



Cooperative Research Centre for

Polymers

Solutions for a better world

Welcome

“Researchers with the CRC-P have developed degradable plastic films which significantly improve productivity for native tree revegetation”.

in this issue

- Advanced Polymerik story
- Congratulations to Ezio Rizzardo
- Career in Research enhanced by PhD studies
- RISS Seminars
- 12th Australasian Polymer Summer School



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

Degradable polymer film for revegetation



Polyolefin films have long been used in agricultural production for: crop propagation, weed suppression, soil moisture conservation and providing additional heat units to the soil – all designed to improve crop outcomes. The CRC-P together with industry participant Integrated Packaging and researchers from UQ and QUT have been working together to develop a polyolefin film which will degrade in a controlled way during the growing cycle. Recently, this technology has been applied to a new market opportunity in the planting of native trees for land restoration and carbon sequestration.

Using a uniquely designed machine, which directly sows the seed as well as lays the degradable film in the one pass, the technology was implemented at a quarry site being revegetated by Greening Australia.

Native tree revegetation involves replanting a diverse range of species indigenous to the area in order to restore wildlife habitat, provide shelter to livestock and sequester carbon for many decades. It involves the

Andrew Makin, Alex Carter and Jim Robinson using degradable film at a revegetation site.

collection of seed, the preparation of the site to remove weeds, then the machine planting of mixed seed. For difficult to germinate species, it is often necessary to hand plant nursery-grown seedlings as opposed to direct seeding, which has obvious cost implications.

Given the large area of land being remediated, follow up care for the emerging plants is neither practical nor affordable thus survival rates are low, especially in dry regions or during drought. This problem is compensated by using very large volumes of seed mix with the expectation that many seeds will fail. The use of degradable plastic film for revegetation is attractive for a number of reasons: the film acts as a mini-greenhouse resulting in greatly improved germination rates, even for difficult to grow species, as well as bringing forward the sowing season. It also traps moisture in

continued on page 3

Advanced Polymerik signs on to Sustainability Leadership Framework

In July this year Advanced Polymerik (a spin-off company from the CRC for Polymers, and current participant in the CRC) became a signatory to the PACIA Sustainability Leadership Framework.

The Plastics and Chemicals Industries Association (PACIA) has taken a leading role in championing sustainability within the Australian plastics and chemicals sectors. The PACIA Sustainability Leadership Framework provides a structure and resources for companies to integrate sustainability into their businesses, in order to position them to respond, adapt and transform to future challenges such as climate change, changing feedstocks and emerging technologies.

More recently, Advanced Polymerik has applied for Rewards Program funding from PACIA to undertake a pilot trial of a new and innovative approach to chemical manufacturing. The Rewards Program is funded through the Sustainability Covenant between PACIA and EPA Victoria and is available to Sustainability Leadership Framework signatory companies with operations in Victoria. The program provides funding to support companies to investigate, research and pilot significant projects that will create a step change or transformation for the company or industry.

The project proposed by Advanced Polymerik seeks to demonstrate the use of continuous microfluidic reactor technology for the



Advanced Polymerik CEO, Kirsty Cleland and Chairman, Rob Trenberth, sign statement of commitment to the PACIA Sustainability Leadership Framework.

manufacture of photochromic dyes. The technology offers considerable benefits over traditional batch manufacture in terms of lower capital and operating costs, and has the potential to deliver significant sustainability benefits, including high levels of safety and revolutionary reductions in chemical waste.

In welcoming Advanced Polymerik as a signatory to the Sustainability Leadership Framework, Helen Millicer (Manager Sustainability Projects - PACIA) commented, "We are delighted by Advanced Polymerik's plans to commercially

trial this technology, which is inherently sustainable, and has the potential to transform specialty chemical manufacturing in Australia."

Through the CRC for Polymers, Advanced Polymerik is collaborating with CSIRO Materials Science and Engineering, who have recognised the importance of flow chemistry (pioneered by the Ley Group at the University of Cambridge) for Australian manufacturing, and is seeking to build an Australian research capability in this field (see www.csiro.au/science/flow-chemistry.html)



Dr Ezio Rizzardo

Congratulations to Ezio Rizzardo *Elected Fellow of The Royal Society*

In May 2010, Dr Ezio Rizzardo was elected to The Royal Society for his pioneering work relating to the control of free radical polymerisation, which has revolutionised polymer synthesis and been widely commercialised.

Founded in 1660, The Royal Society is the world's oldest scientific academy that champions science through a wide range of activities and contributing to public debate on scientific issues. Past Fellows include those famous for scientific endeavour such as Sir Isaac Newton, Charles Darwin, Michael Faraday, Albert Einstein and Ernest Rutherford.

Ezio's distinguished career includes numerous awards and he has co-authored more than 180 journal papers (that have received over 8,000 citations) and 31 patent families. He has been involved with the CRC-P since its inception as the CRC for Polymer Blends in 1992 through CSIRO. In fact, Ezio was the Centre's inaugural Director.

Today Ezio is involved with the CRC-P as Program Leader for Advanced Polymer Materials and is a member of the Technical Committee. We congratulate him on this prestigious accolade.

Career in Research enhanced by PhD studies

After working in R&D for several years in the steel manufacturing industry, engineer Andy Phillips decided it was time to pursue his career goal of undertaking a PhD. He says "I decided to undertake a PhD to obtain new skills that would have been impossible to obtain in my previous role. Australia had just made a considerable investment in the building of the new Australian Synchrotron in Melbourne. I wanted to learn how to use this powerful machine and apply that knowledge to further understand and develop the materials of tomorrow."

Enrolled at Monash University, under the supervision of Assoc. Prof. Graham Edward, his topic of study is the complex thermo-mechanics of the manufacturing processes used to produce plastic products. The aim of Andy's PhD topic is to understand how additives affect plastic crystallisation under typical manufacturing conditions. During processing, graduations in the microstructure form and it is these specific molecular architectures that greatly influence the important properties in the final product. It is anticipated that this understanding of polymers at such a microscopic level will be applied to develop new additives with better characteristics than previously available. The microstructural characterisation has

been greatly aided by the availability of the Australian Synchrotron. A synchrotron can be thought of as a type of "super-microscope" that provides a very bright light to probe a plastic's molecular structure in great detail. The advantage of using a synchrotron source over conventional techniques is that the plastic can be 'imaged' at the molecular scale with high time resolution in environments that simulate industrial processing conditions.

In addition to furthering his career in research, Andy has found that there are many other benefits of doing a PhD with the CRC for Polymers. He says "I've had numerous training opportunities such as the Polymer summer schools, the science leadership and project management course, oral presentation courses, IP protection courses, just to name a few! Furthermore, I would not have been able to meet the large range of Australian polymer scientists and, in particular, the next generation if the CRC had not consistently brought us all together. The additional financial support of a stipend, money for project equipment and materials, plus conference travel assistance has been fantastic. I have just been to the annual meeting of the Polymer Processing Society (PPS-26) in Banff Canada and Macro2010 in Glasgow. At these conferences I was able to get timely feedback on my research which



PhD student Andy Phillips.

will undoubtedly fast track the analysis, interpretation and publication of this work. Also I was able to see the bigger picture of the research being done around the world." Currently in the process of writing up his thesis, Andy reflects "I think the most rewarding part of being in the CRC for Polymers is the feeling of community. That there are extra people to call if the need arises and that you are part of a bigger project, part of a team!"

Degradable polymer film for native tree revegetation

continued from page 1

the soil, aiding the growth of the emerging seedling, which is of great use at low rainfall sites or during dry years. Furthermore, the film may act as a physical barrier to stop seed theft by ants and prevent attack by red legged earth mites on the germinating seed.

In anticipation of future large-scale plantations due to carbon trading and development offset programs, it is important to make process efficiency gains. Early results are promising according to Dr David Freudenberger, Greening Australia's Chief Scientist involved in the project. "The incorporation of degradable plastic film, together with engineered planting equipment, has real potential to reduce costs and improve the productivity and diversity of native revegetation".



Acacia seedling.

RISS Seminars

The Smart Surfaces seminar series, hosted by the CRC-P and the federally funded Research Infrastructure Support Scheme (RISS), have been held in Sydney, Melbourne and Perth. The aim of the seminars is to foster collaboration in medical and material sciences, in particular cGMP human cell work and engineered surfaces, and seeks to identify and address market failures by the provision of prototype services and low-volume manufacturing facilities.

The final two seminars are to be held in Adelaide (November 4) and Brisbane (November TBA). Further information regarding these events, including registration, can be found at www.crcp.com.au/seminars or telephone the CRC-P on (03) 9518 0400.

12TH AUSTRALASIAN POLYMER SUMMER SCHOOL (12APSS)

The University of Wollongong, Innovation Campus, Wollongong, New South Wales, December 7-10, 2010.

OVERVIEW OF SUMMER SCHOOL:

The RACI Polymer Division and the CRC for Polymers are jointly sponsoring the 12th Australasian Polymer Summer School. This provides an excellent opportunity to gain an overview of important developments in polymer science and engineering from experts in their fields. Anyone interested in the seminars provided is encouraged to register.

WHO SHOULD ATTEND?

- Students enrolled in higher degrees
- Undergraduate Engineering and Science students
- Postdoctoral fellows
- Anyone with a technical interest in polymers and polymer research

PRESENTERS:

- **Professor David Lewis** (Flinders University), "Synthesis to application: An overview of polymer science and engineering"
 - **Dr Chris Garvey & Dr Andrew Nelson** (ANSTO): "An introduction to neutron scattering from polymers" & "Neutron reflectometry from thin polymer films"
 - **Dr Phil Barker** (BlueScope Steel) "Understanding Polymer degradation"
 - **Dr Richard Evans** (CSIRO), "Synthesis, properties and applications of stimuli responsive polymers"
 - **A/Professor Darren Martin** (Queensland University), "Development of thermoplastic polyurethanes and nanocomposites for biomedical and industrial applications"
 - **Professor Gordon Wallace** (UoW), "Biological aspects of intelligent polymers"
 - Site visit to the Australian Nuclear Science Technology Organisation (ANSTO)
- (Detailed Program and timetable to follow)

Sponsors:
CRC for Polymers



RACI Polymer Division



Location, Innovation Campus UoW, NSW



OPAL research reactor building



(Photo Courtesy of ANSTO)

12APSS Conference Convener:
Professor Wayne Cook
Department of Materials Engineering
Monash University

Registration: Amy Hunt | phone 03 9518 0400 | email amy.hunt@crpc.com.au | address 8 Redwood Drive, Notting Hill VIC 3168



The Cooperative Research Centre for Polymers | 8 Redwood Drive, Notting Hill, VIC, 3168

p: 61 3 9518 0400 | f: 61 3 9543 2167 | e: polymers@crpc.com.au | www.crpc.com.au