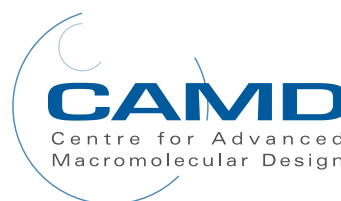


CAMD NEWS

December 2009



News from the Centre for Advanced Macromolecular Design

Director's message

Highly Productive, Year Of Change For CAMD

2009 proved to be a hard working but very productive year for CAMD. In fact our best yet publication output result by a considerable margin. First we appointed two new staff members, Per Zetterlund who arrived from Kobe University and Andy Lowe who came from the University of Southern Mississippi. Per and Andy bring a lot of new expertise into CAMD in areas including nitroxide mediated polymerisation, polymerisation in dispersed media (including emulsion and supercritical CO₂), click chemistry, ROMP and controlled aqueous polymerisations.

CAMD had a very successful year in terms of grant outcomes with the charge led by three successful Fellowship applications, an ARC Future Fellowship for Martina Stenzel, a very prestigious and well-deserved award for Martina to continue her work in platinum anti-cancer therapies and Australian Post-Doctoral Fellowships; Drs Cyrille Boyer to work on hybrid nanoparticles for nanomedicine applications and Gaojian Chen, to work on platinum-polymer therapeutics. In addition, CAMD staff members were awarded four new Discovery grants (Chief Investigators: Cyrille Boyer, Tom Davis, Martina Stenzel and Per Zetterlund) and one Goldstar grant (Volga Bulmus). Dr Cyrille Boyer was also awarded a UNSW ECR grant. CAMD researchers were also prominent in the award of a new infrastructure grant for a scanning probe microscopy facility.

Publication output was very strong with fifty accepted refereed publications (a 20% increase on our previous best) covering diverse areas of macromolecular design and a notable presence in the new RSC Journal Polymer Chemistry, where CAMD had three of the first five papers published on-line, covering photoresponsive polymers, thiol-ene click chemistry and micellar drug delivery. Tom Davis was also invited to join the Advisory Board of this new RSC Journal. This year CAMD members were also invited to write five review articles in journals ranging from Chemical Reviews to Nature Asia Materials, reflecting our broad research base. In addition CAMD members had two patents published on graft copolymer synthesis and anti-biofouling coatings.

The start of the year saw CAMD organise a one-day meeting on Nanomedicine together with Sebastien Perrier (KCPC) from Sydney University that brought together 10 internationally recognised researchers in the field. This meeting attracted 120 attendees, and we hope this will be the springboard for future symposia in Sydney 2010 (stay tuned) and the launch of a new UNSW research centre (pending). The close of the year also saw CAMD with a considerable presence at the Pacific Polymer Conference held in Cairns in December with a number of invited talks.

With much anticipation we will also be opening our new research laboratories in January 2010 adding much needed research space to the existing Centre facilities.

CAMD Staff member, Rob Burford won the Caltex Teaching Award at the annual Chemeca meeting held in Perth. Prof. Burford also appeared on ABC radio talking on "The long and tortuous life of a polyester molecule" (broadcast 04/11). Martina Stenzel was awarded an Engineering Research Excellence Award at UNSW. Tom Davis continued his close collaboration with the Institute for Materials Research & Engineering (IMRE) in Singapore with an extended appointment as a Visiting Professor.

The Centre has also been pleased to host many international visitors in 2009, including; Dr Cécile Nouvel a visiting academic from the Laboratoire de Chimie Physique Macromoléculaire, CNRS-Nancy University - *France*; Mr Mario Luzon who spent 6 months visiting from the Instituto de Ciencia y Tecnología de Polímeros, Madrid - *Spain*; André Pfaff, a PhD student in Prof. Axel H. E. Müller's group, Makromolekulare Chemie II, University of Bayreuth - *Germany* and Constance Teo, a practicum student visiting from the National University of Singapore (NUS) - *Singapore*. Current visitors include Bjorn Bergmann (Johannes Gutenberg University Mainz, Germany) and Yingkai Liu (a lecturer from Shandong Institute of Light Industry of China, *China*).

CAMD staff and students also spent time in overseas collaborators' laboratories, including Dr Cyrille Boyer who visited the laboratories of David Haddleton at Warwick University in Coventry, *UK* and Edgar Wong who spent six months in Karlsruhe, *Germany*. While in Europe, Cyrille Boyer and Mike Whittaker presented talks in *Dresden, Le Mans, Stockholm, Montpellier, Madrid, Coventry, Lyon, Arcachon and Karlsruhe*. Dr. Granville visited the University of Bayreuth, Makromolekulare Chemie II, in November on a collaborative research grant with Professor Axel Müller. Whilst overseas, he also gave lectures at Bayreuth and at the Instituto de Ciencia y Tecnología de Polímeros, CSIC, in Madrid, Spain.

On the personal front we celebrated the arrival of Martina's son, Julian on the 2nd of July.

Finally, on behalf of the Management Team and the Engineering Faculty at UNSW, I would like to acknowledge all the hard work of CAMD members who have contributed to this record-breaking year, with high quality research output, high levels of international engagement and new appointments and facilities leading us to what promises to be an even better year in 2010.

T.P. Davis.



UNSW
THE UNIVERSITY OF NEW SOUTH WALES
SYDNEY • AUSTRALIA

Celebrating **60** YEARS
of extraordinary achievement



Per B. Zetterlund graduated from The Royal Institute of Technology in Stockholm (Sweden) in 1994 with a M.Sc. in Chemical Engineering, and obtained his Ph.D. in the School of Chemistry at Leeds University (UK) in 1998. He carried out postdoctoral research at Griffith University (Brisbane, Australia) with A/ Prof. W. K. Busfield and Prof. I. D. Jenkins in nitroxide-mediated polymerization (NMP). In 1999, he became Assistant Professor at Osaka City University (Osaka, Japan) in the group headed by Prof. B. Yamada, and worked on kinetics/mechanism of high conversion radical polymerization, synthesis/polymerization of macromonomers, and NMP. In 2003, he moved to Kobe University (Kobe, Japan) and joined a large team headed by Prof. M. Okubo, where he was promoted to A/ Prof in 2005. A/ Prof Zetterlund joined CAMD in April 2009. Current research focuses on controlled/living radical polymerization (CLRP) in aqueous and CO₂ based dispersed systems for synthesis of polymeric nanoparticles. A/ Prof Zetterlund has published 83 peer-reviewed papers and 2 book chapters, and is a member of the IUPAC Macromolecular Division (IV) Subcommittee on Modeling of Polymerization Kinetics and Processes, and The International Polymer and Colloid Group. A/ Prof Zetterlund secured an ARC Discovery Grant in 2009 (2010-2012) for research on CLRP in miniemulsions induced by compressed CO₂.

Andrew B. Lowe gained his PhD in Polymer Chemistry in 1997 at the University of Sussex, UK. After a post-doctoral Research Fellowship at the same university he moved to the University of Southern Mississippi, USA. Here he was first appointed as Senior Research Fellow, then Assistant Professor, and finally Associate Professor of Polymer Science and Engineering at the School of Polymers & High Performance Materials. Andrew's research interests include; the application of chain Growth polymerization methodologies, specifically controlled radical and metathesis chemistries, for the synthesis of new stimuli responsive, water-soluble (co)polymers bearing a variety of functionality including groups of interest in nanomedicine. Additionally, he has recently investigated novel applications of the thiol-ene click reaction as well as the utilization of other click and click-like reactions in polymer and materials synthesis. Prof. Lowe has published over 65 peer-reviewed papers, contributed to 8 book chapters and is co-editor on 1 book: "Polyelectrolytes and Polyzwitterions: Synthesis, Properties, and Applications". In 2009 he was both awarded a Doctor of Science (DSc) degree by his alma mater, the University of Sussex, and appointed to the editorial board of *Polymers*. He joined CAMD in May 2009 as a full Professor.



Postdocs from left to right:

Dr Xin Huang Dr. Huang obtained his PhD in physical chemistry and physics from the Jilin University (China) in 2009. He joined CAMD in October 2009 as a postdoctoral researcher under the supervision of Prof. Tom Davis and Dr. Volga Bulmus to develop and optimise siRNA based systems for gene knockdown. Using reversible addition fragmentation chain transfer polymerization (RAFT), as well as conventional polymerization techniques, Dr. Huang will develop architecturally and functionally controlled polymers for bioconjugation to RNA to improve stability, delivery and site-specificity of RNA based therapeutics.

Dr. Antoine Bousquet Dr. Bousquet obtained his PhD in polymer chemistry from the Université de Bordeaux (France) in 2008. He joined CAMD in January 2009 as a postdoctoral researcher under the supervision of A/Prof. Martina Stenzel. His project focuses on the RAFT-HDA project, a combination of RAFT polymerisation and click chemistry using the Hetero Diels Alder cycloaddition reactions developed in CAMD. The aim is to optimise this chemistry, synthesising different macromolecular architectures with controlled functionality.

Dr. Vincent Ladmiral Dr. Ladmiral obtained his PhD in polymer chemistry from the University of Warwick (UK) in 2006. He then joined Professor Fukuda's laboratory, Kyoto University, Japan, and applied surface-initiated polymerization to the synthesis of hybrid nanoparticles. He has also undertaken postdoctoral research at the University of Leeds, UK, and in the Key Centre for Polymer and Colloids (KCPC, Sydney). He joined CAMD in May 2009 as a postdoctoral researcher under the supervision of Prof. Tom Davis and in collaboration with Dr. Volga Bulmus and Prof. Richard Evans. This project aims to synthesize novel macromolecular architectures capable of reversibly capturing carbon dioxide. The self-assembly of these polymers in aqueous systems is will be examined.

Dr Siqing Cheng Dr. Cheng obtained his PhD in physical chemistry from the Sichuan University (China) in 2001. He joined CAMD in November 2009 as a postdoctoral researcher under the supervision of A/Prof. Per B. Zetterlund working on the controlled/living radical polymerisation in environmentally friendly miniemulsions. In this project carbon dioxide induced miniemulsions will be developed for performing nitroxide-mediated radical polymerisation to study particle size effects on the polymerisation in terms of mainly control/livingness (control over molecular weight distribution and chain end functionality). This will in turn enable preparation of novel polymers, polymeric nanoparticles and nano-materials with a wide application range.



In 2009 CAMD was pleased to accept eight new postgraduate students undertaking their PhDs (left to right):
Cameo Song: Synthesis and surface modification of polymeric microspheres for drug therapy diagnostics (Granville)
Wei Scarano: Synthesis and characterization of core-shell particles for the delivery of anticancer drug (Stenzel)
The Vien Huynh: Synthesis of polymeric platinum complexes for anti-cancer drug delivery (Stenzel)
Alyse Harvison: Thiol-based Click Chemistry and (co)polymer functionalisation (Lowe)
Alex Soeriyadi: Establishing in-depth understanding of molecular degradation process in acrylic based polymer coil-coating for domestic roofing applications- (Davis/Whittaker)
Da Wei Pu (David): Nitroxide-mediated polymerisation of CO₂-expanded vinyl monomers using nitroxides TEMPO and SG1 (Zetterlund/Lucien)
Yoseop Kim: Core-shell drug delivery system for Albendazole (Stenzel)
 Not shown: **Yi Guo (Adrian):** Nitroxide-mediated radical polymerization in aqueous miniemulsion (Zetterlund)

WHERE ARE THEY NOW ?



Philipp Vana

Philipp Vana, who spent 2 years at CAMD (2001-2003) as Research Fellow (on an Erwin Schrödinger Fellowship of the Austrian Science Fund) is currently Professor at the Institute of Physical Chemistry, Georg-August-University, Göttingen, Germany. Philipp's current research focuses on the application of RAFT polymerisation including:

- synthesis of complex macromolecular architectures and functional polymers
- biomimetic polymer design
- polymerizations from surfaces
- organic-inorganic hybrid materials
- kinetics and mechanism of RAFT polymerization
- modelling and simulation of polymerization processes.

Philipp is also interested in the application of the latest Electrospray Ionization (ESI) Mass Spectrometry techniques to investigate the macromolecular microstructure and end-groups of polymers, mechanism and the kinetics of radical initiator decomposition. Philipp has a career total of over 70 peer-reviewed papers
 You can learn more about him at this link:
<http://www.fpm.chemie.uni-goettingen.de/pvana.htm>

Dax Kukulj finished his PhD in 1997 and moved to the UK to pursue a post doc at the University of Warwick working with David Haddleton in the area of Atom Transfer Radical Polymerisation. From there he joined Unilever Research as a Program Leader, where he led a team developing and applying polymers in fabric care applications. After four years in the UK, Dax was looking for opportunities to move back to Australia and he joined RPO at its outset and was responsible for developing the company's core polymer waveguide technology for applications originally in fibre optics, and now focused on optical touch screens. Dax has played a critical role in the company's customer engagement activities, including securing a strategic partnership with a world-leading electronics supplier to commercialise RPO's technology. He has also been active in supporting the company's fundraising activities with major international investors and managed the corporate restructuring to establish a US parent entity. Dax has also secured several large government grants for both RPO and working as a consultant to help other start up companies to secure government funding vital in progressing their commercialisation objectives. <http://www.rpo.biz>



Dax Kukulj

2009 HIGHLIGHTS AND UPCOMING EVENTS

Nanomedicine 2009

CAMD, with KCPC (Sydney University) jointly organized the Nanomedicine 2009 Conference on Coogee Beach, on 13th February 2009. Attended by 120 delegates from polymer and medical science and industry, the conference proved to be a very successful event. The welcoming address was given by Prof. Les Field, Deputy Vice Chancellor - Research (UNSW)

Invited Speakers (left to right):

Prof. Joachim H. Wendorff (Universität Marburg)
Prof. Charles McCormick (University of Southern Mississippi)
Dr. Brian Hawkett (University of Sydney)
Dr. Volga Bulmus (University of NSW)
Prof. Stephen J. Kent (University of Melbourne)
Prof. Mike Cortie (University of Technology Sydney)
Prof. Frank Caruso (University of Melbourne)
Prof. Mark Kendall (University of Queensland)
Prof. Justin Gooding [not pictured] (University of NSW)



The KCPC and CAMD were also proud to host a special seminar given by Prof. Kris Matyjaszewski as part of the Nanomedicine 2009 symposium. Prof. Matyjaszewski is one of the leading polymer scientists in the world having conducted ground breaking research in living free radical polymerization and its applications. He has 500 peer reviewed journal publications and is the 4th most cited chemist in the world in the last decade.

The Sydney 2010 International Nanomedicine Conference will be held at the same venue 30 June - 2 July 2010 for details visit <http://nanomed2010.org>



New Website

If you haven't done so already, please check out the "new-look" CAMD web-site. This site was launched on Friday 26th June 2009. The pizza-and-drinks launch party was attended by current CAMD members and local alumni. The Dean of Engineering, Prof. Graham Davies, also dropped in to enjoy the festivities. On the web-site you can find the latest publications of CAMD, staff profiles, the popular rate constant calculator, photos from the 2009 Xmas party (plus other social events), and alumni contacts. We encourage all alumni to keep their current details up-to-date.

32APS

CAMD's A/Prof. Martina Stenzel is the chair of the 32nd Australasian Polymer Symposium (32APS) which is organised on behalf of the Royal Australian Chemical Institute (RACI) Polymer Division. The APS conferences are world recognised forums, highlighting the excellence of polymer research in the Australian-Asian region. The 32APS will be held from 13 to 17 February (2011) at the Novotel Pacific Bay Resort in Coffs Harbour.

The Australasian Polymer Symposium is a feast of polymer science covering all topics ranging from polymer synthesis, characterization, physics of polymers, engineering to materials. Topics will span from fundamental polymer science such as modelling to applied materials. A considerable portion of the APS is always dedicated to the interface of polymer science with other disciplines such as biomaterials, nanomaterials and surface science. Please check out their web-site for further information. We hope to see you there!



Centre for Advanced Macromolecular Design
School of Chemical Sciences and Engineering
The University of New South Wales
UNSW Sydney NSW 2052 Australia
Tel: +61 2 9385 4964
Fax: +61 2 9385 6250
Email: camd@unsw.edu.au
Web: camd.unsw.edu.au



Newsletter Coordinator:
Dr Michael Whittaker
Artwork:
Dr Istvan Jacenyik