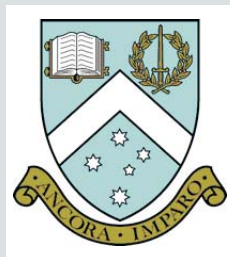


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Monash's 50th Anniversary



On 30 May 2008, Monash University will celebrate the 50th Anniversary of the proclamation of the Monash Act and incorporation of Monash as a university.

Fifty years of existence is a significant milestone for the University and it is a time to highlight its achievements, the benefits of a Monash education, the role of Monash staff in servicing the needs of the global community, and also the achievements of our alumni in prominent positions around the world.

From its first intake of 347 students at Clayton in 1961, Monash University has grown enormously. The university has more than 50,000 students from more than 130 countries at its 6 Australian campuses and campuses in Malaysia and South Africa. Students also benefit from a Monash centre in Prato, Italy and its teaching and research partnerships around the globe.

Monash University was named after prominent Australian, Sir John Monash, because of the many important ways in which he contributed to the community.

Further information about Monash's 50th anniversary can be found at:

www.monash.edu.au/50years

From the Research Director

The first quarter of 2008 has again seen substantial progress in the Centre's engagement with China and the establishment of the Australia-China International Centre for Light Alloy Research (ICLAR) in partnership with the Aluminium Corporation of China Limited (CHALCO). I am pleased to report that, following submission of detailed project proposals in January, two foundation projects have now been approved for funding by CHALCO, with a joint cash budget of ~\$2.3m over three years. The true value of these two projects will significantly exceed this budget, for there will, in addition, be two CHALCO research staff seconded to Monash University for the duration of the projects and substantial in-kind contributions from the partners to the Project Agreements. The research will focus on alloy development associated with future aluminium sheet applications in the automotive and aircraft sectors.

The joint international Centre and these foundation projects are the product of a CHALCO-Monash University relationship patiently cultivated over a period of almost 2.5 years. The Centre of Excellence is enormously indebted to CHALCO CEO Dr Xiao Yaqing and Vice President (Research) Dr Liu Xiangmin for their vision and sustained support throughout this process. We trust that these are just early stages in a long and mutually rewarding partnership.

It is particularly pleasing to see the Centre beginning to develop such independent and prominent linkages with industry, and such meaningful international engagement. As in many fields, light metals research is increasingly to be seen as a global enterprise and the coordination that the Centre of Excellence brings to light metals research in the University sector in Australia is unquestionably proving to be an advantage in promoting the national capabilities internationally. The Centre has had the opportunity to present to a range of national and international companies, such as Boeing, Lockheed-Martin and GM Holden, in recent months, and universally the response has been extremely positive, not only in terms of the capabilities, but also in terms of the degree of coordination.

Of course, that coordination is not limited to the Centre of Excellence and it is pleasing to note that the Centre's formal and informal interactions with the CSIRO Light Metals Flagship and the CAST CRC continue to strengthen. The Centre was pleased to host a meeting of this grouping under the informal banner of a National Light Metals Alliance in April. The Alliance is intended to provide for a strategic broadening of the scope of the Australian Partnership in Light Metals Research that is funded as a research cluster through the CSIRO National Flagships Collaboration Fund. Within the Alliance, there is a high degree of consensus on the need for a coordinated national approach to, for example, the development of research and development infrastructure, to global marketing of the national research and technology capabilities and, where possible, to management and commercialisation of intellectual property in the national interest.

The Centre is presently turning its full attention to the mid-term review to be conducted by the Australian Research Council on September 30, 2008. This is a critical process for the Centre, for it not only represents an assessment of the Centre's progress against ARC and Centre objectives, but it also offers the potential for a further 3.5 years of ARC support (in addition to the original 5 yrs) at up to current levels of funding. The review process requires the submission of written progress reports by both the Centre and the Administering Institution, and the preparation of an extension proposal. As I have indicated previously, our core challenge lies in demonstrating that the Centre is providing a value that well and truly exceeds the sum of the parts, and that we share a vision and a business plan that justifies the continued faith of ARC. Over coming weeks, Centre participants and staff will be called upon to participate in planning discussions, supply information and, in some cases, participate in the review itself. Can I urge everyone approached to give the process their full support.

Light aluminium foams and hybrid structures at UNSW

Centre researchers in the School of Materials Science and Engineering at the UNSW have been intensively working since the beginning of 2007 on characterisation, modelling and analysis of the mechanical behaviour of aluminium foam panels and aluminium foam based hybrid sandwich structures. Led by Prof. Mark Hoffman, the group also includes researchers Dr Tania Vodenitcharova, Ms Maizlinda Idris and Mr Kaveh Kabir, and have recently been joined by Ms Tatiana Avery who is working with Prof. Al Crosky. The team is determined to provide a complete design code for the application of these materials by studying their mechanical response to various contact damage, at micro- and macro-levels.



A detailed experimental program has been put in place, and a large amount of data collected and analysed on the uni-axial and localised contact compressive response of foam-only panels of varying density. Contact damage has been simulated by indentation with punches of varying shape and size, on both foam-only and composite panels; the loading has also been varied in nature, being quasi-static and impact.

Analytical and numerical modelling of the observed macro-scale phenomena has been already performed, to provide further insight into the observed failure mechanisms. The bending resistance of damaged and un-damaged sandwich structures has also been studied in order to assess the remnant strength of the locally damaged panels.

Aluminium based sandwich panels provide high strength and stiffness to weight, as well as being an ideal material for impact energy and sound absorbing devices. A complete study of these materials is valuable in the design of components made from them. With its large scope, the project is a challenge for the team, which is also planning to manufacture its own foam material based on other light metals in near future.

The results have already been communicated at international conferences and workshops in Japan, Korea and Switzerland. One paper has already been published in the *Materials Science Forum*; a second paper is in press in the *Journal of Materials Science and Engineering*, with two more in submission. ■

Centre Visitors: Professors Bréchet and Zurob

At the beginning of April, Professor Yves Bréchet of the Grenoble Institute of Technology in France and Assistant Professor Hatem Zurob of McMaster University in Canada arrived for a short visit to the Monash node of the Centre of Excellence. Professor Bréchet is a Partner Investigator with the Centre with expertise in areas which include: phase transformations, mechanical properties, hybrid materials and materials design and selection.

Professor Zurob is a member of the recently funded Canadian Natural Sciences and Engineering Council (NSERC) Magnesium Network. This three-year (with the possibility of a two year extension) national project involves substantial industrial backing from companies such as General Motors, Novelis and CANMET to develop wrought Mg alloys, primarily for use in the automotive sector. Professor Zurob has particular expertise in the areas of phase transformations and recrystallization of metals.

Professors Bréchet and Zurob were visiting to collaborate on a range of topics including the work hardening of Al alloys containing solute and precipitates and clustering processes in Al alloys (Program A1), fatigue of alloys containing precipitates (Program A4) as well as a range of other topics of interest to the centre including dynamic recrystallisation and interface motion during phase transformations.

This was the first visit to the Centre for both Professors and they are looking forward to their next, longer visit and the further strengthening of research collaborations with the CoE. ■

Article submitted by Dr. Christopher Hutchinson

ARC Review

The Centre of Excellence will undergo a formal ARC review on September 30 this year. The review will examine the extent to which the Centre has met its previously stated aims and objectives, the progress against the Centre's performance targets, the quality of outcomes to date, and the management and governance of the Centre.

The ARC expects that a number of strongly performing Centres will receive an extension of funding for up to three and a half years as a result of this process. The review will therefore also look closely at the financial commitment of the host institution, node institutions and partner organisations, the proposed research program to be undertaken if an extension is granted, and the outcomes anticipated at the end of any extension period.

All Centre staff are strongly encouraged to give the review procedure their full support and cooperation.

Victorian Facility for Light Metals Surface Technology

Activity in the State Government of Victoria funded Victorian Facility for Light Metals Surface Technology commenced in late 2006, and has seen a very successful period since then with intensification of activity and realisation of key milestone and cultivation of key infrastructure between the nodes at Monash University and Deakin University. The facility is funded in support of the core research activities of the Centre of Excellence Research Program D, assisting in the attainment of unified research outcomes via the strategic investment towards the ability to acquire and maintain high level infrastructure and personnel.

Major equipment delivered in 2007:

- Scanning Probe Microscope (AFM / STM) with full electrochemical functionality (Monash) (Figure 2)
- High temperature Tribometer (pin-on-disk) system (Deakin)
- High resolution multi-channel potentiostat for electrochemical testing (Monash) (Figure 3)
- Portable AC/DC potentiostat for electrochemical testing (Monash)
- EBSD system for FEG-SEM (Monash)

The research associated with this Facility includes:

- Investigation into the effect of the effect of specific alloying additions on the corrosion of Mg-based alloys. This is a large program aimed at elucidating the basic science behind the development and design of more stainless Mg alloys.
- Utility of Atomic Force Microscopy as a tool to characterise light alloy surfaces and their microstructure on the nano-scale, whilst tying this into surface sensitive properties.
- Investigation into the effects of surface structure (viz. grain size and grain orientation) on the reaction kinetics of magnesium.
- Sol-gel / silane conversion coating of Al-based alloy systems for enhancing corrosion resistance.
- Investigation and control of the surface properties Mg alloys with respect to ignition control of magnesium and high temperature oxidation.

This work has also involved cooperation with the Cooperative Research Centre for Cast Metals Manufacturing (CRC-CAST), Australian Magnesium Technology Ltd., and engagement with both CSIRO and DSTO.

During 2007, the VFLMST also welcomed several visitors from abroad, including a formal engagement with Prof. Rudolph Buchheit from The Ohio State University in the US.

Plans for the coming year already include numerous high profile visitors to engage in tangible collaborative research in the facility (for extended periods), including visitors from Spain, USA, Korea and China. Furthermore, the facility will see increased usage of the key infrastructure together with access to other key instruments that are arriving as a result of successful LIEF grants across the partner institutions involved. This will cultivate a truly comprehensive and versatile hub in Victoria for surface technology, characterisation, and control of light metal surfaces. ■

Student & Staff profiles



Kaveh Kabir is a Ph.D. candidate at the School of Materials Science and Engineering, University of New South Wales. His research involves the effect of localized contact damage upon the structural response of aluminium foams and sandwich panels assembled using a foam core and aluminium alloy face sheets, under different loading conditions.

The aim of his project is to set design parameters for the manufacturing of aluminium foam-laminate structural components for a particular property space. He was a recipient of a student prize at the recent Centre workshop in Sydney for his presentation on this work.

Kaveh lives with his partner, Steffi, and in his spare time enjoys fishing, music and spending time with friends.



Colleen Bettles has a BE in Chemical and Materials Engineering from the University of Auckland, and her PhD from RMIT. After completing her Bachelor's degree, she worked in industry for several years – as Technical Manager for firstly a technical ceramics company and secondly for a large PVC fabricator.

On moving to Australia, Colleen started an 18 year stint with CSIRO Materials Science, and for the majority of this time was involved in the development of cost-effective creep resistant magnesium alloys.

Colleen has been a Senior Research Fellow with the ARC Centre of Excellence for Design in Light Metals since its beginnings in 2006. Her current work concentrates on the microstructure/property relationships in Titanium and its alloys. There is a strong interest in developing alloys specifically for powder metallurgy processing. In this area, the CoE is involved in a 3 year collaboration with CAST CRC and CSIRO Light Metals Flagship, to investigate alloying and processing opportunities for a range of Ti alloys. As well as leading one of the research projects, Colleen has the overall responsibility for the complete suite of projects under this collaboration.

In her spare time Colleen enjoys reading, gardening, dabbling with patchwork, and most recently has joined the family history bandwagon.

Special Advisor for IP & Commercialisation



The Centre has recently appointed Dr. Malcolm Frost to a part-time role as Special Advisor, Intellectual Property and Commercialisation. Malcolm's primary role with the Centre will be to conduct an audit of potential intellectual property within the Centre's current research portfolio and, on an ongoing basis, monitor the Centre's research outputs with a view to identifying any potential intellectual property. He will

work with the Centre Executive, and the IP and Commercialisation Sub-Committee of the Centre Advisory Board, to advise on protection for and commercialisation of Centre Project IP. Malcolm has extensive experience in the field of light metals, having worked with CSIRO, the Australian Magnesium Corporation, and the CAST-CRC.

Upcoming conferences

**International Magnesium Association
65th Annual World Conference**
18-20 May 2008, Warsaw, Poland
www.intlmag.org

Aluminium China 2008
28-30 May 2008, Guangzhou, China
www.aluminiumchina.com

**ICOTOM15
15th International Conference on Textures of Materials**
1 – 5 June 2008, Pittsburgh, Pennsylvania, USA
www.ceramics.org/ICOTOM15

4th International Conference on Nanomaterials
18-22 August 2008, Goslar, Germany
www.nanospd4.org

11th International Symposium on Physics of Materials
24-28 August 2008, Prague, Czech Republic
<http://material.karlov.mff.cuni.cz/events/ispma11/ann1.html>

**5th International Conference on Advanced Materials
and Processing (ICAMP5)**
3-6 September 2008, Harbin, China
<http://icamp.hit.edu.cn>

**LCF6
6th International Conference on Low Cycle Fatigue**
8-12 September 2008, Berlin, Germany
www.dvm-berlin.de

Titanium 2008
21-23 September 2008, Las Vegas, USA
www.titanium.org

**ICAA11
11th International Conference on Aluminium Alloys**
22-26 September 2008, Aachen, Germany
www.dgm.de/dgm/icaa11

**MS&T'08
Materials Science & Technology 2008**
5 – 9 October 2008, Pittsburgh, Pennsylvania, USA

Corrosion and Prevention 2008
16-19 November 2008, Wellington, New Zealand
www.corrosion.com.au

New building at Deakin University

In January 2008 the Victorian State Government committed \$6 million to a \$13 million expansion of the Geelong Technology Precinct (GTP) through its Rural Infrastructure Development Fund.

The grant will be used to build a Future Design and Manufacturing facility that will incorporate a 3000m² Proof of Concept building. This building will advance the University's research model at the Geelong Campus at Waurin Ponds of co-location and collaboration with industry by providing additional space for prototyping and pre-commercial work.

The expansion supports Deakin's plans to establish a new Institute for Technology Research and Innovation at the Geelong Technology Precinct, which will bring together Deakin's strengths in biosciences, advanced materials and intelligent systems.

This facility will greatly expand the available space for larger scale metals manufacturing related research and will in the future house the casting, rolling and heat treatment facilities located in the current building.



View of the current Geelong Technology Precinct building which houses Deakin University's light metals research and the ARC Centre of Excellence

Join our mailing list

If you would like to be placed on the ALTIMA mailing list, or are interested in submitting articles for publication in the newsletter, please send an email to altima@eng.monash.edu.au, or visit the "Publications" section of the Centre's website at www.arclightmetals.org.au and fill in the subscription form.

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