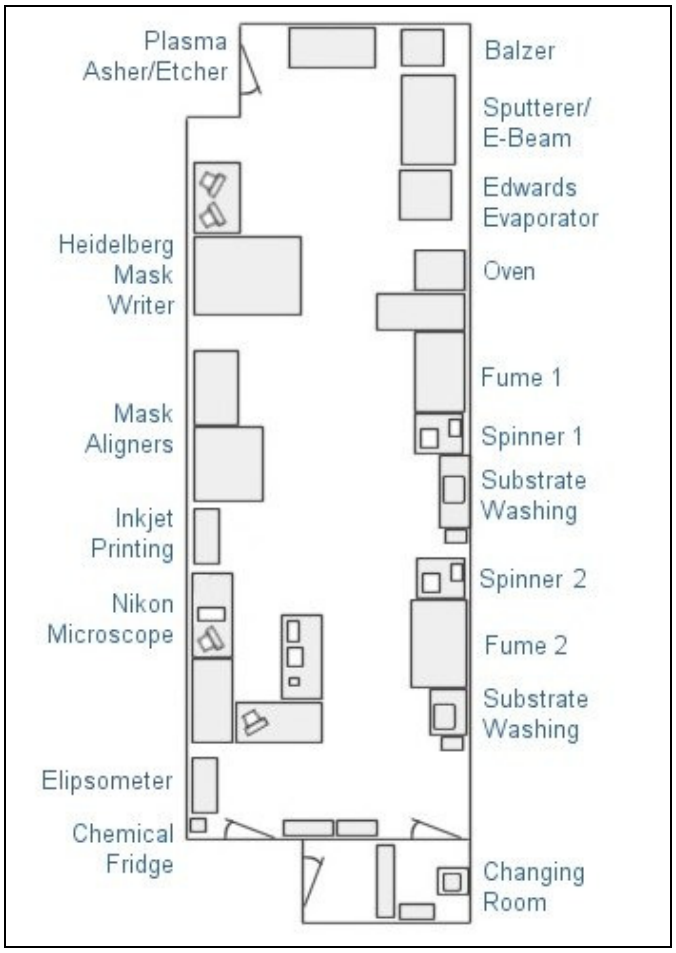
University of Wales, Bangor
School of Electronics

The School of electronics, located on Dean Street in Bangor, is equipped with equipment and facilities which are predominantly located in the School of Electronics building. If you require the use of any equipment located in the School of electronics or require further information please contact Prof Martin Taylor (Email: d.m.taylor@bangor.ac.uk Tel: 01248 382686). Facilities located in the school of electronics building include:



Clean Room Facilities

The School of electronics is equipped with an extensive & recently refurbished grade 1000 microfabrication clean room. The layout of this facility is shown in the preceding diagram. Equipment situated in this facility includes:

1. **Heidelberg photomask plotter (0.8 mm resolution)**

2. **Leybold e-beam evaporator/r.f. sputtering unit**

3. **Edwards Evaporator**

4. **Plasma cleaner / asher**

5. **Spin-coaters**

6. **Mask aligner**

7. **Microdrop Inkjet printer**

8. **Optical microscopes**

9. **Variable Angle Spectroscopic Ellipsometer (VASE)**
   Woollam VASE system on vertical goniometer

UK Laser Micromachining Centre (UK LMC)

School of Electronics are part of the UK Laser Micromachining Centre. If you require the use of LMC facilities then please contact Dr Julian Burt (Email: burt@informatics.bangor.ac.uk) The LMC equipment located in Dean street consists of:

10. **Exitech M-2000 Femtosecond Laser Micromachining Workstation**

11. **Exitech S-8000 Excimer Laser Micromaching Workstation**

Surface Analysis Laboratory

12. **Scanning Electron Microscopy (SEM)**
    International Scientific Instruments ISI-40. Image capture software is ISCAN-2000. With Energy-Dispersive X-ray spectroscopy (EDX) facilities

13. **Atomic Force Microscopy (AFM)**
    Digital Instruments Nanoscope IIIa and a TopoMetrix Explorer. The Nanoscope instrument is capable of contact, tapping & tunneling modes, Magnetic Force Microscopy and Kelvin Probe Microscopy. Scan Sizes from 5 nm to 140 um. Liquid cell and a Signal Access Module accessory

14. **Scanning Near Field Optical Microscope (NSOM)**
    Thermomicroscopes Aurora-2

15. **Raman Microscope**

Renishaw System 1000 single grating spectrometer. Lasers available: HeNe 632.8 nm and Argon Ion 514.5 nm.

16. **Fourier Transform InfraRed (FTIR) Spectrometer**
Bomem" Michelson Model MB100 FTIR Spectrometer.
Free Spectral range:
Mid IR region: 0 to 7,900 cm-1
Near IR Region: 0 to 15,800 cm-1
Wavenumber Precision: 0.01cm-1 controlled with internal HeNe laser
Resolution: 4 cm-1 (apodized), fixed

Design & Modelling

17. **Altera FPGA**

18. **Cadence and PSPICE Circuit modelling**

19. **FEMLAB**
Fluid dynamics, electrostatics, electrodynamics modelling

Electrical Characterization

20. **Keithley 4200-SCS Semiconductor Characterization system.**
Range 200mV to 200V. With inbuilt computer and monitor, and easy to use software

21. **Keithley Model 237 High Voltage Source/Measure Unit**

22. **Keithley Model 617 Programmable Electrometers.**
200mV to 200V, 2pA to 20mA, 200pC to 20nC, 2kΩ to 200GΩ. (2 off)

23. **Hewlett Packard 4140B pA meter/DC voltage source.**
Range +/- 100V DC, +/- 1 pA.

24. **Solartron 1255 Frequency Response Analyzer and 1296 Dielectric Interface**
Signal amplitude 0-3V rms or 0 to 1V rms. DC Voltage range +/- 40.95V.

25. **Solartron 1250 Frequency Response Analyser.**

26. **Agilent/Hewlett Packard 4284A Precision LCR Meters.**
5mV to 2V rms. DC voltage range +/-40V. (2 off)

27. **Wayne Kerr 6425 Precision Component Analyser.**

28. **HP 54120A Digitising Oscilloscope**

29. **Wiltron Network Analyser**

Electro-optics Laboratory

If you require the use of any of the high speed optical equipment of spectrum analyzers located at the school of electronics or require further information please contact Prof Paul Spencer (Email: p.spencer@bangor.ac.uk, Tel: 01248 382 686).

30. **Optical Tables (x4)**
    With superdamp active self-levelling isolation system

31. **Lecroy Wavemaster 8600A Oscilloscope**
    6 GHz Bandwidth, 10 Gs/s for four channels, 20 Gs/s for two channels

32. **Tektronik Oscilloscope**
    4 GHz Bandwidth, 10 Gs/s for two channels

33. **Lecroy LC564 A Oscilloscope**
    1 GHz Bandwidth, 4Gs/s for dual channel and 2 Gs/s for quad channels

34. **Burleigh Fabry-Perot Interferometer**
    Operating wavelength is around 850 nm, Frequency Spectral range is 1-1500 GHz, Finesse is more than 150. Input aperture is 20 mm

35. **Agilent 86141B Optical Spectrum Analyser**
    Measuring wavelength from 0.6 μm to 1.75μm, resolution is 0.07 nm.

36. **Anritsu MS9001B1 Optical Spectrum Analyzer**
    Measuring wavelength from 0.6 μm to 1.75μm, resolution is 0.1 nm.

37. **Jobin Yvon TRIAX SERIES 550 Monochromator**
    850 nm and 1550 nm.

38. **Synchroscan Streak Camera**

39. **Stanford Research System SR830 DSP Dual Phase Lock-in Amplifies**

40. **EG&G Applied Research 5207 Lock-in Amplifier**

41. **OPHR CCD Camera**
    Spectral Response: 350nm to 1100 nm

42. **Various Tunable Laser Diode Sources**

43. **Power Meters**

44. **Stanford Research System DS345 30 MHz synthesized Function Generator**

45. **Oxford Instruments cryostat and temperature controller**

46. **Anritsu Spectrum Analyzer MS 710 C**
Measuring Frequency: 10 kHz – 23 GHz

47. **AVTECH AVNN-1-C Pulse Generator**
Frequency Range: 25-250 MHz, 100 ps rise time

UWB at Optic Technium

In addition to the facilities located in the School of electronics building in Dean Street, the school of electronics has facilities located in the Opto-electronics Technology and Incubation Centre (OpTIC) Technium in St Asaph. These facilities include:

48. **Polymer Labs GPC50 Gel Permeation Chromatography System**
Light Scattering Detector & Software, Integrated GPC System, Viscometer, Degasser, Data Interface, GPC Autosampler

49. **Polymer Labs GPCXT220 Rapid Integrated Gel Permeation Chromatography System**
Bridge Viscometer, Rapid Integrated GPC System, Light Scattering Detector, High Temperature Autosampler, Data Interface

50. **Perkin Elmer Differential Scanning Calorimeter (DSC)**
Differential Scanning Calorimeter, Pyris Advanced Kinetic Suite Software, Pyris DSC Step Scan Software, Intracooler

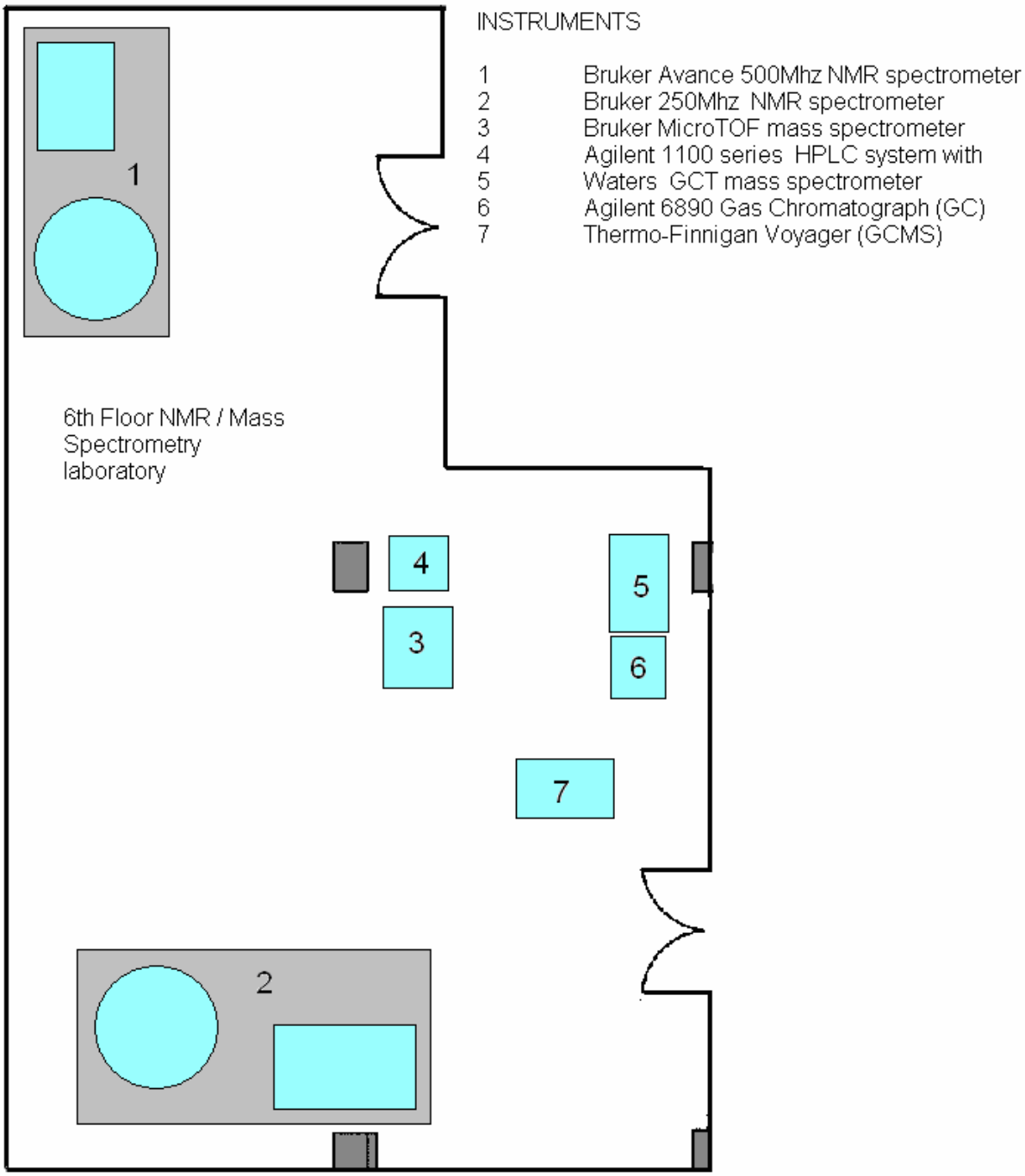
51. **Perkin Elmer Thermogravimetric Analyser (Pyris 1TGA)**

52. **Perkin Elmer Dynamic Mechanical Analyser (DMA)**
Onboard PC, Film Shear Head, 3 Point Flexure Clamp, Exstar Thermal Analysis Software, Shear Head, Compression Head, Transformer Cooling Controller and Dewar

University of Wales Bangor
School of Chemistry

The School of Chemistry, located just back from Deiniol Road, has a range of facilities. If you require the use of any equipment located in the School of electronics or require further information please contact Mr Denis Williams (Email: d.j.williams@bangor.ac.uk). Facilities located in the school of chemistry includes:

Characterisation Facilities



1. **Nuclear Magnetic Resonance (NMR)**
   NMR spectroscopic facilities at both 250MHz and 500MHz. Both these instruments have automated facility, multinuclear probes (up to silver), broadband solid state, variable temperature solid state, multidimensional spectra, inverse detection capability, variable temperature analysis of samples. The 500MHz machine can be connected to other systems such as LC and MS.

2. **Mass Spectrometry (MS)**
   Two research grade time of flight instruments deliver accurate mass measurements (resolution > 5ppm above 300Da). The MicroTOF has electrospray and atmospheric chemical ionisation interfaces and can be linked to an Agilent HPLC system to perform LCMS analysis. The GCT has electron and chemical ionisation sources and is linked to an Agilent 5890 gas chromatograph for GCMS analysis. There are a number of quadrupole GCMS systems within the school for routine analysis. MALDI facilities are available in the school of biological sciences.

3. **Infrared Spectroscopy**
   Standard FTIR instruments including two Bruker IFS 113v

4. **Chromatography**
   Chromatographic capabilities include numerous Gas Chromatography (GC) systems with a range of detectors for the analysis of volatile organic compounds. Analysis can be further enhanced with Mass Spectrometry detection (GCMS). High performance liquid chromatography is available with a combination of UV, Diode Array, or Mass Spectrometry (LCMS) detection methods.

5. **Elemental Microanalysis**
   Carbon, Hydrogen and Nitrogen elemental analysis facilities

6. **UV / Visible Spectrophotometry**

7. **X-ray powder Diffraction (XRD)**
   XRD is performed on two Phillips instruments located on the second floor of the Alun Roberts Building these are the X-PERT PRO and PW3830

8. **ESCALAB MK2 X-ray Photoelectron Spectroscopy (XPS)**
   Vacuum Generators ESCALAB MK2 XPS system. located on the second floor of the Alun Roberts building. There are Grazing Incidence Reflectometry (GXR) capabilities for thin film measurements.

9. **Thermogravimetric analysis**

10. **Differential Scanning Calorimetry (DSC)**

11. **Veeko Instruments Atomic Force Microscope (AFM)**

12. **Veeko Instruments Scanning Tunnelling Microscope (STM)**

13. **Surface Plasmon Resonance (SPR)**

14. **Thin film electrical characterization**

15. **Optical Microscopy**

16. **Electrochemical Apparatus**

17. **Laser Beam Induced Current Mapping**

18. **Reflectometers**
    (Single and Triple wavelength laser systems)

Film Deposition facilities

19. **Edwards coating units**

20. **Langmuir-Blodgett troughs:**
    With combined visible spectrometer and quartz crystal microbalance

21. **Molecular self-assembly:**
    With simultaneous molecular area studies

22. **Edwards coating Units (x2)**

23. **Spin Coating.**

Biological and Life sciences facilities.

24. **Bioforce Nanosciences nano arrayer**
    A molecular printing system enabling the delivery of ultra micro and Nanoscale fluids containing biomolecules and or other materials to defined locations on surfaces with ultra micro and nano spatial resolution.

25. There are two biological containment laboratories located on the second floor (category 1 and category 2) fully equipped with centrifuges, incubators, autoclaves and other equipment.

Molecular modeling and computational chemistry.

26. A large part of the 3rd floor is dedicated to a visualization suite that can be used to project images of molecules and many other objects in three dimensions. The suite is linked to powerfull computing hardware and software which can be used to calculate the structure energies and properties of complex molecules.

Workshop facilities.

27. **Electronics Workshop Facilities**
Technical experience with servicing equipment and production of custom specialist equipment.

28. **Mechanical Workshop Facilities**
General mechanical engineering facilities and glass blowing expertise