSAR. Gaussian Gaussian (09 & 16) Semichem GaussView 6 AMBER AMBER Molpro Molpro SCM ADF & ADF-GUI TK Gristmill AIMALL Professional NBO NBO7 Chemissian Chemissian Hardware: LMS hardware can host ITAR and Export Controlled Software (EAR) Computer Configuration LMS 17 Dell Precision T3420 workstations NVIDIA Quadro K620 GPU VICI 1088-core cluster (768 core of 16-core nodes and 320 core of 8-core nodes) VIDI 312-core cluster (Mix of 8 and 12-core nodes).

CONTACT

lms@tamu.edu
979.458.8414

https://lms.chem.tamu.edu/

Laboratory for Molecular Simulation

EQUIPMENT

Software and Training:

- The LMS provides commercial and open-source software solutions and the training required to utilize the software.

Axio Imager.M2 Motorized Upright Microscope:

- The LMS has hardware solutions to fit your computational research needs.

TEXAS A&M UNIVERSITY
CORE FACILITIES

IBT Rigor & Reproducibility Core-Houston, TX

Institute of Biosciences and Technology
Houston, TX

The core assists investigators with incorporating Rigor and Reproducibility into their research by performing rigorous statistical and bioinformatics analysis. The core provides consultation for grant preparation in the following areas: (1) Study design, including treatment arms, sample size and power calculations; (2) The review and discussion of protocols involving the generation of data prior to submission to the funding agency; (3) The protocol development for statistical analysis and bioinformatics analysis; (4) Enforcement of authentication for key biological and chemical sources.
Research Collaboration: The core will provide high-quality statistical and bioinformatics support for the proposed projects. We will develop and implement statistical methods and bioinformatics software that is optimized for the proposed study and the targeted dataset. If substantial efforts are required for the core to participate in the proposed project, a budget request should include the time efforts of the core personnel. Investigators are welcome to discuss such opportunities for collaboration.
The development of training programs: The core is committed to educate and train the next generation of scientists for the good practice of Rigor and Reproducibility. We will collaborate with colleagues in the Department of Statistics and the School of Public Health to develop workshops and webinars for predoctoral students and postdoctoral fellows. Those workshops and webinars will cover a wide range of areas, such as study design, randomization, blinding, batch effects, reproducibility, validation, and authentication. We will also work with colleagues in the COM and AgriLife to develop a curriculum of Rigor and Reproducibility for graduate and medical students.

CONTACT

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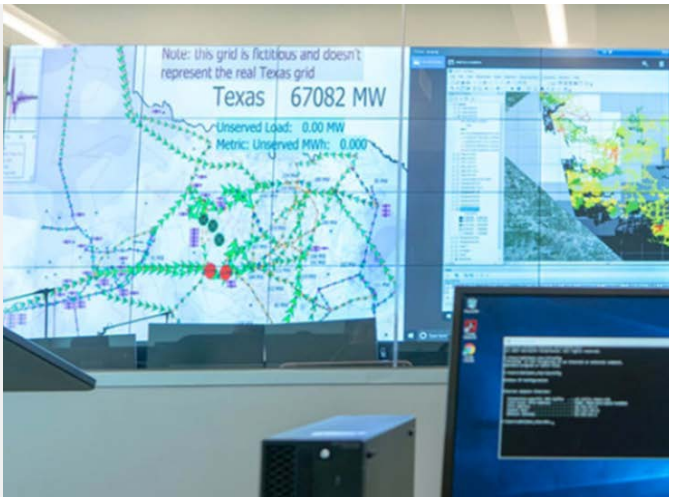
713.677.7476

https://ibt.tamu.edu/cores/rigor-and-reproducibility-core/index.html

TEXAS A&M UNIVERSITY
CORE FACILITIES

Smart Grid Control Room Lab



Center for Infrastructure Renewal

Since 2012 the Smart Grid Center of Texas A&M Engineering Experiment Service (TEES) galvanizes a number of smart grid-related activities that are underway in the A&M System and brings them under a coordinated umbrella to form partnerships essential for smart grid research, education and training. These partnerships are funded through various projects in excess of more than $10 million over the next five years. The Center aims to expand on its broad range of capabilities and expertise in seven key smart grid areas: Electricity Transmission/Distribution and Production/Consumption; Advanced Data Analytics for Outage Prediction, Clean Energy Enabling Technologies; Electrified Transportation System; The Built Environment; Computer Information Services; Energy-related Markets; and High Impact, Low Frequency Event Grid Contingencies. They all come together to create an integrated infrastructure able to handle the growing power demands of residential, corporate, and public needs ranging from smart homes and plug-in electric vehicles to distribution intelligence and operation centers. A large-scale testbed facility with a smart grids control center is hosted at the Center for Infrastructure (CIR) on the RELLIS campus of Texas A&M. The SGC works with many highly qualified and experienced faculty at Texas A&M including several members of the U.S. National Academy of Engineering and two former Presidents of the IEEE Power and Energy Society.

Specific goals are to:

- Assist expanding the government and private sector vision of the smart grid;
- Conduct transformational research to generate new concepts, technologies and integrated systems for the 21st century grid;
- Train engineering students and professionals in electric energy-related concepts and technologies.

Other objectives involve:

- Studying public policy implications;
- Initiating and supporting international collaborative programs;
- Developing partnerships for smart grid research;
- Providing unbiased advice to industry, government and the public related to electric energy production, transport and consumption, and smart grid matters.

Achieving these goals and objectives will position the Texas A&M University System and the State of Texas as global leaders in education, research, and public service in the modernization of the electricity system, leading to job creation and increasing business opportunities for Texas and the nation.

CONTACT

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overbye@tamu.edu
979.458.5001

TEXAS A&M UNIVERSITY
CORE FACILITIES

TIGSS Bioinformatics Core

The TIGSS Bioinformatics Core was established in 2012 with the aim to support scientists who require bioinformatics/computational biology resources to complete their research. The core provides bioinformatics consultation and computational analyses of high-throughput biological data, including next-generation sequencing data. Best practices are followed as specified in peer reviewed journals and protocol articles. All steps of the analyses are documented so that users can replicate analyses as needed. The price structure for data analyses includes:

- Initial Bioinformatics Consultation / Discussions of Project Design: FREE
- Small assistance / Custom analysis steps / Preliminary analyses (less than 2 hours): FREE
- Comprehensive data analyses (Internal): $50 / hr
- Comprehensive data analyses (External Academic / Federal): $75 / hr
- Comprehensive data analyses (External Commercial): $100 / hr

The TIGSS Bioinformatics Core also provides graduate-level courses designed to teach various aspects of bioinformatics research, including topics such as command line skills, RNA-seq analysis, genome assembly, single-cell genomics, and metagenomics.

Since many tools and open source software produces different outputs in different data formats, please contact us regarding your requirements.

CONTACT

Wesley Brashears
wbrashear@tamu.edu
979.458.5231

https://genomics.tamu.edu/bioinformatics-core/

TIGSS Bioinformatics Core

EQUIPMENT

lncRNApipe:

- a reference annotation based automated pipeline to identify non-coding RNAs, both known and novel from RNA-Seq reads. It takes FASTQ / FASTA reads as input, trims reads, assembles transcripts, and identifies any possible known and novel ncRNAs, categorizes them into 5 catgories: Long intergenic lncRNAs (LincRNAs), Intronic contained lncRNAs (Incs), Partially overlapping lncRNAs (Poncs), Completely overlapping lncRNAs (Concs) and Exonic overlaps (LncRNAs with sense or antisense overlap with reference exon) and annotates the novel ncRNAs, where possible.

gQTL:

- Multi-parental recombinant inbred populations, such as the Collaborative Cross (CC) mouse genetic reference population, are increasingly being used for analysis of quantitative trait loci (QTL). However specialized analytic software for these complex populations is typically built in R that works only on command-line, which limits the utility of these powerful resources for many users. To overcome analytic limitations, we developed gQTL, a web accessible, simple graphical user interface application based on the DOQTL platform in R to perform QTL mapping using data from CC mice.

Open Source Software:

- The TIGSS High Performance Computing cluster hosts a broad range of tools such as BWA, ABySS, SOAPdenovo, Velvet, TopHat, Cufflinks, Trinity, Bowtie, MUMmer, HMMER, MIRA, NCBI BLAST, ClustalW and many more. Users have the option to access cluster-hosted tools via either shell accounts or a Galaxy front-end. To request an account send an email to Kranti Konganti. It is very important that you provide your correct Texas A&M Net ID (not the university provided UIN or the alias / email id provided by your department) as you will use that at login on both TIGSS PRoMIs (PRoject Mangement and Issue tracking software) and also at HPC command-line. You will be notified once the account has been created after which you will have access to PRoMIs and TIGSS-HPC Cluster (command-line).

High Performance Computing:

- The TIGSS High Performance Compute Cluster (HPCC) is tailored for bioinformatics and computational Biology applications, sequence assembly, alignment and analysis and many more. A total of 296 compute cores (592 with HT enabled) with a forty-core high performance/high memory “fat” node plus sixteen blades with sixteen cores each are available on the TIGSS-HPC Cluster. The fat node (edius) has a total of 1 TB of memory and the standard compute nodes have 64 GB each for a total of 2 TB compute memory. The cluster has 70 TB useable high-performance/high-availability network attached storage (NAS). A local WIKI is available describing the general usage guidelines and various software that is available globally on the cluster.

CLC Genomics Workspace:

- Comprehensive suite of tools for analysis of next-gen sequencing data including resequencing data, workflow management, read mapping, de novo assembly, variant detection, RNA-Seq, ChIP-Seq, and trio analysis. Access is through a GUI or command line. Support all the major next-gen sequencing platforms, such as SOLiD, Ion Torrent, Complete Genomics, 454, Illumina Genome Analyzer and also Sanger. Acquired in collaboration with the Institute for Plant Genomics and Biotechnology. This is an eight-seat license.
- Access:
  - Please make sure you download v8.01 of the software and install any required plugins that you may need.
  - Before you upgrade your existing client, please take note of the existing license server setting (see below).

They have not changed, but you will need to manually enter them when you upgrade your CLC Workbench client software.

- When you open the existing CLC Workbench client on your computer, you are prompted to upgrade the software with the latest version, and provided a download link.
- Download the CLC Workbench client for your operating system, Windows, MAC or Linux, 64 or 32 bit.
- Run the installer and follow the instructions on the screen. When the installer completes, the CLC Workbench will start and prompt for license information (see below).
- Once you have established a connection, you will need to install the necessary plugins required for your work. On Windows installations, you may find the option to upgrade plugins grayed out. In that case, you will have to right click on the CLC Workbench icon and use the “Run as Administration” option to install plugins.
- Also note, when Paul Greer upgraded the client on my workstation, he was not prompted to upgrade the existing client, so the new version was installed as a new package. If you setup a custom folder location or Workspace, you will likely need to reestablish that path to access your data.
- Send an email to pgreer@tamu.edu to get information about IP address.

Ingenuity Pathway Analysis (QIAGEN):

- Provides expansive suite of tools for interpretation of omic data including upstream regulators and downstream effects, cross-experiment comparison of pathways and causal networks, causal network analysis, disease anchoring, interactive visual exploration of molecules, phenotypes and diseases, identification of mechanistic networks, multiple pathway and network analyses, microRNA target filters, fox lists to link data to clinical pathology endpoints and pharmacological response, and molecule activity predictor.
- This is a multi-user site license and your lab will be charged the internal subscription price. Please fill out the form below so that we can link your account to your lab.

TEXAS A&M UNIVERSITY

CORE FACILITIES

CHEMICAL SCIENCE TECHNOLOGIES

Chemical Science Technologies

Cores in this area focus on state-of-the art sample collection and chemical analysis using resources including a mobile environmental sampling van, high volume size-resolved particle samplers, mass spectroscopy, Raman spectroscopy, and other analytical techniques.

Name of Core Facility	Director	Thematic Area
Center for Atmospheric Chemistry and the Environment	Sarah Brooks	Chemical Science Technologies
Chemistry Mass Spectrometry Facility	Klaudia Kocurek	Chemical Science Technologies
Collaborative Resource in Biomolecular NMR	Joshua Wand	Chemical Science Technologies
Elemental Analysis Laboratory	Bryan E. Tomlin	Chemical Science Technologies
Geochemical and Environmental Research Group	Anthony Knap	Chemical Science Technologies
NMR/ESR Facility of the Chemistry Department	Janet Bluemel	Chemical Science Technologies
Nuclear Science Center	Sean McDeavitt	Chemical Science Technologies
Radiation Effects Facility	Henry Clark	Chemical Science Technologies
Stable Isotope Geosciences Facility	Chris Maupin	Chemical Science Technologies

TEXAS A&M UNIVERSITY
CORE FACILITIES

Center for Atmospheric Chemistry and the Environment

Eller Oceanography & Meteorology 202

An interdisciplinary center, the Center for Atmospheric Chemistry and the Environment (CACE) aims to facilitate collaborative laboratory and field research projects with faculty members across campus, addressing the roles of atmospheric chemistry in fundamental chemical processes, environmental threats resulting from climate change, as well as chemical aspects of air quality and human health. CACE also now houses a state-of-the-art micro-pulse LIDAR that is available to the campus science community for on and off campus field measurements. LIDAR, which stands for Light Detection and Ranging, uses light in the form of a pulsed laser to generate vertical maps of aerosol and cloud properties. The Sigma Space Mini Micropulse LIDAR (MPL) is operated by the Texas A&M University Center for Atmospheric Chemistry and the Environment (CACE), and is located on the roof of the Eller Oceanography and Meteorology Building. The MPL is a highly efficient Single Photon LIDAR (SPL) system that does atmospheric monitoring of aerosols, gases, pollutants, cloud vertical structure, and boundary layer heights. It is an ultra portable LiDAR scanning system that operates unattended 24/7/365, and can also be deployed in a mobile setting. The real-time atmospheric mapping data from the MPL, empowers scientists, academia, meteorologists, and air quality professionals with an understanding of the small particles in our atmosphere that make a big impact on our environment and health. The MPL uses eye safe lasers, precision photon counting electronics, and built-in data analysis to deliver a rich source of atmospheric feature information from uncovering changes in our environment.

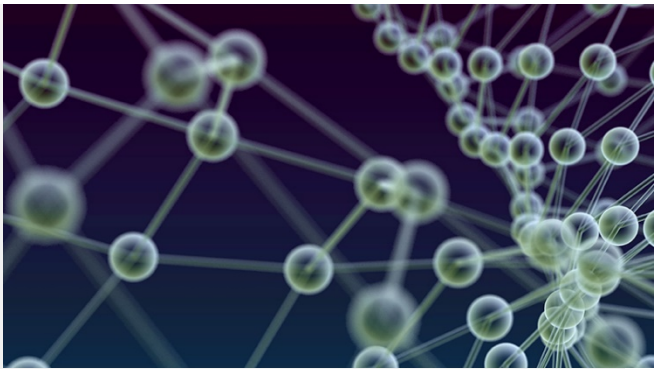
CONTACT

Sarah Brooks, *Director*
sbrooks@tamu.edu
979.845.5632

https://cace.tamu.edu/

TEXAS A&M UNIVERSITY
CORE FACILITIES

Chemistry Mass Spectrometry Facility



Chemistry Building

The Chemistry Mass Spectrometry Facility serves researchers throughout the Texas A&M University system and the Department of Chemistry for chemical characterization. The services available include analyses of compounds ranging from small organic molecules to macromolecules including proteins, oligonucleotides, polymers and dendrimers. In addition, the research capabilities of the facility are accessible to non-Texas A&M users; academic, government, and industry through a fee-for-service method. All proteomics services are performed on the Thermo Scientific Orbitrap Fusion tribrid mass spectrometer equipped with a Dionex UltiMate 3000 reverse-phase nano-UHPLC system.

CONTACT

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979.845.8404

https://mass-spec.chem.tamu.edu/

TEXAS A&M UNIVERSITY
CORE FACILITIES

Chemistry Mass Spectrometry Facility

EQUIPMENT

Protein Identification:

- Identification of proteins from gel bands
- Protein and peptide identification in solution, including identity confirmation of single, purified proteins, as well as large-scale protein identification in complex samples
- Sample requirements: For gel samples, excise the band of interest and cut it into approximately 1-2 mm2 pieces. Place these in an Eppendorf tube and submit. Please provide an approximation of protein amount and information on the stain used in the submission form.
- For in-solution samples, we require a minimum of 10 ug of protein for analysis. PEG, glycerol and detergents are not compatible with mass spectrometric analysis and must be removed prior to sample submission. Please provide details on the buffer composition in the submission form.

Quantitative Proteomics:

- As standard, we offer label-free quantitation (LFQ) as no specific sample pre-treatment is required. For LFQ, each sample is analyzed separately by LC-MS/MS and the results are subsequently compared across all samples to yield relative quantitation data.
- Labeling of proteins for quantitation can be employed to enable multiplexed measurements (that is, samples are pooled together analyzed in a single LC-MS/MS experiment). There are several options for consideration:
- SILAC (Stable isotope labeling by amino acids in cell culture) is suitable for comparing the abundance of proteins in cell culture under two different conditions. Labelling is performed at the cell culture stage during protein expression.
- TMT (Tandem mass tags), iTRAQ and similar labelling systems can be used to label proteins and peptides following their extraction. A larger number of conditions (up to 11 for TMT) can be simultaneously compared.
- Targeted quantitation of specific proteins for increased accuracy can be carried out by parallel reaction monitoring (PRM). PRM requires dedicated method development for each target and will thus be more time-consuming than other approaches.
- Sample requirements: Requirements are similar to those for protein identification; we need a minimum of 10 ug of protein for analysis. We recommend submitting three biological replicates for quantitation.

Post-Translational Modification Analysis:

- We offer the identification and localization of acetylation, methylation, phosphorylation, glycosylation and other modifications by LC-MS/MS. Analysis of post-translational modifications can be performed as part of qualitative or quantitative experiments. In certain cases, enrichment of modified peptides may be necessary prior to sample submission. Laser lines at 458, 477, 488, 514, 543 and 633 nm
- Petri dishes, chamber slides, multiwell plates, plastic or glass, thin or thick vessel bottoms, low skirt or high skirt plates.
- Definite focus, Incubation (Temperature & CO2) and motorized stage
- Zen Blue software complemented with Arivis software

Other Analyses:

- Other, non-routine experiments may be developed and offered on an individual basis. If you wish to start a new project, please contact Klaudia Kocurek to schedule a consultation prior to submitting samples.
- We provide mass spectrometry based analysis in fee-for-service format for the Texas A&M University Department of Chemistry, other departments throughout the university, and to researchers outside the university.
- Our services include, but are not limited to mass analysis of small molecules including identification and structural elucidation, and mass analysis of macromolecules such polymers, dendrimers, and oligonucleotides. We have summarized our services as follows:

TEXAS A&M UNIVERSITY
CORE FACILITIES

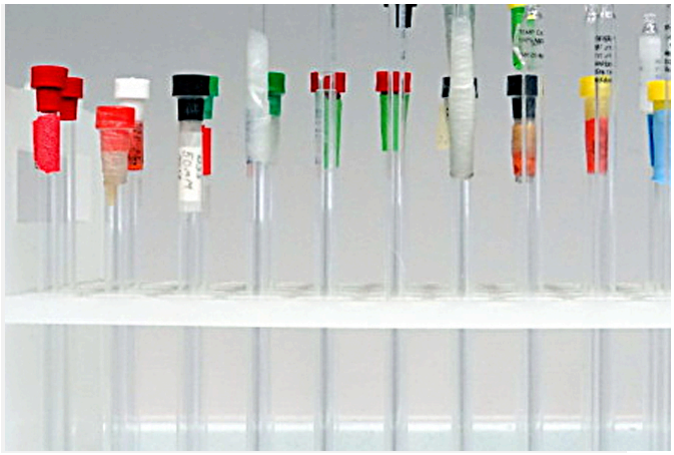
Chemistry Mass Spectrometry Facility

Small and Macromolecule Analysis:

- Analyses of small and macromolecules, which involve determination or confirmation of synthesized products, using low or high resolution mass spectrometry, are considered routine analysis. The following analyses methods are applicable for routine small molecule analysis:
- **Gas chromatography-mass spectrometry (GC-MS): *Thermo Scientific DSQ II:*** Low resolution mass measurements of volatile and thermally stable nonpolar compounds; Sources: electron ionization (EI), chemical ionization (CI); Mass range: up to 1000 m/z; Sample introduction: standard GC sample injection, headspace, and direct probe; Service available daily
- **Liquid chromatography-mass spectrometry (LC-MS): *Thermo Scientific QE Focus:*** Separation of analyte mixtures coupled to high resolution mass measurements; Sources: electrospray ionization (ESI), atmospheric pressure chemical ionization (APCI); Mass range: up to 2000 m/z (3000 m/z in high mass mode); Optional MS/MS fragmentation by HCD (higher-energy collisional dissociation); Can confirm structural information; Service available daily
- **Direct infusion mass spectrometry: *Thermo Scientific QE Focus:*** Fast, high resolution mass measurement for polar and relatively nonpolar compounds; Sources: electrospray ionization (ESI), atmospheric pressure chemical ionization (APCI); Mass range: up to 2000 m/z (3000 m/z in high mass mode); Service available daily;
- **MALDI-TOF-MS: *Bruker microflex:*** Nominal mass measurements; High resolution mass measurements up to 5000 Da; Service available daily
- **Thermo Scientific Q Exactive Focus:** High-resolution Orbitrap instrument configured for routine small molecule analysis. LC system available; Architecture: hybrid quadrupole-orbitrap; Resolution: up to 70,000 at m/z 200; Mass range: up to 3000 m/z
- **Thermo Scientific Orbitrap Fusion:** The primary proteomics instrument. Used for bottom-up proteomics analysis for simple and complex samples. Intact mass measurements possible for small proteins (up to approx. 50 kDa dependent on sample purity). LC system available; Architecture: tribrid (quadrupole, ion trap, and orbitrap mass analysers); Resolution: up to 500,000 at m/z 200; Mass range: up to 6000 m/z
- **Thermo Scientific Q Exactive:** Secondary proteomics instrument. LC system available; Architecture: hybrid quadrupole-orbitrap; Resolution: up to 140,000 at m/z 200; Mass range: up to 6000 m/z
- **Thermo Scientific DSQ II GC-MS:** Gas chromatography platform.
- **Bruker microflex MALDI-TOF**
- **Bruker amaZon SL:** Dedicated training instrument. LC system available.

TEXAS A&M UNIVERSITY
CORE FACILITIES

Biomolecular NMR Laboratory



Biochemistry & Biophysics Building NMR Wing

The Biomolecular NMR facility of the Department of Biochemistry and Biophysics is hosted in newly built NMR wing of the BioBio building located on the West Campus of Texas A&M University. The facility consists of four state of the art NMR spectrometers including a Bruker AVANCE III 800 MHz. At 18.8 Tesla, this modern spectrometer represent one of the very few ultra-high field instruments currently operational in southern United States and Texas. It is equipped with 5mm TCI cryoprobe, which is exceptional proton detection sensitivity of 10,677:1. The facility also hosts two more Bruker AVANCE III HD spectrometers, a 600 MHz and a 500 MHz; alongside a Varian 600 MHz. All these spectrometers are ideally suited for solution-state NMR studies on biological macromolecules like proteins and nucleic acids. In addition Bruker 800 MHz and Varian 600 MHz have capabilities to perform solid-state NMR experiments.

CONTACT

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EQUIPMENT

Bruker AVANCE III 800

Bruker AVANCE III HD 600

Bruker AVANCE III HD 500

TEXAS A&M UNIVERSITY
CORE FACILITIES

Elemental Analysis Laboratory

The Elemental Analysis Laboratory specializes in two kinds of neutron activation analysis (NAA).

- Fast neutron activation analysis (FNAA)
- Thermal instrumental neutron activation (INAA)

Our Laboratory provides training and access to use inductively-coupled plasma mass spectrometry (ICP-MS) in your own research. The ICP-MS has been fitted with both:

- Liquid autosampler for solution analysis
- 213-nm laser ablation module for solids/surface analysis

The Elemental Analysis Laboratory at Texas A&M University is a component of the Department of Chemistry's Center for Chemical Characterization and Analysis. The laboratory provides research support in the area of elemental and trace analysis, as well as, service analyses for Texas A&M researchers, other academic and government agencies and private industry. Our lab is distinguished in that we feature fast neuron activation analysis (INAA) using the University's Nuclear Science Center 1 MW TRIGA research reactor. In addition, the laboratory provides training and access to a state-of-the-art inductively-coupled plasma mass spectrometer (ICP-MS). The ICP-MS has been fitted with both conventional sample introduction hardware for solution work, as well as, a 213 nm laser ablation system for studying solids and surfaces. The laboratory is extensively used to benefit a wide variety of research programs, reporting some 50,000 measurements completed each operational year. If your research depends on knowing whether or not your sample contains certain elements or how much it contains, then we're here to help.

CONTACT

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TEXAS A&M UNIVERSITY
CORE FACILITIES

Geochemical and Environmental Research Group

Geochemical Environmental Research Group
833 Graham Road

The Geochemical and Environmental Research Group (GERG) is a center of excellence in applied geosciences within the College of Geosciences of Texas A&M University. GERG, founded in 1981, focuses on applied interdisciplinary research in the ocean and environmental sciences. GERG is organized as three interrelated core competencies working together to provide capabilities including field data acquisition, data analyses, and data interpretation. Current research projects conducted at GERG encompass chemistry, biology, oceanography, geology, geochemistry, meteorology, and toxicology. GERG offers complete sample preparation laboratories as well as instrumentation for the analysis of salinity, dissolved oxygen, nutrients, trace elements, aliphatic hydrocarbons, aromatic hydrocarbons, petroleum biomarkers, total scanning fluorescence, PAH metabolites, pesticides, polychlorinated biphenyls (PCBs), planar PCB, PBDEs, dioxin/furans, semi-volatile organic compounds, volatile organic compounds, and other organic compounds.

CONTACT

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TEXAS A&M UNIVERSITY
CORE FACILITIES

Geochemical and Environmental Research Group

EQUIPMENT

- Two Dionex Accelerated Solvent Extractors (ASE): When samples for organics are isolated and purified, sample extracts are analyzed for specific analytes using high resolution fused silica capillary gas chromatography (HRGC).
- A multitude of gas chromatographic detectors are available including flame ionization, electron capture, mass spectrometers and a high resolution mass spectrometer.
- Analytical instrumentation is computerized and automated for rapid and efficient sample throughput.
- GERG's organic analyses are provided by 6 gas chromatograph with mass spectrometers (GC-MS) detectors, 1 dual-channel gas chromatographs with two electron capture (GC-ECD) detectors, 2 gas chromatographs with micro-electron capture (GC-uECD) detector, 4 gas chromatographs with flame ionization detectors (GC-FID).
- GERG has a GC with a high resolution mass spectrometers (GC-HRMS) for the analysis of dioxin/furan and dioxin-like PCBs.
- For other trace organic analyses, GERG has 2 high performance liquid chromatographs (HPLC), 1 HPLC coupled to a mass spectrometer (HPLC-MS). All instruments are fully automated with injectors and computers for data acquisition.

Most recent acquisitions in analytical equipment:

- a Waters/Agilent 6470 triple quadrupole LC-MS/MS
- an Agilent Ion Mobility Q-TOF LC/MS
- an Agilent 7010 GC/MS/MS Triple Quadrupole EI system
- a Leco GC/GC 2 dimensional system with a Time of Flight Mass spectrometer. The IMS and LCQQQ are housed in a Biological Safety Laboratory 2 for the analysis of human cells as well as environmental samples.
- GERG has a six channel Astoria analyzer for nutrient analyses and 3 automated oxygen titrators.
- GERG can perform salinity analyses on either a Guildline Autosal 8400B or 8400A.
- GERG's trace metal laboratory has 2 forced air hoods and 1 perchloric acid hood housed in an isolated controlled access area where samples are digested. Teflon vessels and sufficient lab-ware is available for use in acid digestion of samples. The inorganic sample preparation room is adjacent to the inorganic instrument room and both rooms have a heating and ventilation system isolated from the remainder of the GERG laboratory.
- The laboratory has a PerkinElmer FAMI 400 cold vapor mercury atomic absorption spectroscopy (CVAAS) system with an AS 90 Auto Sampler.
- Other trace metals are determined by inductively coupled plasma mass spectrometry (ICP/MS) using a PerkinElmer NexION ICP-MS located at the Texas A&M University Chemistry Trace Characterization facility.
- GERG also can perform metal analyses by neutron activation at Texas A&M University research reactor.
- High-performance interactive 3D / 4D rendering on standard PCs and laptops with 3D Graphics Support
- Intuitive tools for stitching and alignment to create large multi-dimensional image stacks
- Powerful Analysis Pipeline for 3D /4D image analysis (cell segmentation, tracking, annotation, quantitative measurement, and statistics, etc)
- Easy design and export of 3D / 4D High-resolution Movies
- Seamless integration of custom workflows via Matlab API and Python scripting
- Data sharing for collaboration

TEXAS A&M UNIVERSITY
CORE FACILITIES

NMR/ESR Facility of the Chemistry Department

Chemistry '72 Wing

Our facility includes 9 NMR spectrometers, an EPR, and 3 full-time staff positions. Although this facility is physically housed within the Chemistry Department, we provide services to the entire Texas A&M community and beyond.

CONTACT

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TEXAS A&M UNIVERSITY
CORE FACILITIES

NMR/ESR Facility of the Chemistry Department

EQUIPMENT

AVANCE 500:

- This system is located in the Chemistry ’72 Wing room 1235. It has a Bruker Avance Neo console with an Oxford magnet, an automated tuning 5mm 1H/13C/15N cold probe, and a 24 position SampleCase sample changer

VNMRS 500:

- This system is located in the Chemistry ’72 Wing room 1327. It has a Varian VnmrS console with an Oxford magnet, and 5mm 1H {X} broadband and [1H/19F] {X} switchable probes

AVANCE NEO 400 (TANGO):

- This system is located in the Chemistry ’72 Wing room 1318. It has a Bruker Avance Neo console with an Ascend magnet, an automated tuning 5mm broadband iProbe, and a 60 position SampleXpress sample changer

AVANCE III 400 (ILSB):

- This system is located in the Interdisciplinary Life Sciences Building room 1163. It has a Bruker Avance III NanoBay console with an Ascend magnet, an automated tuning 5mm broadband probe, and a 60 position SampleXpress sample changer

VNMRS 300:

- This system is dedicated for use by the undergraduate labs, serving thousands of students a year. It has a Varian VnmrS (DD1) console with an Oxford magnet, a 5mm 4Nuc (1H/19F/31P/13C) probe, and 100 position SMS sample changer.

VNMRS 500 REED-MCDONALD:

- This system is located in the Reed-McDonald building room 415. It has a Varian VnmrS console with an Oxford magnet, and 5mm [1H/19F] {13C} {31P} specialty and [1H/19F] {X} Auto X probes

INOVA 500:

- This system is located in the Chemistry ’72 Wing room 1221. It has a Varian Inova console with an Oxford magnet, and a 5mm 4Nuc (1H/19F/31P/13C) probe

AVANCE NEO 400 (WALTZ):

- This system is located in the Chemistry ’72 Wing room 1318. It has a Bruker Avance Neo console with an Ascend magnet, an automated tuning 5mm broadband iProbe, and a 60 position SampleXpress sample changer

AVANCE 400 (SOLIDS):

- This system is located in the Chemistry ’72 Wing room 1321. It has a Bruker Avance console with an Magnex wide-bore magnet and MAS probes for 7mm, 4mm, and 2.5 mm rotors.

EPR:

- This system is located in the Chemistry ’72 Wing room 1133. It has a Bruker Elexsys E500 console with a standard resonator and CoolEdge cryo system.

TEXAS A&M UNIVERSITY
CORE FACILITIES

Nuclear Engineering and Science Center

Cyclotron Institute

This facility has a one-megawatt TRIGA swimming pool reactor that can be pulsed and a variety of other features including experimental laboratories, a large irradiation cell, beam ports, a thermal column and a pneumatic “rabbit” system. One of the best-equipped facilities of its type in the country, the Nuclear Engineering and Science Center is used in our laboratory courses as well as our research program.

The goal of the Nuclear Engineering and Science Center is to improve the health, well-being and environment of mankind through the application of nuclear technology. The Nuclear Engineering and Science Center, located near the southwest side of Easterwood Airport, provides services to researchers and/or faculty from Texas A&M University, other colleges and universities, government agencies and private industry. The center is recognized primarily for providing radioisotopes and other nuclear irradiation services for research, academic, medical and industrial applications and as a teaching and nuclear training facility.

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TEXAS A&M UNIVERSITY
CORE FACILITIES

Nuclear Engineering and Science Center

EQUIPMENT

Irradiation Cell:

- At one end of the reactor pool is a large room that allows dry irradiation of samples up to 20 feet long.

In-Core Irradiation Devices:

- In-core irradiation devices allow for a variety of geometries, given that the active region of the core is 15 inches long.

Radiochemistry Lab:

- The radiochemistry lab has a handling cell to allow for remote handling of highly radioactive samples, a glove box for handling lower level samples in a contained environment, and several fume hoods.

TRIGA Reactor:

- The centerpiece of the Nuclear Engineering & Science Center is a 1 megawatt TRIGA (Testing, Research, Isotopes, General Atomics) reactor, an open “swimming pool”-type research reactor cooled by natural convection, providing passive and inherent safety.

Neutron Activation Analysis and Counting Lab:

- Samples may be quickly transferred between the reactor and the counting laboratory through a pneumatic transfer system. The counting lab contains four high-purity germanium (HPGe) detectors, as well as advanced gamma spectroscopy software for trace isotope identification, which allows for analysis down to parts per million (ppm) and parts per billion (ppb).

Nuclear Electronics and Machine Shops:

- On-site electronics and machine shops are available for custom fabrication of prototype equipment and electronics for researchers and students.

TEXAS A&M UNIVERSITY
CORE FACILITIES

Radiation Effects Facility

Cyclotron Institute

The Cyclotron Institute's Radiation Effects Facility provides a convenient and affordable solution to commercial, governmental, and educational customers in need of studying, testing and simulating the effects of ionizing radiation on electronic and biological systems. With dedicated beam lines for both heavy ion and proton testing, we can meet a wide variety of testing needs.

CONTACT

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TEXAS A&M UNIVERSITY
CORE FACILITIES

Radiation Effects Facility

EQUIPMENT

K500 Heavy Ion Testing:

- Various ion beams have been developed specifically for the Radiation Effects Facility. These beams provide for a wide scope of LET with high energies for deep part penetration. Time for beam species changes will vary, but with species that have the same energy per nucleon change times are about one half hour.
- Beams can be delivered with a high degree of uniformity over a 1.8″ x 1.8″ cross sectional area for measurements inside the vacuum chamber and 1″ diameter circular cross sectional area for the in-air station. Uniformity is achieved by means of magnetic defocusing.
- A degrader foil system makes it possible to set the desired beam LET value at a particular depth inside the target without changing the beam or rotating the target. The beam energy is reduced by means of a degrader system with foils having a suitable thickness and orientation with respect to the incident beam. Each foil can be inserted, withdrawn, and rotated remotely through use of computer controls.
- The intensity of any beam is easily regulated over a broad range spanning several orders of magnitude in a matter of seconds. This can be done by the operator on duty at the user's request. The target exposure system is fully automated. Exposure can be set for a certain time, total accumulated fluence, or can be manually stopped at any time.

K150 Proton & Heavy Ion Testing:

- The Cyclotron Institute's Radiation Effects Facility now offers a second dedicated beam line for proton and heavy ion testing.
- Combining an H-minus ion source with the re-commissioned K150 cyclotron, we offer protons with tunable energies from 6.3 to 45 MeV. Additional energies can be provided as low as 2 MeV with our degrader system. Maximum flux for these beams is on the order of 1×1010 particles/cm2/s.
- The K150 beam line is also available for heavy ion testing with sets of 9.4 MeV/u and 15 MeV/u beams.
- As with our K500 heavy ion testing beam line, we provide diagnostic equipment for complete dosimetry analysis and beam quality assurance. Test control and monitoring are conducted with the same custom SEUSS software that is used for K500 heavy ion testing. Dosimetry at low flux (1×107 particles/cm2/s and lower) is conducted using an array of five detectors comprised of plastic scintillators coupled to photomultiplier tubes. For higher fluxes, uniformity is first adjusted at a lower flux and then a set of four tantalum foils are used to back-scatter protons into four additional detectors. After a calibration measurement, dosimetry relies on these back-scattering measurements.

TEXAS A&M UNIVERSITY
CORE FACILITIES

Stable Isotope Geosciences Facility

Eller O&M 406

Established on the Texas A&M University campus in College Station in 2009, the Stable Isotope Geosciences Facility is designed to provide accessible, reliable and high-quality stable isotope measurements and training for faculty, staff and students within the College of Geosciences and the Texas A&M community. It was also created as a facility where state-of-the-art methodologies and technological developments in stable isotopes could be applied to important societal problems related to energy, ecology, Earth history, and the environment.

Beyond the Texas A&M community, the SIGF has strong research links with scientists and students from other universities and industry who require precise measurements. The facility continues to be recognized for its quality work and research, and to operate on the core values of Texas A&M University.

CONTACT

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TEXAS A&M UNIVERSITY
CORE FACILITIES

Stable Isotope Geosciences Facility

The Stable Isotope Geosciences Facility (SIGF) in the College of Geosciences, and the Stable Isotopes for Biosphere Science (SIBS) Laboratory in the College of Agriculture and Life Sciences have teamed up to better integrate the two light stable isotope ratio facilities on campus, and to add needed capabilities to serve the greater Texas A&M and regional community. Funded by a $5 million initiative from the Chancellor's office to support mass spectrometry, SIGF and SIBS will share $1 million to purchase four new instruments: a clumped isotope mass spectrometer (CIMS) and a gas chromatograph-combustion-isotope ratio mass spectrometer system (GC-C-MS-IRMS), and two additional IRMS to couple with Elemental Analyzers and other peripherals, delivering to Texas A&M a stable isotope capability unmatched in Texas and the region.

The clumped isotope mass spectrometer (CIMS) measures the concentration of molecules with two rare isotopes, for example, 13C18O16O/12C16O2. This ratio in carbonate rocks and minerals is temperature dependent, providing a geothermometer for pore-filling carbonate cements, sedimentary basin temperatures, and ocean and terrestrial paleoclimate studies. The CIMS would be housed at SIGF. A second instrument, the GC-C-MS-IRMS, separates and identifies compounds with gas chromatography and quadrupole mass spectrometry, then quantifies isotopic composition through a combustion or pyrolysis interface to an IRMS. This system would provide cutting-edge capabilities to track sources and fates of specific biochemical compounds through the biosphere, geosphere, hydrosphere, and atmosphere, expanding the interpretation of bulk isotopic measurement. The instrument would be housed in the SIBSLaboratory.

SIGF houses five dynamic-source isotope ratio mass spectrometers (IRMSs), a cavity ring-down spectrometer, and seven peripheral devices with the capabilities of performing high precision H, C, N, O, S and clumped analyses on carbonates, sediments, waters, and organic matter.

We perform high-precision carbonate δ13C and δ18O analyses with a Thermo Scientific Kiel IV Automated Carbonate Device coupled to a Thermo Scientific MAT 253 dual inlet IRMS. Our instrument is capable of analyzing CaCO3 samples as small as 10 µg, making our facility a viable option for specialized carbonate samples such as individual foraminifera.

With the new addition of a Thermo Fisher Scientific 253 Plus and modified Kiel IV Automated Carbonate Device, we are now capable of clumped isotope analyses of carbonate samples as small as 1.2 mg.

We have routinely analyzed a broad range of organic sample types for bulk total organic carbon, total organic nitrogen, δ13C, and δ15N compositions via Thermo Scientific DeltaplusXP isotope ratio mass spectrometer with Carlo Erba NA 1500 Elemental Analyzer (EA).

With addition of a new Thermo Fisher Scientific Delta V Advantage with Flash EA, we can now run δ34S along with δ13C and δ15N of organic matter.

With our new Thermo Fisher Scientific Delta V Advantage IRMS with GC-Isolink, we can perform H, C, and N isotope analyses on specific organic compounds.

δ13C analyses of natural water dissolved inorganic carbon (DIC), soil gas, breath gas, etc. are available using continuous flow headspace sampling via a Thermo Scientific GasBench II also connected to our DeltaplusXP or Delta V IRMSs.

We perform water δ18O and δD analyses via Picarro Li2120 Cavity Ring-Down Spectrometer (CRDS). Water δ18O and δD analyses are also available using headspace equilibration methods on the GasBench II upon special request, or for samples with high dissolved organic contents that would interfere with cavity ring own analysis.

At SIGF we pride ourselves in method development and in doing everything within our abilities to meet the analytical requirements of our customers. We welcome inquiries regarding unique and unconventional analyses, and we will work to adapt our analytical capabilities to the specific needs of individual researchers, clients and students. High-performance interactive 3D / 4D rendering on standard PCs and laptops with 3D Graphics Support