ALTIMA

ARC Centre of Excellence Design in Light Metals Newsletter: Volume 2 Summer 2006

From the Research Director

I have to confess to finding it difficult to come to terms with the fact that the first year of the Centre's existence is already drawing to a close, perhaps reflecting the hectic pace of the past 12 months and the myriad challenges associated with establishing a new cross-Institutional national centre. On reflection, the Centre has made substantial progress and has much of which it can be proud.

One of the most pleasing aspects of this first year has been the outstanding quality of the international research team that the Centre has been able to assemble. While still not at full complement, the Centre has filled in excess of 85% of available positions in a highly competitive environment which has allowed it to be measured and selective.

I would like to welcome all those who have joined the Centre during 2006 and wish you well in your engagement; I am sure that you will find that you are joining a very strong team.

Other noteworthy achievements in this year of establishment have included:

- development of the initial Centre Research Portfolio, comprising four core Research Programs, plus a fifth Linkage Program which will capture existing ARC Linkage Projects and third-party projects which participants elect to align with the Centre,
- formation of the Australian Partnership in Light Metals Research, engaging the Centre with the CAST CRC in a Research Cluster with the CSIRO Light Metals Flagship, with support of $2.1m from the CSIRO National Flagships Collaboration Fund,
- completion of an Agreement with the State Government of Victoria (DIIRD) for the establishment of the Victorian Facility for Light Metals Surface Technology, with funding of $1.5m,
- collaborative research agreements with major industry partners such as Advanced Magnesium Technologies (AMT) and the Aluminium Corporation of China (CHALCO),
- international linkages with the National Basic Research Program 973 in PR China (through Central South University, Changsha) and the National Institute for Materials Science (NIMS) in Japan,
- a forum linking the Centre with CSIRO and the CAST CRC on the topic of a national Light Metals Alliance to explore common research goals, a national strategy for light metals research infrastructure, and a coordinated national approach to marketing and promotion of light metals research capability, and
- the Centre's first Annual Workshop in November, 2006 at Monash University, with a strong strategic focus on sharpening the definition of strategic design targets and research outcomes.

These are but the highlights, which combined with the sterling efforts within each of the participating Institutions, provide an excellent platform from which to progress the Centre against each of its strategic goals. I would like to take the opportunity to thank all participants in the Centre for their efforts and their support since we began this journey. A special thanks to the Centre Executive and to Astrid, Nancy and more recently Athanasia, for they have shared much of the burden of establishing the Centre.

IN THIS ISSUE

Please welcome **Athanasia Pappas** to the Centre! Athanasia assumes the role of Executive Officer, replacing Nancy Place for 12 months while Nancy is on maternity leave. Athanasia has previously held administrative positions within Telstra and BP. No doubt Athanasia will be made to feel welcome by Centre staff and students!

It is also appropriate to acknowledge gratefully the efforts of those who have joined the Centre Advisory Board, most notably those independent members who give generously of their time and advice in an honorary capacity. Board Chairman, Dr Colin Adam, has been a constant source of valued advice, assistance and support. In a similar vein, the Centre's Partner Investigators, and those who have joined the International Technical Advisory Committee, have proven universally enthusiastic in their response to the Centre, and I look forward to strengthening these immensely valuable international linkages in the coming year.

My very best wishes to all for a happy and safe holiday season, and a happy and productive 2007.

Barry Muddle

Victorian Facility for Light Metals Surface Technology

Progress of the Victorian Facility for Light Metals Surface Technology is now well underway, with the recent commencement of Dr. Nick Birbilis at Monash University to lead this activity.

Nick is an expert in the area of corrosion of light metals and completed his PhD at Monash under the supervision of Professor Maria Forsyth. He has since spent three years at the Fontana Corrosion Center at Ohio State University and has returned to Monash to establish the State-Government funded Light Metals Surface Technology Facility within the Centre.

DIIRD funding has been used, in part, to purchase key infrastructure items to be housed within the Facility.

A portion of the DIIRD contribution has been allocated towards the purchase of a Tribolab nanomechanical base system, including modulus mapping, heating/cooling stage, and associated software.

This equipment is valued at approximately $325k and will greatly assist the surface characterisation of light metals.

Further DIIRD funding has also been made available to contribute to the purchase of an EBSD system for the new FEG-SEM to be located at Monash University.

Success in LIEF grants

Centre participants have been very successful in the latest round of ARC LIEF (Linkage Infrastructure and Equipment) grants which include:

A **near net shaped casting and alloy development facility** will be established at Deakin University with a grant of $520k. Nearly all metal production is based around an initial casting phase, often followed by other deformation and thermal processes.

This facility will allow the study of current and future advanced alloys and processing routes, including metals of strategic importance to Australia such as aluminium, titanium and magnesium. One of the major innovations for these metals is to directly cast to strip, followed by minimal processing to provide strip products with novel properties, low capital costs and short lead times.

Additionally, the University of Sydney has led a successful bid for the award of $380k to install a **multiscale system for characterising surface and subsurface properties of advanced materials**.

The installation of the equipment will greatly strengthen the research capability and capacity in the frontier areas of multiscale manufacturing and advanced materials technology. This will in turn lead to more significant innovations and sharpen Australia's competitive edge internationally.

Staff & student profiles

This issue's staff and student profiles are **Dr. Matthew Barnett** from Deakin University and **Mr. Oday Al-Buhamad** from The University of New South Wales.

Matthew's primary research interests are in the mechanical metallurgy of light metals. His recent research has focussed on magnesium and its alloys. Under this topic he has projects concerned with **i)** developing a new fast extruding magnesium alloy, **ii)** determining and modelling the role of deformation twinning in the mechanical response during wrought processing and in service, **iii)** improving the low temperature ductility and **iv)** understanding recrystallisation. He is also very much interested in the Hall-Petch effect in Mg and Ti and in the development of deformation structures in Al.

Matthew is married with 3 daughters aged between 1 and 7. He lives in the sleepy town of Inverleigh situated on the confluence of the Barwon and Leigh Rivers. In his spare time, of which he claims to have very little, Matthew enjoys either running along or removing brown trout from the nearby rivers. When out of town, he is frequently in a 4WD Landcruiser towing a dilapidated camper van. He has recently taken up welding and has stuck together most loose bits of metal in his shed. His wife hopes that soon he'll make something useful.

Oday has acquired a wide expertise in aluminium alloys (AA) through a combination of 12 years industrial experience in both aluminium smelting as well as aluminium cable manufacturing. Particularly, he has experience in the processing and properties of electrical-grade AA 6xxx and mechanical-grade AA 5xxx.

Some of the R & D work was concerned with hydrogen porosity of AA products and experimenting with the effect of strontium at the foundry stage. He also posseses extensive knowledge in quality control laboratory including AA type testing, quality management system & environmental management system and many other technical/industrial areas.

His PhD project focuses on the coarsening mechanisms and thermal stability of submicron-grained (SMG) aluminium alloys containing rare earth (RE) dispersoids of Hf and Er. The research involves production & processing of the alloys including ECAP, together with annealing treatments and microstructural characterisations utilising TEM, FIB, EBSD and possibly 3-DAP.

Oday lives in the southern Sydney suburb of Mascot, not too far from Sydney Airport, with his wife Heba and kids Alia and Rawya. In his leisure time he enjoys cardio-exercise, soccer, parasailing and other adventure sea sports, neither regularly nor occasionally but rather depending on free time availability.

Annual CoE workshop

The Centre held its Annual Workshop at Monash University on the 21st and 22nd of November. Over 100 delegates attended the event, including **Professor David Embury** as an invited speaker from McMaster University in Canada.

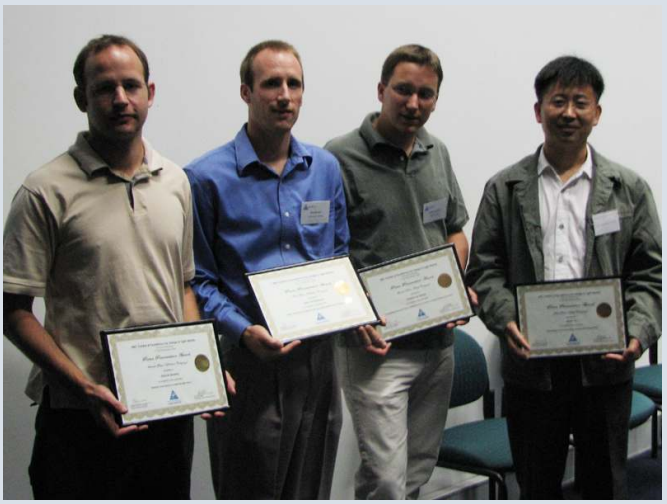
Program Leaders provided an overview of the Centre's four main research areas (Alloy Design and Processing, Titanium, Hybrid Materials and Surface Engineering), while research staff and students displayed their work during the workshop's poster sessions.

The formal program also included a section on the Centre's linkages with industry and CSIRO, a focus on computational materials science, and a discussion on the research infrastructure and capabilities within the Centre. It was also a pleasure to host the inaugural **Ian Polmear Lecture** given by Professor Polmear himself on *'A New Age for Age Hardening'*.

We would particularly like to note the high quality of poster presentations from Centre staff and students. Over 50 abstracts were received for the two poster sessions and they provided the 'Best Poster' judging panel with quite a challenge! But in the end a decision was reached and congratulations are extended to **Dr. Martin Xu** from The University of New South Wales who won Best Staff Poster for his work on *'The use of 3D-EBSD in the analysis of various crystallographic aspects of deformation and annealing'*, and to **Ross Marceau** from The University of Sydney whose presentation on *'Solute clustering and rapid hardening during ageing of Al-Cu-Mg alloys'* won the Best Student Poster award.

Runners up in the respective categories were **Dr. Frederic De Geuser** from Monash University and **Chris Gourlay** from The University of Queensland. Congratulations to the winners and thank you to everyone who submitted a poster.

Centre staff and students during a workshop poster session.



Winners of the poster prizes (L to R): Chris Gourlay, Ross Marceau, Frederic De Geuser and Martin Xu.

Congratulations!

We are delighted to announce that Dr. Ming-Xing Zhang from the University of Queensland has been awarded a $65,000 UQ Foundation Research Excellence Award. These awards are among a range of initiatives created by the University to foster and nurture exciting research projects.

Ming-Xing's laboratory is evolving and trialling different routes as well as two methods of treating the surface of light metals to vastly increase their strengths and corrosion properties, but not their weight or density.

One of the methods involves the application of an ultra-fine powder 'cold spray' to the alloy surface, a technique knows as Kinetic Metallisation. Ming-Xing will direct his UQ grant towards this research activity which forms a major component of the CoE research program.

"I am very happy and excited about winning the award and am very grateful to my colleagues at the Division of Materials for their help. It is wonderful to have your research recognised in this way" says Ming-Xing.

Professors Graham Schaffer and John Drennan with Dr. Ming-Xing Zhang and his wife, Caiping Li.

Upcoming conferences

Aluminium 2006: 6th World Trade Fair & Conference
4th International Conference on Advanced Materials & Processing (ICAMP-4)
10 – 13 December 2006, Hamilton, New Zealand
http://mape.waikato.ac.nz/icamp

5th International Conference on Materials Processing for Properties & Performance (MP3 2006)
11 – 15 December 2006, Singapore
http://www.iommp3.org/

3rd International Conference on Advances of Thin Films and Coatings Technology (Thin Films 2006)
11 – 15 December 2006, Singapore
http://www.thinfilmSingapore.org

2007 TMS Annual Meeting & Exhibition
25 February – 1 March 2007, Orlando, USA
http://www.tms.org/Meetings/Annual-07

6th International Congress ('Aluminium Two Thousand')
13-17 March 2007, Florence, Italy
http://www.aluminium2000.com

IMA's 64th Annual Magnesium Conference
13-15 May 2007, Vancouver, Canada
http://www.intlmag.org

GIFA 2007
12 - 16 June, 2007, Dusseldorf, Germany
http://www.messe-duesseldorf.de/gifa/

Light Metals 2007
25-30 August, 2007, Toronto, Canada
http://www.metsoc.org

LMT2007 – 3rd International Conference on Light Metals Technology
24-26 September 2007, Saint-Sauveur, Québec, Canada
http://www.lightmetals.org

Titanium 2007
7-9 October 2007, Orlando, USA
http://www.titanium.org

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CRC Leadership and Innovation Course

The 10th CRC Leadership and Innovation course was held from 14 to 18 August 2006 at the University of Melbourne. The course, designed to help early career researchers to develop an understanding of the nature of leadership and the requirements for successful R&D, was attended by Dr. A. Kanta from Monash University. He writes:

"The seminar covered knowledge and skills in leadership, motivation, communication and influence, and team processes. It incorporated a two-day 'Commercialisation Bootcamp' run by the Australian Institute for Commercialisation. The Bootcamp was a highly interactive training program aimed at providing participants with a practical introduction to the key principles and issues in commercialising publicly-funded research. The focus was on business models, intellectual property protection, approaches to negotiating deals, and assessment of commercial opportunities.

The course, delivered by a number of outstanding speakers, was led by Professor Leon Mann from the University of Melbourne. It provided an excellent introduction into the issues at the interface between science, commerce and industry. The program was highly regarded by all participants, and future participation is recommended without hesitation."

Our partner universities

- **Monash University**
  Department of Materials Engineering
- **University of Queensland**
  School of Engineering
- **University of New South Wales**
  School of Materials Science and Engineering
- **Deakin University**
  School of Engineering and Technology
- **University of Sydney**
  Australian Key Centre for Microscopy and Microanalysis
- **University of Melbourne**
  Department of Mechanical and Manufacturing Engineering