Membrane Society of Australasia

www.membrane-australasia.org

December 2009 Newsletter

Welcome from the Chair

Since our incorporation early this year, it is with great pleasure to bring to you the final newsletter of 2009. Looking back, the MSA has grown steadily in membership, now having more than 90 members within its corporate, normal and student categories. Activities this year have included the official launch sponsored by Siemens Water Technologies, hosting an international speaker, Professor Raphael Semiat, participating on the ICOM2014 bid, initiating the organisation of 1st Student Symposium next year and co-organising next year's IMSTEC conference.

As a result of its formation, we have seen MSA appear in the media both locally and nationally. Also, I would like to congratulate the members who have been successful in the recent Australian Research Council round receiving funds for their membrane research. These activities and significant outcomes indicate the value of a distinct membrane society in Australasia and I would like to thank all those who have supported the MSA first year of growth, especially from our membership and event sponsors.

Next year, the goal will be to begin to roll into full establishment which will be kicked off by the Annual General Meeting tentatively arranged to be held at the Student Symposium. Before the end of the year, we hope to have nomination forms sent out for board positions. Are you interested in taking part as a director of this rapidly growing society? I can assure you it will be a positive experience! On behalf of the board of the MSA, I wish you all a happy holiday season and look forward to working with you all again in the new year.

Associate Professor Mikel Duke - Chair of the Inaugural Board

Editor:
Dr. Bradley Ladewig
bradley.ladewig@eng.monash.edu.au

In this issue:

Australian National Centre of Excellence in Desalination

The Australian National Centre of Excellence in Desalination (NCED) leads and coordinates Australia's research in desalination technology. Through the NCED, Australia is building national capacity and capabilities in desalination with a dual focus on breakthrough fundamental research and applied research with a goal of delivering meaningful improvements at commercial scale.

The NCED is currently compiling the National Desalination Research Roadmap, which will guide the funding decisions of the board.

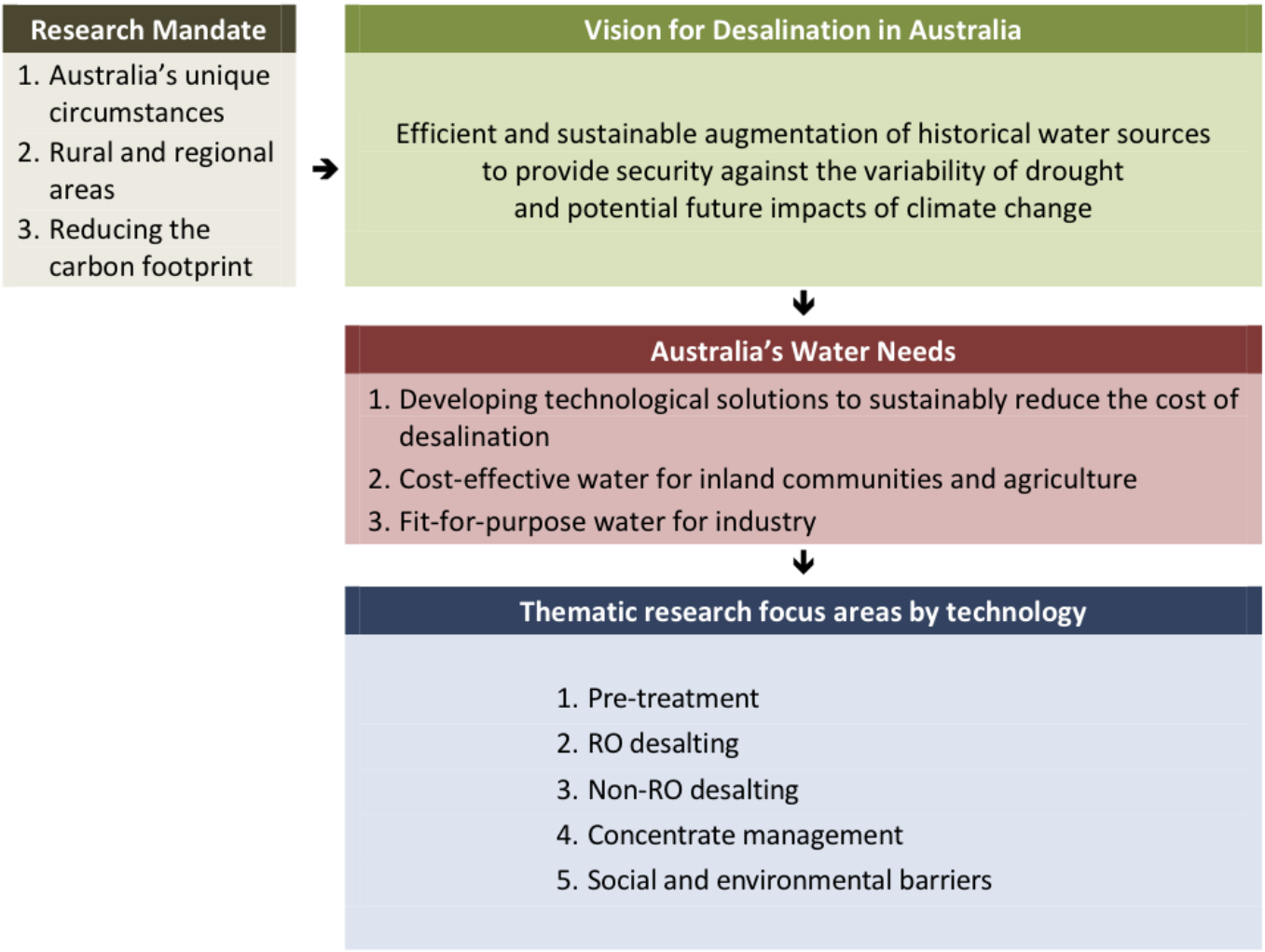
The image below comes from the Draft Strategic Research Agenda, and outlines the relationship between the research mandate (fixed under the funding agreement with the commonwealth government), the centre's vision for desalination in Australia, and Australia's somewhat unique water needs. Finally, the research focus has been rationalised into five focus areas.

The Centre proposes to direct its research investment within the RO desalting theme towards:

- 2.1 Anti-fouling technologies
- 2.2 New membrane materials that reduce operating pressure while maintaining or increasing flux rates
- 2.3 Contaminant removal without the need for second-pass RO
- 2.4 Direct use of renewable energy via kinetic, electrical, or thermal means
- 2.5 Real-time monitoring and classification of potential foulants

The document is still being developed, and the centre welcomes wide participation in building the research roadmap.

Please visit the roadmap to get involved.



Major Grant Successes for Membrane Research

A significant number of membrane related research projects were awarded funding in the recent round of Australian Research Council grants. Some of these projects are highlighted below, and the MSA congratulates successful grant recipients.

Over $4.3m was awarded to both Discovery projects (which are focussed on fundamental research at the forefront of human knowledge), and Linkage projects (which are carried out with input and contributing funding from partner organisations). This is a tremendous acknowledgement of the depth of scientific and engineering talent throughout Australia.

The University named with each grant is the *Administering Organisation*; however some of the investigators may come from other institutions, overseas universities, or industry.

Discovery Projects

- **Novel Fuel-Cell Structures based on Electroactive Polymers**
  - Dr B Winther-Jensen (Monash University)
  - $785,000
- **Zeolitic Nanoflake-Polymer Composite Membranes for Low Energy Desalination**
  - Dr H Wang (Monash University)
  - Prof M Tsapatsis
  - $460,000
- **Tuning Membrane Chemistry for Desalination and Water Reuse Applications**
  - A/Prof SE Kentish (The University of Melbourne)
  - Dr AJ Hill
  - $310,000
- **Multifunctional Porous Nanospheres Engineered Composite Membranes for Hydrogen and Methanol Fuel Cells**
  - Dr S Qiao
  - Dr Y Jin
  - Prof M Jaroniec (The University of Queensland)
  - $250,000
- **Development of High Performance Nanocomposite Filtration Membranes: Fabrication and Fouling Mechanisms**
  - Prof V Chen (The University of New South Wales)
  - $310,000
- **Surface immobilisation of enzymes for the synthesis of ethanol**
  - Prof DR McKenzie (The University of Sydney)
  - Prof MM Bilek
  - Prof CG Dos Remedios
  - Prof H Yasuda
  - $680,000
- **Recycling water and nutrients using a high-rate membrane bioreactor coupled with an ion-exchange system**
  - Prof S Vigneswaran (University of Technology, Sydney)
  - Prof A Grasmick
  - $290,000
- **Photoelectrochemical control transport across a photoactive inorganic membrane fabricated by an in situ vapour phase hydrothermal method**
  - Prof H Zhao (Griffith University)
  - Dr H Zhang
  - Prof W Choi
  - $380,000

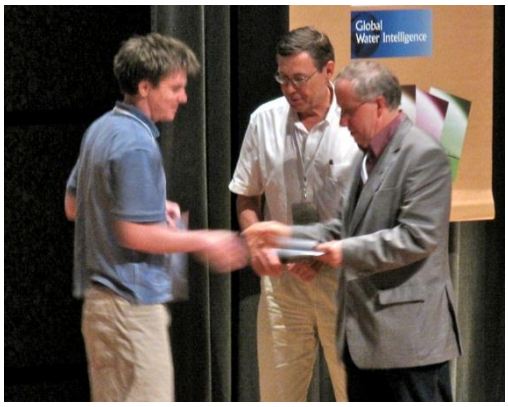
Linkage Projects

- **Optimisation of nutrient removal, membrane fouling and sludge dewatering in hybrid coagulation/submerged membrane bioreactor treatment of wastewaters**
  - The University of New South Wales
  - Partner Organisations:
    - Beijing OriginWater Technology Co Ltd, Sydney Water,
    - Water Quality Research Australia Ltd
  - Researchers:
    - Prof Trevor D Waite
    - Dr Xiaomao Wang
    - A/Prof Gregory L Leslie
    - Dr Xia Huang
    - Dr Heriberto A Bustamante
    - Prof Xianghua Wen
    - Dr Jing Guan
  - $548,000
- **Measurement and Prevention of Membrane Fouling for Water Reuse in Biorefineries**
  - The University of Sydney
  - Partner Organisation:
    - AB Mauri Technology and Development Pty Ltd
  - Researchers:
    - Prof Hans G Coster
    - Prof Geoffrey W Barton
    - Dr Daniel R Ryan
    - Dr Cormac O'Cleirigh
    - Dr John M Kavanagh
  - $253,000
- **Improving the Durability and Performance of Hollow Fibre Membranes with Nanocomposite and Inorganic/organic Hybrid Materials**
  - Victoria University
  - Partner Organisation:
    - Siemens Water Technologies
  - Researchers:
    - A/Prof Mikel C Duke
    - Prof Stephen R Gray
    - Dr Andrew M Groth
  - $80,007

Poster Prize for Membrane Researcher

Cameron Shearer, a PhD student at Flinders University under the supervision of Prof. Joe Shapter was awarded a poster prize at the Euromembrane 2009 conference held in Montpellier, France on the 6th-10th September 2009. His poster was entitled 'Mass Transport Through Vertically Aligned Single Walled Carbon Nanotubes Grafted on Porous Silicon.'

Cameron's participation in Euromembrane 2009 was assisted by funding from the Australian Research Network for Advanced Materials (ARNAM) under its collaborative research scheme to visit the University of Bath, in the UK.



CAMERON SHEARER (AT LEFT) RECEIVING HIS PRIZE

Upcoming Events

First MSA Student Symposium

The First MSA student symposium, organized by students, will be held at the University of Wollongong from the 18th to 20th of February 2010. To make the conference attractive for all membrane/advanced materials students we have chosen the theme: *Addressing Issues in Energy, Food, and Water – Membrane Applications and Advanced Materials.*

Apart from the exciting theme, students and potential guest speakers will be enticed by the conference location which is almost on the beach at the brand new Innovation Campus, pictured below.

The symposium is open to international students as we are hoping to attract those attending ICONN2010, which commences two days after. Oral and poster presentations will be presented by the students and workshops will be held by industry and academia candidates. Sponsors, invited speakers and programme are yet to be confirmed.

Two exceptional guest speakers have already been confirmed for the event. They are *Prof. Gordon Wallace* (University of Wooloongong) - "New materials, new possibilities for membrane technologies", and *Prof. Tony Fane* (University of New South Wales and Nanyang Technological University, Singapore)- "Some challenges for membrane researchers".

We are also pleased to announce the first symposium sponsors: Dairy Innovation Australia, DOW water solutions, CSIRO, Nanomechanics Group at the University of Wooloongong, and Dr. Michel Lefebvre.

Further details can be found at the Symposium website: http://www.membrane-australasia.org/symposium2010/

Dr Aaron Thornton - Symposium Chair

More Upcoming Events

- **Membrane Technology, Process and System Design: A 3-day Intensive Course**
  - Lecturer: Mark Wilf, PhD
  - March 3-5, 2010, Genoa, Italy
- **Desalination with solar energy: A 4-day intensive course**
  - Presented by the European Desalination Society
  - Lecturers:
    - Julián Blanco Gálvez,
    - Diego-César Alarcón Padilla,
    - Guillermo Zaragoza,
    - Elena Guillén
  - May 3–6, 2010,
  - Almeria, Spain

Position spotlight

Victoria University PhD Scholarship – Membrane Materials Manufacture Australian Postgraduate Award (Industry) Scholarship

Industry Sponsor

Siemens Water Technologies – South Windsor, Sydney

Topic

Improving the Durability and Performance of Hollow Fibre Membranes with Nanocomposite and Inorganic/organic Hybrid Materials

Package

- Annual tax free stipend of AU$26,669 for three years (with a possible extension for another 6 months)
- Tuition fee scholarship
- Thesis allowance
- Limited relocation allowance
- Strong post-graduate employment opportunities through industry contacts

Project Summary

Water is an increasingly scarce resource in Australia as well as other parts of the world. Reuse and purification from alternative sources are gaining importance in addressing the water shortage. The aim of this project is to develop novel materials which have advanced performance as membranes in water treatment.

The key issues which the new materials aim to improve are fouling, chemical resistance, physical durability, and performance. By incorporating inorganic materials such as silica and alumina, these improvements can be made. Issues such as linking inorganic materials to the polymer, development of optimal nanoparticle size and their dispersion will be addressed.

Composite membrane materials are high priority in research internationally, as their benefits are now being fully realised in water treatment. New membranes developed with potential to be manufactured at industrial scales will be demonstrated in real waters.

Applicants

Applicants should have or should expect to attain a H1/H2A Honours degree in either either Chemical Engineering (or similar), Polymer Science or Chemistry. Graduates with a Masters degree and/or graduates with demonstrated research potential in the above fields are also invited to apply for this scholarship.

Applicants generally should be Australian Citizens or permanent residents. However, academically exceptional overseas students will also be considered.

Further Details

Prospective applicants should contact Associate Professor Mikel Duke, Principal Research Fellow of Membrane Science at the Institute for Sustainability and Innovation (phone: +61 (0)3 9919 7682; e-mail: mikel.duke@vu.edu.au), to obtain an information pack regarding the scholarships.

The closing date for Scholarship is Friday 31st December 2009 and successful applicants are expected to start their studies before 31st March 2010.

This newsletter has been prepared by Dr Bradley Ladewig. He can be contacted at bradley.ladewig@eng.monash.edu.au

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