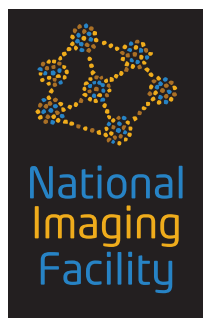




NANOSCALE RESEARCH NEWSLETTER

ISSUE 1 – December 2015



Biomedical Magnetic Resonance Facility

The Internationally renowned Western Sydney University Biomedical Magnetic Resonance Facility (BMRF) specialises in assisting researchers, students and industry with a variety of magnetic resonance-based biological, chemical and medical analyses. The facility offers fee for service work or training on the instruments for external users.

The BMRF is capable of conducting all standard contemporary nuclear magnetic resonance (NMR) experiments including High Resolution Magic Angle Spinning (HRMAS). Magnetic resonance imaging (MRI) and NMR diffusion measurements are particular specialties. The BMRF also has high-level expertise for analysing the resulting data.

The BMR Facility is a node of the National Imaging Facility (NIF anif.org.au).

Novel experimental techniques and theoretical models are developed in the BMRF for studying molecular association, organisation and dynamics, and functional nanomaterials – with some of the work having clinical significance.

Areas of expertise include diffusion and transport theory; nuclear magnetic resonance (NMR) and magnetic resonance imaging (MRI) modelling and methodology.



This is a historical photo of ye olde facility...watch this space for a photo of the nouveau facility.

New Infrastructure for BMRF

PERKIN-ELMER QUANTUM GX MICRO-CT

Western Sydney University also received a grant for a new micro-CT system, installation and training. This was installed in March 2015. Instrument and Radiation Safety training was completed in August. A percentage of the machine time is dedicated to NIF.

X-ray microtomography is used to create 3D models without destruction of the original object and will be used in the BMRF for:

- ≥ Medical Imaging
- ≥ Agricultural Imaging (Chick Peas, Shiraz buds)
- ≥ Industrial Imaging

14.1 WIDE-BORE MRI

Western Sydney University was successfully awarded an ARC LIEF application (LE140100009, Price et al. Ultra-high resolution magnetic resonance imaging (MRI) system for physical applications; \$1.064 M). The grant went towards the purchase price of \$1.8 M for a Bruker 14.1 Tesla MRI. The system was installed and fully operational March, 2015 with a percentage of the machine time dedicated to use by the National Imaging Facility (NIF

SPECIAL POINTS OF INTEREST

ABOUT THE BMRF

NEW INFRA-STRUCTURE FOR THE BMRF

NATIONAL INSTITUTE MATERIALS SCIENCE (JAPAN) DELEGATES VISIT WSU

FACILITY MONITOR

2015 DOCTORAL SUBMISSIONS AND COMPLETIONS

NEW BMRF MANAGER – MIKHAIL ZUBKOV

STUDENT PROFILE – BEN PAGES

VISITING FELLOW – VIVIAN CHEN

NANOSCALE RESEARCH ORGANISATION STRUCTURE

OK,

SO WHAT'S THE SPEED OF DARK?



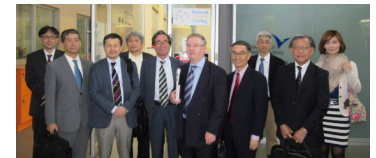
National Institute of Materials Science (NIMS) visit

Tuesday (Sept 29th) morning (8:15 am - ~9:00 am) a large delegation from the National Institute of Materials Science (NIMS) delegation from Japan together with Troy Deighton (Senior Manager, Communications) and Michael Norris (Project Officer) from the Of-ice of the NSW Chief Scientist and Engineer (OCSE). NIMS is one of the enormous Japanese Govt. research institutes (<http://www.nims.go.jp/eng/nims/profile.html>) located in Tsukuba, Japan.

The members of the Japanese delegation were: Mr Takahiro Fujita

(Executive Vice President), Dr Masakazu Aono (Director-General, Nano-Scale Materials Division (MANA), delegation head), Dr Koji Kimoto (Unit Director, Surface Physics and Structure Unit, Advanced Key technologies Division), Dr Koichi Tsuchiya (Managing Director, Research Centre for Strategic Materials), Dr Johsei Nagakawa (Deputy General-Manager, Academic Collaboration Office), Dr Toshiyuki Mori (Group Leader, Fuel Cell Materi-als Group, Battery Materials Unit, EEMD), Dr Toru Hara (Chief Researcher, Electron Microscopy Group, Surface

Physics and Structure Unit, research Centre for Strategic Materials), Dr Kazunari Yamaura (Chief researcher, Strongly Correlated Materials Group, Super-conducting Properties Unit, EEMD), and Ms Megumi Kiwamoto (International Coordinator, Academic Collaboration Office).



The Japanese delegation and Prof. Price in front of the BMRB.

Monitor-Acoustic BMRB upgrade

“Hey, what’s in the fish-bowl? I wonder what they do in there? Is that R2D2?”

Well, all these questions and more will be answered with the addition of our new 55" monitor. The Nanoscale Research Group was granted funding for the installation of a monitor and for preparation of graphic slides. So, with the assistance of Capital Works, the monitor installation was carried out in conjunction with acoustic material being fitted to the western and eastern walls for noise abatement.

The information slides flashed up on the monitor will be divided into 5 exciting areas:

Profiles – These slides will profile the users of the facility (students & academics) to demonstrate what can be achieved, indicate where our many and varied users come from and how diverse are their areas of research interest.

Instruments – We have world class instruments in the facility and these slides will showcase the capabilities and particular research specialty of each instrument.

Upcoming events – These slides will advertise any up-coming talks, symposia, workshops, presentations, related conferences and of course our Biennial NMR,

MRI and Diffusion symposium (to be held toward the end of 2016).

Projects – These will be brief representative slides to demonstrate the many and varied projects which our users are undertaking and are involved in.

Industry – These will be advertisements to support our industry associates, collaborators and facility sponsors.

TO STEAL IDEAS FROM ONE PERSON IS PLAGIARISM;

TO STEAL FROM MANY IS RESEARCH.

COMPLETIONS



Doctoral Submissions and Completions 2015

Dr Dale Codling - “NMR and MRI studies of Restricted Diffusion.” Dale has been working in ANSTO health and recently was appointed as the Bragg Institute Laboratory Manager, a six month appointment.

Dr Batchimeg Ganbold - “NMR of Ion Dynamics in Solution (including ionic liq-uids and salt-polymer electrolytes.”

Dr Amninder Virk - “Experimental and Theoretical Modelling of Diffusion in Biological Milieu.”

Mr Ryan Dean - “Development of Dynamic MRI Contrasts and their Application to Biological Systems.”

Mr Benjamin Moroney – “Advanced Numerical Modelling of NMR Diffusion Experiments.”

Mr Abhishek Gupta – “Development of Advanced MRI Contrast Agents.”

Mr James Stranger – “Characterisation of Liquid Electrolytes using Advanced Magnetic Resonance Techniques.”

Mr Mikhail Zubkov – “Development of Advanced MRI Techniques for Clinical Imaging.”

New Biomedical Magnetic Resonance Facility Manager

The new Biomedical Magnetic Resonance Facility (BMRF) manager Mikhail (Mike) Zubkov started in mid-October 2015. His strong background in Nuclear Magnetic Resonance and Magnetic Resonance Imaging allows co-operation with the BMRF users to ensure efficient setup of the majority of the planned experiments.

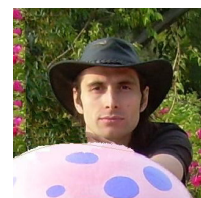
Mikhail graduated from the faculty of Physics at Saint Petersburg State University (Saint Petersburg, Russia) with specialisation in MRI (B.Sc. and M.Sc. thesis-studies both related to the use of wavelet transforms in MRI and ultra-low field MRI of flow respectively); his MRI expertise expanded to high-field MRI and clinical MRI during the employment as an MRI Technician at the Radiology department of the Mariinskij State Hospital (Saint Petersburg, Russia).

NMR spectroscopy became Mikhail's area of interest during his studies at the school of Technical Physics at the Lappeenranta Technical University (Lappeenranta, Finland), which he graduated from with his second M.Sc. thesis on high-field NMR investigation of electrolyte solutions.

Finally, in the late August 2015 Mikhail submitted his PhD thesis at the school of Science and Health of the

Western Sydney University. His PhD work which is currently under examination, describes novel methods of measuring molecular diffusion by NMR both in imaging and spectroscopy experiments. The results of the majority of these works have been published in chemistry and magnetic resonance-related journals, as book chapters and as reports and posters at multiple conferences.

As facility manager Mikhail will be glad to assist you in performing your experiments through both advice on practical application of the NMR methods and a thorough explanation of the underlying NMR theory.



MIKHAIL ZUBKOV

Mikhail hails from St. Petersburg. He has mastered the Aussie look – now comes the accent.

A CONCLUSION IS THE PLACE WHERE YOU GOT TIRED OF THINKING.

Student Profile – Ben Pages

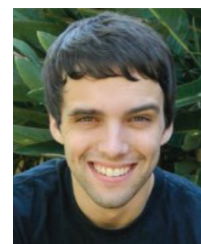
Benjamin J. Pages completed his B.Sc. (Adv) (Honours) in 2013 at Western Sydney University and was awarded the Dean's Medal and University Medal.

He is currently in the second year of his PhD at Western Sydney under the supervision of Prof. Janice R. Aldrich-Wright, Prof. William S. Price and Dr Gang Zheng. His research interests include the development of novel platinum(II) and (IV) anti-cancer agents, and the use of a variety of bio-physical techniques to study their biological activity.

Recently Ben travelled to the UK to work at the University of Warwick under an Endeavour Fellowship.

During this period he also worked at the Universities of Aarhus, Reading and Glasgow in order to gain an in-depth understanding of the DNA binding modes and affinities of several platinum(II) complexes using several different spectroscopic and calorimetric techniques.

This work will form the basis of a high-impact publication, and Ben hopes to continue study abroad sometime in the future.



BEN PAGES

Visiting Fellow – Ms Vivian Chen

Ms Vivian Chen is a Ph.D. Candidate in Chemistry and Biochemistry, at the National Chung Cheng University (CCU) in Taiwan.

She completed a B.S. in Chemistry and Biochemistry in 2010 and her supervisor is Prof. Dennis Hwang who collaborates with Prof. Price.

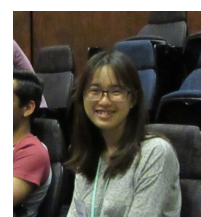
Vivian is here as a visiting fellow for 12 months to work on a joint project.

Western Sydney University and National Chung Cheng University formalised an agreement for student

exchange and collaboration in 2014. WSU is the first Australian University to have such an agreement with CCU.

Her research interests are:

- ≥ Frequency lock-in technique
- ≥ MRI method development
- ≥ Water dynamic and NMR relaxation
- ≥ Biophysical properties of biomembranes



VIVIAN CHEN

NANOSCALE ORGANISATION AND DYNAMICS

Professor William S. Price

Group Leader

- Medical Physics, MRI, NMR and diffusion

Professor Janice Aldrich-Wright

- Potent in-vivo cytotoxic agents

Professor Annemarie Hennessy

Dean of Medicine

- Preeclampsia

Assoc. Prof. Gary Dennis

Director Research School of Science and Health

- Polymer and surface chemistry

Dr Tim Stait-Gardner

National Imaging Facility Fellow

- MRI and quantum physics

Dr Abhishek Gupta

Post Doctoral Fellow

Dr Allan Torres

Research Instrumentalist

Senior Lecturer

- NMR and MRI

Dr Scott Willis

Post Doctoral Fellow

- NMR and MRI diffusion measurements

Dr Gang Zheng

Lecturer

- NMR pulse sequence development

Group Meetings

**NO AMOUNT OF
EXPERIMENTATION
CAN EVER PROVE
ME RIGHT;**

**A SINGLE
EXPERIMENT CAN
PROVE ME WRONG.**

- ALBERT EINSTEIN

NANOSCALE RESEARCH / GRANT MEETINGS

Nanoscale Research/Grant Meetings are held monthly at Campbelltown with the next one to be held in February.

PROFESSOR WILLIAM PRICE'S LAB GROUP

Meet every Friday at 09:30 am in CA 21.1.65

BMRF USERS MEETING

February / May / August / November

PROFESSOR JANICE ALDRICH- WRIGHT'S LAB GROUP

Meet every Tuesday at 12:00 pm in 21.G.23

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