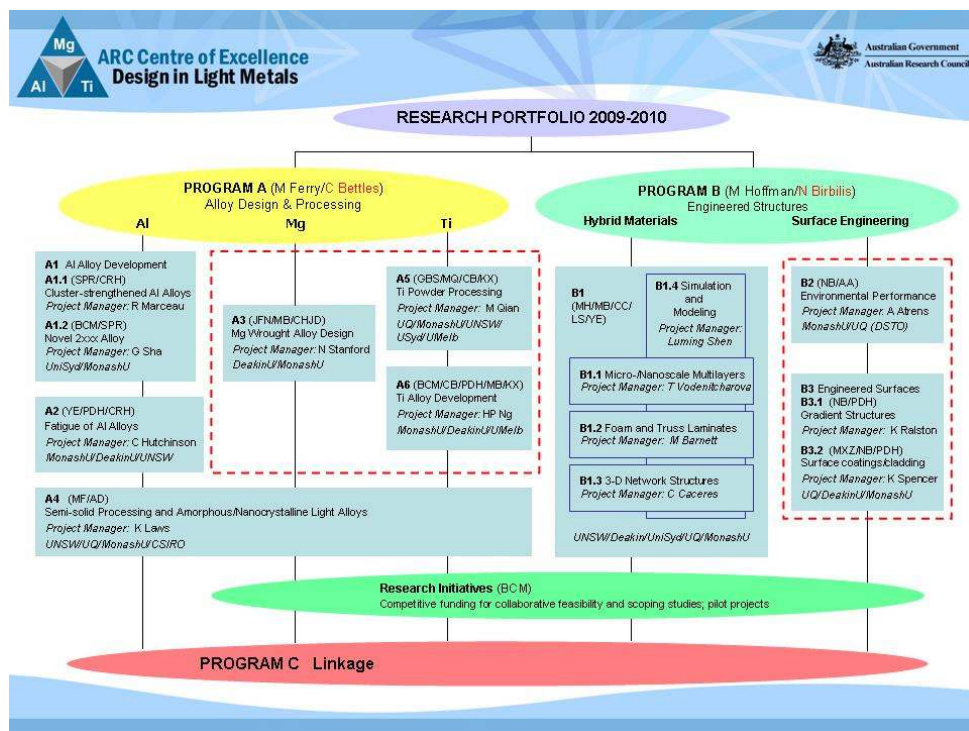


From the Research Director's Office

The New Research Portfolio

The Centre's revised Research Portfolio Framework for 2009 and 2010 streamlines the research of the centre into nine projects, as below:



All CoE researchers (including postgraduate students) fit somewhere within this structure (new, or existing researchers who may be unfamiliar with the centre structure, are able to confirm which project they are allocated to, by simply logging on to the Centre's research management tool Centric (<http://lightmetals.centric.com.au>) and accessing the "Projects" list from the pull-down menu. Information on each project, including the objectives, and importantly, the name of each Project Manager, can also be found here, as well as the latest Quarterly Research Report (via the "Documents" section).

Project Managers

These relatively new Project manager roles were designed to improve project administration, enhance intra-centre communication and lighten the burden of Project leaders who often hold senior roles in their institutions. They provide valuable experience for younger research staff and foster technical leadership within the Centre. Centre Project managers are responsible for organising regular meetings of the entire project team (at least biannually), and coordinating administrative and reporting requirements. Each quarter (if not more frequently), Project Managers liaise with all members of their teams, across all institutions in order to collate information on research progress, commercialization issues and any new publications for the Quarterly Research Reports, which are examined by the Research Management Committee, who in turn, upon acceptance of these reports, release the next allocation of funding.

Intellectual Property

Another relatively recent initiative within the centre has been the distribution of Centre-tailored laboratory notebooks, to encourage effective keeping of laboratory notes and to provide an auditable record of invention for any practical, commercial outcome of research. This further strengthens the Centre's increased focus on the identification of potentially valuable intellectual property, together with the ongoing requirement that papers arising from Centre-funded research are submitted to the Centre's Special Advisor on IP and commercialization, Dr Malcolm Frost.

New Assistant Director

Finally, it is with great pleasure that we announce the appointment of Dr Colleen Bettles as Assistant Director of the Centre. Colleen has of course been with the Centre since its inception, initially overseeing the CSIRO Cluster interaction, and later the Titanium Program (formerly program B, now A3, A5 and A6). Colleen will be handling the Node Manager role at Monash University, in addition to assisting Barry with Centre research administrative matters.

IN THIS ISSUE

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Deputy Director Professor Peter Hodgson awarded an Australian Laureate Fellow



Peter Hodgson, the Director of Research at Deakin's Institute for Technology Research and Innovation (ITRI), and Deputy Director (Research Management) of the Centre, received an Australian Laureate Fellow award, one of just 15 elite world-class researchers so honoured by Senator Kim Carr, Minister for Innovation, Industry, Science and Research.

Professor Hodgson was chosen from among several hundred applicants as an outstanding researcher of international repute for his work around innovative process technologies and product approaches that aim to minimise the environmental impacts of both the production and the application of metals.

Professor Hodgson's research, which aims to develop new metal manufacturing processes and products that will contribute to a more sustainable metal industry, including the motor vehicle industry, will have real and tangible benefits to Australia.

Professor Hodgson, a globally acknowledged expert in innovative light weight metals and advanced materials, especially for the automotive and aerospace industries, said the awarding of the ALF had come as a complete surprise.

"When I look at the quality of research that's being done here in Australia, or by Australians overseas, to be regarded in the top 15 by a body like the ARC is a great honour," he said.

"However, I can say, with all honesty, this award is not just for me, but for all the people at Deakin, and especially those within ITRI, who have worked so hard to support the vision for our University as a research based institution.

"Even though we have come a long way over the past decade or so, in many ways, this is only a beginning as Deakin strives to achieve its goal of being in the top third of research universities in Australia in terms of performance.

"But an honour like this gives us extra encouragement to keep working towards our vision."

Congratulations

Prof Arne Dahle won the Bede Morris Fellowship from the Australian Academy of Science to undertake research collaboration with Grenoble INP in France.



Prof Arne Dahle has been appointed Visiting Professor in the Computational Materials Laboratory at Ecole Polytechnique Federale de Lausanne (EPFL) Switzerland to work with Professor Michel Rappaz. Arne spent one month in Switzerland in June/July 2009.

Sky (Poay Thiam) Loo was the recipient of the Centre and Jerry McAuliffe Prizes at the Monash University Faculty of Engineering Awards Presentation Dinner on the 20th of May 2009.



Centre Visitors

Professor Michel Suery from Grenoble INP visited UQ for two months between 8th March and 8th of May to collaborate with CI Prof Arne Dahle.

Annual Centre workshop and Titanium workshop

A reminder for those who have registered their attendance, that the fourth annual workshop of the ARC Centre of Excellence for Design in Light Metals will be held on Wednesday 9th and Thursday 10th December 2009 at Deakin University in Geelong. Registration opens at 8am, with the program starting promptly at 8.30am

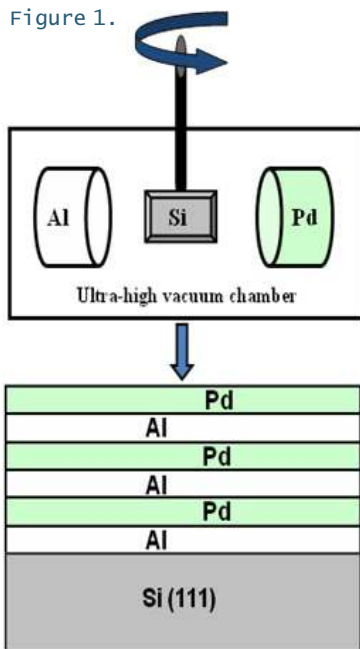
Following the Annual Workshop, the Centre will be holding a one-day Titanium workshop on Friday 11th December at Monash University. This one-day workshop includes three distinguished guests, recognized for their research in understanding the behavior of titanium alloy systems: Professor Jim Williams and Professor Hamish Fraser (Ohio State University), and Associate Professor Raj Banerjee (University of North Texas).

Smaller is better!

Being lightweight and cost-effective, aluminium-based alloys and composites have been intensively used in the automotive and aerospace industries. Nevertheless, their mechanical strength is certainly lower than of other materials, such as steel, which limits their application. Thus, new lightweight aluminium-based alloys with enhanced mechanical strength will have a great potential for future industrial applications.

A small team in the Australian Research Council Centre of Excellence for Design in Light Metals located at the University of NSW (Mr Pranesh Dayal and Prof. Mark Hoffman) is exploring the possibilities of enhancing the mechanical strength of aluminium-based alloys by changing their microstructure at the nanometre level (one billionth of a metre)!

Figure 1.



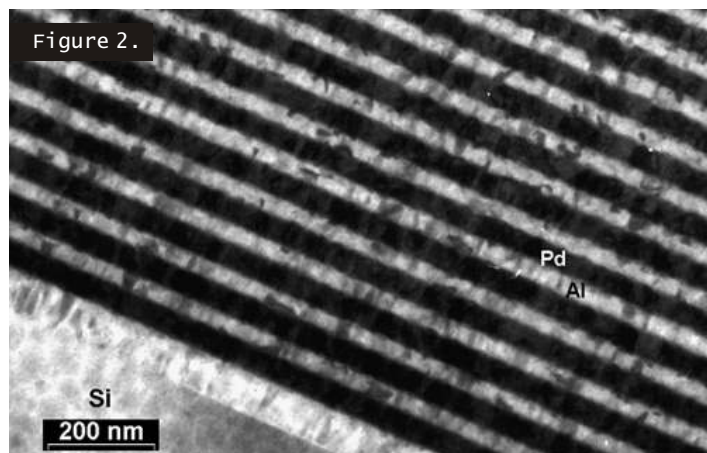
The team has recently developed a new composite structure of alternating aluminium (Al) and palladium (Pd) nanolayered thin films, which has extraordinary mechanical strength.

The researchers deposited the Al/Pd films on silicon (Si) wafer substrates in an ultra-high vacuum chamber using the magnetron sputtering facility at CSIRO, Lindfield under supervision of Dr. Nick Savvides (as shown schematically in Figure 1).

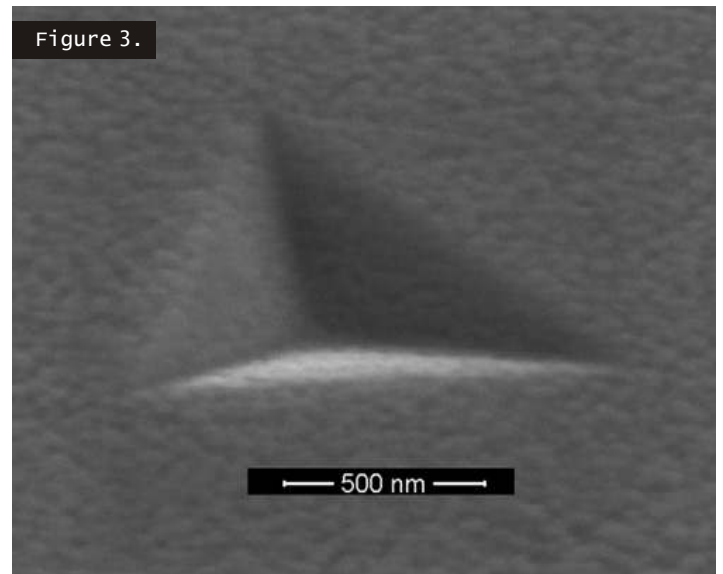
This technique facilitates the atom-by-atom deposition of thin layers of a very precise thickness. To

optimise the Pd content, several samples with varying volume percentage of Pd were fabricated.

The thin films were characterized using nanoindentation and cross-sectional transmission electron microscopy (XTEM) techniques, to study their mechanical properties and nanostructure, respectively. The XTEM image (Figure 2) of the composite clearly shows the Al (light colour) and Pd (dark colour) nanolayers, and the Si substrate. In this image both Al and Pd layers are just 40 nm each in thickness.

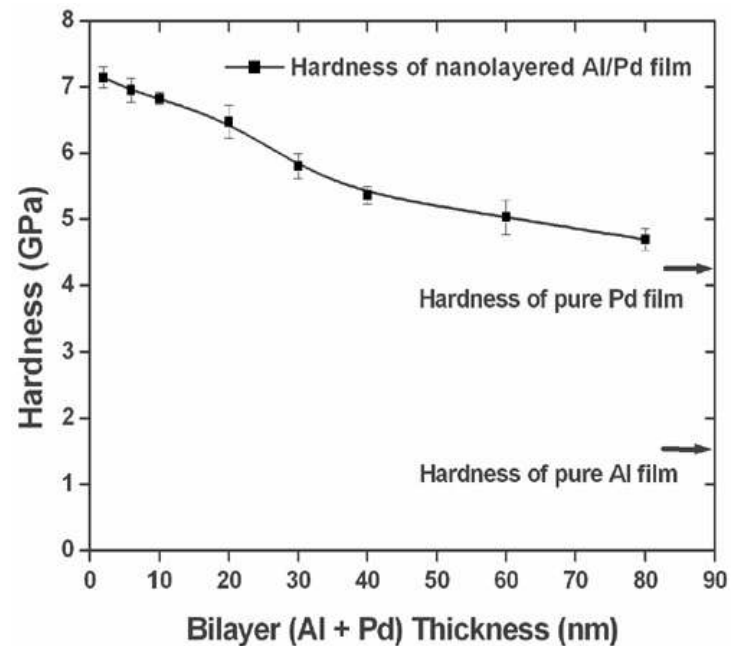


The nanoindentation study (Figure 3 shows a typical nano-indent impression on the surface of the thin film) revealed that with just 6.5% (v/v) Pd, a hardness enhancement of ~200% can be achieved for nanolayered Al/Pd composite, compared to the hardness of pure Al film.



Furthermore, when the Pd content was increased to 50% (v/v), the hardness increased even further, to 350% (as shown in Figure 4)!

Figure 4.



The elastic modulus of the composite also benefited from the addition of Pd, compared to the modulus of pure Al.

In future, metal processing routes will be investigated, to achieve these nanolayered structures in the bulk form.

These findings have already been published (P. Dayal, N. Savvides, M. Hoffman, *Thin Solid Films*, Vol. 517, Issue 13, 2009, pp. 3698-3703).

The team is currently working on the explanation of why smaller is better.

Upcoming conferences

High Temperature Processing Symposium

8-9 February, 2010
Melbourne, Australia

www.swinburne.edu.au/feis/http/

TMS 2010

14-18 February, 2010
Seattle, USA

www.tms.org/annualmeeting.html

67th Annual World Magnesium Conference

16-18 May, 2010
Hong Kong

www.intlmag.org

PTM 2010

6-10 June, 2010
Avignon, France

www.fcc-asso.fr/PTM2010

INALCO 2010

23 - 25 June, 2010
Eindhoven, Netherlands

www.inalco2010.com

PRICM7

1-5 August, 2010
Cairns, Australia

www.materialsaustralia.com.au/pricm7

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- **University of Sydney**
Australian Key Centre for Microscopy and Microanalysis
- **University of Melbourne**
Department of Mechanical Engineering



Australian Government
Australian Research Council

And finally . . .

Congratulations to the Centre's Chief Operating Officer Astrid Nordmann, and her partner Gavin, on the arrival of Carly Jade Willcock on 12th May 2009!



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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.

Contact the Centre

Dr Astrid Nordmann is on maternity leave until April 2010. In her absence, enquiries may be directed to:

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