

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:

- Waters GCT Premier Time of Flight Mass Spectrometer (w/EI, CI, and FI/FD ion sources)
- Micromass QTOF2 Quadrupole/Time-of-Flight Tandem mass spectrometer
- Bruker Microflex LRF MALDI TOF Mass Spectrometer
- Agilent GC/MSD

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://web.chem.ucsb.edu/~ocf/>

Facility Manager: Alexander Mikhailovsky (mikhailovsky@chem.ucsb.edu) (ph: 805-893-2327)

Instruments:

Ultrafast lasers

Spectraphysics:

- Spitfire
- Tsunami
- OPA-800; Coherent: Mira-900

Continuous wave lasers

- Spectraphysics Millennia V/DPSS YAG
- Beamlok-2060-8/Ar-ion
- 3900/TiSapphire



- Crystalaser/Single frequency diode laser
- several alignment He-Ne lasers

- Multichannel detectors (Visible and NIR range CCD and PDA detectors, respectively)
- TE cooled MCP photomultiplier with 60 ps resolution (Hamamatsu R5809U)
- Variety of conventional detectors (Analog and photon counting PMTs, photodiodes, etc)
- Several Churny-Turny monochromators
- Liquid nitrogen and liquid helium cryostat with optical access and electrical connectors to the sample for variable temperature measurements.
- Kelvin probe apparatus in inert atmosphere glovebox (KPTechnology)
- Integrating sphere with calibrated detector.
- Raman microscope (JY Horiba Labram-Aramis)
- UV-Vis microphotometer (Shimadzu)
- Spectrofluorometer with additional NIR detector (PTI Quantamaster)
- Large stock of optical and optomechanical components for rapid development of new experiments.
- Experiment support equipment (Oscilloscopes, power supplies, computers, IR viewer, optical powermeters, vacuum pumps, etc.)

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@enr.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: Amanda Strom (amanda@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 (jpszhang@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 (chloroform)
- Nano ITC (Isothermal Titration Calorimeter)

Spectroscopy Facility

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

Facility Director: Professor Song-I Han (songji@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
- Advance DSX300 WB NMR for solids
- Advance DMX500 SB NMR for solution
- Advance IPSO500 WB NMR for solids
- Bruker EMX Plus EPR Spectrometer
- Q-Sense E4 Quartz Crystal Microbalance (QCM-D)
- Varian VNMR5 600MHz SB NMR Spectrometer for Solution

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)
- Rigaku Smartlab High Resolution Diffractometer
- Panalytical MRD PRO with Pixel area detector
- Small Angle X-ray Spectrometer (SAXS)

California NanoSystems Institute

Contact: Craig Hawker (Hawker@mrl.ucsb.edu) (805)893-7141

CNSI Microfluidics Laboratory

Contact: Dave Bothman (bothman@engineering.ucsb.edu) (805) 893-893-4125

Cleaning

- Solvent wipe, ultrasonic
- DI
- Piranha (to be added summer 2013)

PDMS Processing

- CNC razor cutter
- Mixing
- Spin coating
- Casting
- Ozone clean/activate

NOA sticker devices

Packaging

- CNC Drill
- Wafer bonding furnace
- Aligner for PDMS – substrate bonding
- Punch with camera for vias, valves
- Scribe and break
- Wafer bonding and cleaning
- Inspection & Testing
- Stereo zoom microscope w/camera
- Compound microscope w/camera
- Syringe pump

Direct device fabrication

Laser cutting

- 3-D printers (to be added summer 2013)
- UV flood chamber

Inspection and Testing

- Stereo zoom microscope and camera
- Compound microscope and camera
- Inverted compound microscope (to be added summer 2013)

Nanostructures Cleanroom Facility(NCF)

<http://www.cnsi.ucsb.edu/facilities/nanostructures/cleanroom/>

Contact: Peter Duda (duda@cnsi.ucsb.edu) (805) 893-2604

Lithography

- Heidelberg DWL200 Mask Writer
- NCF Mask Writing service
- Suss MicroTec MA6 Aligner

Deposition

- Aixtron "Black Magic" Carbon Nanotube CVD Reactor
- SEKI Diamond CVD
- AJA UHV 7 Gun DC/RF Magnetron Sputter System
- Plassys Ebeam for Al-AIO₂-AL Josephson Junctions
- Organic PhotoVoltaic Device Manufacturing System
- Calibrated Monochromator light source
- Solar Simulator (1 Sun)

Wet Processing

- 2 Solvent benches
- 1 Developer Wet Bench
- 2 Acid/Base Wet Bench

Furnace

- Sentro Tech High Temp (1700C) Box Furnace

Inspection

- Nikon Inspection 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: Tom Reynolds, reynolds@ece.ucsb.edu, 805-451-3979

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
- ASML DUV Stepper S500/300
- 250 nm Pitch Interference Lithography System

Packaging

- ADT Dicing Saw
- Finetech Flip Chip Bonder

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
- AJA#1 6-source DC / RF magnetron sputter system
- AJA#2 7-source DC / RF magnetron sputter system
- Molecular Vapor Deposition System
- Oxford FlexAL Atomic Layer Deposition System
- Advanced Vacuum PECVD

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 Fluorine 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
- Gasonics Aura2000-LL Downstream Asher
- XeF2 Gas Etcher
- Logitech CMP ORBIS
- SPTS Primaxx HF Vapor Etcher

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
- JEOL 7600F FESEM with Charge Compensation
- 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
- CDE Resmap 4 Point Resistivity Mapper
- Woolam Spectroscopic Ellipsometer



- Olympus LEXT: Scanning Confocal Microscope
- QFI Thermal Infrared Microscope

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

Wet Benches and Fume Hoods

- Solvent Benches (4)
- Acid Wet Benches (5)
- Spin Wet Benches (3)
- Develop Wet Benches (3)
- Technic Au Plating System

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.

There are dedicated digital cameras for the light microscopes and electron microscope.

SOLiD DNA Sequencer

To learn more about how your company can work with UC Santa Barbara, contact Leslie Edwards (805-893-3944/edwards@engineering.ucsb.edu) or Chris Russo (805-893-5544/crusso@engineering.ucsb.edu) in the Corporate Affiliate Programs office.