Profiles

Professor Michael Oelgemöller, recipient of an AITHM 2013 Development Grant

Associate Professor Michael Oelgemöller is a leading expert in green (solar) photochemistry, microflow photochemistry and photocatalysis. He received his Diploma from the University of Münster in 1995 and his PhD from the University of Cologne in 1999. He was a researcher at the ERATO-JST Photochirogenesis project in Osaka (1999-2001) and at Bayer CropScience Japan in Yuki (2001-2004). From 2004-2008 he held a position as a lecturer in Organic and Medicinal Chemistry at Dublin City University, Ireland. In February 2009 he joined James Cook University in Australia as an Associate Professor in Organic Chemistry. He received the Kurt-Alder award of the University of Cologne in 2000 and the Bayer Employee award of the Research Centre in Yuki in 2004.

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Tell us about your area of research?

My research is dedicated to applied and green photochemistry, so almost everything that deals with the chemical effects of artificial and natural light. Our projects span across the entire spectrum of pharmaceutical and chemical research, ranging from the development of miniaturized early drug discovery tools to the production of chemicals, photostability testing and photolytic degradation. All of these processes match seamlessly with JCU's motto 'crescente luce – light ever increasing'.

What interests you about working in this area?

I 'saw the light' when I did a research project as an undergraduate student at the University of Münster, Germany. I have since been fascinated by the possibilities that light energy offers in terms of chemical synthesis, waste treatment or disease prevention. Many of these applications are not possible with conventional 'dark' methods. When I worked for Bayer CropScience, photochemistry was often blamed when a pesticide candidate failed in the field, however, proof was rarely provided. Instead, light can be very creative and it allows generating complex molecules with a 'flick of a switch'. Alternatively, light can degrade chemical or microbial pollutants, which offers important medical, environmental or aquacultural applications. I personally enjoy our work on solar photochemistry and North Queensland's 300 days of sunshine were one of the main reasons for me to come to Townsville from much less sun-blessed Dublin.

How do you see your research developing in the future?

We are well-known for our solar work and have successfully realized large technical-scale productions of fragrances and platform chemicals. More recently, we went the opposite direction and have started work on continuous flow photochemical processing, i.e. 'lab & light on a chip'. I would like to combine these successful research streams and my group is currently building the first solar trough continuous flow capillary reactor.

This reactor will be utilized for the synthesis of fragrances such as rose oxide or antimalarials such as artemisinin. This simple technology would enable local producers to add value to their products and commodities. We also

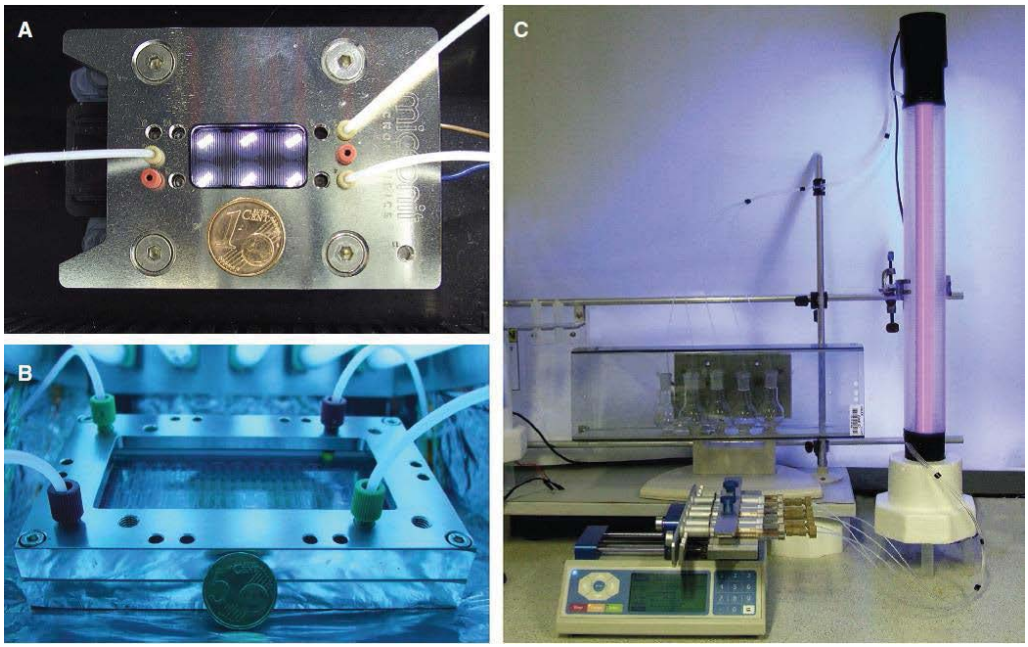

Figure 1: Microflow photoreactors: (A) UV-LED/microchip; (B) UV-panel/ dwell device; and (C) UV-fluorescent tube/multicapillary tower.

became interested in the solarthermal synthesis of insect repellents from local essential oils. We have done some laboratory experiments already and the results are remarkable. I hope we will be able to generate some proof-of-concept funding for this new project in the future. After all, prevention is always better than curing.

How has the AITHM funding helped your research develop?

The AITHM funding allowed me to match some seed funding from the Clinton Health Access Initiative. It was really rewarding when this large organization approached me some years ago regarding a potential collaboration on artemisinin. The idea behind this project is to realize the synthesis of this frontline antimalarial in a small production plant. Instead of a traditional centralized manufacturing, these mobile plants could produce on-site and on-demand where needed. This makes it especially attractive for some of our neighbours in the Pacific, especially PNG. If successful, the project could also open substantial follow-up funding from the Clinton Health Access Initiative. The project also nicely complements the existing activities of the AITHM on malaria.

What has been the highlight of your science career so far?

Thus far I have enjoyed a successful research career and have worked in a number of very different countries, spending time in the U.S.A, South Korea, Japan, Ireland and now Australia. None of that was ever in my mind when I started my degree in 1989. It is very rewarding when a breakthrough is achieved in a project or when results come together as a whole. I also enjoy working with the diversity of students in my group, which consists mainly of visiting students from all over the world. This international team has created a lively and creative environment. It would be great to be able to keep some of the students though.

What would you like to do in the future?

I am very open for collaborations and do not mind low- or even no-budget projects. Something I

would really like to pursue in the future is getting into health care. Some of our projects on small-scale manufacturing of pharmaceuticals or water treatment could have a significant impact in rural and remote communities in the tropics. So my guiding principle is once again 'crescente luce – light ever increasing'!

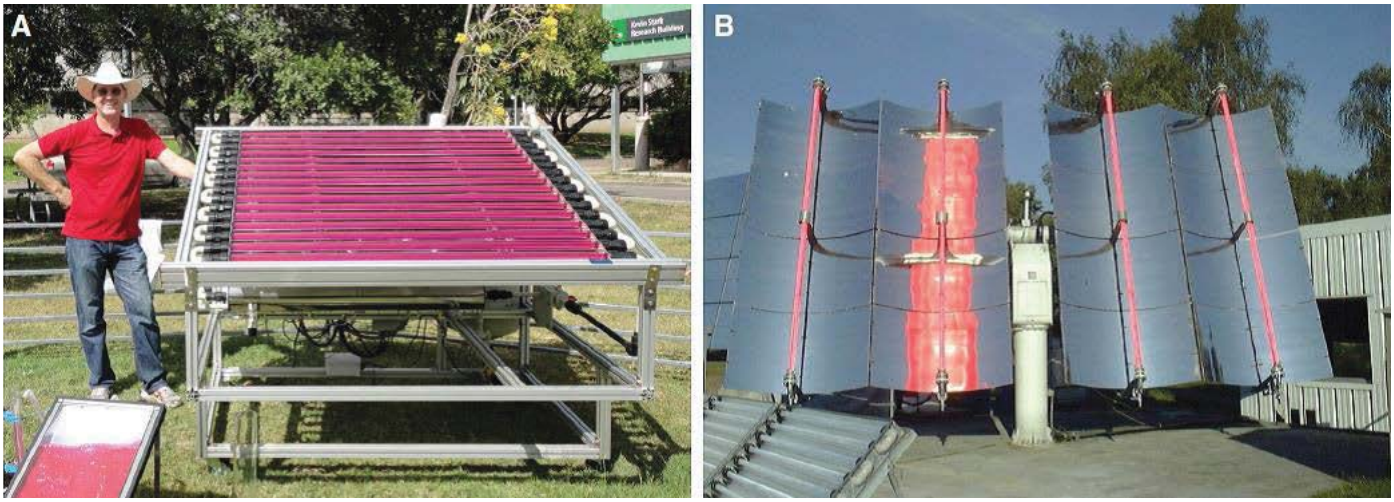

Figure 2: Solar reactors: (A) CPC-reactor at JCU; and (B) PROPHIS-loop at the DLR in Germany.

Profile, Dr Paula Clancy, recipient of an AITHM 2013 Development Grant

Dr Paula Clancy leads the HART-BEAT (Health Pracitioners And Researchers Together-Blood, Endothelium and Tissue) research group at James Cook University, an alliance between laboratory based researchers, health practitioners and their patients within one research group to tackle the issues of diabetes and its associated complications.

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Tell us about your area of research?

So far my post-doctoral research has involved investigating protein signalling pathways in atherosclerosis. Using cultured human carotid atheroma explant culture I have investigated the impact of various commonly used drugs, such as angiotensin receptor blockers (ARBs), angiotensin converting enzyme inhibitors (ACEis) and statins on the chronic up-regulation of inflammatory mediators from the atheroma.

Following on from my previous studies I have now set up a new research group called HART-BEAT (Health practitioners And Researchers Together-Blood, Endothelium And Tissue) which aims to investigate secondary complications in diabetes, in particular cardiovascular disease; mental health issues, including depression and anxiety; impaired wound healing; and increased pathogenic infection. Inflammatory mediators, such as cytokines, proteases, growth factors and