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### 1. INTERNATIONAL FILM SHOT AT AUSTRALIAN SYNCHROTRON

The international spotlight was firmly focused on the Australian Synchrotron in April 2008, with the arrival of film star Nicholas Cage.



Parts of the facility were briefly transformed into film sets for a new movie featuring Nicholas Cage and Australian actor Rose Byrne under the direction of another Australian, Alex Proyas. In the movie, titled 'Knowing', Cage's character finds some chilling predictions inside a time capsule dug up at his son's school. The predictions suggest that the world is about to end.

Filming at the synchrotron involved transforming a conference room into Cage's on-screen office. Some scenes were shot in and around the infrared beamline enclosure, and several synchrotron staff were asked to step in as movie extras.

### 2. VOLUNTEER TOUR GUIDES WANTED

Would you like to get to know the Australian Synchrotron from the inside?

Since it opened for business in July 2007, the Australian Synchrotron has created a great deal of excitement and interest amongst the general public as well as the scientific and academic communities.

To respond to an increasing number of requests from school and social groups who would like to tour the synchrotron, we are seeking interested people to act as volunteer tour guides.

*Don't have a PhD in photonics? Don't worry – we will provide a comprehensive training program to support our volunteers. We are looking for individuals who have a range of skills and share a common interest in communicating science.*

To register for our volunteer information session at the Australian Synchrotron on Friday 23 May 2008 at 10am, please send an email with a brief biography to Jennifer Cook at [jennifer.cook@synchrotron.org.au](mailto:jennifer.cook@synchrotron.org.au)

### 3. NEW ZEALAND USERS MEETING

The 2008 New Zealand synchrotron users meeting gave participants and organisers a glimpse into the very bright future of synchrotron science in New Zealand.

Held on 14-15 April 2008 at Massey University, Palmerston North, the meeting attracted 50 current and potential users from nine institutions.

The first day of the meeting took the theme of 'New Zealand synchrotron science so far', with Prof. Jim Metson (University of Auckland) speaking about New Zealand's synchrotron history and involvement with the Australian Synchrotron. Prof. Geoff Jameson (Massey University) and Dr Bridget Ingham (Industrial Research Limited) gave overviews of synchrotron science in New Zealand from biological and materials viewpoints respectively. The three invited speakers were followed by contributed presentations on topics ranging from microdiffraction of tin solder films to small-angle scattering from flax fibres.



**New Zealand synchrotron users met recently in picturesque surroundings at Massey University**

The second day focused on future possibilities for New Zealand scientists at the Australian Synchrotron and elsewhere. Stephen Mudie and Martin de Jonge from the Australian Synchrotron presented an update on beamlines at the synchrotron. In the afternoon, a series of parallel workshops enabled participants to discuss their research needs with other users and the beamline scientists. Steve Gower (Australian Synchrotron) and Bridget Ingham (New Zealand Synchrotron Group) then spoke about user access arrangements and how New Zealand scientists can apply for beam time.

For more information on the meeting, or the New Zealand Synchrotron Group, visit <http://www.synchrotron.rsnz.org> or contact Bridget Ingham at [bridget.ingham@rsnz.org](mailto:bridget.ingham@rsnz.org)

#### 4. USER PROFILE: LIZ CARTER

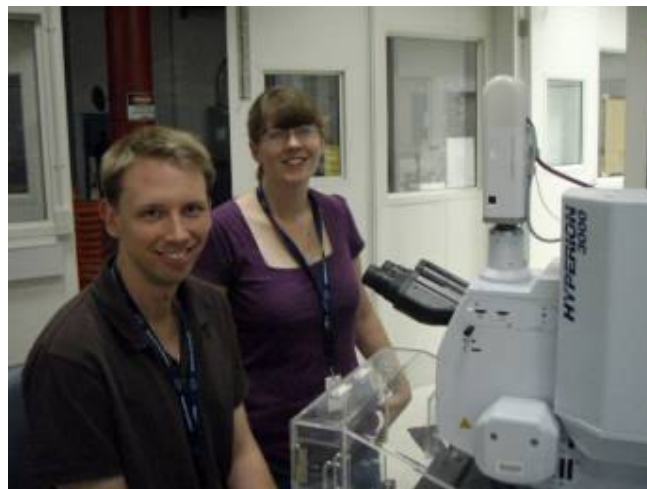
**Dr Liz Carter and colleagues Prof. Peter Lay and Mr Andrew McLeod from the University of Sydney are using the infrared beamline at the Australian Synchrotron to research the mechanisms that underlie vanadium's anti-diabetic properties.**

Vanadium is believed to enhance the efficacy of insulin and has strong potential as a pharmaceutical for treatment of type II diabetes, which affects more than 100 million people around the world. Clinical trials of vanadium complexes are underway in the northern hemisphere.

Although the mechanisms by which vanadium exerts its anti-diabetic effects are still unclear, the generally accepted theory is that vanadium controls phosphorylation processes involved in the insulin signalling pathway.

Liz and her colleagues are using synchrotron-radiation Fourier-transform infrared (SR-FTIR) spectroscopy to

examine the distribution of key biomolecules in adipose (fat) cells that play an integral role in the regulation of glucose metabolism. The team is examining SR-FTIR maps of the distribution of lipids, proteins and carbohydrates within adipocytes (fat cells) to obtain insights into how vanadium changes these distributions. By combining SR-FTIR with other microscopic techniques, the group will obtain more-detailed information on adipocyte biochemistry and the mechanisms by which vanadium exerts its impact.



**Liz Carter and Andrew McLeod are keen users of the IR beamline**

The research is funded by an ARC Discovery Projects grant awarded to Professor Peter Lay for work on anti-diabetic metal complexes.

#### 5. BEAMLINE NEWS

##### Soft X-ray Beamline

The soft x-ray beamline now incorporates a multi-user XANES and XPS end-station designed for flexibility and ease of access. The end-station was previously located at the National Synchrotron Radiation Research Centre (NSRRC) in Taiwan.



**Anton Tadich working on the new endstation for the soft x-ray beamline. Photo: Sandra Morrow.**

End-station features include separate preparation, transfer and analysis chambers, and a fast-entry load lock system and a glove box for handling sensitive samples.

In addition to the synchrotron beam, the analysis chamber has a dual-anode x-ray source to enable synchrotron spectra to be directly compared with laboratory-generated spectra. An electron flood gun can be used to record soft XPS spectra from samples that would normally become electrically charged under the influence of the x-ray beam.

With a suitable sample holder, samples can be heated to over 1300K in the analysis and the preparation chambers. The liquid-nitrogen cooling system is being commissioned to enable samples to be cooled to 120K.

By the end of 2008, near-edge extended x-ray absorption fine structure (NEXAFS) capability will be fully integrated into the end-chamber system with detection by partial electron yield or total fluorescence yield.

*Bruce Cowie, Soft X-ray Beamline Scientist*

### SAXS/WAXS Beamline

The SAXS/WAXS (small angle / wide angle x-ray scattering) beamline has entered the construction phase. Hutch construction is complete and installation of the beamline utilities is nearing completion. The beamline optics are on their way from England, having successfully completed factory acceptance testing. FMB-Oxford, the photon delivery system contractor, will begin installing the beamline optics in mid April.



Construction of the endstation is about to begin. Many parts for the endstation have now been ordered, and assembly of the SAXS table, sample table and SAXS camera has begun. The beamline controls and data acquisition system are in the development phase.

*Nigel Kirby, SAXS/WAXS Beamline Scientist*

### Imaging & Medical Therapy Beamline

Between early April and mid-May 2008, around 17,000 cubic metres of earth will be dug out and redistributed on the synchrotron site to make room for construction of the satellite building, access road and long beam transfer tunnel for the Imaging and Medical Therapy 'long' beamline. Construction will last until October, followed by

installation of the 110m long beam transfer pipe with associated utilities and equipment to begin experiments. One of the world's longest beamlines, the new beamline will give scientists access to very high resolution imaging in the field of biomedical, medical and materials research.



**Neither black nor threatening, this hole in the ground will house facilities for the imaging and medical therapy 'long' beamline.**

April also saw the first major contract placed for the design and fabrication of beam delivery and conditioning equipment for this beamline. State-of-the-art technologies and materials are used in the challenging design of these components, which must safely and reliably handle 25kW of x-ray power when the current x-ray source – a conventional permanent magnet multipole wiggler - is upgraded to a super-conducting multipole wiggler.

*Daniel Häusermann, IMT Beamline Scientist*

### Infrared Beamline

The infrared beamline continues to attract prospective users, with the latest round including Bill van Bronswijk and colleagues from Curtin University. Bill and his colleagues made the trip from Western Australia to use the IR beamline to study a range of samples.

One project, which involves examining different inks on paper with the aim of finding ways to identify where documents have been altered, was filmed as part of a broader synchrotron segment for the 'Can we help you?' program on ABC television (see article below). In a separate project, PhD student Renee Jelly is investigating the chemistry of the reagents used to reveal fingerprints, with the aim of assisting the development of better reagents and methods for visualising fingerprints. Another Curtin University project involves looking at naturally formed biominerals with interesting properties that could potentially lead to valuable industrial applications.

*Mark Tobin, IR Beamline Scientist*

### Microspectroscopy Beamline

The radiation enclosures for the microspectroscopy beamline have been constructed and tested for radiation shielding performance. Work now in progress includes laying down the beamline utilities and fitting out the hutches and external work spaces. IDT will begin

beamline optical component installation this month, with completion expected by September 2008. CSIRO has signed a contract to supply an advanced energy dispersive detector with unique capabilities for extremely fast scanning x-ray fluorescence microscopy. The high-resolution scanning x-ray microscope (nanoprobe) is in the final design review stage with contractor Xradia and construction will commence shortly.

*David Paterson, Microspectroscopy Beamline Scientist*

## 6. FAMOUS FACES

In April 2008, the Australian Synchrotron hosted a visit from astrophysicist Prof. John Koestler of Haystacks Observatory.



An expert in the modeling of solar flares, Prof. Koestler (middle) is pictured with the Australian Synchrotron's Rob Lamb (left) and Greg Le Blanc (right).

## 7. AUSTRALIAN SYNCHROTRON IN THE NEWS

The Australian Synchrotron featured in the 'Totally Wild' children's program on Channel 10 on Thursday 17 April at 4.00 pm. The segment highlighted the work that Phil Heraud from Monash University is doing on the infrared beamline.

### Location, Location, Location

Also in April, the Australian Synchrotron was again the location for a media production when the crew from the ABC TV1 series "Can We Help You" recorded a segment for their show. "Can We Help You" is a half-hour program screened each Friday night, prior to the evening news, investigating questions sent in by viewers. The show's presenter, Pete Rowsthorn; aka Brett from the popular Kath & Kim series, took a tour around the synchrotron storage ring with Director Rob Lamb and stopped to chat at the IR beamline with user Bill van Bronswijk from Curtin University. Bill demonstrated the use of synchrotron science in forensic investigations by identifying different ink samples on forged cheques. The synchrotron segment is

provisionally listed to be screened at 6.30 pm on Friday 25 July 2008 on ABC TV 1.

In March and April 2008, the powder diffraction and soft x-ray beamlines featured in *Australasian Science* as part of a series of monthly articles highlighting the Australian Synchrotron's unique capabilities. The x-ray absorption spectroscopy beamline will feature in the next issue.

## 8. BEAMTIME SUBMISSIONS

### Australian Synchrotron Beamtime Submissions

The second round of submissions for 2008 beamtime at the Australian Synchrotron closed on 1 April 2008. This call was for beamtime between May and August 2008 on the protein crystallography, infrared, powder diffraction and soft x-ray beamlines.

For a list of proposed dates for the rest of 2008, go to: [http://www.synchrotron.org.au/content.asp?Document\\_ID=5305](http://www.synchrotron.org.au/content.asp?Document_ID=5305).

If you would like to discuss your ideas with the beamline scientists at the Australian Synchrotron, please allow plenty of time.

For more information about applying for beamtime at the Australian Synchrotron, contact Cathy Harland, Group Leader, User Support: [cathy.harland@synchrotron.org.au](mailto:cathy.harland@synchrotron.org.au)

## 9. EVENTS DIARY

### EVENTS IN AUSTRALIA

#### IUMRS-ICEM 2008: Synchrotron Radiation (Symposium J)

International Conference on Electronic Materials  
28 July – 1 August 2008  
Hilton Sydney, Sydney, Australia



The synchrotron radiation symposium at IUMRS-ICEM 2008 aims to help participants gain a new understanding of, and appreciation for, the role that advanced synchrotron techniques can play in their research. Topics covered in the symposium will include:

- Advances in x-ray microscopy techniques and instrumentation
- Novel methods for non-destructive characterisation of materials
- Three-dimensional imaging methods
- Characterisation of interfaces and microstructural defects
- Structure and deformation of nanostructured and thin-film materials
- Advances in theoretical and/or computational imaging.

More: <http://www.aumrs.com.au/ICEM-08/Symposia/?S=9>

## EVENTS OUTSIDE AUSTRALIA

For additional information and listings, see:  
<http://www.lightsources.org/cms/?pid=1000068>

### 8th World Biomaterials Congress—2008

28 May–1 June 2008, Amsterdam, The Netherlands

<http://www.wbc2008.com/>

*Crossing Frontiers in Biomaterials and Regenerative Medicine*



More: <http://www.wbc2008.com>

### 6<sup>th</sup> International Conference on Synchrotron Radiation in Materials Science (SRMS-6)

20-23 July 2008, Campinas, Brazil

<http://www.srms-6.com.br>

The conference's main topics are archaeological materials, catalysts and clusters, complex oxides, data-storage and engineering materials, films, surfaces and interfaces, geo-physical and electronic materials, glasses and ceramics, liquids, magnetism, materials under extreme conditions (high pressure, etc.), metals and alloys, metamaterials, molecular electronics, multiferroics, nanostructured materials and self-assembly, polymers and biomaterials, photo materials, nanofocus techniques, strongly correlated materials, superconducting materials, industrial use of SR, and instrumentation/recent developments. Students and post-doctoral fellows may be able to apply for registration waivers.

### 9th International Conference on X-Ray Microscopy (XRM 2008)

21-25 July 2008, Zürich, Switzerland

<http://xrm2008.web.psi.ch/>



Topics to be addressed at this conference include x-ray microscopy applications, methods and novel approaches, and instrumentation. XRM2008 will also feature non x-ray based microscopy techniques with the aim of stimulating collaborations and further progress in the field. The conference is organised by the Paul Scherrer Institut, Switzerland's largest research institute.

### Australia-India Collaboration Meeting

The Bragg Institute at ANSTO, in collaboration with the Australian Synchrotron, has been awarded a \$25,000 grant from the Department of Innovation, Industry, Science and Research (DIISR) to organise a two-day meeting on "Indo-Australian Collaboration in Neutron and Synchrotron Science". The meeting will be held on 23-24 August at the Tata Institute of Fundamental Research in Mumbai, India.

## CAREERS AT THE AUSTRALIAN SYNCHROTRON

The Australian Synchrotron offers a unique working environment for a wide range of specialists. For information on job postings, go to:

[http://www.synchrotron.vic.gov.au/content.asp?Document\\_ID=14](http://www.synchrotron.vic.gov.au/content.asp?Document_ID=14).

## MORE INFORMATION

A list of Australian Synchrotron personnel can be found at

[http://www.synchrotron.org.au/content.asp?Document\\_ID=129](http://www.synchrotron.org.au/content.asp?Document_ID=129)

**Email:** [info@synchrotron.org.au](mailto:info@synchrotron.org.au)

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International +61 3 8540 4100

*[Please note that the facility is not open to the public]*

### City office

The city office is now closed.