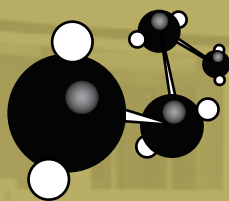


NEWSLETTER

Faculty of Engineering and Applied Science CHEMICAL ENGINEERING



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2010 - YEAR IN REVIEW

Another eventful year is drawing to a close, and as the holiday season approaches, it is time to reflect on our accomplishments for the year. 2010 has been an exciting year of changes - new people, updated facilities, and accomplishments to celebrate. Dr. Dominik Barz and Dr. Steven Liss joined the department this year. Dr. Liss is the new Vice-Principal Research, and he holds a cross-appointment in our department. He has new graduate students starting their programs in Chemical Engineering, and we are very pleased that he has joined us. Dr. Liss oversees the research portion of the Queen's University mission, which in fiscal 2007/08 attracted \$180M in research funding to the university. Queen's placed fourth in the research intensive category of Canada's Top 50 Research Universities in 2008, and is ranked third in NSERC/CIHR funding, the federal agencies that support research in the natural and health sciences and engineering. Queen's tops all universities in the number of national research awards per full-time faculty member and has maintained this ranking for 6 years. Dr. Liss brings expertise in environmental biotechnology and engineering, and is profiled in this edition of the newsletter. Dr. Barz, who was profiled in our previous newsletter, brings expertise in microfluidics and electrochemical engineering. He is gearing up to teach a new course in Electrochemical Engineering this winter, and he is busy establishing his research lab. Dr. Barz's expertise in electrochemical engineering and micro-power sources is particularly timely as the demand for alternative and portable energy sources has never been greater.

We have been renovating our basement! Actually, the basement in this case is our Pilot Plant, which has served us well over the years but was badly in need of a facelift. We have a new polymer processing arena that includes extruders, mixers, presses and an injection moulder, to be used by undergraduate and graduate students and faculty for research and teaching. Our undergraduate pilot plant lab has been renovated with a new floor, a fresh coat of paint, and new benching to accommodate our newer laboratory equipment. And speaking of lab equipment, we have a new modular humidification experiment which we are using to support our mass transfer course, which joins ion exchange, heat transfer, and gas expansion experiments purchased over the last few years. These renovations and equipment have been possible because of the support of our alumni, the undergraduate student Better Equipment Donation (BED) fund, and the Dean of the Faculty of Engineering and Applied Science.



Pilot Plant

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DEPARTMENT NEWS

POLYMER PROCESSING SOCIETY HONOURS PROFESSOR KONTOPOULOU

The Polymer Processing Society (PPS) awarded the 2010 Morand Lambla Award to Dr. Marianna Kontopoulou at a ceremony during the *26th Annual PPS Conference* held in Banff, Alberta in July, 2010. The Morand Lambla Award is presented each year by the PPS to a young researcher who shows originality, high achievement and potential for continued creativity in the science and technology of polymer processing.

Dr. Kontopoulou's research interests include polyolefin blends and composites, polymer nanocomposites, thermoplastic vulcanizates, thermoplastic elastomers, and electrically conductive composites. She has also been involved in projects related to polymers and polymer rheology in biomedical applications and polymer joining processes. She is recognized for her contributions in material development for a wide-array of industrial processes, such as automotive applications, rotational molding, thermoplastic foaming, and films. Her highly cited work on polyolefin nanocomposite blends has advanced knowledge on these complex multiphase systems, leading to new approaches for obtaining well-controlled structures with improved properties.

She has co-authored more than 100 scientific publications, including peer-reviewed journal papers and refereed conference proceedings. She has served as technical program committee chair, organizer and moderator for major international scientific conferences and has delivered invited lectures in academic and industrial settings. She is the vice-president of the Canadian Society of Rheology (CSR) and a member of the Polymer Processing Society (PPS), Society of Plastics Engineers (SPE), Society of Rheology (SoR), American Chemical Society (ACS), and the Canadian Society of Chemical Engineering (CSCHE).



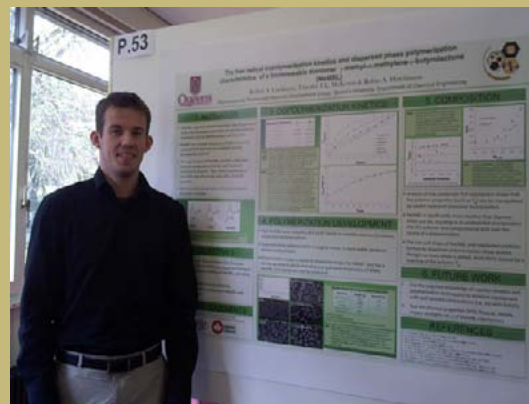
Marianna Kontopoulou
Ph.D., P.Eng.

DISTINCTION IN EUROPE - BOB COCKBURN

For Master's candidate Bob Cockburn, Hamburg, Germany was the place to be in October. It was at the 10th International Workshop on Polymer Reaction Engineering that Bob's poster presentation was awarded one of two poster prizes granted at the workshop. The prize, which is sponsored by Macromolecular Journals (Wiley-VCH) consists of books valued at 200 Euros and a one year subscription to the Macromolecular Reaction Engineering Journal.

Bob's poster titled "*The free radical copolymerization kinetics and dispersed phase polymerization characteristics of a biorenewable monomer gamma-methyl-alpha-methylene-gamma-butyrolactone (MeMBL)*" was co-authored by his supervisors Dr. Robin Hutchinson and Dr. Tim McKenna. MeMBL, a gamma lactone monomer, can be produced from biomass and thus has the potential to be a bio-renewable alternative to petroleum based monomers such as Methacrylates and Styrenics. The ring structure of MeMBL provides a high glass transition temperature (215°C) and improved resistance to solvents; therefore, there is a possibility of extending the operating range and utility of acrylic polymers. The authors have used Pulsed Laser Polymerization/Size Exclusion Chromatography (PLP/SEC) techniques to investigate copolymerization kinetics and have developed methods of producing copolymers of MeMBL with MMA, ST and BA.

In future, Bob, along with his two supervisors, are planning to use the acquired knowledge of reaction kinetics and polymerization techniques to produce copolymers with well tailored compositions for further study.



Bob Cockburn, Master's Candidate

LETTER FROM THE CEGSA PRESIDENT

During its second year of operation, the Chemical Engineering Graduate Student Association (CEGSA) has been helping to promote a shared sense of camaraderie between students, staff, and faculty alike.

Our many social events, ranging from backyard BBQ's, to paintball showdowns, to talent/music nights at Clark Hall Pub, have helped bring everyone together with great success. A continuing mission of CEGSA has been to promote community within the Department, so that even with the spatial separation of the many different research groups, we can still share a collective experience.

Additionally, the Executive has focused on representing the graduate students within the many broad departmental- and faculty-level initiatives currently underway at Queen's. Having a voice has allowed graduate students to work closely with the faculty in a variety of areas. Departmental infrastructure, both physical and electronic, as well as our continued involvement with the Departmental Speaker Series has allowed for positive developments in these programs, ensuring they remain current and relevant to the graduate students. In particular, the exciting line-up of excellent speakers this term has been a reflection of this work, and would not have been possible without close interaction with the Faculty.

We plan to continue these efforts and improvements into the future, and look forward to working with everyone in the upcoming term and over the years to come!

Sincerely,
Jonas Elliott Gerson, CEGSA President (2010/2011)

NEW VP (RESEARCH) CROSS-APPOINTED TO CHEMICAL ENGINEERING

On September 1, 2010, Dr. Steven N. Liss became the Vice-Principal (Research) at Queen's University. Dr. Liss was most recently the Associate Vice-President for Research at the University of Guelph. He holds an undergraduate degree in microbiology and immunology from the University of Western Ontario, and a Masters and Ph.D. in applied microbiology from the University of Saskatchewan.

His research focuses on environmental biotechnology and engineering, applied microbiology, wastewater and water microbiology, and microbial ecology and structures in engineered and natural environmental systems. His primary appointment at Queen's stands in the School of Environmental Studies but his cross-appointment to Chemical Engineering will allow him to explore engineering resources as well.

Working at the interface of biology, engineering, and environmental science, Dr. Liss has a strong orientation to interdisciplinary and collaborative initiatives. He was recently elected to the Management Committee of the International Water Association Specialist Group on Microbial Ecology in Water Engineering (MEWE). He has led numerous strategic research programs involving a range of collaborators, government and industry partners. His research has led to numerous publications and contributions including the book *Flocculation in Natural and Engineered Systems* (2005, CRC Press, Boca Raton, USA). Dr. Liss has supervised over 40 students at the Masters and Ph.D. level and he has a strong interest in international work with particular interests in Central and South America, China and India.

To add to his diverse range of research interests, Dr. Liss is also researching how government policies impact the contributions immigrants make to innovation and investigating how universities advance a country's social wealth.

We are proud to welcome Dr. Liss into the department and we hope he enjoys many years of collaborative research success at Queen's.



Stephen Liss, VP (Research)

WHERE IS CHEMICAL ENGINEERING NOW?

ENGINEERING & HUMAN MOBILITY

The Human Mobility Research Centre (HMRC) is a multi-disciplinary group of clinician-scientists, basic scientists and engineers interested in the mechanisms of musculoskeletal diseases and disorders. Originally formed as the Clinical Mechanics Group, the centre has vastly expanded its research. The working unit is located in the Syl and Molly Apps wing of the Kingston General Hospital and supports research in many aspects of human mobility. Contributing engineering departments include Mechanical and Materials Engineering as well as Chemical Engineering.

Four of our faculty members contribute their research in various ways to the treatment of bone and joint disorders and all of them have a hand in tissue engineering in some capacity. One of Dr. Brian Amsden's projects explores the development of synthetic synovial fluid to reduce osteolysis after a total hip replacement. Dr. Stephen Waldman focuses on connective tissue engineering to find alternatives to total hip replacement by synthesizing a tissue with similar properties to cartilage.

Dr. Lauren Flynn's research group studies adipose-derived stem cells and natural biomaterials in support of cartilage tissue engineering. Rounding out the chemical engineers is Dr. Kim Woodhouse whose work lies primarily in regenerative medicine and biomimetic materials.

Many of the graduate students who are supervised by these researchers are also registered in the Collaborative Biomedical Engineering Program, which grants a specialization to Master's or Doctoral students in Chemical Engineering, Mechanical & Materials Engineering and Electrical & Computer Engineering.



RAPIDLY EMERGING CLEAN ENERGY TECHNOLOGY!

QUEEN'S-RMC
FCRC

Fuel Cell
Research Centre

The Queen's-RMC Fuel Cell Research Centre is currently the only research centre housed entirely within the Faculty of Engineering and Applied Science at Queen's University. The FCRC is a truly multi-disciplinary group and includes Queen's and RMC faculty members from five different disciplines. Located at the Queen's Innovation Park, it is Canada's leading university-based fuel cell research and development organization. Working with various private sector partners, FCRC is advancing the knowledge base for addressing the key technology challenges to the wide-spread commercialization of fuel cell products.

FCRC was created in 2004 to address the need for a multi-disciplinary approach to fuel cell research. By partnering the strong group of Chemical Engineering fuel cell researchers with researchers from Mechanical and Materials Engineering, Civil Engineering, Mining Engineering as well as Chemistry, synergies have developed that have led to internationally recognized breakthroughs in fuel cell development. Research interests and FCRC include the modeling and development of innovative porous electrodes, catalysts catalytic reactor design for hydrogen production, new materials for hydrogen storage, detailed modeling of transport processes at the microscopic level within the fuel cell as well as the creation of completely new concepts for fuel cells (usually involving imaginative informal discussions at the Graduate Club).

The Director of FCRC is Dr. Brant Peppley, Professor and Canada Research Chair in Fuel Cells, who is a chemical engineer by training but holds a joint appointment between Chemical Engineering and Mechanical and Materials Engineering. The core of FCRC is the so-called Kingston Trio; Dr. Kunal Karan, Associate Professor Chemical Engineering and Associate Director of FCRC, Dr. Jon Pharoah, Associate Professor (Mechanical and Materials Engineering and Associate Director of FCRC. Other Queen's faculty members connected with FCRC include Dr. Aris Docoslis and Dr. Dominik Barz (Chemical Engineering), Dr. Pascale Champagne (Civil Engineering), Dr. Patrick Oosthuizen and Dr. Steven Beale (Mechanical and Materials Engineering), Dr. Boyd Davis (Mining Engineering), and Dr. Philip Jessop (Chemistry). From the Royal Military College, Department of Chemistry and Chemical Engineering, Dr. Christopher Thurgood and Dr. Cecile Malardier-Jugroot make important contributions in reactor modeling and design, and quantum mechanical analysis of fuel cell catalysts respectively.



Brant Peppley, FCRC Director

FCRC's unique strength lies in bringing together a strong multi-disciplinary team and providing them with a wide-array of resources for fuel cell research with which to explore breakthrough ideas and develop game-changing new fuel cell developments. The on-going strong support that has been provided by FCRC's industrial partners as well as CFI, NSERC and the Ontario Ministry of Research and Innovation is an indication that this research is considered a valuable part of the need to find clean energy technologies to address the challenges that currently are facing the planet earth.

LOCATION LOCATION LOCATION

BIOSCIENCES COMPLEX

The Biosciences Complex (Bi-Sci), connected on the south side of Earl Hall on Arch Street, houses some of Canada's most sophisticated facilities for research in biotechnology and molecular science. The showcase of the building is the atrium in the main entry, which offers student study space and art displays. Expansion of Earl Hall into the complex occurred in 1997, with the goal of providing more research space for bio-related sciences and technology, and providing larger lecture halls on campus. If you drive around this area of campus, look up and you will see the Phytotron on the roof, which contains six greenhouses. With the addition of a Tim Horton's, Bio-Sci (as it is affectionately nicknamed) has become a hub of student activity.

As the Department of Chemical Engineering grew, Dupuis Hall did not grow with it. Bio-Sci, fortunately, was able to house some of our research faculty laboratories. Dr. Brian Amsden's polymer laboratory is located in Bio-Sci and currently has a Waters HPLC and GPC system. Dr. Juliana Ramsay's laboratory investigates fermentation and bioremediation and contains a Gas Chromatograph Mass Spectrophotometer (GCMS). Dr. Ron Neufeld's laboratory is highly inter-disciplinary and collaborative and therefore accesses equipment and opportunities across campus and around the world. His research is focused on the micro and nanoencapsulation of biologically active materials.

Some of our faculty members' offices are located in Bio-Sci as well as student workspaces which allows close interaction in graduate research projects.

CONTINUED FROM PAGE 1

In a time of budget challenges, having endowments and student funds provides a vital means to enhance the laboratory experience for our undergraduate and graduate students.

Along with the Pilot Plant renovations, we have also been consolidating and upgrading some of our graduate research labs on the third floor of Dupuis Hall. Finding space - both quantity and quality - is a constant challenge, both in the department, and across the Faculty of Engineering and Applied Science. We are hard at work trying to solve this problem. Please keep looking in the months ahead for more details about our plans.



Polymer Processing Arena

We have very talented students, faculty and staff in our department. This edition of the newsletter features Professor Marianna Kontopoulou, who this year was recognized by the Polymer Processing Society for her contributions and accomplishments as a young researcher. Mr. Bob Cockburn, a Master's student under the supervision of Professors Hutchinson and McKenna, achieved distinction at an international polymer reaction engineering workshop in Germany, and his accomplishments are also featured in this newsletter.

Financial support from alumni and external organizations is very important as we strive to offer the best undergraduate and graduate programs of education. Shell Canada has been a very generous supporter, having donated \$825K to the department over the past 6 years to support the Technology Engineering and Management (TEAM) program, and our Oil and Gas Speakers Series. This generous financial support has been matched with another precious gift - the gift of time from the engineers and scientists at Shell Canada. Rob Seeley, General Manager for Sustainable Development with Shell Canada, has been a tireless supporter of the department in so many ways. He was instrumental in helping us obtain the financial support from his company, and he has been a tireless contributor as a mentor for TEAM projects, speaker in the Oil and Gas series, and supporter of our design in the curriculum initiatives. Rob is a classmate of mine from Sci '81, and it was particularly gratifying to see him receive the 2010 Mentorship Award from the Queen's University Alumni Association, in recognition of his significant contributions to our students and programs. Thank you Rob!

Through programs such as TEAM, our graduate research programs, and seminars and talks, the educational and professional development of our students is greatly enriched. I am pleased that we have such strong connections to our alumni, companies and organizations, and I would like to take this time to say "thank you" to all of you who have provided your time and support. I would also like to thank Jim Campbell, Manager of the Queen's Western Canada office in Calgary, who has been a great help in building contacts with our western Canadian alumni, and David Mody, who has put considerable time and energy into TEAM and the Oil and Gas Speakers Series, and has been a major point of contact with our alumni.

Finally, I would like to wish you and your families all the best for the holiday season, and to wish you Happy New Year for 2011. I hope that it is a great year for all of us.

All the best,

Jim McLellan

PROGRAM NEWS

UNDERGRADUATE COMPUTER FACILITY

Undergraduate students in Chemical Engineering and Engineering Chemistry pay for access to 42 computers in the Undergraduate Computer Facility (UCF), also called the computer “cluster”. These computers are prepared with specialized engineering software dedicated to supporting specific courses in their programs. While the software remains generally the same from year to year, the department endeavours to move both the software and hardware forward by making hardware upgrades every other year and keeping the software as up to date as possible.

The cluster is the main location on campus where Chem Eng Chem students have access to a full suite of specialized software. Access to the cluster is restricted to our 420 undergraduate students, and with only 42 machines available, we are always looking to improve student access to software. Software virtualization technologies may be the next step to bring our students to the leading edge of academic delivery. To accomplish this will require an investment in both hardware and software.

GRADUATE COURSES

Over the past year, the department has been reviewing its core course offerings for graduate students in an effort to make the offerings consistently available on either an annual or semi-annual basis. One course that was identified as a priority was CHEE890, *Advanced Polymer Structure and Properties*, a term-length course which is taught in conjunction with CHEE490. This course was identified as having considerable crossover of background information with CHEE872. Put a group of engineers in a room and they will come up with a solution!

Beginning this year, the Chemical Engineering Department offers CHEE990, module (half-term) course, *Structure-Property Relationships of Polymer Materials*, which offers the background information graduate students require for basic polymeric concepts. The department also instituted two new modular courses that use CHEE990 as a pre-requisite; both are intended to build on these basic concepts by taking students down two specialization pathways.

Those specialized courses are CHEE991, *Introduction to the Processing and Rheology of Polymeric Materials* and CHEE992 “*Polymeric Biomaterials*”. Students have the option to continue their basic polymer knowledge in either rheology or biological applications.

Another significant offering brought forward this year is CHEE906, *Entrepreneurship for Engineers*, where students evaluate the commercial potential of a technology or opportunity of their choice.

As the chemical engineering world changes, we are in a position to teach our students leading edge theories and technologies. We are in the process of introducing a course in Green Engineering, which will familiarize students with the greener alternatives to current engineering practices, chemistry and process design.

ALUMNI ASSOCIATION PRESENTS MENTORSHIP AWARD TO SCI '81 ALUMNUS



As the General Manager, Sustainable Development for Shell Canada in Calgary, Rob Seeley works diligently with students in TEAM - Technology, Engineering and Management and was recently honoured for his contribution to the education and development of Queen's students. With Shell, Rob has created many opportunities for Queen's students to contribute to innovative and pertinent research, including work on carbon capture and storage.

The 2010 Mentorship Award was presented on October 23, 2010 at the Alumni Awards Gala Dinner in Wallace Hall. This award recognizes a Queen's alumnus who has made a significant and ongoing contribution to the education and development of Queen's engineering students through a business or organization.

Rob Seeley (Sci'81)

ALUMNI PROFILE – TED GRANDMAISON



Ted Grandmaison
Ph.D., P.Eng.

THE HEART OF CHEMICAL ENGINEERING

If you want to know about changes in the Department of Chemical Engineering, just ask Ted Grandmaison. Currently a full professor, Undergraduate Coordinator and Associate Head in the department, Ted embodies the heart and soul of the undergraduate program. Having grown with us from his own days as an undergraduate student in the 1960's, he watched Dupuis Hall being built and it was the promise of a new facility that kept him at Queen's for his Ph.D.

Ted Grandmaison grew up in a pulp and paper district of western Quebec. His father was a paper machine superintendent and he spent his summers working at a chemical pulping mill. His interest in science and math along with encouragement that a career in engineering had better job prospects brought him to Queen's. As a graduate student and NSERC scholarship recipient, Ted earned a whopping \$4,500 (tax free in those days) annually, almost the equivalent of an engineering salary, which was \$6,000. After spending nearly 3 years as an engineer at Domtar's research centre, he chose to return to academia by taking up a tenure track faculty position back in the department. *"I considered this opening to be a once-in-a-lifetime chance"*, Ted says of his return, since faculty positions were scarce at the time. In January 1979, he stepped in front of a second year process analysis class that contained one James McLellan, the current Head of Chemical Engineering, and the rest as they say is history.

Over the years, Ted has taught many different courses, stretching outside of his area of expertise, even teaching process control while the then Dean David Bacon and Reg Clark were busy with other commitments. Convinced in 1980-81 to teach a course in industrial air pollution control (now CHEE 481), he has continuously taught it since then. His early interest in the pulp and paper industry remained and Ted was instrumental in establishing the Pilot Plant to study dry paper making. His research work continued collaboratively with his doctoral supervisor, Henry Becker, in the area of turbulent flows and fluid mixing phenomena, which also produced a steady stream of graduate students. One significant accomplishment was with the Centre for Advanced Gas Combustion Technology, which was established under the leadership of Dr. Becker. The primary facility was a large multi-burner research furnace. After a decade of research here at Queen's, the furnace was moved to Natural Resources Canada (NRC) in Nepean, Ontario, where it is still one of their major research facilities.

Nobody knows the undergraduate program like Ted Grandmaison! As Undergraduate Coordinator and following in the footsteps of Russ Code and John Downie, he has counseled untold numbers of students from 2nd to 4th year in both the ChemEng and EngChem programs. His seemingly infinite patience in dealing with undergraduate students has earned him the respect of students and colleagues alike. Program changes and accreditation regulations have challenged him over the years but Ted maintains a positive attitude. He never waivers from his focus to serve the students well and ensure their learning experience is a good one. Some day Ted will retire and there is no question that those will be big shoes to fill!

Your Development and Alumni Relations Team!

Our alumni and friends from the Department of Chemical Engineering have a long standing tradition of being engaged. Your support allows us to enhance the quality of the educational experience of our students. You can help through student internship or employment opportunities, design and research topics and sponsorships, as a guest speaker or financial funding for academic chairs, library resources, industry collaborations and curriculum initiatives. We invite you to contact our Development team at 613-533-6000 extension 75248 or 1-800-267-7837.

Jane McMillan, Senior Development Officer
Email: jane.mcmillan@queensu.ca

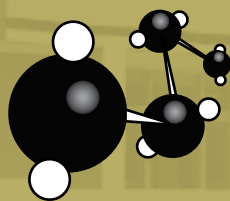
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NEWSLETTER

Faculty of Engineering and Applied Science CHEMICAL ENGINEERING



NEWSLETTER FEEDBACK

The Chemical Engineering Newsletter is a publication of the Department of Chemical Engineering, Queen's University, Kingston, ON K7L 3N6.

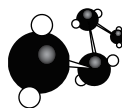
Its purpose is to provide news concerning faculty, staff and students in the department.

Comments and suggestions can be sent to newsletter@chee.queensu.ca or 613.533.2765.

Update your contact information at <http://alumni.queensu.ca/> and click on "Update My Profile".



*Dupuis Hall 2009
Photo credit Stephen Wild*



Faculty of Engineering and Applied Science
CHEMICAL ENGINEERING

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