

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@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: 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

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Furnace

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Inspection

- Nikon Inspection Microscope

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.