Cooperative Research Centre for Polymers

polymernews

News from the CRC for Polymers

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Welcome

in this issue

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Chief Scientist visits CRC-P

Australia's Chief Scientist, Dr Jim Peacock, visited the CRC for Polymers (CRC-P) recently to be briefed on the activities of the Centre and to meet researchers involved in some of the Centre's projects. The Centre's CEO, Dr Ian Dagley, and the Deputy CEO, Dr Julie White, gave Dr Peacock an overview of the Centre's objectives, programs and projects. The CRC-P is investing more than $100 million over seven years on research aimed at developing specialty polymers for use in applications spanning the biotechnology, energy, mining, agriculture and manufacturing sectors of the economy. $32 million of this funding is provided by the Commonwealth's CRC Programme.

Dr Peacock then visited research laboratories at CSIRO Molecular and Health Technologies. Here he discussed the Centre's research on plastic solar cells (see story on page 2) with the Project Leader, Professor Andrew Holmes, and other members of the project team. He was also briefed by Dr Graeme Moad and Professor George Simon on the Centre's research targeting the development of biodegradable polymers from renewable resources with improved properties for packaging applications.

The visit concluded at the Australian Stem Cell Centre where CEO, Professor Stephen Livesey, and other researchers provided an overview of the Centre's research on making polymer microenvironments to control cell function for use in biomanufacturing.

Dr Peacock (left) discussing research on plastic solar cells with Professor Andrew Holmes (right) and Dr Gavin Collis.

Making solar power more competitive

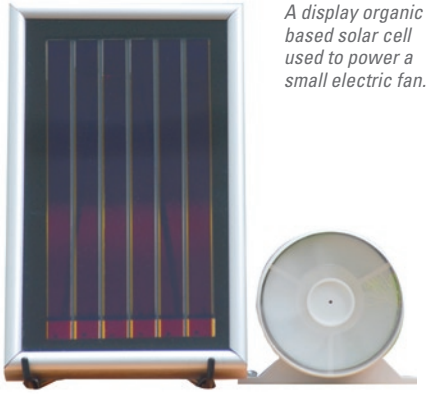
Scientists from the CRC for Polymers (CRC-P) are developing technology to produce an all-plastic solar cell that will be more economical than silicon cells, light and flexible, making it highly portable and easy to store.

Currently available solar cells are based on silicon, which makes them heavy and requires a large area to accommodate the solar cell panels.

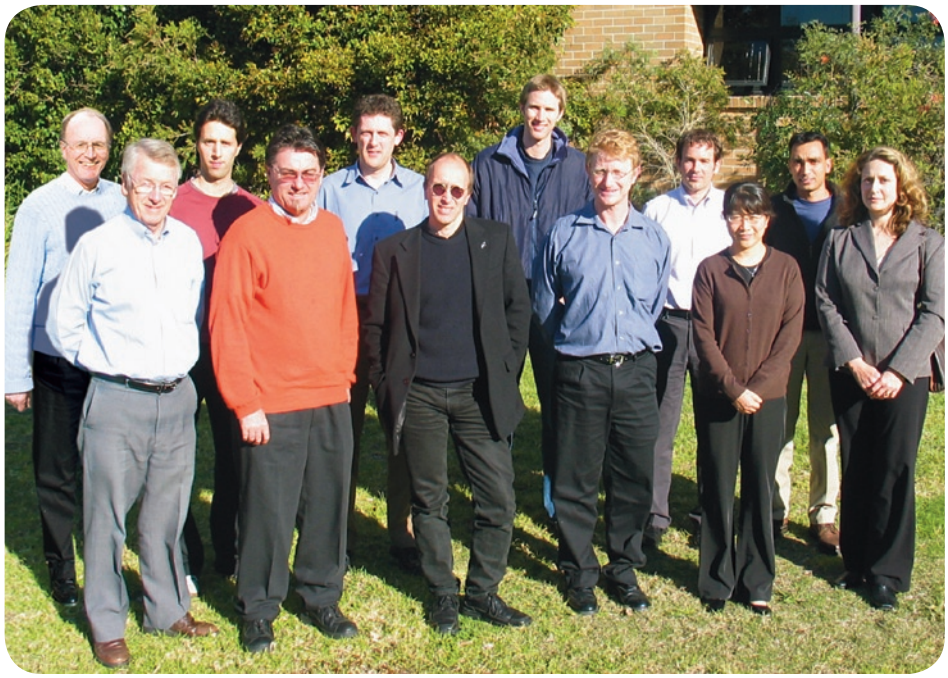
The CRC-P researchers are focusing on two key weaknesses of all-plastic solar cells developed so far: short lifetimes and low efficiency. They aim to produce a less expensive, lightweight and durable product with a competitive rate of efficiency in converting solar energy into electric power.

The researchers, led by Professor Andrew Holmes at the CSIRO, are trying to develop a better understanding of the function, properties, performance and interaction of the individual components of an all-plastic solar cell, which will ultimately result in designing materials and processes to produce the desired product.

The team includes CSIRO, recognised as a world leader in controlled polymer synthesis, whose role is to control the architecture of the plastic to produce a material with the desired chemical and physical characteristics.



A display organic based solar cell used to power a small electric fan.



Another partner is the University of Wollongong which is contributing expertise in 'plastic electronics', and will help develop plastics with electronic function. The recently created Centre of Excellence for Electromaterials Science is based at the University.

Other specialised ingredients besides plastics are required to produce an all-plastic solar cell and CRC-P research partners also have expertise in working with these components. Specifically, the University of New South Wales and the Australian Nuclear Science and Technology Organisation (ANSTO) have expertise in working with specific titanium dioxide, which has been developed as a pigment for accepting electrical charges.

Left: Members of the research team developing plastic solar cells.

Andrew Holmes: raising Australian expertise in photovoltaic cells

Leading the plastic solar cell research project is Professor Andrew Holmes, renowned internationally as co-discoverer of the world's first light-emitting polymers.

Professor Holmes returned to Australia from Cambridge University under the Federal Government's Federation Fellowship scheme, designed to bring eminent Australian researchers working overseas back to Australia. He is now involved in research projects at the University of Melbourne and CSIRO. Professor Holmes has assembled a team with leading photovoltaic expertise from across several organisations for the solar cells project.

In May 2004 Professor Holmes became the inaugural recipient of a fellowship sponsored by the Victorian Endowment for Science, Knowledge and Innovation (VESKI) which is committed to sponsoring innovation through the recruitment of expatriate Australians to Victoria.

New equipment for accelerating commercialisation of research

New fire-testing facility

A new state-of-the-art test furnace, which allows researchers to visualise the fire performance of materials within the furnace, was inaugurated at CSIRO on 27th November 2006. The equipment is essential for accelerating the commercialisation of research aimed at developing improved passive fire performance products.

The furnace is installed at CSIRO Manufacturing and Materials Technology, and was funded by the CRC-P. It will be used mainly by a team working on collaborative research within the CRC-P which involves CSIRO, Monash University, RMIT and the commercial partner Ceram Polymerik.

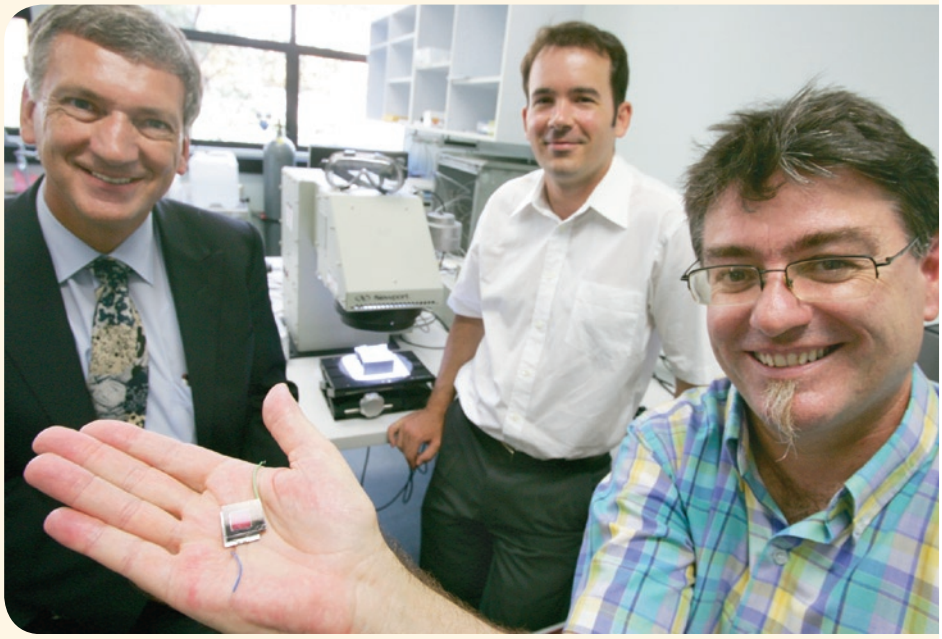
Ceram Polymerik was established to commercialise novel polymer ceramic composites in non-cable applications. These composites behave like polymers under normal processing conditions, but turn into ceramics when exposed to fire - thereby creating a life-saving fire barrier.

The project has already generated many new ceramifying materials to be evaluated, and the furnace has a large backlog of tests to be conducted. The equipment will provide the research team with the ability to rapidly evaluate the performance of new ceramifying compositions in a test that accurately replicates the results from larger scale, and much more expensive tests used in fire standards. It will dramatically decrease the time it takes to develop new products and get them into the market place.

Dr Julie White, Deputy CEO of the CRC-P, and Mr Ray Purcell, CEO of Ceram Polymerik, inaugurate the new test furnace at CSIRO Manufacturing and Materials Technology.

New solar simulators

Solar simulators replicate natural sunlight and are essential for accurate measurements of the efficiency of plastic solar cells being developed with the Centre. The Centre has funded the acquisition of two of these devices, one being located in Victoria at CSIRO Molecular and Health Technologies, and the other at the University of Wollongong in New South Wales. The inauguration of the University of Wollongong facility took place on 21st February 2007.



Dr Ian Dagley, CEO of the CRC-P (left) at the inauguration of the new solar simulator, with Dr Attila Mozer (centre) and Professor Gordon Wallace, both from the University of Wollongong.

8th Australasian Polymer Summer School held in Geelong

The CRC-P, in conjunction with the Polymer Division of the Royal Australian Chemical Institute (RACI), held the 8th Australasian Polymer Summer School on 6-9 February 2007 in the seaside city of Geelong, Victoria.

The annual summer school aims to broaden polymer education in Australia, increase the level of cross-fertilisation in polymer science and engineering, and provide a strong theoretical introduction for new researchers.

Students also had an excellent opportunity to meet and to hold discussions with the leading Australian and international polymer scientists who spoke at the sessions.

Delegates and presenters at 8APSS 2007.

The topics and presenters were:

- Introduction to polymer science and engineering – Professor Don Napper, formerly from the University of Sydney;
- A quantum mechanical approach to polymer science – Dr Michelle Coote, Australian National University;
- Protein polymer conjugates and application to human health and nanotechnology – Professor Heather Maynard, University of California, USA;
- Radical polymerisation and its kinetics – Associate Professor Greg Russell, University of Canterbury, New Zealand;
- Block copolymers and nanotechnology – Professor Tony Ryan, University of Sheffield, UK; and
- Biomanufacturing applications of polymer science – Professor Justin Cooper-White, University of Queensland.

Gavin Collis: attracted back to Australian energy research

The opportunity to work in a multidisciplinary team in the vital area of alternative energy was the incentive for Gavin Collis to return to Australia and take up a position with CSIRO in conjunction with the CRC-P.

As well as his skills as a synthetic organic chemist, Gavin brings to the CRC-P a wealth of experience working in multidisciplinary teams, most recently at the Los Alamos National Laboratory in New Mexico.

After completing a PhD at the University of Western Australia in organic chemistry in 1997, Gavin worked as a postdoctoral fellow at Massey University, New Zealand before taking up a position at Los Alamos National Laboratory.

He worked on several major projects including trying to develop a water soluble, conducting polymer to detect aqueous plutonium and developing a sensor to detect chemical warfare agents. He was also instrumental in the development of a portable kit for detecting beryllium in the field. This research was patented and has been commercialised.

"My experience in Los Alamos taught me a lot about working in multidisciplinary teams and that is what I have returned to do in Australia.

"Each one of the teams involved in this project to develop organic photovoltaics brings certain skills and capabilities.

"If you can get the different groups to interact and communicate together you will achieve much more than trying to do this independently.

"Having a well integrated, multidisciplinary team provides an opportunity for people to start thinking outside the box, which is where most breakthroughs will probably occur," says Gavin.