



Equipment Available for Industry Use:

Chemistry and BioChemistry

<http://www.chem.ucsb.edu/>

Mass Spectroscopy Facility

<http://www.chem.ucsb.edu/~massspec/>

Facility Manager: Dr. James Pavlovich (pavlovich@chem.ucsb.edu)

Instruments:

- VG70 Magnetic Sector
- Micromass QTOF2 Quadrupole/Time-of-Flight Tandem mass spectrometer
- PE Sciex QStar quadrupole/time-of-flight tandem mass spec
- GC/MS instruments

NMR Facility

<http://www.chem.ucsb.edu/~nmr/>

Facility Manager: Ata Shirazi (shirazi@chem.ucsb.edu)

Instruments:

- Varian UNITY INOVA 500 MHz NMR Spectrometer
- Varian UNITY INOVA 400 MHz NMR Spectrometer
- Varian MERCURY Vx 200 MHz NMR Spectrometer

Optical Characterization Facility

<http://www.chem.ucsb.edu/~ocf/>

Facility Manager: Alexander Mikhailovsky (mikhailovsky@chem.ucsb.edu)

Instruments:

Laser

- Spectraphysics Tsunami
Broadband tunable femtosecond Ti:Sapphire laser
- Spectraphysics Spitfire
Chirped pulse Ti:Sapphire amplifier
- Spectraphysics Millennia-V
Diode pumped all-solid state continuous wave YAG:Nd laser
- Spectraphysics Evolution-X
Diode pumped all-solid state pulsed YAG:Nd laser
- Spectraphysics Beamlock 2060



Ar-ion CW laser

Non-Linear Crystal

Using second harmonic generation in BBO crystals, output of the femtosecond lasers can be converted from IR to UV:

- 345-435 nm using output of Tsunami (~ 200 mW at 400 nm)
- 375-425 nm using output of Spitfire (~200 mJ/pulse at 400 nm)

Output of Spitfire can be used for generation of the femtosecond white-light continuum

- 2 nm crystalline sapphire plate pumped with 100 fs, 2 mJ pulse generates chirped continuum covering the range 430-700 nm

Conventional Light Sources

- Ocean Optics LS-1 tungsten lamp with near-black body emission spectrum (color temperature 3100 K).

Beam Diagnostics Tools

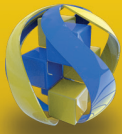
- Single Shot Pulse Autocorrelator
Home-built instrument for measurements of the shape of femtosecond pulses
- Ocean Optics Portable Spectrometer USB2000
Palm-size portable spectrometer with USB computer interface for real-time spectral analysis
- FGW Systems IR Viewer
Handheld IR viewer for visualization of weak or invisible beams.
- Newport 1815-C Optical Power Meter
General purpose optical power meter with thermoelectric sensor.

Photodetectors

- Hamamatsu R928 Photomultiplier Tube
High sensitivity/low noise analog PMT for measurements of the low intensity light
- Large area UV-enhanced Si photodiodes
Large (diameter 1 cm) generic Si photodiodes with enhanced response in UV range.
The best choice for high intensity and low repetition rate measurements.
- Fast Si photodiodes with built-in preamplifiers
Fast preamplified Si-photodiodes are available in 100 MHz and 200 MHz versions.
These are typically used with high repetition rate systems.

Spectrometers

- Acton Research SP300i spectrometer
Versatile, highly automated general purpose spectrometer
- Acton Research SP500 spectrometer



Versatile, highly automated general purpose spectrometer. Good choice for simple Raman and fluorescence spectroscopy experiments.

Signal Processing Instrumentation

- Stanford Research Systems SR830 DSP Lock-in Amplifier
Digital Signal Processor (DSP) based lock-in amplifier for the phase-sensitive signal detection. Ensures outstanding signal/noise ratio in measurements of low-level signals.
- Stanford Research Systems SR570 Current Preamplifier
Low-noise current preamplifier for photodetectors (PMT, photodiodes) with variable sensitivity, bandwidth, and input bias current.

Miscellaneous Equipment

- Newport ILS-200 Translation Stage
High-precision computer controlled linear translation stage.
- New Focus 5203 Optical Chopper
Mechanical modulator for the laser beams. It is mostly used in the phase sensitive detection.
- Janis Research Inc. VPF-100 LN2 Cryostat
Cold finger liquid nitrogen cryostat for optical measurements with PID temperature controller.

X-ray Analytical Facility

<http://www.chem.ucsb.edu/~xray/>

Facility Manager: Dr. Guang Wu (wu@chem.ucsb.edu)

Instruments:

- Single Crystal Diffraction
- Powder Diffraction

Chemical Engineering - Patrick Daugherty Lab, psd@engr.ucsb.edu

- Fluorescence Activated Cell Sorter (FACS)

Materials Research Laboratory (MRL)

<http://www.mrl.ucsb.edu/mrl/centralfacilities/index.html>

TEMPO - Thermal, Electronic, Elemental, Magnetic, Porosity, and Optical Facility

<http://www.mrl.ucsb.edu/mrl/centralfacilities/chemistry/index.html>

Facility Director: Professor Ram Seshadri (seshadri@mrl.ucsb.edu)

Facility Manager: Joe Doyle (jdoyle@mrl.ucsb.edu)



Instruments:

- Quantum Design Physical Properties Measurement System (PPMS)
- Quantum Design MPMS 5XL SQUID Magnetometer
- METTLER TGA/sDTA851e ThermoGravimetric Analyzer With Blazers ThermoStar 300 AMU Mass Spectrometer
- Bruker D8 Advance
- Inductively Coupled Plasma (ICP) Atomic Emission Spectrometer
- Shimadzu UV3600 UV-Nir-NIR Spectrometer
- Perkin Elmer LS 55 luminescence spectrometer
- Micromeritics Porosimeters
- MicroMeritics AccuPyc 1330 Pycnometer

Microscopy and Microanalysis Facility

<http://www.mrl.ucsb.edu/mrl/centralfacilities/microscopy/index.html>

Facility Director: Professor James S. Speck (speck@mrl.ucsb.edu)

Facility Manager: Dr. Tom Mates (mates@mrl.ucsb.edu)
Dr. Jin-Ping Zhang (jpzhang@mrl.ucsb.edu)
Dr. Jan P. Lofvander (lofvander@engineering.ucsb.edu)
Mark Cornish (cornish@engineering.ucsb.edu)

Instruments:

- Transmission electron microscopes:
 - FEI Titan FEG High Resolution TEM/STEM and Analytical Microscope (in installation)
 - FEI Tecnai G2 Sphera Microscope for Life Science Studies
 - FEI Tecnai G2 Sphera Microscope w/EDS for Materials Science Studies (Coming)
- Scanning electron microscopes:
 - FEI XL40 Sirion FEG microscope w/EDS System
 - FEI XL30 Sirion FEG microscope
 - FEI Inspect S System w/CL System (coming)
- Scanning probe microscopes (STM/AFM):
 - Digital Instruments Multi-mode Nanoscope (2)
 - Digital Instruments Dimension 3000 microscope
 - Digital Instruments Dimension 3100 microscope
 - Asylum MFP-3D SL System
 - Asylum MFP-3D Bio System
- Secondary Ion Mass Spectrometry System:
 - Physical Electronics 6650 Quadrupole
- X-ray Photoelectron Spectroscopy System:
 - Kratos Axis Ultra w/UPS Capability
- Focused Ion Beam System:
 - FEI Focused Ion Beam (Model DB235 Dual Beam) w/EDS System
- Instruments for Sample preparation:



- Gatan precision ion polishing system (Model 691) x2
- Fischione ion polishing system (Model 1010)
- Allied MultiPrep polishing machine (Model 15-1000)
- Gatan dimple grinder (Model 650)
- Image Processing tools:
 - Microtek ScanMaker i900 (6400x3200 DPI) Scanner
 - Epson V700 Dual Lens Scanner for film/image digitization
- Electron microscopy simulation:
 - Software for Scanning Electron Microscopy (SEM)
 - Software for Transmission Electron Microscopy (TEM)

Polymer Characterization Facility

<http://www.mrl.ucsb.edu/mrl/centralfacilities/polymer/index.html>

Facility Director: Professor Craig Hawker (hawker@mrl.ucsb.edu)

Facility Manager: Dr. Krystyna R. Brzezinska (kbrzez@mrl.ucsb.edu)

Instruments:

- Circular dichroism (CD)
- Differential Scanning Colorimetry (DSC)
- Light Scattering (DLS and SLS)
- Dynamic Mechanical Analyzer (DMA)
- GPC using DMF as a solvent
- GPC using THF as a solvent
- HPLC High Performance Liquid Chromatography
- Microwave Reactor
- Modulated Differential Scanning Calorimeter (MDSC) Q2000
- Preparative GPC
- Rheometer I (with water bath)
- Rheometer II (with oven)
- Wyatt GPC with MALS

Spectroscopy Facility

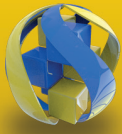
<http://www.mrl.ucsb.edu/mrl/centralfacilities/spectroscopy/index.html>

Facility Director: Professor Song-I Han (songi@chem.ucsb.edu)

Facility Manager: Dr. Jerry Hu (jghu@mrl.ucsb.edu)

Instruments:

- Nicolet Magna 850 IR/Raman
- Varian Cary Eclipse Fluorimeter
- Bruker DPX200 SB NMR for solution
- Bruker DSX300 WB NMR for solids
- Bruker DMX500 SB NMR for solution



- Bruker IP500 WB NMR for solids
- Bruker EMX Plus EPR Spectrometer

X-ray Facility

<http://www.mrl.ucsb.edu/mrl/centralfacilities/xray/index.html>

Facility Director: Professor Cryus R. Safinya (safinya@mrl.ucsb.edu)

Facility Manager: Dr. Youli Li (youli@mrl.ucsb.edu)

Instruments:

- Philips XPERT Powder Diffractometer
- Bruker D8 Advance Power Diffractometer
- Panalytical MRD PRO Thin Film Diffractometer (I)
- Panalytical MRD PRO Thin Film Diffractometer (II)
- Small Angle X-ray Spectrometer (SAXS)
- Intermediate SAXS (2-Circle)
- Wide Angle X-ray (4-circle)
- Ancillary Equipment
- Confocal Microscope

Micro-Environmental Imaging & Analysis Facility

Donald Bren School of Environmental Science & Management

Contact: meiaf@bren.ucsb.edu or (805) 893-5892

Instrument:

The core technology is an FEI Co. XL30 ESEM with a field emission gun (FEG). The ESEM detectors include a patented gaseous secondary electron detector (GSED), a solid-state backscattered electron detector (BSED), and a large field detector (LFD). The ESEM can be used as a conventional SEM (high vacuum mode) or as an environmental SEM (wet mode, i.e. moderate vacuum and moist atmosphere).

National Nanotechnology Infrastructure Network (NNIN)

<http://www.nanotech.ucsb.edu/>

Contact: Jack Whaley (whaley@ece.ucsb.edu)

Contact Brian Thibeault (thibeault@ece.ucsb.edu)

Instruments:

Lithography

- High-resolution, direct write Electron Beam Lithography System
- Nanonex NX2000 Nanoimprinting System
- Deep UV Flood Exposer
- Mask Aligner / MJB 3 UV400 IR with back-side alignment



- Mask Aligner / MJB 3 UV400
- GCA AutoStep 200 i-line wafer stepper
- GCA 6300 i-Line Wafer Stepper
- Karl-Suss MA-BA-6 Mask/ Bond Aligner with backside optics
- Veeco Dimension 3100 Nanoman AFM-based Lithography tool
- FEI Sirion field-emission SEM with Nabyty Pattern Generatory System
- 250 nm Pitch Interference Lithography System

Vacuum Deposition

- E-beam #1: Sharon Vacuum 4-pocket Electron Beam Evaporator (metals)
- E-Beam #2 Electron-Beam Evaporation System
- E-Beam #3 Load Locked Metal Evaporator Dual Gun (8 sources)
- E-Beam #4 CHA Muti-Wafer Metal Evaporator
- PECVD Plasma Therm 790 for Oxides and Nitrides
- Unaxis High Density PECVD
- Sputtered Films DC/AC bipolar 3-chamber Reactive Sputtering System
- 3-source Solder Evaporator, Veeco VE-300
- 3-source research S-gun DC/Pulsed DC Reactive Sputtering System
- NRC 3117 3-source Thermal Evaporator
- Veeco Nexus Ion Beam Deposition Tool
- 6-source DC/RF magnetron sputter system

Etching

- RIE #1 Custom, Loadlocked Chlorine-Based System
- RIE #2 Methane / Hydrogen-Based System
- RIE #3 Fluorine-Based System MRC 51
- RIE #5 Programmable, Loadlocked Chlorine-Based System
- SiRIE ICP Based Flourine Etcher for Bosch MEMS Processes
- Technics PEII Plasma Etching Systems
- ICP#2 Panasonic Inductively Coupled Plasma Etcher - Fluorine/Chlorine
- ICP#3 Unaxis ICP etching system with 200 C chuck - Chlorine
- ICP#4 Panasonic Inductively Coupled Plasma Etcher - Fluorine/Chlorine
- EVG Plasma Activation System

Test and Inspection

- FEI Sirion Ultra High Resolution Field-Emission SEM w/EDX
- Veeco Dimension 3100 Nanoman AFM
- Hitachi s2400 Scanning Electron Microscope
- Veeco Multimode Scanning Probe Microscope
- Various Optical Inspection Microscopes (5)
- Rudolph Auto-EL Ellipsometer
- Filmetrics White Light Reflection Dielectric Characterization tool



- Nanometrics 210 Reflectometer
- Dektak IIA Profilometer
- Probe Station with Curve Tracer
- Tencor Flexus 2320 Film Stress Measurement System
- Dektak VI Profilometer

Thermal Processing

- M-8A Flip Chip Aligner Bonder
- Karl-Suss SB-6 Wafer Bonder
- AET model RX Rapid Thermal Annealer
- Custom Made Strip Annealer
- Wafer Fusion Annealer

Neuroscience Research Institute

<http://www.nri.ucsb.edu/index.html>

Microscopy Facility

Contact: Brian Matsumoto (matsumot@lifesci.ucsb.edu)

Instruments:

Basic Light Microscopy

- Two upright microscopes equipped for high-resolution fluorescence and digital recording of the images (Olympus BX 51, BX60 with MacroFire camera).
- One upright microscope equipped with oil immersion darkfield darkfield condenser and low light digital imaging camera (BX 51 with Qimaging camera).
- One Stereo microscope with photoports for imaging specimens in three-dimensions (Olympus SZXZ with MicroFire camera).
- One inverted microscope equipped with long working distance phase objectives and epifluorescent illuminator. This microscope is used for looking at cultured samples Petri dishes or multi-well plates.

Confocal Microscopy

- There are two confocal microscopes, a point-scanning laser based system for the highest vertical and lateral resolution (Olympus Fluoview 500) and a spinning disc confocal microscope (Olympus DSU) for live cell recordings.

Electron Microscopy

- The facility has a JEOL 123 transmission electron microscope for imaging specimens that require resolving structures that are separated by only a nanometer.
- SOLiD DNA Sequencer