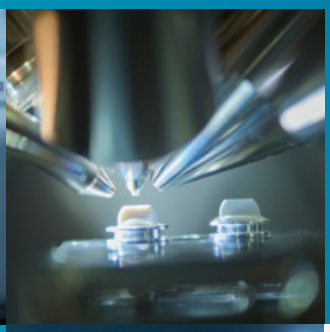
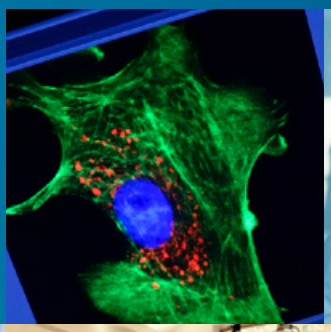
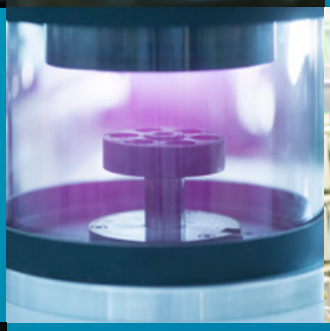
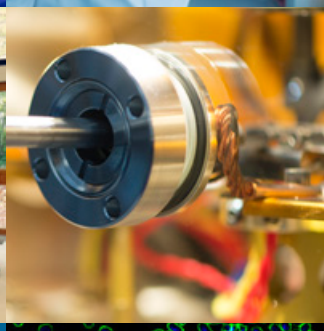
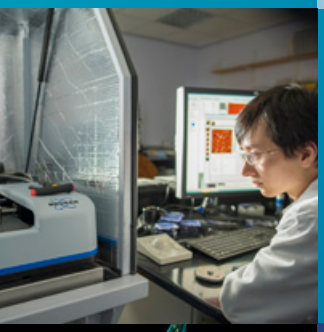
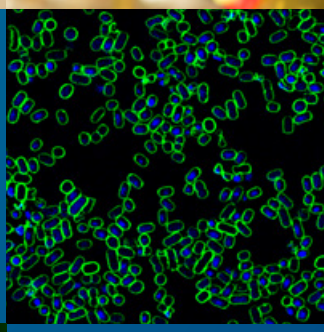
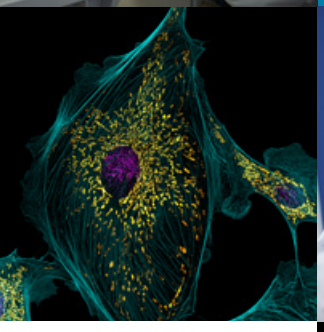
University of Nottingham
UK | CHINA | MALAYSIA

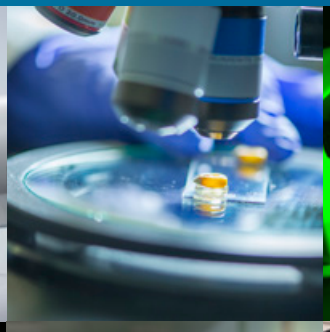
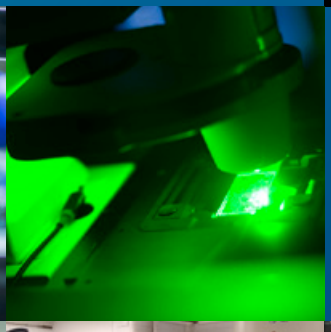




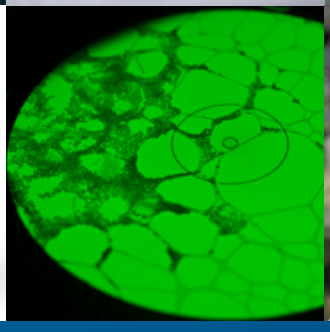
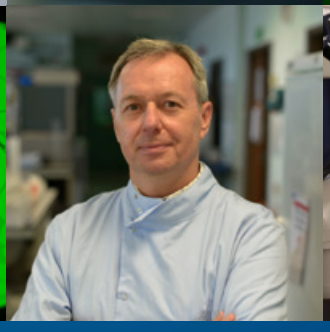


Multi-user equipment and facilities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Foreword

World-class facilities and expertise: we're ready to help

At the University of Nottingham we are committed to the delivery of exceptional research that transforms lives and shapes the future.

By sharing expertise and real-world solutions with industry and the business community we enhance this mission.

Our world-leading facilities combine cutting-edge equipment and technologies with internationally renowned technical skills and expertise.

This brochure introduces these facilities and explains how you can access the training, support, experimental design and data analysis that are essential to delivery of the highest quality of outcomes.

It also underlines how services for business and access to our equipment and expertise further strengthen our partnerships with the communities we serve. Funding through EPSRC, BBSRC and University of Nottingham has recently helped deliver on-line and remote access to high end technology within facilities such as SLIM, the Hounsfield and nmRC which further improves our connectivity and collaborations with external companies.

Here you will find summaries of our facilities and their capabilities, plus contact details.

Our experts participate in regional and national networks and work across facilities and disciplines, further enhancing our capabilities to offer solutions to complex problems.

If you cannot find what you are looking for then please contact tim.self@nottingham.ac.uk or david.onion@nottingham.ac.uk who can guide you to the expertise you need.

We look forward to working with you.

Professor Phil Williams
Chair, University of Nottingham Facility
and Equipment Management Committee

Compare

COMPARE
CENTRE OF MEMBRANE PROTEINS AND RECEPTORS

Centre of Membrane Proteins and Receptors

We are a multidisciplinary centre across the universities of Nottingham and Birmingham with a mission to study membrane proteins, using advanced quantitative imaging approaches, and foster the development of innovative therapies. At Nottingham we specialise in developing imaging based outputs to understand the biophysics and pharmacology of membrane receptors with a particular emphasis on fluorescence fluctuation applications such as Fluorescence Correlation Spectroscopy (FCS). We have the potential to work collaboratively alongside being able to provide advice, training and analysis workflows. Our instrumentation is based on C-floor of the Medical School (QMC).

Who to contact and how

- Dr Joëlle Goulding
  joelle.goulding@nottingham.ac.uk

Website address

birmingham-nottingham.ac.uk/compare/

Equipment / techniques available

Olympus LuminoView 200

- Bioluminescence imaging

PhaseFocus LiveCyte

- Label-free high-content imaging; Wound-healing; Migration; Proliferation; Cell-tracking

Nikon Ti-2

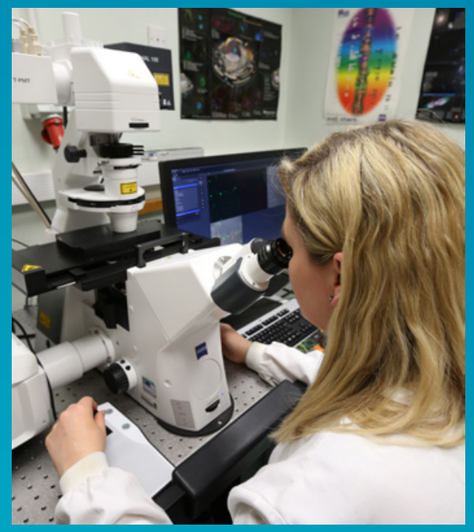
- TIRF; Dual camera; Single molecule tracking

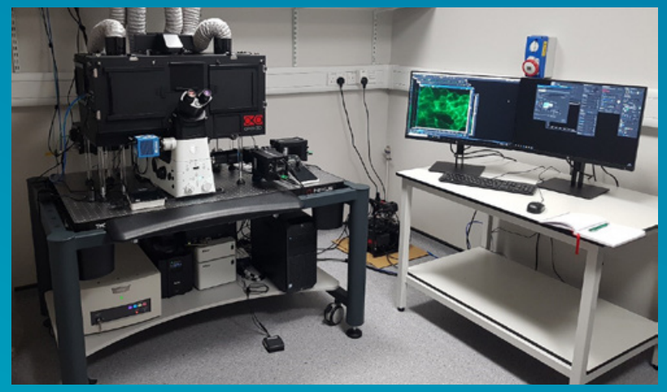
PicoQuant Microtime 200

- FCS (and two-colour FCCS); Fluorescence Lifetime Imaging; STED microscopy

Zeiss Cell Discoverer 7

- Live-cell high-content fluorescence imaging; Multi-well format; Confocal (Airyscan) and widefield



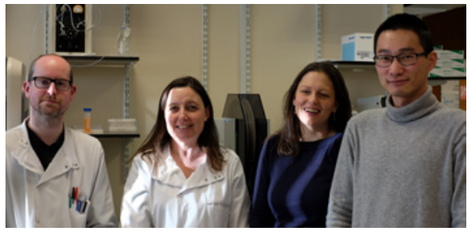


DeepSeq

Next Generation and Sanger Sequencing Facility

The sequencing facility offers research scientists access to state of the art high-throughput sequencing technology. Our experienced team of dedicated experimental scientists and bioinformaticians will work with you from the conception of your sequencing experiment to the final analysis of your data. As well as running standard sequencing projects we enjoy the challenges of developing new and emerging applications. DeepSeq are world experts in Oxford Nanopore Technologies platforms, and also run two Illumina platforms, a 10x Genomics Chromium and a Bionano Saphyr for optical mapping.

DeepSeq also houses the Sanger sequencing facility which provides quick turn-around times and help and expertise for high quality Sanger sequencing and fragment analysis.



Who to contact and how

- **General Enquiries:**
  victoria.wright@nottingham.ac.uk
  deep.seq@nottingham.ac.uk
- **Sanger Facility:**
  matthew.carlile@nottingham.ac.uk

Website address

nottingham.ac.uk/deepseq/index

nottingham.ac.uk/life-sciences/facilities dna-sequencing

Equipment / techniques available

1. Bioinformatics support and expertise
2. Bionano Saphyr for optical mapping
3. We run libraries you prepare for Run-Only projects
4. Pilot Studies for NGS projects and advice on outsourcing large projects
5. Library preps for most NGS applications. Includes express 2-week MiSeq turn-arounds
6. Illumina Sequencing with the MiSeq and NextSeq500, from 50bp single to 300bp paired-end reads
7. MinION runs : we can even help you to run your own Oxford Nanopore Technologies MinION
8. GridION and PromethION library preps and runs.
9. HMW DNA extractions for Oxford Nanopore Technologies and Bionano Saphyr projects
10. Perform library preps then outsource the sequencing for high throughput projects
11. High quality Sanger sequencing with fast turn arounds.
12. 10x Genomics Chromium runs for single cell and many more applications
13. Accessible kit: TapeStation, Covaris, Flouorskan, Sage HLS, BluePippin, NanoDrop, Qubit

Digital Research Service

Bespoke Data Analytics

Bioinformatics

Software Engineering

With some of the brightest minds in data analytics, bioinformatics and software engineering, the Digital Research Service (DRS) prides itself on being a challenge-led team that supports a diverse and ever-growing community of researchers and partners in industry, helping to unleash the potential of the data they collect and improve the quality of their research and outcomes. Based at the University of Nottingham, the interdisciplinary group is building on the foundations of the Advanced Data Analytics Centre.

Today, we are involved in a range of multimillion-pound projects, collaborating with an international network of specialists to find solutions to the challenges faced by our clients.

If you would like to find out how we can support you and your research, simply complete the enquiry form at the website below and we will get in touch with you.

Contact

- Click here

Website address

nottingham.ac.uk/dts/researcher/digital-research-service

DNP MAS NMR Facility

DNP assisted magic-angle spinning solid-state NMR

Dynamic nuclear polarisation assisted solid-state NMR is a unique technique which gives an unprecedented sensitivity boost to already established solid-state NMR. It enhances sensitivity by two-four orders of magnitude. This can be used to study rare and insensitive nuclei or organic compounds without isotope enrichment, carry out surface-selective studies of materials like zeolites and MOFs or work with biomaterials in low physically relevant concentrations which otherwise could not be used in conventional ssNMR.

The facility is a joint project of the School of Physics and Astronomy, the School of Chemistry and the School of Life Sciences. It consists of a unique Ascend™ wide-bore (89 mm) 14.1 Tesla cryo-magnet, with sweep-coil and autonomous helium recycling system (Ascend Aeon design), and a 7.2 T, 395 GHz gyrotron for high sensitivity and high resolution solid-state NMR. It is the first and only UK DNP MAS NMR Facility based on a commercial instrument.

Who to contact and how

- Dr Walter Köckenberger
  walter.kockenberger@nottingham.ac.uk

Website address

nottingham.ac.uk/dnpnmr

Equipment / techniques available

1. 14.1 T High field solid-state NMR spectrometer coupled with 395 GHz CW microwave source for dynamic nuclear polarisation assisted solid-state NMR
2. Low temperature (100K) magic-angle spinning equipment

Flow Cytometry Facility

Flow Cytometry, Imaging Flow Cytometry and Cell Sorting

About the University of Nottingham Flow Cytometry Facility

The University of Nottingham Flow Cytometry Facility provides a fully comprehensive flow cytometry and cell sorting service open to all. Access high end flow and imaging cytometers or our sterile cell sorting service, as well as comprehensive advice, training and support.

Who to contact and how

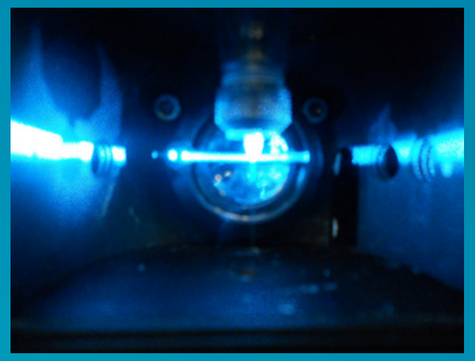
- Facility Manager: David Onion: david.onion@nottingham.ac.uk
- Facility Technician: Nicola Croxall: nicola.croxall@nottingham.ac.uk

Website address

nottingham.ac.uk/life-sciences/facilities/flow-cytometry-facility

Techniques / equipment available

1. High speed sterile cell sorting with the Astrios EQ
2. Full spectrum flow cytometric analysis with the SONY ID7000
3. Conventional flow cytometry with our 3 dedicated analytical machines
4. Imaging cytometry with the ImageStreamX MKII
5. Data analysis with Kaluza, FCS Express, FlowJo, IDEAS and more
6. Training: 'Introduction to Flow Cytometry' and Data Analysis Courses offered all year round, bespoke training upon request



Service Provision

With the maximum capability of a 5 laser 147 channel SONY ID7000, the Facility can cope with even the most complex experiments.

Full-service provision available: we can design your experiment, stain your samples, run them on a cytometer, analyse data and report.

Equipment access service: simply pay per hour to use the facility's flow cytometers: we will give you all the training and support you need.

The Hounsfield Facility

3D X-ray CT Imaging

The Hounsfield Facility is a world leading multidisciplinary initiative involving researchers from the Schools of Biosciences, Computer Science, Maths, and Engineering. We use 'state-of-the-art', 3D, non-destructive X-ray Computed Tomography (CT) technologies and innovative image analysis techniques to explore and quantify the internal architecture of biomaterials and support research into environmental sustainability and global food security. We have three X-ray CT systems available for different applications and object sizes. Examples of projects range from the quantification of pore networks and voids in soils, rocks, metal castings and food products to measuring the temporal development of plant root systems in heterogenous environments.

Who to contact and how

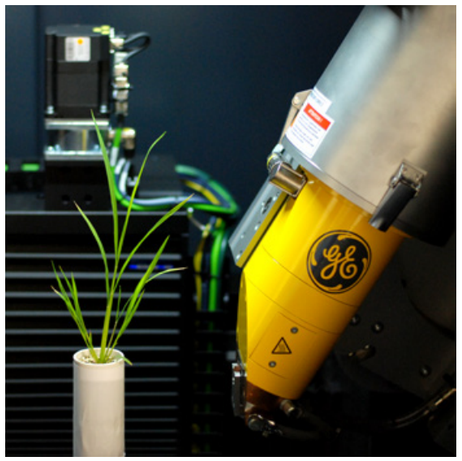
- Dr Craig Sturrock
  craig.sturrocknottingham.ac.uk
  +44 115 951 6786

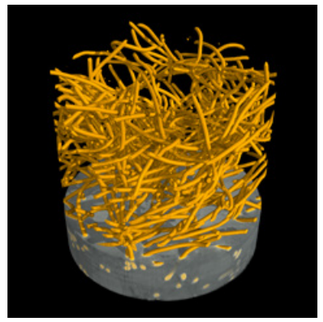
Website address

nottingham.ac.uk/microct

Equipment / techniques available

1. GE phoenix nanotom180kV X-ray CT system
   - Spatial resolution: <1 to 60µm (depending on sample size)
   - Maximum sample size: 100 × 60 × 60mm
2. GE v|tome|x M 240 kV X-ray CT system
   - Spatial resolution: 10 to 150µm (depending on sample size)
   - Maximum sample size: 400 × 250 × 250mm
3. GE v|tome|x L 320 kV custom X-ray CT system
   - Spatial resolution: 150µm
   - Maximum sample size: 100 × 20 × 20cm





Managed Chemical Compound Collection Facility

Automated Compound Screening

The MCCC Facility

The University of Nottingham has an established state-of-the-art fully automated and integrated Managed Chemical Compound Collection Facility. The facility provides a screening resource for the identification of chemical starting points as drug leads against newly identified and validated drug targets.

Compound Collection

At present MCCC contains ~85k public-domain compounds, sourced from primary vendors using advanced chemical diversity and physicochemical properties selection criteria. The collection is housed in an automated high density environmentally control storage unit coupled with retrieval and dispensing equipment.

Compound Integrity

The MCCC facility includes a dedicated liquid chromatography-mass spectrometry (LC-MS) system for quality control of samples.

Who to contact and how

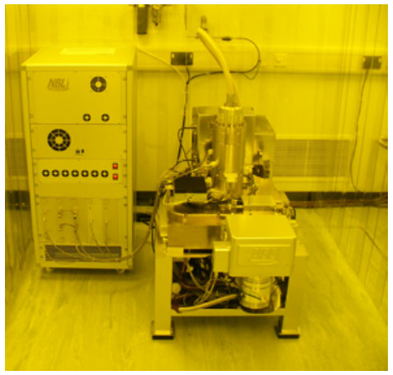
- Fadi Soukarieh
  pazfs2@exmail.nottingham.ac.uk
- Lodewijk Dekker
  pazlvd@exmail.nottingham.ac.uk

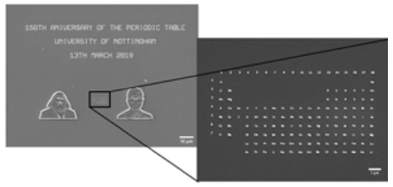
Equipment

1. TTP Labtech comPOUND
2. TTP LabTech comPILER
3. Tecan Freedom Evo
4. Shimadzu LC2020

Nanofabrication Nottingham (NaNo)

Open Access nanofabrication and microfluidic facility





Nanofabrication Nottingham (NaNo) is an ISO 5 (class 100) cleanroom located within the nmRC. It houses a nanobeam nB5 electron beam lithography tool that can create features as smallas 30nm on a range of substrates including silicon, glass and GaAs. For larger patterns we have a maskless photolithography tool (Alvéole Primo), with a resolution of 1.2 µm, which can be used to make microfluidic devices without the need for costly masks. This can also be used to pattern substrates allowing for cells to be deposited in specific areas allowing for easier and more relevant imaging.

In addition to our lithography equipment we also have an Accurion ep4 imaging ellipsometer that can be used to measure the thickness and optical properties of thin films with a lateral resolution as small as 5µm making it ideal for measurements on flakes of 2D materials.

Contact

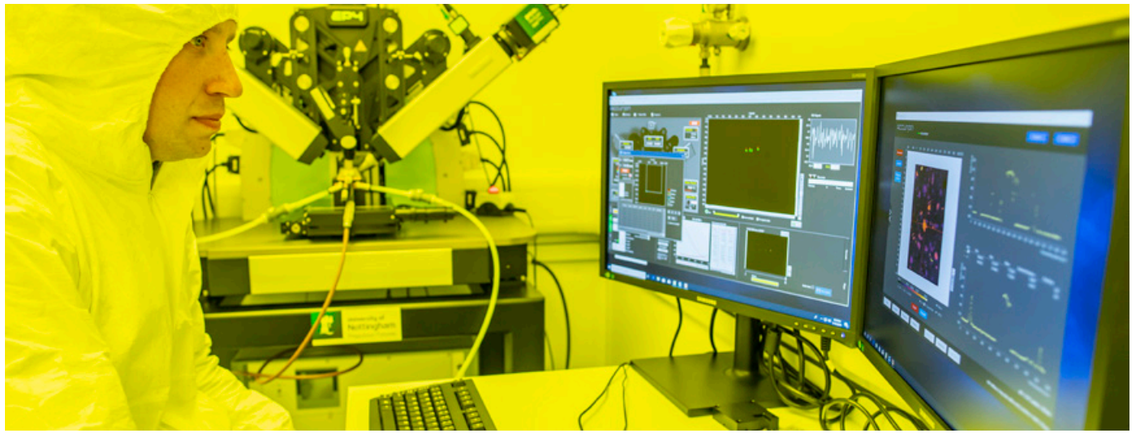
- Dr Richard Cousins
  richard.cousins1@nottigham.ac.uk
- Dr Christopher Mellor:
  chris.mellor@nottingham.ac.uk

Website address

nottingham.ac.uk/nmrc/facilities/ebl/electron-beam-lithography

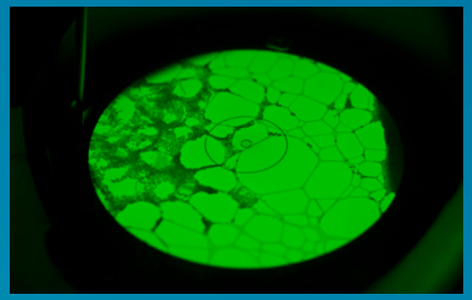
Equipment / techniques available

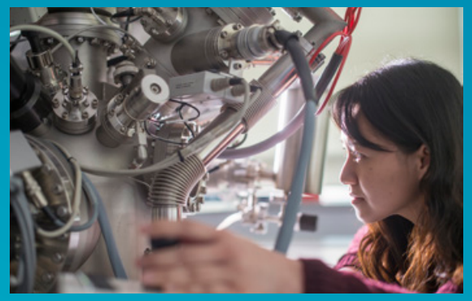
1. Electron Beam Lithography
2. Microfluidic cell fabrication
3. Imaging ellipsometry
4. Cell adhesion control



Nanoscale and Microscale Research Centre

World leading materials nanoscience imaging and characterisation





The Nanoscale and Microscale Research Centre (nmRC) is a cross-faculty centre servicing the entire university and research communities beyond. The centre offers a broad range of state-of-the-art facilities for micro- and nano-scale imaging and chemical characterisation suited to research applications across the engineering, physical and life sciences. The high end analytical capabilities are allied to expansive in-house technical and academic expertise, meaning the centre is well placed to support both academic and commercial projects in achieving research excellence. The nmRC is located in the Cripps South Building, University Park and is happy to receive enquiries of any nature via the contact details below.

Who to contact and how

- nmrcenquiries@nottingham.ac.uk
  +44 115 748 6340

Website address

nottingham.ac.uk/nmrc

Equipment / techniques available

1. Scanning Electron Microscopy (SEM)
   - Including Cryo-SEM, FIB-SEM, FEG-SEM, ESEM and more
2. Transmission Electron Microscopy (TEM)
   - Including Cryo-TEM
3. X-ray Photoelectron Spectroscopy (XPS)
4. Confocal Raman Microscopy
5. Time-of-Flight Secondary Ion Mass Spectrometry with OrbiTrapTM Detection (3D OrbiSIMS)
6. Optical and Confocal Laser Scanning Microscopy (CLSM)
7. Electron Micro Probe Analysis (EMPA)
8. Spectroscopic Imaging Ellipsometry
9. Biosafety Level 2 (BSL2) Cryogenic Analytical Transfer Laboratory (CLEM)

SBRC Robotics Suite

Liquid handling and high throughput screening

The SBRC Robotics Suite hosts two robotic platforms both placed within a positive pressure HEPA enclosure. They provide a fully integrated, yet versatile system of auxiliary devices, centred around a BiomekFXp dual arm liquid handling robot. It can handle a wide range of plates in the SBS format and benefits from an on-deck thermocycler and peltier devices (4ºC-100ºC), integrated CO2 shaking incubators (4ºC-50ºC), plate reader, solid phase extraction, a pin tool for plate stamping and a colony picker (Qpix, Molecular Devices). The system can perform a variety of high throughput biochemical and molecular techniques such as magnetic beads and vacuum-based extractions, enzymatic assays, gene assembly, high-throughput screening plus plate replication and reformatting. The system is supported by an experienced team to help design, budget and set-up your automation experiments, extract generated data as well as track and manage your samples.

Who to contact and how

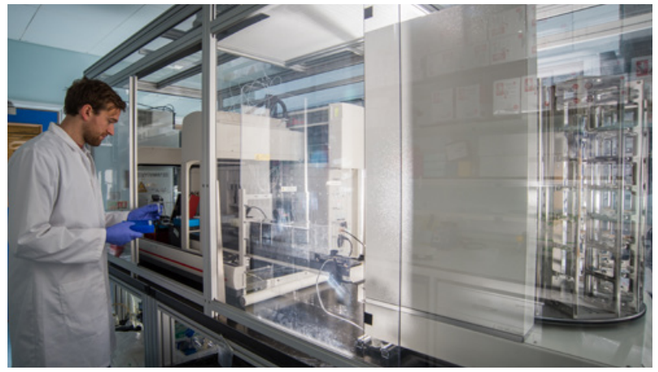
- Dr Ruth Cornock, Facility Manager:
  ruth.cornock@nottingham.ac.uk
- Dr Ying Zhang, Academic Lead:
  ying.zhang@nottingham.ac.uk
- Dr Alan Burbidge, SBRC Manager:
  alan.burbidge@nottingham.ac.uk

Website address

nottingham.ac.uk/cbs/expertise-and-equipment

Equipment / techniques available

1. Biomek FXp (Beckman Coulter) dual arm liquid handling robots
2. Cytomat24 (ThermoFisher) Plate hotels with a combined capacity of 341 plates
3. Cytomat2 (ThermoFisher) CO2 shaking incubators (4oC-50oC)
4. SpectraMax i3x (Molecular Devices) plate reader (absorbance, fluorescence and luminescence)
5. Qpix colony picker (Molecular Devices)



School of Chemistry Analytical Sciences

Chromatography, Mass Spectrometry, X-ray Crystallography, NMR and High Field NMR

What we do...

Our instrumentation ranges from general application benchtop analytical equipment and walk-up spectrometers (NMR and MS), to the prestigious UoN high-field NMR facility.

We specialise in providing access to equipment with the tailored support necessary for you to get the best from our facilities. The majority of our equipment is available as 'walk-up access' where no booking and minimal training is required, or 'open-access' where booking is required and a short training session will be provided. Additional specialist teaching is available and one-to-one training is provided for users of the most sophisticated instrumentation.

Who to contact and how:

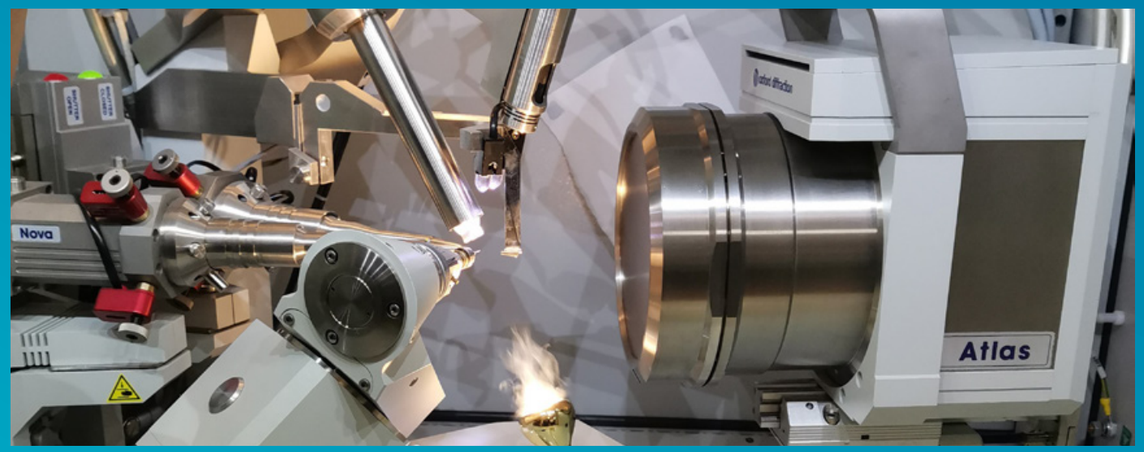
- General Enquiries Dr Huw Williams: huw.williams@nottingham.ac.uk
- Business and Commercial Research : NottinghamAnalytical@nottingham.ac.uk (Business Partnership Unit, School of Chemistry)

Website address

nottingham.ac.uk/analytical

Equipment / techniques available:

1. Chromatography / Mass Spectrometry
2. NMR
3. High Field NMR
4. Powder and Single Crystal X-ray Crystallography



School of Life Sciences Imaging

State of the art microscopy from wide field to electron microscopy

Information about SLIM

School of Life Sciences Imaging (SLIM) provides access to cutting-edge imaging technology and expertise to researchers across the University and the business community. The resources in SLIM are supported by an experienced 5-person team with a combined 100+ years expertise in microscopy, image-analysis and sample-preparation. Both collaborative projects and service work are available to external users.

Who to contact and how

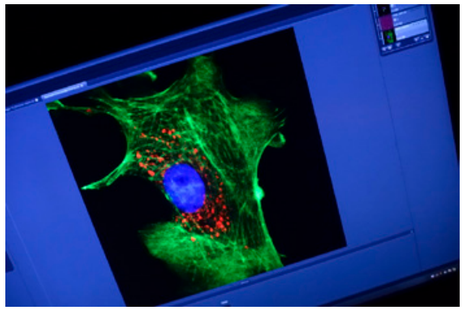
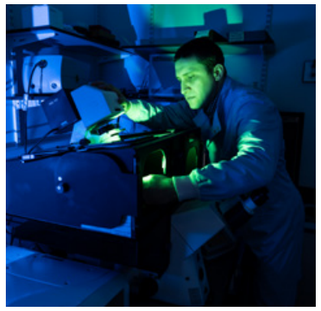
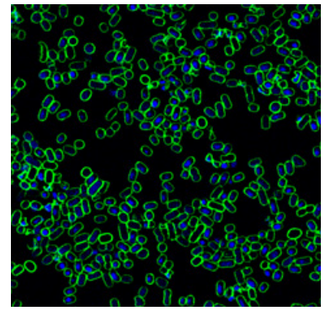
- Tim Self, Head of SLIM
  tim.self@nottingham.ac.uk
  +44 115 823 0090

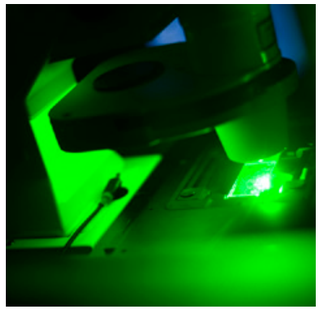
Website address

nottingham.ac.uk/life-sciences/facilities/slim

Equipment / techniques available

1. Light microscopy
2. Confocal microscopy
3. Electron microscopy
4. Super resolution
5. High Content Imaging
6. Histology




Sir Peter Mansfield Imaging Centre

Medical Imaging

The Sir Peter Mansfield Imaging Centre (SPMIC) is an interdisciplinary, cross-faculty centre for innovative imaging in experimental and translational medicine, which brings together researchers who develop new medical imaging techniques with clinicians and scientists who use them. The SPMIC spans two sites: one based on University Park and the other in the Medical School in the Queen's Medical Centre.

Whether you are a new user of medical imaging equipment (MRI, MEG, EEG, and fNIRS) or are an experienced user, we have the facilities, the staff and the experience to help you get the most from using medical imaging in your research. We have experience of working with clinical and non-clinical academic research groups including the pharmaceutical and food industries, as well as other science and engineering research groups.

In particular, our staff have training and experience in working to Good Clinical Practice standards and include clinically-qualified radiographers.

Who to contact and how

- General enquiries:
  spmic@nottingham.ac.uk
  +44 115 846 8946
- Centre Manager: Andrew Peters
  andrew.peters@nottingham.ac.uk

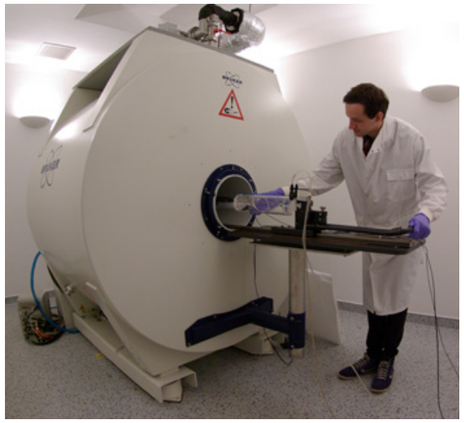
Website address

nottingham.ac.uk/spmic

Equipment / techniques available

1. 1.5T, 3T and 7T whole body Magnetic Resonance Imaging (MRI) systems
2. 275-Channel Magnetoencephalography (MEG) system
3. OPM-MEG system
4. Electroencephalography (EEG) – including MR-compatible EEG
5. Mock Scanner
6. Upright 0.5T scanner, allowing weight-bearing studies
7. Sound-proof, screened room equipped with high density EEG, and Auditory Brainstem Response system
8. GE SPINlab MRI Hyperpolariser
9. Krypton Hyperpolariser

The pre-clinical imaging research laboratories



The pre-clinical imaging research laboratories provide state-of-the art MRI facilities for in vivo high field magnetic resonance imaging and spectroscopy. The facilities have a Bruker Avance III system with a 30 cm bore 7 T magnet with a range of RF coils that make them applicable to an array of applications including a deuterium coil for the latest applications in metabolic imaging. We have extensive experience with imaging and spectroscopy methods in a large variety of samples and materials from animals, cells and ex vivo tissues to food products and plants. Work is ongoing with the facility to create targeted MRI contrast agents, particularly in the areas of inflammation, neurodegeneration, cancer, and drug delivery. There is the potential for collaborative projects in the design of new molecular imaging approaches for tailored applications, including complementary synthetic chemistry and histology expertise.

Who to contact and how

- Dr Malcolm Prior
  malcolm.prior@nottingham.ac.uk
  +44 115 846 8265
- Dr Peter Harvey
  peter.harvey@nottingham.ac.uk
  +44 115 823 2871

Equipment / techniques available

There are numerous magnetic resonance methods that are implemented on the pre-clinical scanners and they have many applications.

Magnetic resonance imaging in its simplest forms, can be used to measure structural features in a wide variety of samples and can routinely achieve a resolution 30 µm in smaller objects. Examples of applications in vivo include the study of morphological development, injuries and tissue deterioration, whilst studies in other materials have measured such things as the composition of manufactured foods. More sophisticated magnetic resonance imaging applications can provide information on range of physical parameters such as flow, molecular diffusion, temperature and chemical composition. These techniques have numerous applications and have been applied to disease models such as tumour growth, stroke and infection. Similarly, there are numerous applications of these techniques in fields of plant biology and food science. The technique of magnetic resonance spectroscopy has been routinely used in this facility to measure brain metabolite levels in regions as small as the mouse hippocampus. Measurements of changes in metabolite levels are applicable to many in vivo disease models and can also be acquired from cell suspensions. This technique can also be applied to plants, food science and other materials.

Glossary

COMPARE
- Fluorescence Correlation Spectroscopy (FCS)
- Fluorescence Lifetime Imaging (FLIM)
- Total Internal Reflection Fluorescence (TIRF)
- Bioluminescence
- Ptychography
- Stimulated Emission Depletion (STED)

3

DeepSeq
- Next Generation Sequencing (NGS)
- Illumina
- Oxford Nanopore Technologies
- Sanger

4

Digital Research Service
- Data Analytics
- Bioinformatics
- Software Engineering

5

DNP MAS NMR Facility
- Dynamic Nuclear Polarisation (DNP)
- Solid State Spectroscopy
- Materials Characterisation
- Molecular Structure Determination

6

Flow Cytometry Facility
- Flow cytometry
- Cell sorting
- FACS

7

Hounsfield Facility
- X-ray Computed Tomography
- Non-destructive testing
- 3D microstructural imaging

8

Managed Chemical Compound Collection Facility
- Drug Discovery
- Screening compounds
- Inhibitor Screening
- Automated library

9

Nanofabrication Nottingham
- Electron Beam Lithography
- Ellipsometry
- Microfluidics
- Cleanroom
- Nanofabrication

10

nmRC
- Nanoscience
- Electron microscopy
- Chemical mapping
- High resolution imaging
- Cryogenic capabilities

11

SBRC Robotics Suite
- Automation
- Liquid handling
- High-throughput Screening
- Plate replication

12

School of Chemistry Analytical Sciences
- X-ray Crystallography
- Chromatography
- Mass Spectrometry

13

School of Life Sciences Imaging
- Light microscopy
- Confocal microscopy
- Electron microscopy
- Super resolution
- High Content Imaging
- Histology

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Sir Peter Mansfield Imaging Centre
- Magnetic Resonance Imaging (MRI)
- Magnetic Resonance Spectroscopy (MRS)
- Magnetoencephalography (MEG)
- OPM-MEG
- Dynamic Nuclear Polarisation (DNP)
- Hyperpolarised Gas Imaging
- Medical Imaging

15

The Pre-Clinical Imaging Research Laboratories
- Magnetic Resonance Imaging (MRI)
- Magnetic Resonance Spectroscopy (MRS)
- Molecular imaging
- Contrast agents
- Pre-clinical

16

University of Nottingham
UK | CHINA | MALAYSIA

For more information

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