

Evaporation suppressant trials progress to larger scale



Welcome

"The CRC-P has made a major advance in chemical technology for the suppression of evaporation"

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Established and supported under the Australian Government's Cooperative Research Centres Program



Evaporation suppressant evaluation (clockwise from top left): CRC-P researchers Emma Prime and Pearl Lim conducting suppressant tests at the University of Melbourne using a Langmuir trough; instrumented lined sections of channel used for field tests at Yanco, NSW; and a test site established at Dookie, Victoria, consisting of instrumented three large above ground pools and six smaller troughs.

Loss of water through evaporation from water storages is known to be a major issue for water users such as water authorities, irrigation operators and farmers. One research project carried out by the Cooperative Research Centre for Polymers (CRC-P) is directed towards making a major advance in chemical technology for the suppression of evaporation. In the first phase of the CRC-P research, laboratory results showed a major improvement in evaporation reduction, improved wind resistance and the need for less frequent application compared to current alternatives.

The past year has seen the second phase of research which has involved the further evaluation of the technology in the field. To conduct these evaluations, field trial sites (shown above) have been established at Yanco in NSW and at Dookie in Victoria. These sites allow performance to be assessed on water storages with areas in excess of 150 square metres, and the ability to correlate evaporation suppression performance against the prevailing weather conditions which are monitored by on-site weather stations.

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Advanced Polymerik wins grant funding for flow chemistry project



Advanced Polymerik (a spin-off company from the CRC for Polymers, and a current participant in the CRC) has been successful in its application for grant funding of \$80,300 under the PACIA-EPA Rewards Program. The Rewards Program is funded through the Sustainability Covenant between the Plastics and Chemicals Industries Association (PACIA) and EPA Victoria. It supports PACIA members who are signatories to the Sustainability Leadership Framework to investigate, research and pilot projects that will create a step change or transformation in sustainability for the company or relevant industry.

The Advanced Polymerik project seeks to use continuous microfluidic reactor technology for the manufacture of high value chemicals, with the pilot trial focusing on photochromic dyes. The technology offers considerable benefits over traditional batch manufacture in terms of lower capital and operating costs and scalability, and has the potential to deliver significant sustainability benefits, including high levels of safety. To date, the project has been able to demonstrate a 94% reduction in total waste volume, with the elimination of chlorinated waste. The technology also has potential for significant energy savings, with reactions which would otherwise have to be performed cryogenically in batch processing, being performed successfully at room temperature.

Through the CRC for Polymers, Advanced Polymerik is collaborating with CSIRO Materials Science and Engineering who are building an Australian research capability in the field of flow chemistry (see www.csiro.au/resources/FC-fact-sheet.html). The project is being led by Dr Mark York.

Mark York demonstrating the flow chemistry instrumentation.



Commercialisation of Reactive Extrusion Technology

Advanced Polymerik has granted an option to licence for one of its reactive extrusion technologies. The technology was initially developed in the previous funding round of the CRC for Polymers, and has been further developed and trialled within the current CRC.

The CRC for Polymers invested in a new Japan Steel Works (JSW) twin-screw extruder in 2006, and has funded a dedicated operator for the facility since that time. The equipment is housed at CSIRO Materials Science and Engineering (CMSE), with the reactive extrusion process currently being used to produce nanocomposite materials and advanced polyethylene film materials, and to modify the properties of both conventional polymers and renewable biopolymers, such as starch.

Reactive extrusion can be used to extend the range of physical and processing properties of polymers to achieve target product properties. The extrusion facility, which permits processing and reaction condition control over a wide range of conditions, provides a unique research/pilot-scale polymer processing capability, not otherwise available in Australia.

Members of the CMSE reactive extrusion team, Dr Graeme Moad (left), Dr Guoxin Li (front), and Lance Nichols (back).

12th Polymer Summer School - an annual event



In early December 2010, with the support of the RACI Polymer Group, the CRC-P organised the 12th Australasian Polymer Summer School. An annual event in the CRC-P's calendar, it aims to broaden polymer education in Australia, increase the level of cross-fertilisation in Australian polymer science and engineering, and to provide a strong theoretical introduction for new researchers.

In addition to attending formal presentations, delegates have an excellent opportunity to meet on an informal basis with leading polymer scientists. The Summer School was held over four days at the University of Wollongong, NSW, and attracted 45 delegates. The speakers and their topics were:

- Prof. David Lewis Flinders University, "Synthesis to application: an overview of polymer science and engineering"
- A/Prof. Darren Martin University of Queensland, "Development of thermoplastic polyurethanes and nanocomposites for biomedical and industrial applications"



Students attending the 12th APSS – an annual event in the CRC-P calendar

- Prof. Gordon Wallace University of Wollongong, "Biological aspects of intelligent polymers"
- Dr Richard Evans CSIRO, "Synthesis, properties and applications of stimuli responsive polymers"
- Dr Phil Barker BlueScope Steel, "Understanding polymer degradation"
- Dr Chris Garvey, Dr Andrew Nelson ANSTO, "An introduction to neutron scattering for polymers"

As with our previous summer schools, we were very fortunate to attract outstanding speakers who are at the forefront of their fields. The event also included a visit to ANSTO, Lucas Heights, and a presentation on the use of nuclear scattering to characterise the structure of polymers. The Summer School convenor was Professor Wayne Cook (Monash University) and the event was organised by Amy Hunt (CRC-P office).

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The trials have been carefully designed to provide data useful for fine tuning the formulation science as well as determining the optimal application rate and method of application. A prototype delivery system for applying the product to the water surface has been designed and is also being field tested.

Modelling of the product's behaviour when applied to the surface of water has also been undertaken, and this has been helpful in providing information on the best way to deploy the evaporation suppressant on water bodies with large surface areas.

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The CRC-P team includes of members from the University of Melbourne and Coliban Water, and its research activities also receive funding from the Victorian Government. The team is also collaborating with Industry & Investment NSW for the trials that are being conducted at Yanco.



CRC-P PhD students – where are they now?

Kris Frost commenced his PhD studies in applied chemistry with Prof Robert Shanks, RMIT, in 2007. Three years on, after submitting his PhD thesis on *Thermoplastic starch composites and blends*, and publishing several research journal papers, Kris took up a position working with Plantic Technologies (a CRC-P Participant) in their formulation laboratory. Reflecting on his time with the CRC-P, Kris says “The benefits of doing a PhD with a CRC were numerous - the access to equipment, the multi-university collaborations, the link with industry partners such as my employer Plantic, and the support network of other polymer scientists that the CRC taps PhD students directly into. I also attended two of the annual Polymer Summer Schools which were both excellent”.

Nationally, the CRC Program currently has 42 CRCs spanning the agriculture, forestry, fishing, mining, manufacturing and services industries. Collectively they have a postgraduate education target of approximately 1500 students over the course of this decade. The CRC for Polymers has supported 30 students to undertake postgraduate studies over the last five years. Currently there are 17 active PhD students with several in the process of writing up their theses. The remaining cohort, having submitted, have moved into postdoctoral positions with research institutes and universities both in Australia and abroad, or commenced employment in industry, or continued with further studies and industry training programs.



Top 100 Chemists in the World

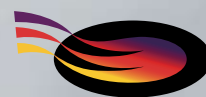
Congratulations to CRC-P's Program Leader for *Advanced polymeric materials*, Dr Ezio Rizzardo, CSIRO, who was identified by Thomson Reuters as one of the world's top 100 chemists over the past 10 years. With 2011 designated as the International Year of Chemistry, the top 100 list is intended to celebrate the achievements of chemists who have achieved the highest citation impact scores for their chemistry papers published since 2000. Dr Ezio Rizzardo, placed at number 18 with 52 papers, 4,747 citations, and an impact score of 91.29 during this time, was the sole Australian to feature on the list.



Congratulations to Ian Dagley, FSTE

Congratulations to our CEO Dr Ian Dagley for his recent admission as a Fellow of Australian Academy of Technological Sciences and Engineering (ATSE).

One of the four learned Academies in Australia, ATSE was founded in 1976 to recognise and promote the achievements of Australian scientists, engineers and technologists. It is an independent, non-government organisation, promoting the development and adoption of existing and new technologies to improve and sustain our society and economy.



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