Microfabrication Equipment

Featured below is some of the microfabrication equipment in use in the Centre. Click on a heading to view the relevant item.

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FEI DualBeam Strata 235 Focused Ion Beam

The FEI DualBeam Strata 235 is a high-resolution field emission scanning electron microscope with a focused Ga+ ion beam side column and an EDAX X-ray analyser. This instrument will allow regular SEM imaging and X-ray analysis plus the capability to ion mill the sample with the FIB. The sample can be cross-sectioned for SEM or STEM imaging or patterned into nanostructures for other applications. Organometallic platinum gas is available for selective deposition of a conducting layer and specialized software scripts allows TEM cross-section sample preparation.

	Ion column	Electron column
Accel. voltage	10-30 kV	0.2 – 30 kV
Beam current range	1 pA – 20 nA	0.7 pA - 36.9 nA
Resolution	7 nm	3 nm

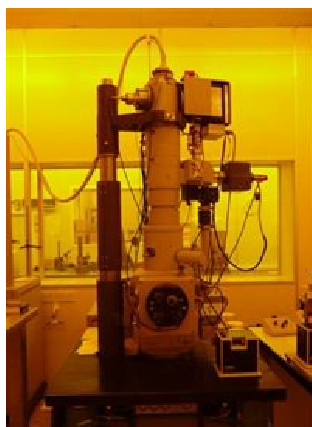
STS Multiplex ICP DRIE etcher

The STS Etcher is an induction coupled plasma deep reactive ion etcher. It was developed by Surface Technology Systems using their Advanced Silicon Etch (ASE) process. When etching bulk silicon it allows high etch rates typically 3 μm min^{-1} and deep trenches with aspect ratios of 40:1 may be realized.

The system allows either simple reactive ion etching or a Bosch based deep reactive ion etching process which uses an alternating etching/passivation cycle.

C4F8 deposition and O2 plasma cleaning is also possible using this system.

Leica EBL100 Nanowriter Electron-Beam



The Leica EBL100 Nanowriter e-beam patterning system has a LaB6 electron source capable of producing a 100 keV beam. The stage is laser-controlled with resolution down to 30 nm. The machine has two detectors that can be used for imaging: the Quadrant Back Scattering Detector (QBSD) and the Secondary Electrons Detector (SE) permitting magnification up to 50,000 X.

Canon PLA-501FA Mask Aligner

The mask aligner is used for UV lithography for both SU-8 processing and DRIE. It uses a USHIO 250W super high-pressure mercury lamp with an output in the wavelength area of 436, 405 and 365 nm controlled via a light integrator for exposure.

It can load 4" wafers automatically and can be set for soft or hard contact.

Alignment is achieved by use of XY and θ alignment mechanisms to an accuracy <0.5 μm.

Delvotec 6319 Ultrasonic wire bonder

The bonder comes equipped with a moving head in the X, Y and Z directions plus 360 degree rotation that can operate in fully automatic mode, it features pattern recognition technology for automatic location of the bonding pads.

Automatic height measurement and height adjustment during bonding. Bond Process Control that ensures controlled deformation and welding parameters of each individual bond.

The machine is set up to use 25 µm aluminium wire welded at 60Khz.

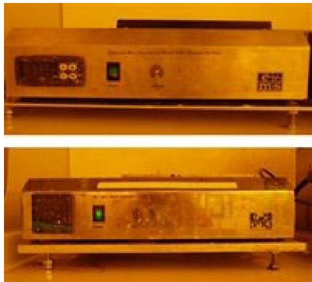
High Temperature Gas Protected Furnace and CVD

This high temperature gas protected furnace is typically used for sintering ceramic and nanocomposite micro components up to 1750 °C. Inert gases such as N2 and be passed through the furnace to prevent oxidation of materials.

High Temperature Furnace

The high temperature furnace can reach temperatures up to 1750 °C. It is typically used for sintering in the fabrication of ceramic and functionally graded nanocomposites microcomponents.

Programmable Hot-Plate



The EMS Precision Electronic Hot Plate Model 1000-1 provides an extremely accurate means of providing even temperatures across a surface. Temperatures range from 50°C to 150°C and are accurate to ±1% across working surface. Temperature controlled via PID controller with digital readout allowing for specific ramp and hold cycles. Vacuum ports ensure intimate contact between substrate and hot plate.

Substrate size from 10 mm to 150 mm. The two EMS Precision Electronic Hot Plate Model 1000 also allows the temperatures to be set from 50°C to 150°C.

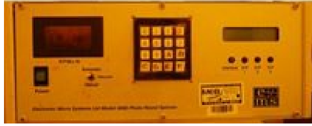
Sonosys Megasonic Cleaner

The Sonosys megasonic cleaner uses a piezoelectric transducer to produce sound waves in the frequency range 600 kHz to 1 MHz. This permits the removal of particles down to 34 nm in diameter from substrates, semiconductor wafers, micro parts and micro systems up to 200 mm in size.

LabCaire Aura 550E Fume Cabinets and Wet Benches

Two Labcaire Aura 550E recirculating fume cupboards are available with a two-filter EVERSAFE fume monitoring system combining fume and particulate removal. The wet benches are 1070mm in size with one dedicated for use with organic solvents and the other for acids and bases.

EMS Model 4000 Photoresist Spinner



The Model 4000 photoresist spinner provides a simple means of applying highly accurate coatings and photo resists to silicon wafers, ceramic substances or other flat items at up to 10,000 rpm. It consists of a bench top spinner and a remote microprocessor control unit, linked by a flexible cable. Wide selection of 'quick fit' chucks for any sized substrate. It permits simple programming of spin speeds, times and accelerations including a single 'press to go' button control.

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