

Cooperative Research Centre for

Polymers

Solutions for a better world

Welcome

“Researchers with the CRC-P have developed an improved material which results in greater solar cell efficiency.”

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

Technology licensed for use in the manufacture of photovoltaic devices



CRC for Polymers PhD student Jared Barnes demonstrates a non-silicon photovoltaic device.

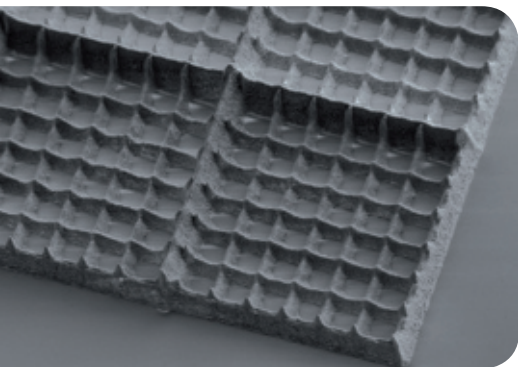
Concerns about carbon dioxide emissions associated with the generation of electricity using fossil fuels, and the finite nature of these reserves, is driving the development of more sustainable technologies for producing electricity, including its production from sunlight.

Several technologies for producing solar cells that are not based on silicone, and have the potential to be flexible, light-weight and produced at comparatively lower cost, have reached the performance levels required for their adoption in large-scale manufacturing. As these devices transition from the research laboratory to the factory, high-quality components required to produce these cells must become available on a commercial scale from reliable sources.

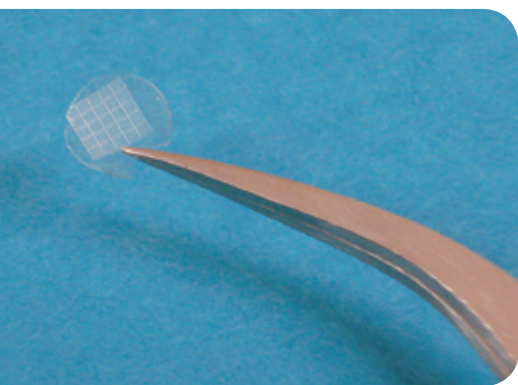
A research team at the CRC for Polymers has been studying the materials' requirements for optimising the performance of one of these types of photovoltaic devices. One outcome

has been an improved material which results in greater cell efficiency. A robust process for producing this on a larger scale has now been developed, and the CRC-P has licensed the technology to BASF, a participant in the project and the world's largest chemical company. Dr Ian Dagley, the CEO of the CRC-P notes, "A great strength of the CRC Program is that it allows us to establish research collaborations which deliver solutions to major challenges, the outcome of this project is a good example of this." The multidisciplinary team assembled by the CRC-P to carry out this project also included researchers from ANSTO, CSIRO, the University of New South Wales, the University of Wollongong and Swinburne University of Technology. The team operated across three countries and the technology took four years to develop.

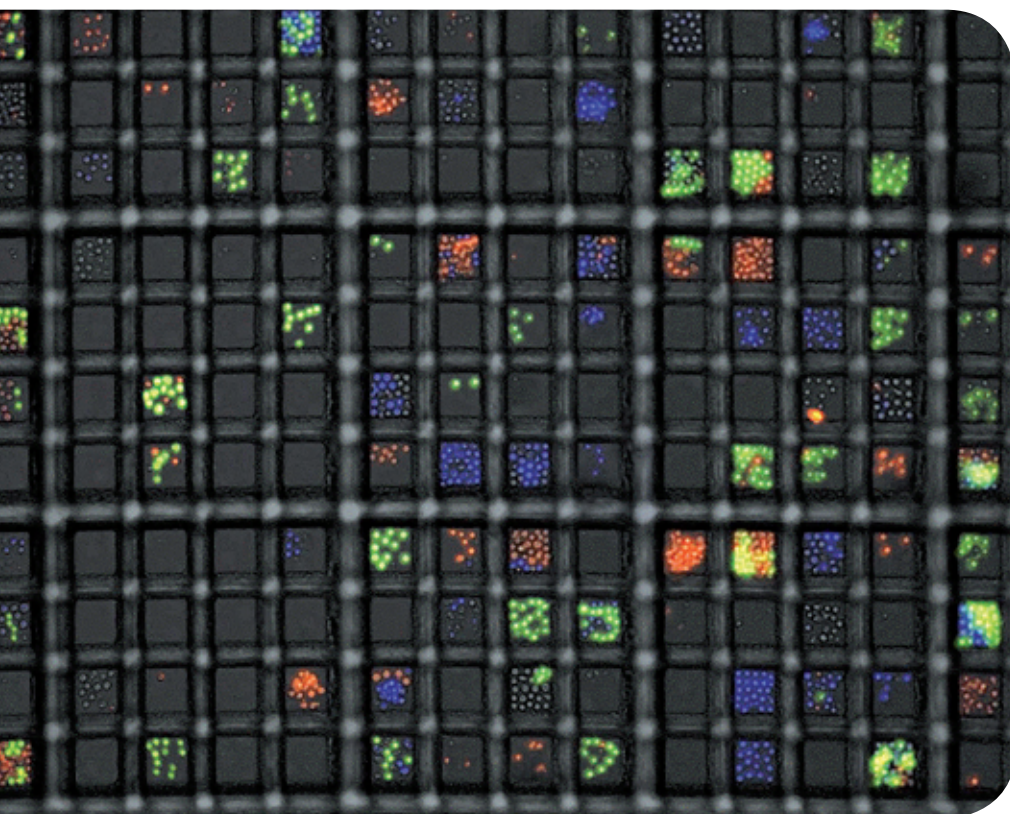
Biosurfaces – a new business for live cell imaging



The microgridded surface viewed under an electron microscope.



A Microgrid held with tweezers.



A Microgrid containing living cells, which have been stained with special dyes, demonstrates how microscope imaging is facilitated (Photo: Dr John Markham, WEHI).

With the development of new technologies, live imaging of cells *in vitro* has revolutionised many aspects of cell biology. A key goal now is to develop systems to optimise *in vitro* imaging by maintaining physiological conditions which will enable prolonged viewing of live cells.

Researchers based at Swinburne University of Technology, assisted by funding support provided by the CRC-P, have developed polymeric microgridded surfaces which, when incorporated into standard cell cultureware, physically separate the population of cells into sub-populations within the field of view of an imaging system. Dr Daniel Day, an inventor, says, "The microgridded surfaces are made from polydimethyl siloxane, which is non-toxic to cells, and are made in a mould which has been microfabricated using laser etching."

The CRC-P has established Biosurfaces as a business to sell the Microgrids to cell cultureware users. Dr Day continues "The self-adhesive Microgrids are easily inserted into a variety of cell cultureware formats such as microtitre and terasaki plates. The Microgrid walls are high enough to isolate cells but are

low enough to permit the supply of medium across wells, allowing prolonged cell viability and proliferation. This makes it possible to culture and observe cells for at least 6 days and enables imaging of multiple cell divisions and generations."

The Microgrids are already being used by several researchers – Professor Sarah Russell from Peter MacCallum Cancer Centre has used the Microgrids in her immune signalling research. She says, "To observe dynamic movements and interactions of immune cells by microscopy, it is essential that the cells are confined within the field of view. There is no commercially available product to accommodate these needs, but the Microgrids are excellent at confining the immune cells while allowing normal interactions and keeping the cells viable. Many of our experiments would not be possible without the Microgrids, but with them we are now making seminal advances in the regulation of immune responses."

Dr John Markham is a researcher at the Walter and Eliza Hall Institute. He says, "We have found the Microgrids to be the best solution for filming cells over prolonged periods of time. With other products we had issues of reduced cell proliferation or cell escape, but neither of these appears to be a problem with the Microgrids. Being able to put the Microgrids into multi-chamber slides has been good because it enables us to do multiple conditions at once and image quality is still great because the Microgrids are so thin."

The improved imaging and tracking of live cells over extended periods increases research efficiency in analytical applications such as cell-cell interactions, cell tracking, proliferation and differentiation, chemotaxis assays and cell activation assays. The Microgrids are designed to be used as a one off consumable insert and they do not require the development of new procedures or protocols. They are suitable for fluorescence and transmission imaging as well as scanning electron microscope (SEM) imaging. The Microgrids can be produced in a range of well sizes and shapes, and further products under development include a microdimple plate and micromesh product.

For more information on Microgrids please contact Ms Kirsty Cleland on 03 9518 0400.

Centre for Micro-Photonics links with polymer researchers

The Centre for Micro-Photonics (CMP) at Swinburne University is a leading player in biophotonics and nanophotonics. Headed by Professor Min Gu, the Centre is focused on innovative nanophotonic devices for all-optical information technology and novel optoelectronic imaging methods for biological studies. Its world-class laboratory also provides training for Australian and international research students.

Within the CRC-P, the Centre for Micro-Photonics has been working in collaboration with University of Wollongong and ANSTO on the development of the next generation of photovoltaic devices. The CMP is applying its extensive knowledge of micro and

nanofabrication within polymers and metals specifically to organic photovoltaic devices.

The CMP has also been a core partner in another CRC-P project with Monash University, CSIRO and the Australian Stem Cell Centre in the development of a novel 3D microreactor for stem cells. This research partnership has brought polymer sciences together with microfluidics and cell culture know how – a synergistic combination of skills facilitated by the collaborative nature of CRCs.

For further information on the Centre for Micro-Photonics, contact Professor Min Gu at mgu@swin.edu.au



Professor Min Gu

PhD studies with the CRC-P enhance career options



Dr Dylan Nagle

After completing a Masters in Science, Dylan Nagle had thought his studying days were behind him. However with a difficult job market at that time, he opted to undertake a PhD funded by the CRC for Polymers, in association with Queensland University of Technology. His investigations centred on the development of plastic film, such as that used in agriculture, which would break down in an environmentally neutral manner over a period of months.

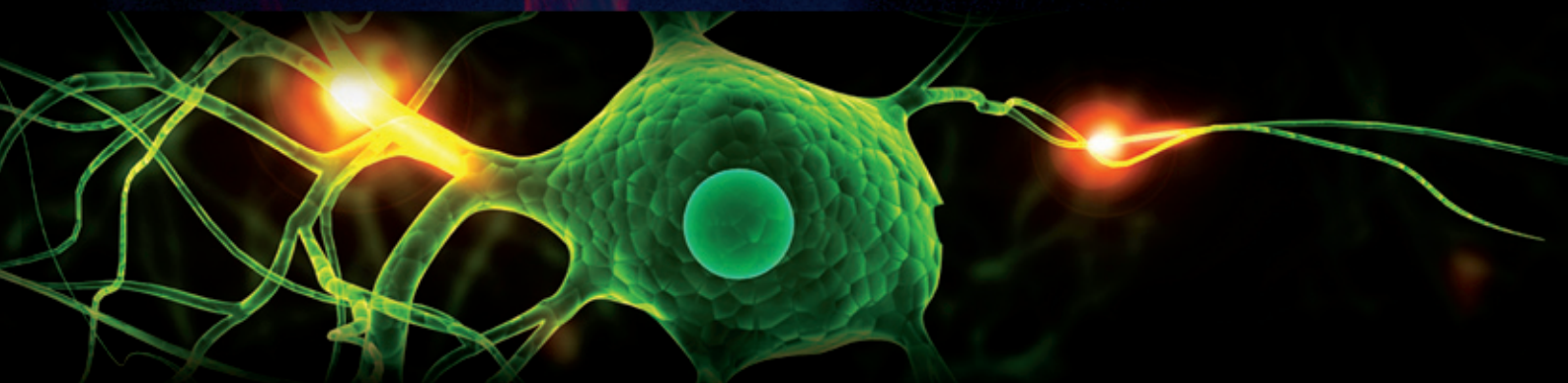
With his thesis now complete, Dylan has started the next phase of his career at the Defence

Science and Technology Organisation (DSTO) where he was specifically recruited because of his polymer experience. Dylan says, "The main benefits of doing a PhD with the CRC for Polymers were three-fold: firstly, the extra-curricular learning opportunities on offer for CRC-P students such as the R&D leadership course, media training, annual meetings, and Summer Schools – these were all useful for building my CV; secondly, the generous scholarship allowed me to concentrate on my PhD studies without having to supplement my income with part-time work; and thirdly, the exposure to the CRC-P's partners both in industry and government gave me a much better idea of how R&D is conducted in the private, public and university sectors as well as gave me confidence when applying for jobs."

After submitting his thesis and relocating to Melbourne, Dylan reflects on his PhD experience, "Overall I feel lucky and honoured to have been a part of the CRC for Polymers. Certainly with all the benefits and extra funding, I was the subject of envy of my fellow post graduate colleagues at university. To anyone who is a recipient of a CRC-P scholarship I would encourage them to take full advantage of the many opportunities that it presents – not only in scientific research, but in all aspects of technological development from the creation of an idea through to the implementation of a product."

Evaporation suppression research awarded VSA funding support

The CRC-P has received funding support of \$1.5 million from Victoria's Science Agenda (VSA) Investment Fund for one of its projects. The funding is to accelerate the translation of a new technology for suppressing the evaporation of water through the development and demonstration stages, so that the resulting evaporation reduction system can assist Victoria by preserving its declining reserves of stored water. Annually evaporation from storages results in losses of more than 880 GL of water, which is greater than 15% of the State's water consumption. The collaborative team consists of chemistry expertise from the University of Melbourne, product commercialisation by Orica Australia and field trial facilities at Coliban Water.



Smart Surfaces

National Seminar Series 2010

OBJECTIVES

To foster exchange and collaboration between researchers and developers in medical sciences and material sciences, particularly cGMP compliant human cell work seeking to produce engineered surfaces; to identify and address market failures in the provision of prototype services and low-volume manufacturing facilities.

SEMINAR PROGRAM

Includes key scientific, clinical and commercial identities including:

Prof. Richard Herrmann
(Royal Perth Hospital)
Prof. Anthony Weiss
(Sydney Medical School, USyd)
Assoc. Prof David Haylock (CSIRO)
Calimmune
Mesoblast
Invetech
Cell Therapies
Cochlear

Topics covered include:

- Synthetic biopolymers for tissue engineering applications
- Excitable surfaces
- Biocompatibility

- Microfluidic devices for separation of blood
- Cell Tracking

(Seminar format and speakers will vary from state to state)

LOCATIONS

Sydney - July 2
Melbourne - July 22
Perth - August
Brisbane - September
Adelaide - November

OPPORTUNITY TO JOIN OUR COLLABORATIVE ENDEAVOUR

As part of this initiative we will develop a research and infrastructure database to enable greater interaction between researchers, clinicians and industry. This will help researchers to find the expertise and equipment they need to develop new technologies.

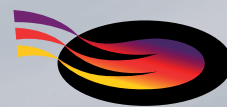
REGISTRATION

For updated information and to register visit the following websites:

www.crcp.com.au
www.rissltd.com



An Australian Government Initiative
National Collaborative Research
Infrastructure Strategy



Cooperative Research Centre for

Polymers

Solutions for a better world

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