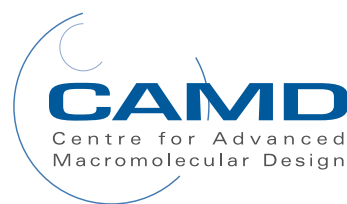


CAMD NEWS

December 2010



News from the Centre for Advanced Macromolecular Design

Director's message

CAMD – One Decade Old

Ten years have passed since CAMD was formed, and a lot has happened since I completed all the Centre proposal paperwork whilst on Sabbatical at Queen's University ten years ago. We continue to grow our output, with more than 60 refereed papers published in 2010 and a broad current portfolio of projects including mine site regeneration, algal bloom mediation, environmental degradation of coatings (and hopefully prevention of!!), in addition to our fundamental programs supported by the Discovery program of the Australian Research Council. In celebration of the decade we have published a review on RAFT for Nanomaterials scheduled as a cover article for the Journal of Polymer Science in early 2011 and we plan to have a function at UNSW in the first half of 2011. Also, after ten years, I am starting a new UNSW Research Centre, "The Australian Centre for Nanomedicine" – a collaborative Centre with the Science and Medicine Faculties, together with a co-Director, Professor Maria Kavallaris at the Children's Cancer Institute Australia (CCIA).

2010 started strongly with CAMD making major contributions to the new RSC Journal Polymer Chemistry, with two major reviews and the cover of the inaugural issue. CAMD staff made strong contributions to International Conferences: I was involved in the organisation of a Symposium at the IUPAC World Congress in Glasgow and Andy Lowe organized a Symposium at the Fall ACS in Boston, in honour of Professor Charlie Hoyle who sadly passed away in 2010. Per Zetterlund was involved in organizing two symposia at Pacificchem in Hawaii. CAMD Staff organized a 3-day International Nanomedicine Conference at Coogee Beach.

As usual we have had an ebb and flow of staff and students at CAMD. We farewelled two staff members: Dr Volga Bulmus who has taken a Faculty position at Izmir Institute of Technology in Turkey and Dr Jingquan Liu who has become a Professor at Qingdao University in China. They both contributed hugely to the recent projects of CAMD and they will be missed – although hopefully we will continue in active collaborations with both.

In terms of International exchange and interaction, three CAMD PhD students spent time in Europe: Edgar Wong at Karlsruhe, Alex Soeriyadi at Warwick and Karlsruhe and Sam Pearson at Pau. We hosted a number of visiting PhD students: Marco Oliveira from the Universidade Federal de Rio de Janeiro in Brazil as a part of collaboration with Professor Jose Carlos Pinto, with Per Zetterlund and myself; Jay Syrett from Warwick University as a continuation of a long standing collaboration with Professor David Haddleton; Arthur Bertrand from INSA de Lyon and Pierre Escalé from the Université de Pau et des Pays de l'Adour.

We were pleased to welcome back Dr Cécile Nouvel from the Laboratoire de Chimie Physique Macromoléculaire, CNRS-Nancy University, as a part of a longer-term exchange collaboration.

We also hosted Yin Chen from ETH, Zurich and Cyril Curado, Julien Ferreira and Alexandre Mulot all from the University of Technology of Troyes, France and Fredrick Nystrom from the University of Uppsala, who followed in the footsteps of his brother (Daniel) in spending time at CAMD.

In terms of awards, Martina Stenzel received the Le Fevre Prize from the Australian Academy of Science, Andy Lowe was admitted as a Fellow of the Royal Society of Chemistry (FRSC) and Steve Jacenyik (CAMD Manager) received his Doctor of Pharmacy title from Semmelweis University, Budapest.

We were successful in new Discovery research grants awarded by the Australian Research Council: New Polymers for Imaging Applications (\$190K p.a.) to Cyrille Boyer, Andy Lowe, Tom Davis and Sophie Laurent; Organic-Inorganic Hybrids... (\$120K p.a.) to Andy Lowe and Crosslinked Micelles for Drug Delivery (\$150Kp.a.) to Martina Stenzel, David Morris and Mohammed Pourgholami.

Tony Granville led a successful Equipment grant application for new thermal analysis equipment and CAMD researchers participated in a successful bid for upgrading the NMR Facilities in Chemistry – on a proposal led by Jim Hook.

So, unquestionably, yet another highly productive and successful year. I would like to thank all my colleagues and the students in CAMD for their hard work, in particular our Deputy Director, and the Head of the Chemical Engineering School, Rob Burford. I also wish to acknowledge the invaluable contribution of the Dean of Engineering, Graham Davies and the Deputy Vice Chancellor Les Field for strongly supporting our Nanomedicine initiative.

The strong Management Team of Steve Jacenyik and Mikey Whittaker continue to be the backbone of our success and they have now been joined by Carla Gerbo who will take responsibility for the launch and management of the new Australian Centre for Nanomedicine (ACN).

Best wishes for 2011.

T.P. Davis



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Dr. Cyril Boyer has received his PhD in polymer chemistry, in 2005 from the University of Montpellier II (Ecole Nationale Supérieure de Chimie de Montpellier) under the guidance of Profs. J.J. Robin and B. Boutevin. His PhD was in collaboration with Solvay-Solexis and devoted to the synthesis of new graft copolymers using grafting "to" approach. In 2005, he undertook a position as engineer with Dupont Performance and Elastomers and Dr. B. Ameduri, dealing with the synthesis of original fluorinated elastomers using controlled radical polymerization (e.g. iodine transfer polymerization). In October 2006, he joined the Centre for Advanced Macromolecular Design (CAMD) as a senior research fellow under the direction of Prof. Tom Davis. In 2009, he received an Australian Post-Doctoral Fellowship. His research interests mainly cover the preparation of well-defined polymers, protein/siRNA-polymer conjugates and hybrid organic-inorganic nanoparticles using controlled radical polymerization for imaging and drug delivery, and energy storage (with François Aguey). He has been recently invited as a Guest Editor with Profs. Destarac and Tsarevsky in the International Journal of Polymer Science dedicated to Advanced Synthetic Methodologies for the Functionalization of Well-Defined Polymers (<http://www.hindawi.com/journals/ijps/si/asm.html>). He is also lecturing in the School of Chemical Engineering in Organic Chemistry, Polymer Science and Food Sciences. He has co-authored over 65 peer-reviewed research papers, 2 book chapters and 3 international patents, generating more than 900 citations. He has been awarded two ARC discoveries (2009 and 2010), one early career research grant (2009) and one UNSW research grant to develop new energy storage.

Dr. Anthony Granville graduated from the University of Akron, Ohio in April of 2004 with a PhD in polymer chemistry under the supervision of Professor William Brittain. His doctoral research dealt with the synthesis of stimuli-responsive semi-fluorinated polymer brush coatings generated using surface initiated ATRP. Afterwards, he took up a postdoctoral position at CAMD under the supervision of Professor Tom Davis and Dr. Martina Stenzel shortly thereafter. For nearly two and a half years, he was researching the RAFT synthesis of glycopolymer materials, their protein binding, and use in targeted delivery systems. Towards the end of this time, Dr. Granville began to lecture courses at UNSW and expand his role into more of the academic side as well as research. In the middle of 2008, he obtained an Academic Fellowship position at UNSW, a lecturer position allowing for the full-time lecturing of courses, applying for research grants, and directly supervising his own PhD students. In this same year, he also became the academic co-ordinator for the Industrial Chemistry Co-operative Education programme. Also in 2009, he hosted one student from, as well as travelling himself to, Professor Axel Mueller's laboratory at the University of Bayreuth on their shared collaborative research grant. His current research work involves the synthesis of nano- and microsphere polymer particles for drug delivery and diagnostic devices, surface functionalisation of polymeric optical fibres (in conjunction with Dr. Kok Hou Wong at the School of Electrical Engineering), and functionalisation of magnetoelastic substrates for biosensors.



Postdocs from left to right:

Dr. Simon Ting completed his PhD in 2010 under the supervision of Assoc. Prof. Martina Stenzel and took up a post doctoral position in CAMD. His PhD project focused on the synthesis of glyco-materials via controlled/living radical polymerization used for biological recognitions. The use of reversible addition-fragmentation transfer (RAFT) and nitroxide-mediated radical polymerization (NMP) were the two main techniques employed in synthesizing carbohydrate-based micelles, nanoparticles and honeycomb structured films. He is currently working with Assoc. Prof. Per Zetterlund on low energy miniemulsion polymerization and the mechanism of RAFT polymerization

Dr. Sandra Binauld graduated in 2006 with a Master degree in materials science and engineering from the National Institute of Applied Sciences of Lyon (INSA Lyon), with a specialization in polymer chemistry. She received her PhD degree in 2009 from the University of Lyon (France), after working with Dr. E. Drockenmuller and Pr. E. Fleury on the elaboration of linear and cyclic polytriazoles using the CuAAC click chemistry reaction. Since March 2010, she has been working as a Postdoc in CAMD, under the supervision of Assoc. Prof. Martina Stenzel, where she is developing new polymeric drug delivery systems for the release of platinum anticancer drugs.

Dr. Peter J. Roth joined CAMD in May 2010. He studied chemistry at the University of Mainz, Germany, and the University of Massachusetts (Amherst, USA), receiving his diploma in chemistry in 2006 on the synthesis and functionalization of gold nanoparticles in the group of Dr. Patrick Theato. He undertook his PhD studies at the University of Mainz, jointly supervised by Prof. Rudolf Zentel and Dr. Patrick Theato and at Seoul National University (South Korea), supervised by Prof. Byeong-Hyeok Sohn. His research targeted the end group functionalization of RAFT polymers, as a stipend holder of the International Research Training Group on optoelectronics and as a colleague of the Graduate School of Excellence "Materials Science in Mainz". He obtained his PhD in chemistry in 2009 and a pre-degree in psychology in 2010 from the University of Mainz. His current research involves the synthesis of functional polymers based on "click"-chemistry, their self-assembly into micelles and vesicles, and their stimulus-responsive properties.



In 2010 CAMD was pleased to accept ten new postgraduate students undertaking their PhDs (left to right):

- Siti Hajjar Che Man** (Universiti Teknologi Malaysia) ATRP in aqueous miniemulsion for the synthesis of polymeric nanoparticles by use of low energy miniemulsification procedures (**Zetterlund**)
- Jinna Liu** (Wuhan University, China) New copolymer materials via RAFT (**Boyer**)
- Soli Le-Masurier** (UNSW) Coating magnetoelastic materials with polymers to manufacture highly sensitive, wireless and cheap biosensors (**Granville, Davis**)
- Adrian (Yi) Guo** (Tianjin University, China) Nitroxide-mediated radical polymerization in aqueous miniemulsion (**Zetterlund**)
- Johannes Arend van Hensbergen** (UNSW) Preparation of complex macromolecules using living Ring Opening Metathesis Polymerization (ROMP) and thiol-based 'Click' chemistry (**Burford, Lowe**)
- Ted Chang** (University of California, Santa Barbara) RAFT polymerization to synthesize self-assembling aggregates to investigate their cellular uptake behaviour for determining the optimum structure as a drug delivering carrier (**Stenzel**)
- Yusuke Sugihara** (Kobe University, Japan) Low-energy miniemulsion polymerization and application to controlled/living radical polymerization (**Zetterlund**)
- Ray Quek** (UNSW) Amidine containing polymers for drug delivery (**Lowe, Davis**)
- John Rondolo** (UNSW) Synthesis of inorganic/organic hybrid nanoparticles with a focus on iron oxide nanoparticles (**Davis, Boyer**)
- Yong Chen** [not shown] (Dalian University of Technology) Glycopolymers with various structures and the mechanism of how the presentation of carbohydrates affects their efficiency on binding to their specific proteins (**Stenzel, Whitelock**)

WHERE ARE THEY NOW ?



Lisa Muratore

After completing my PhD in "Synthesis of Novel Contact Lens Materials" in 1999, I commenced employment with GlaxoSmithKline (GSK) as a production supervisor in their production facility at Ermington. In 2001 I moved into a Continuous Improvement role and was formally trained in the Lean Six Sigma methodology as a Lean Six Sigma Black Belt. In 2003 I left GSK and commenced work for Luxottica as an Operations Manager in charge of their Anti Reflective Coating facility at Chipping Norton. In 2004 I was promoted to Manufacturing Manager for Australia and New Zealand. In 2005 I became a Director of Segla International Pty Ltd (Segla). Segla provides training and consulting in business efficiency solutions, utilising the Lean Six Sigma Methodology. Segla is also a Registered Training Organisation (RTO) and is a provider of accredited training in the nationally endorsed Competitive Manufacturing and Business Services Training Packages.

John Quinn

I completed my PhD at the Centre for Advanced Macromolecular Design in mid 2002. My PhD studies were in the area of RAFT Polymerization – I was the second person at CAMD to use this process, and the first for whom it was the main subject of a thesis. I looked at two main classes of thiocarbonylthio compounds: dithiobenzoates and phenyldithioacetates, and in particular the kinetics and mechanism of the polymerization mediated by these compounds. A substantial part of my thesis was devoted to performing RAFT polymerization at room temperature and in conjunction with ionizing radiation as a source of initiation. During this period the labs were renovated and there was a significant change in the CAMD personnel. When I started there were 7 PhD students. By the time I finished there were 7 postdocs and about 13 PhD students! Since finishing at CAMD I have done a number of different things work-wise. For the first six months I worked as Acting Dean at one of the residential colleges at UNSW, handling student admissions and student welfare issues. After this I moved to the University of Melbourne (2003-2007), where I postdoc-ed in the group of Professor Frank Caruso. During this time I worked on stimuli responsive surfaces, anti-fouling coatings, nanoporous materials and hydrogen-bonded films. In mid-2007 I had my first career change, switching to intellectual property law and working as a Technical Assistant in the Melbourne office of patent attorney firm Phillips Ormonde Fitzpatrick. This was a great couple of years, doing something I would never have imagined when finishing my PhD. I also completed a Graduate Diploma in IP Law during this period. In 2010 an opportunity arose to return to UNSW and work as the Dean of Residents at the new postgraduate residential college on campus, so (for now) it is back to student welfare. Being back at UNSW is interesting, and I am hoping to dabble in a bit of polymer research again. Certainly a PhD from CAMD has opened a lot of unexpected doors!



2010 HIGHLIGHTS AND UPCOMING EVENTS

Nanomedicine 2010

The very successful 1st International Nanomedicine Conference Sydney 2010, organized by the CAMD management team and chaired by Profs Tom Davis and Maria Kavallaris, was held in Coogee Beach, June 2010. The conference was attended by nearly 200 delegates, with representation from Europe, United States and Australia. Over the 3 days we were treated to 58 excellent oral and 23 outstanding poster presentations.

Inspirational Highlight Plenary talks were given by five world leaders in nanomedicine

Professors (left to right)
Samuel Stupp (USA)
Gordon Wallace (OZ)
Tariq Rana (USA)
Patrick Stayton (USA)
Frank Caruso (OZ)



The outstanding science presented initiated great discussions and the associated social events provided the perfect forum to exchange ideas and form new research collaborations. Of the 4 "Industry and Investment NSW Awards for Excellence in Nanomedicine Research" 2 went to CAMD researchers (Peter Roth and Vien Huynh), presented by Professor Mary O'Kane, NSW Chief Scientist and Scientific Engineer. We were also lucky at the raffles, the iZON Raffle Prize pack (the raffle raised \$ 1,000.00 for the Children's Cancer Institute Australia) went to Soli Le-Masurier and the Davies Collison Cave Lucky Door Prize (a bottle of 2002 Grange Bin 95) was picked up by Martina Stenzel.



New Laboratory

Certainly the highlight of 2010 for our students and postdocs was the opening of new additional CAMD laboratories in April. These specially designed work spaces effectively doubled CAMD laboratory space providing work benches and fume hoods for 20 researchers. Now, in hindsight, it is barely conceivable that we all worked so effectively confined to the previous space. Special recognition goes to **Dr Leonie Barner** for getting the ball rolling in 2007 (yes it took that long!)....thanks Leonie!

2nd International Nanomedicine Conference

**Prof Tom Davis welcomes you to the
2nd International NanoMedicine Conference
Coogee Beach Sydney - 14-16 July 2011**

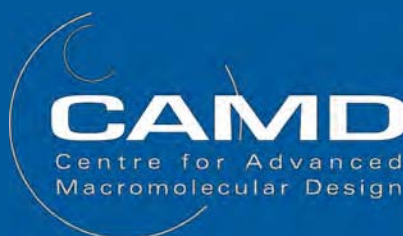
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Invited Speakers Include: Highlight Plenary : Prof Ian Frazer, Diamantina Institute for Cancer, Immunology and Metabolic Medicine (DI) | Prof Calum Drummond—CSIRO Materials Science & Engineering | Prof Justin Gooding UNSW | Prof Justin Cooper-White, AIBN | Prof Istvan Toth, UQ | Prof Mark Kendall, AIBN | Dr Suzanne Smith, ANSTO | Prof Neil Foster, UNSW | Prof Nicolay (Nick) Tsarevsky, Southern Methodist Uni Dallas | A/Prof Nigel McMillan, DI | A/Prof John Forsythe, Monash Uni | A/Prof Jagat Kanwar, Deakin Uni | A/Prof Nigel McMillan, UQ | Dr Volga Bulmus, Institute of Technology, Turkey | Dr Simon Moulton UofW



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