Membrane Society of Australasia

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www.membrane-australasia.org

January - March 2012 Newsletter

Message from the President

Welcome to the first MSA newsletter of 2012. The new year brought sad news of Emeritus Professor Malcolm Chaikin, who passed away peacefully on the 7th January. Prof Chaikin was awarded an Honorary Membership of the MSA on the 26th June 2009, in recognition of his role in developing Australia's world class membrane science and technology field. I count myself amongst the many membrane science researchers positively influenced by his leadership and enthusiasm. I speak on behalf of all members in conveying my condolences to his family and friends.

Since our last newsletter, I am pleased to announce that our second Early Career Researchers Membrane Symposium was a success. This is with thanks to the outstanding efforts of Dr Mike Dixon and his committee, as well as the sponsors and attendees. You can read more about the symposium on our website and in this newsletter. The symposium scheduled November this year is to be in Brisbane. We look forward to your continued support for these events, which are an outstanding opportunity for professional development of early career researchers, as well as showcasing the latest developments by our membrane community in membrane science and technology. Please contact Dr Simon Smart, MSA Secretary, or Dr Long Nghiem, MSA Vice President, to find out more about participating. We are looking to hear from students, early career researchers, industry and of course anyone with an interest to participate.

This year will start with the planning of the Annual General Meeting to be held in May this year. The MSA is looking for membrane science and technical enthusiasts to join the board of directors and help drive the awareness from your discipline (science, engineering, research or industry) of the role of membrane science and technology in our sustainable future.

I would also like to take this opportunity to promote this year's 7th Conference of the Aseanian Membrane Society, July 4-6, Korea. The Plenary Speaker line-up features expert talks on gas separation, emerging membrane materials and advance characterisation. The speaker from Australia is Prof. Stephen Gray, who will talk on current progress in membranes for water treatment.

So as always, this year is looking to be a busy year for the membrane community and the MSA is heavily involved. There have also been several positions advertised

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Members who wish to contribute to future editions of the MSA Newsletter should contact the editor

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2nd Annual ECR Membrane Symposium delegates

Message from the President cont.

in the membrane field, which have been announced to our email list and on our website home page under 'Membrane Jobs'. We therefore look forward to bringing to you the latest developments and opportunities in membranes in 2012.

Assoc. Prof. Mikel Duke

President, MSA

MSA AGM and Election of the Board of Directors

The Membrane Society of Australiasia Annual General Meeting will be held on Wednesday 23 May 2012 at 4 pm.

Location: University of New South Wales, Sydney.

Kens Chemical Sciences G37 AC Seminar Room

To be participate in the AGM and/or nominate for a board position, please contact the MSA Secretary Dr. Simon Smart at

secretary@membrane-australiasia.org

Research in Focus -

Development of high performance membranes for CO_2 in power plants

Gas separation membrane processes offer unique benefits over amine solvent absorption for CO_2 separation and capture from power plants, including a smaller footprint and avoidance of chemicals. However, current commercial membranes could not provide the required high CO_2 permeation rate and selectivity (CO_2/N_2 selectivity) to deal with the large volume of either syngas for pre-combustion or flue gas for post-combustion capture. Development of high performance integrally skinned asymmetric hollow fiber membranes (Figure 1) promises to be the most cost-effective choice due to the low fabrication cost, high membrane module packing density and low operating pressure drop.

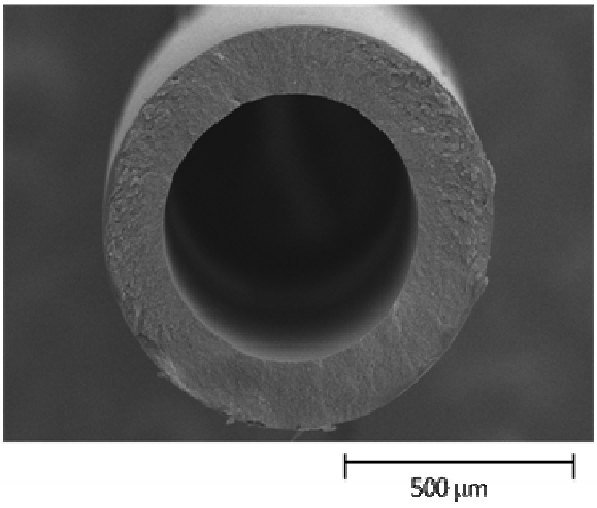

Fig. 1: SEM images of cross section of a Matrimid hollow fiber and an enlarged section showing the top skin layer of

Our study is focused on using commodity polymeric materials blended with targeted high CO_2 permeation polymers components for fabrication of hollow fiber membranes to improved CO_2 separation performance. Preliminary tests with hollow fibers fabricated from Matrimid blended with 1% to 3% additive achieved twice the CO_2 permeance at three times the CO_2/N_2 selectivity compared to fibers made with pure Matrimid. Further improvements will be explored involving optimisation of fabrication conditions, additive selection and ratio of additive to main polymer.

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Vicki Chen, Guanxi Dong and Tao Hu[1]

[1]. University of New South Wales

Feature – Early Career Researcher's Membrane Symposium 2011

The Membrane Society of Australasia successfully hosted the 2nd Annual Early Career Researchers Membrane Symposium at The Beachouse in the seaside suburb of Glenelg, South Australia. The three day event held from the 23rd to 25th November 2011 catered to over 60 delegates from a range of industry and research institutions. It was organised by a student committee chaired by Dr Mike Dixon and mentored by A/Prof Long Nghiem who all worked diligently to ensure the success of the event. Vice Chair; George Chen, Treasurer; Angela Hausmann, Abstracts and Papers Coordinator; Ming Xie, Sponsorship Coordinator; Takahiro Fujioka, Program and Guest Speaker Coordinator; Zenah Bradford-Hartke, Venue Organiser; Clare Worthley and Web and Graphic Designer; Ben Weereratne.

The aim of the symposium was to provide membrane scientists in the early stages of their careers with a chance to come together and present their work and further discuss membrane application and fabrication in the areas of water treatment, gas separation and dairy processing. The symposium would not have been possible without the much valued contribution of the event sponsors. Many thanks to the Platinum Sponsor; CSIRO, the Gold Sponsors; the National Centre of Excellence in Desalination, Hatch and Siemens Water Technologies, the Silver Sponsors; Dairy Innovations Australia, Acciona Agua and the International Desalination Association - Young Leader Program and the Bronze Sponsor; Pall.

The three day event kicked off with presentations from Mr Bruce Biltoft (Siemens Water Technology), Mr Shane Cox (Membrane Futures), Mr Victor Verbeek (Toray) and Mr Kevin Yerrell (KBR) on topics ranging from careers in the membrane industry to membrane system design and importance of both technical and business management. A two hour problem solving session conducted by George Chen offered a chance for young researchers to form groups and exchange ideas and

Feature cont.

thoughts about the problems, gaps in knowledge and the opportunity for membrane industrial application in their relevant fields of gas separation, water treatment or membrane fabrication. The findings were presented to the entire group as a whole and discussed further with valuable input from guest speakers and sponsors. The day came to a close with IDA-Young Leader Program Hospitality Reception held at the Pier Hotel which offered a chance for continued discussion and networking in a more relaxed environment.

Day two included guest presentations from Professors Tony Fane and Stephen Gray about membrane research conducted at Nanyang University and Victoria University, respectively and from Mr Mark Mullett on Hatch Process Separations. Twenty minute presentations from young researchers about their work with membranes in reverse and forward osmosis and gas separation as well as challenges and advances made in membrane fabrication continued for the rest of the day. Nine outstanding posters contributed to a successful poster session held over lunch and provided excellent ground for renewed discussion with authors about their work. The MSA ECR symposium dinner was held at the Morphettville racecourse, a short tram ride from the conference venue and involved great opportunity for networking over a great dinner and drinks.

The final day of the symposium began with presentation from Dr Nohemi Quispe-Chavez and Colin Jones on research done at Dairy Innovations Australia. This covered the current application of membranes in the diary industry, as well as the future potential membrane technology has in the food industry. This important discussions were followed by presentations on nanoparticles used in membrane fabrication by young researchers.

round of young researchers presentations included work on membranes for water and phosphorous recovery as well as oxygen separation. The symposium came to a close with MSA President A/Prof Mikel Duke presenting the best oral presentation award to Wei-Xian Lim of Adelaide University for her presentation titled “Mathematical Modelling of Gas Capture in Porous Media" as judged by the guest speakers and sponsors. The organising committee were also presented with certificates by MSA President and A/Prof Long Nghiem for their contribution to the management of the successful event.

In summary, the ECR symposium was a resounding success and offered a great platform for young researchers to exchange ideas and discuss the challenges and opportunities associated with membrane fabrication and application in gas separation and water treatment areas. It allowed for great networking and career development opportunities as well as reinforcing the importance and need for such events so as to ensure peer support is available to the Australian membrane community, especially for those in the early stages of their careers. The 25 platform presentations and nine posters from young researchers as well as the presentations from nine guest speakers contributed to the very high calibre of the symposium and reinforced the need for such an event to emphasise the future of membranes in Australia. A final thank you once again to all the sponsors for contributing to the events great success and we hope you will continue to be associated with MSA.

Hirra Azher, University of Melbourne

www.ecrmemsym2011.com.au

Feature cont.














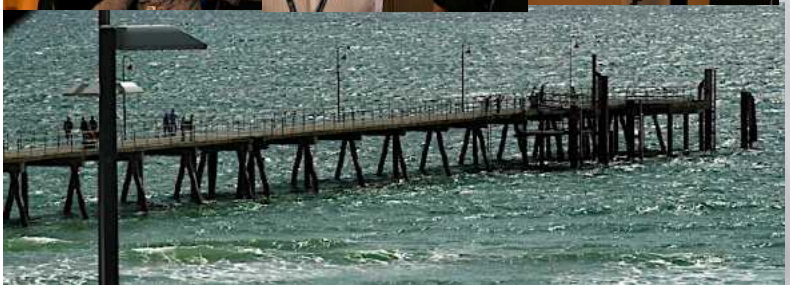


Industry Update -Trialling Membrane Distillation to Convert Waste Heat to Treated Water"

Industries utilise large volumes of water and are seeking ways to improve the water efficiency without increasing energy consumption and greenhouse gas emissions. Membrane distillation is a thermally driven desalination technology that is emerging in the context of industrial water recycling, and offers the opportunity to improve the quality of industrial effluents for internal recycling utilising waste low grade heat that is available on-site.

With the support of the Victorian SmartWater Fund, Water Quality Research Australia, City West Water and GWM Water, the research team at Victoria University's Institute for Sustainability and Innovation trialled membrane distillation on-site at Ecogen Energy's gas fired Newport Power Station for 3 months. In this context, the opportunity is the desalination of saline waste water (~ 3,000 mg/L) currently disposed to trade waste, which can instead be used to offset the incoming potable water needed to top up the power station's steam cycle. The power station condenses water vapour in the cycle at 40°C, which is cooled by nearby sea water. This heat is ideally suited as the driving energy for membrane distillation so the trial utilised a portion of the power station's waste heat to treat the effluent.

Before settling on the power station site, six other industry sites in Melbourne's Western suburbs were examined for suitability to the membrane distillation process. Most of these sites could also employ MD for internal water recycling as their effluent was suitable and possessed adequate waste low grade heat. Over the 3 month period, the plant achieved water recoveries between 80% and 90%, and flux of between 3 and 4 l/m^2/h using a heat feed of only 30-38°C. Permeate total dissolved solids was less than 10 mg/L while the concentrated reject reached more than 71,000 mg/L. The membrane, made from porous PTFE, did not need cleaning for the entire 3 month trial. The outcomes of the trial and industry survey revealed there is enough waste heat available to treat the entire volume of a site's effluent to trade waste.

The detailed results and outcomes of the trial will be presented at the upcoming OzWater conference to be held in Sydney from the 8th to the 10th May this year. A peer reviewed paper will be available from the proceedings, and a journal publication is also under development.

Noel Dow[1] (noel.dow@vu.edu.au)

Mikel Duke[1], Stephen Gray[1], Jun-de Li[1], Eddy Ostarcevic[5], David Halliwell[2], Paul Atherton[3], Audra Liubinas[4]

1 – Victoria University

2 – Water Quality Research Australia

3 – GWM Water

4 – City West Water

5—Integrated Elements

Newport Power Station and Membrane Distillation plant.

Vale Professor Malcolm Chaikin

Professor Malcolm Chaikin, who passed away on January 7th 2012, took a keen interest in the development and success of the membrane community in Australia. This interest began at the end of the 1970s when he was Dean of the Faculty of Applied Science at the University of New South Wales. He supported the early membrane research group of Chris Fell and Tony Fane in the School of Chemical Engineering that eventually became the UNESCO Centre for Membrane Science and Technology, involving Hans Coster in biophysics. In 1977/8 he encouraged the involvement of Dr Michel Lefebvre as a Visiting Scientist to the membrane group at UNSW. An outcome of that involvement was a novel membrane that led to the establishment in 1983 of Australia's own membrane company, Memtec Ltd (now part of Siemens Water Technology). Another outcome was funding to support the Chaikin Foundation. This Foundation was used to fund applied science education including membrane research scholarships and projects at UNSW and around Australia. Malcolm also took a keen interest in the setting up of the Institute of Sustainability and Innovation, headed by Stephen Gray with a strong focus on membranes at the Victoria University. Malcolm had many international contacts and facilitated the visits for conferences, seminars and sabbaticals of several well-known membrane researchers, including Prof Ora Kedem (Weismann Inst), Prof Yoram Cohen (UCLA), Prof Rafi Semiat (Technion) and Dr Rami Messalem (Ben Gurion University). Through this range of activities Malcolm Chaikin encouraged and assisted the flourishing membrane community in Australia. He was there at the formation of the Membrane Society of Australasia and we thank and recognize him for all the interest and support he gave to the membrane community over the years.

Tony Fane

February 2012

Up coming events:

- 7th Conference of the Aseanian Membrane Society — Korea, July 4-6, 2012
- 12th International Conference on Inorganic Membranes (ICIM) - Enschede, The Netherlands, July 9 - 13, 2012
  www.icimconference.com
- North American Membrane Society (NAMS) Conference - New Orleans, Louisiana, June 9-13, 2012
- Euromembrane - London, UK, September 23-27, 2012