Expertise

The Centre's team includes leaders in their fields of expertise both in research and in management of smelters and major site upgrades.

Mark Taylor BE(Hons), PhD, MIChemE, C.Eng, Centre Director

Mark commenced at the Comalco Research Centre in Melbourne, moving into plant management at New Zealand Aluminium Smelters, Tiwai, Invercargill. During this time, Dr. Taylor was the Implementation Manager for the $450m smelter upgrade and then Potroom Manager. Following this he managed the smelter for a six month period before transferring to Brisbane.

As General Manager Technical, Dr Taylor directed Comalco's reduction research and development and provided technical support to Comalco's three operational smelters. Mark was appointed General Manager Operations in 2000 to Comalco's largest smelting operation, Boyne Smelters Ltd in Central Queensland.

Mark returned to the University of Auckland in January 2003 as the Director, Light Metals Research Centre and is engaged in light metals research and consulting globally. He has over 50 publications.

Jim Metson BSc(Hons), PhD, FNZIC, MRSNZ, MTMS, Associate Director

Associate Professor Metson completed his PhD at Victoria University of Wellington in 1980. After a period as a staff Scientist at Surface Science Western, the University of Western Ontario, Canada, he moved to The University of Auckland late in 1985. In addition to his appointment in the Department of Chemistry he has since held positions as Director of the Research Centre for Surface and Materials Science, Acting Director of the Light Metals Research Centre during its formation. In addition he held the position of Associate Deputy Vice-Chancellor (Research) for the University between 2000 and 2002.

His research work, largely based in surface and materials science, has involved extensive contact with the aluminium industry, including involvement in the development of a new dry-scrubbing technology and studies of cell emissions, electrolyte chemistry and electrode reactivity. He has presented many papers at the TMS Light Metals Conference and was a Light Metals award winner in 1994. He was also winner of the New Zealand 1995 Shell Prize for Industrial Chemistry.

He has presented more than 20 plenary or keynote lectures, has over 100 research publications and sixty technical reports, many dealing with applications in the aluminium industry.

Margaret H. Hyland PhD, MRSNZ, MTMS

Margaret Hyland graduated with a PhD in Chemistry from the University of Western Ontario, London, Canada in 1989, and is currently a Senior Lecturer in the Department of Chemical and Materials Engineering at the University of Auckland. She has been active in aluminium reduction technology research for more than 15 years, working with major international aluminium producers and suppliers.

Her areas of interest are in environmental emissions and capture; chemical and mechanical properties of cathode and anode materials and development of new materials. She has presented numerous papers at the TMS Annual Conference and is the winner of 4 TMS Awards in Carbon and Reduction Technology in 2004, 2001 and 1997, and a recipient of the Light Metals Award in 2004. Dr Hyland has published over 60 papers and over 80 technical reports. She is also winner of the 2003 Distinguished Lecturer Award, for the Faculty of Engineering.

John JJ Chen BE, PhD, FRSNZ, C.Eng, FIChemE, FIPENZ

John JJ Chen is Professor of Chemical and Materials Engineering at the University of Auckland. After obtaining his BE degree from the University of Auckland, he worked for three years as a Potrooms Development Engineering at New Zealand Aluminium Smelters. He then returned to Auckland and completed a PhD in 1979. He has published over 170 papers in international journals and conference proceedings, one patent and over 60 proprietary research reports. He is on the Light Metals Division and the Aluminium Committee of TMS. He is a Fellow of the Royal Society of New Zealand, the Institution of Chemical Engineers (London), and the Institution of Professional Engineers New Zealand.

He has received Merit Awards and Best Teachers Awards in the School of Engineering, and awards for best paper from TMS and IPENZ.

Professor Chen's research interests include the modelling of the aluminium smelting process, the treatment of molten metal, and process control in the potrooms. He has been for many years at the forefront of multiphase flows and related transport processes. Professor Chen's research team was the first to quantify the impact of bubble driven flows on current efficiency in aluminium smelting cells and the first to identify and measure the increase in sidewall heat transfer coefficient opposite the bath/metal interface due to the waves in the metal layer impinging on the wall.

Light Metals Research Centre

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THE UNIVERSITY OF AUCKLAND
NEW ZEALAND

Light Metals Research Centre

Auckland UniServices Limited
University of Auckland

THE UNIVERSITY OF AUCKLAND
NEW ZEALAND

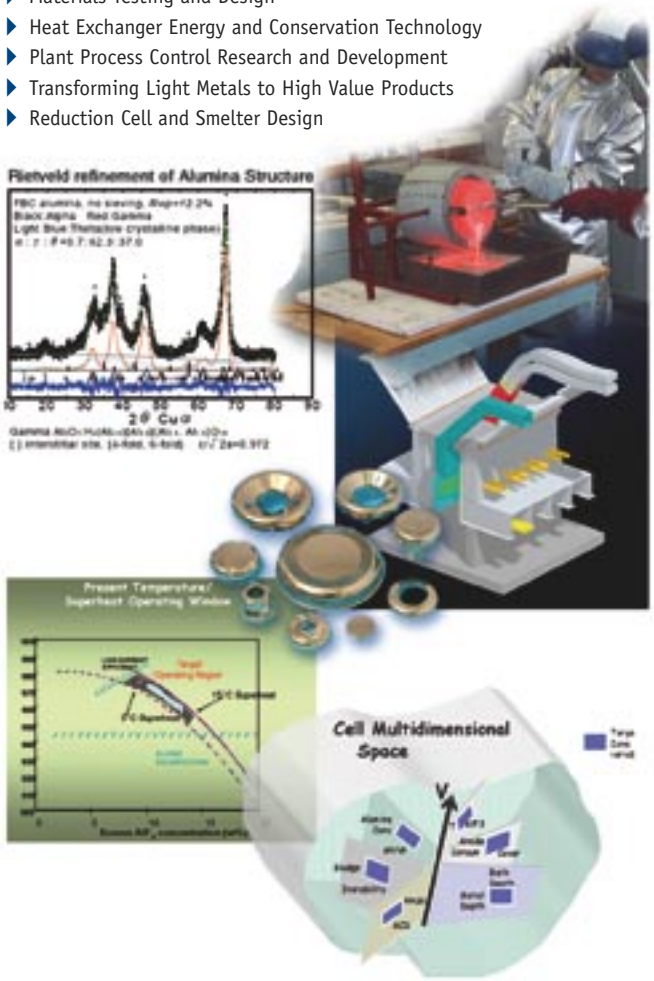
Introduction

The Light Metals Research Centre, The University of Auckland, was founded in 2002 to meet a global need for a dedicated light metals research centre with development and training facilities. Acting as a one-stop-shop for the sector, the Centre's team includes world leaders in their fields of expertise who can draw on substantial experience and knowledge both in academic research and in management of smelters and of major site upgrades.

Research Profile

The Centre is involved in a wide range of applied research activities including:

- Materials Testing and Design
- Heat Exchanger Energy and Conservation Technology
- Plant Process Control Research and Development
- Transforming Light Metals to High Value Products
- Reduction Cell and Smelter Design



Developing the Underpinning Science

Behind these industrial applications we have programmes of fundamental science and engineering research to draw on:

- Pioneering use of synchrotron radiation in examining the materials science of aluminium reduction cells.
- XPS, SEM, Neutron diffraction and Secondary Ion Mass Spectrometry studies for micro and nano-structure of heterogeneous materials.
- Novel application of mathematical techniques for tracking and controlling complex multivariate processes such as aluminium reduction.
- Electrochemical technique development for high temperature electrode testing in molten salt electrolytes.
- Surface chemistry investigations on light alloys for the purposes of coating and finishing of wrought and cast components.
- Transducing of transient phase change, product gas composition and liquid level changes for sensor development purposes.
- Thermochemical history determination and characterisation for small particles in dust streams.
- 3D electromagnetic and wave propagation/instability analysis.

These programmes utilise a range of academic expertise within the centre, and the wider University.

University Training

Practical learning based around fundamentals of light metals science and technology, and involving Guest Lecturers from many parts of the world who bring unique perspectives on light metals production.

Qualifications which are provided:

- Post Graduate Certificate
- Post Graduate Diploma
- Masters Programme
- PhD Projects
- On-site Training for Smelters

Certificate Programme

For general information on admission and Engineering Postgraduate Programme see:

http://www.engineering.auckland.ac.nz/Studentinfo/Postgraduate/postgrad.html

Light Alloy Manufacturing Group in New Zealand (LAM-NZ)

The Light Alloy Manufacturing Group was formed in 2003 to provide export oriented companies in the sector with a network for disseminating information, discussing business strategy and obtaining advice, support and technology leverage in the market. The Group is convened by Mark Taylor, Director of Light Metals Research Centre, and is active in research and implementing new technology initiatives.

Consulting

The Centre has undertaken consulting contracts for many parts of the international light metals industry, including primary aluminium producers on all continents, electrode and refractory manufacturers in Europe and Asia, environmental control companies in Scandinavia and major Australasian companies and government agencies. Currently more than 20 aluminium smelters from South America, North America, UAE, Iceland, Australia, New Zealand, Germany, Norway, China and India are in regular contact with LMRC, and the number approaching the Centre for technology expertise and assistance is growing.