Australian Synchrotron

Lighting the path to innovation

Two More Australian Synchrotron Beamlines

Headline: **Two More Australian Synchrotron Beamlines**

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Main Text:

The Minister for Innovation, John Brumby, today announced contracts to supply soft x-ray and infrared beamlines for the Australian Synchrotron had been signed.

"The soft x-ray and infrared beamline contracts have been awarded to Feinwerk-und Meßtechnik GmbH (FMB), bringing to five the number of beamlines under way," Mr Brumby said.

"We are well on track to deliver the synchrotron light that will transform Australia's research agenda."

The Australian Synchrotron is being built faster than any other comparable light source. A sustained electron beam has been successfully generated, and assembly of the synchrotron machine that delivers intense light to the beamlines is almost complete.

Mr Brumby said Australian researchers would use soft x-ray and infrared techniques for groundbreaking science that will benefit Australians and Australian businesses.

"The soft x-ray beamline will assist development of new high-tech materials and coatings for the textile, building and computing industries while the infrared beamline will help improve cancer diagnosis and treatment," he said.

University of New South Wales' Professor Rob Lamb, and Professor Dudley Creagh from the University of Canberra said Australian scientists were eagerly awaiting the chance to use the Australian Synchrotron.

"Australian soft x-ray scientists are excited about accelerating their research programs when our own synchrotron opens next year," Prof Lamb said.

"The frustrations of gaining beam time at overseas facilities, with the attendant inefficiencies of long distance science, will be over."

Professor Creagh, who prepared the initial design for the infrared beamline, has helped develop synchrotron techniques to aid criminal investigations, heritage conservation and investigations of cell biology.

"The Australian synchrotron will move forensic investigations to a new level, giving police and customs access to a powerful new weapon against crime and terrorism by enhancing our ability to trace the sources of drugs and explosives," Prof Creagh said.

The contract to provide the first four beamline hutches has been awarded to French company Caratelli SA. These lead-lined enclosures around beamlines and experimental stations provide radiation shielding and a clean environment.

Caratelli has built hutches at the European Synchrotron Radiation Facility, one of the three largest synchrotrons in the world, as well as other synchrotron facilities.

The initial synchrotron beamlines are being funded by Australia's first ever national partnership to deliver major science infrastructure. Partners include state governments, universities, leading research institutions and New Zealand.

SOFT X-RAY SCIENCE - EXAMPLES

Associate Professor Paul Dastoor at the University of Newcastle is investigating how molecules order and orient themselves on surfaces. This work is expected to result in better drug inhalation systems and flexible low cost electronic circuits made from polymers.

Professor Hans Griesser at the Ian Wark Research Institute, University of South Australia, is investigating the mechanisms of how living tissues and man-made materials interact. The results will guide development of biomedical
implants and anti-biofouling coatings.

Professor Margaret Hyland at the University of Auckland has discovered how to minimise generation of ozone-depleting carbonyl sulphide by the aluminium industry.

Professor Robert Lamb from the University of New South Wales developed self-cleaning coatings for tiles and glass, now widely used in the construction industry. These environmentally friendly coatings let rain clean large areas automatically, without manpower, detergents or the waste of precious tap water. He has also driven development of a sophisticated experimental station for the soft x-ray beamline.

Professor James Metson from the University of Auckland is examining the microstructure of light-emitting semiconductors, exploring new ways of making these materials that will be crucial to next-generation high density data storage and high efficiency lighting.

Associate Professor Bill Skinner of the Ian Wark Research Institute and Professor Alan Buckley of the University of New South Wales are investigating the fundamental surface and bulk chemical properties of minerals crucial to Australia's balance of trade. The goal is more efficient industrial processes for separating and concentrating minerals.

INFRARED SCIENCE - EXAMPLES

Professor Dudley Creagh from the University of Canberra has used synchrotron infrared light to study the composition of street drugs. He is also helping the National Museum gain information to help establish provenance, and guide restoration and preservation, of precious national relics. Infrared science has yielded new data on the composition of traditional pigments used in Aboriginal paintings.

Dr Phil Heraud from Monash University has revealed microscale biochemical changes in living cells, improving our understanding of how plants respond to changes in the environment.

Dr Ivan Kempson from the Ian Wark Research Institute and Dr Paul Kirkbride at Forensic Science South Australia have studied particle shape and lead distribution in gunshot residues to allow better differentiation from environmental lead and better matching of tiny particles to different types of ammunition. Dr Kempson is also using synchrotron light to study glass fragments, and toxins in hair.

Dr Craig Marshall, also at the University of Sydney, is examining fossils of micro-organisms from sedimentary rocks 2.5 billion to 543 million years old, to provide new insights into the evolution of the earliest eukaryotes – cells with nuclei - that were the forerunners of multi-cellular life.

Professor Don McNaughton from Monash University is investigating drug interactions with cancer cells, with a view to improving cancer treatments, and also looking at abnormal tissues in an effort to improve screening for cervical cancer.

Professor Stephen Thurgate at Murdoch University is looking at deposition of mineral scale on iron surfaces to help improve energy efficiency in ore processing.

Dr Bayden Wood from Monash University is non-destructively probing the molecular architecture of single living cells to help identify target sites for new anti-cancer agents and monitor their uptake.