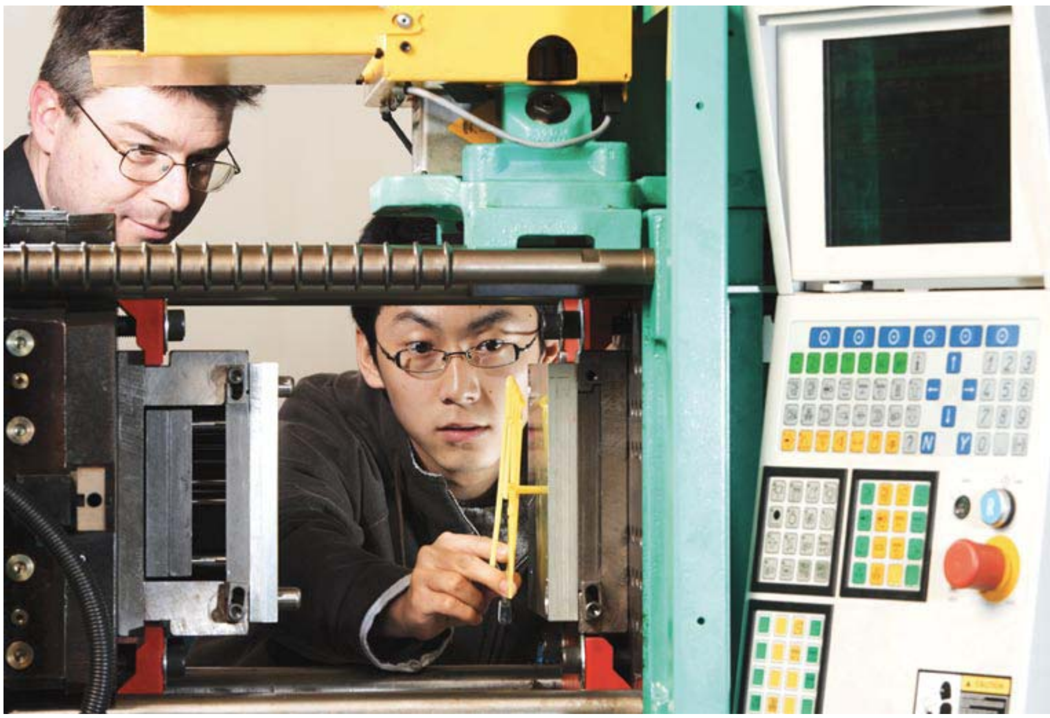
McMaster University
Chemical Engineering



Research Brochure 2009

McMaster University
Chemical Engineering

MESSAGE FROM THE CHAIR

This year we celebrated the 50^{th} anniversary of the Faculty of Engineering and the Department of Chemical Engineering. The founders of the Department set a high standard for excellence in teaching and research, and we continue that tradition through to today. Our research is focussed in three major areas within chemical engineering: *process systems engineering, polymer science and engineering,* and *bioengineering*. These research areas are linked to the undergraduate curriculum so that our students can benefit from the research expertise within the Department.

We welcome two new faculty members: Benoit Chachuat in the areas of process control and modelling and Todd Hoare who has interests in nanotechnology, polymer science and surface science and their application in biomedical applications.

We also congratulate a number of faculty who are now enjoying emeritus status: John MacGregor (Distinguished University Professor Emeritus), Tom Marlin, Paul Taylor, and John Vlachopoulos.
A number of our colleagues have been honoured with awards.

- Dr. Robert H. Pelton will receive the 2009 Chemical Institute of Canada Macromolecular Science and Engineering Award for distinguished contribution to macromolecular science or engineering. The award is sponsored by NOVA Chemicals Ltd. The award will be presented at the Canadian Chemistry Conference and Exhibition.
- Dr. Tom Marlin was awarded the D. G. Fisher Award for 2008 from the Systems and Control Division of the CSChE at the annual meeting held October 19-22 2008 in Ottawa. This is a well deserved recognition of Tom's important contributions to process control education and research, as well as academic-industrial research collaborations through MACC.
- Dr. John F. MacGregor has been named a Fellow of the Royal Society of Canada. His contributions span the areas of data analytic methods, advanced process control and polymer reaction engineering. Pioneering research on latent variable modeling approaches to interrogate large industrial databases led to an explosion in the use of these methods for the analysis, monitoring and control of industrial processes. Research on batch processes has been particularly influential. Recent research on digital imaging for process control and on the rapid development of new products is also noteworthy. His earlier research on polymer reaction engineering, involving fundamental modeling and advanced polymer property control, was instrumental in helping to define that field.
- Dr. John Vlachopoulos is the winner of the Stanley G. Mason award for 2007. The award is presented to a Canadian rheologist, or a rheologist who has worked in Canada, for exceptional contributions to the science of rheology.
- Dr. Don Woods, professor emeritus of chemical engineering, was presented with an honorary Doctor of Science degree at McMaster’s convocation ceremony held on June 7/07 in recognition of his many contributions and achievements especially in education. Don's reputation is that of an innovator in both chemical engineering and learning. He is perhaps most widely known as a pioneer of McMaster's distinctive learning strategies: inquiry and problem-based learning.

- Rena Cornelius, Research Engineer in Pathology & Molecular Medicine and the Department of Chemical Engineering received the President's Award for outstanding service at a ceremony held on May 15, 2008. Rena was recognised for her invaluable work in the various research groups, her training of students, TA's and staff in the research laboratories. Her membership on the McMaster Environmental Steering Committee and her involvement in the municipal waste reduction program, all enhances the reputation of the Departments' and McMaster through her commitment to excellence.
- Doug Keller, Lab Manager for the Department and Research/Lab Manager for SENTINEL and MIPPT, has been recognized for his tireless efforts and dedication to the Faculty and Department with the Veronika Czerneda Award. The Czerneda award recognizes staff for their exceptional quality of service, for their improvements of daily operations of their department or division, or through their contribution, which has enhanced the reputation of engineering. In addition to his Departmental work, Doug provided a large amount of time and support for a number of Faculty of Engineering initiatives related to Level I, the new Engineering Technology Building and coordinating computing resources for engineering design initiatives.

We have two research networks led by faculty in the Department.

Researchers from 10 universities across Canada, nine industry partners, and federal and provincial government agencies have formed a research consortium named the **SENTINEL Bioactive Paper Network** to develop low-cost and easy-to-use paper-based products with biologically active chemicals that can protect the public against increasing incidents of food-, water- and air-borne illnesses. The term "bioactive paper" was coined by **Dr. Bob Pelton**, scientific director of SENTINEL who specializes in pulp-and-paper research. Bioactive paper will offer immediacy, portability and low cost in detecting and repelling or deactivating harmful pathogens, right now it can take days or weeks to get samples to a lab, diagnose the problem and get the remedy into the field. Please see http://www.bioactivepaper.ca/ for more information

Vision problems affect millions of Canadians of all ages. Of the senses, issues with vision are arguably the most traumatic and the effects of vision loss are much broader than a loss of sight. **Dr. Heather Sheardown** is the principal investigator and leader for **20/20 NSERC Ophthalmic Materials Network**: **Materials for Improved Vision** is aimed at the development of new biomaterials and ultimately to new therapies for treating vision disorders. The research has the potential to touch on the lives of Canadians of all ages from the young children who must undergo repeated procedures for treating the cataracts that inevitably form when intraocular lenses are implanted in pediatric patients to the elderly who are suffering from age related macular degeneration and who must currently undergo monthly injections into the back of the eye. In the developing world, inexpensive and innovative solutions to vision problems are critical.

I hope that you find this research brochure informative about the many research activities within our Department. If you have questions, please contact me by e-mail at hrymak@mcmaster.ca or the contact information below.

Andrew Hrymak,
Professor and Chair
November, 2008

Department of Chemical Engineering
McMaster University
1280 Main Street West,

FACULTY AND STAFF

FACULTY

Brash, J.L.	B.Sc., Ph.D. (Glasgow), Dhon.Caus. (Paris Nord), P.Eng. *Emeritus Professor, University Professor*
Chachuat, B.	B.Eng. (National Engineering School, Strasbourg, France), M.A.Sc. (Louis Pasteur University), Ph.D. (Lorraine National Institute of Technology, France) *Assistant Professor*
Dickson, J.M.	B.A.Sc., M.A.Sc. (Waterloo), Ph.D. (Virginia Polytech. Inst. & State Univ.) *Professor*
Filipe, C.	B.S. (Escola Suprior de Biotecnologia, Portugal), Ph.D. (Clemson) *Associate Professor*
Ghosh, R.	B.S., M.S. (Jadavpur University, India), D.Phil. (Oxford). *Associate Professor*
Hoare, T.	B.Sc. (Eng., Queen's), Ph.D. (McMaster) *Assistant Professor*
Hrymak, A.N.	B.Eng. (McMaster), Ph.D. (Carnegie Mellon), F.C.I.C., P.Eng. *Professor and Chair*
Jones, K.J.	B.A.Sc. (Waterloo), M.Sc. (Guelph), Ph.D. (Toronto) *Assistant Professor*
Loutfy, R.	B.Sc., M.Sc. (Ain Shams University), Ph.D. (Western) *Professor*
Mahalec, V.	Dipl. Ing. (U. of Zagreb, Croatia), Ph.D. (Houston) *Professor*
Mhaskar, P.	B.T. (Indian Institute of Technology), M.S. (Louisiana State), Ph.D. (University of California, Los Angeles) *Assistant Professor*
Pelton, R.H.	B.Sc., M.Sc. (Guelph), Ph.D. (Bristol) *Professor*

Potter, D.	B.Sc., Ph.D. (Waterloo) *Associate Professor/Joint appointment with the Walter G. Booth School for Engineering Practice)*
Sheardown, H.	B.Eng. (McMaster), Ph.D. (Toronto), P.Eng. *Associate Professor*
Swartz, C.L.E.	B.Sc. (Cape Town), Ph.D. (Wisconsin-Madison) *Professor*
Thompson, M.R.	B.Sc., B.Eng., M.Eng. (McMaster), Ph.D. (Waterloo) *Associate Professor*
Wood, P.E.	B.A.Sc. (Waterloo), Ph.D. (Caltech), F.C.I.C., P.Eng. *Professor, Associate Vice-President, Student Affairs & Dean of Students*
Zhu, S.	B.Eng. (Zhejiang), Ph.D. (McMaster), P.Eng. *Professor (joint with Materials Science & Engineering)*

EMERITUS FACULTY

Baird, M.H.I.	B.Sc., (Glasgow); Ph.D., (Cambridge), F.C.I.C., P.Eng. *Emeritus Professor*
Crowe, C.M.	B.Eng. (McGill); Ph.D. (Cambridge), F.C.I.C. *Emeritus Professor*
Feuerstein, I.A.	B.Chem.Eng. (City College of New York), M.S. (Newark College of Eng); Ph.D. (Massachusetts) *Emeritus Professor*
Hamielec, A.E.	B.A.Sc., Ph.D. (Toronto), F.R.S.C., F.C.I.C., P.Eng. *Emeritus Professor*
MacGregor, J.F.	B.Eng. (McMaster), M.S., Ph.D. (Wisconsin), FASA, P.Eng. *Distinguished University Professor*
Marlin, T.E.	B.S. (SUNY at Buffalo), M.S. (Dayton), Ph.D. (Massachusetts) *Emeritus Professor*
Shemilt, L.W.	O.C., B.A.Sc., Ph.D. (Toronto), M.Sc. (Manitoba), D.Eng. (Waterloo), D.Hon.C (Kracow), D.Sc. (McMaster), F.R.S.C., F.C.A.E., F.C.I.C., F.A.I.ChE., F.E.I.C., P.Eng. *Emeritus Professor*
Taylor, P.A.	B.Sc., Ph.D. (North Wales), P.Eng. *Emeritus Professor (Joint with Computing and Software)*

Vlachopoulos, J.	Dipl. Chem. Eng. (National Tech. Univ. of Greece), M.S., D.Sc. (Washington, St. Louis), F.C.I.C., F.S.P.E., P.Eng. *Emeritus Professor*
Woods, D.R.	B.Sc. (Queen's), M.Sc., Ph.D. (Wisconsin), D.Sc. (Queen's, Guelph, McMaster), F.C.I.C., F.A.I.Ch.E., P.Eng. *Emeritus Professor*

ADJUNCT FACULTY

Faucher, S.	B.Sc. (Queen's), Ph.D. (McMaster) *Assistant Professor*
Jones, L.	B.Sc. (U. of Wales), Ph.D. (Aston) *Professor*
Kostanski, K.	M.Eng., Ph.D. (Technical University of Szczecin) *Assistant Professor*
Kourti, D.	Dipl. Eng. (Chemical) (Aristotle Univ., Greece), Ph.D. (McMaster) *Associate Professor*
Liu, Q.	B.S., M.S. (East China University of Science & Technology), Ph.D. (Laval) *Associate Professor*
Wu, Yiliang	B.Sc. (Sichuan Univ.), M.Sc. (University of Science & Technology), Ph.D. (Tokyo Institute of Technology) *Associate Professor*
Yu, Honglu	B.Eng., M.Eng. (Tsinghua University), Ph.D. (McMaster) *Assistant Professor*

INDUSTRY PROFESSOR

Szabo, Paul	B.Eng., M.Eng. (Bucharest, Romania)

ASSOCIATE MEMBERS

Brook, M.A.	B.Sc. (Toronto), Ph.D. (McGill), M.C.I.C. *Professor of Chemistry*
McDermid, J.	B.Sc. (Queen's), M.Eng., Ph.D. (McGill) *Associate Professor of Mechanical Engineering*
West-Mays, J.	B.Sc. (Wilfrid Laurier), M.Sc., Ph.D. (Waterloo) *Associate Professor of Pathology and Molecular Medicine*

VISITORS (2008-09)

Dogu, Timir	Middle East Technical University	(A.N. Hrymak)
Dogu, Gulsen	Gazi University	(A.N. Hrymak)
Shao, Zhijiang	Zhejiang University	(T.E. Marlin)

POSTDOCTORAL FELLOWS

Apostolou, Konstantinos	Ph.D. U. of Minnesota	(A.N. Hrymak)
Ashter, Ali	Ph.D. U of Massachusetts Lowell	(M.R. Thompson)
Fortuna, Jeff	Ph.D. McMaster University	(J.F. MacGregor)
Khanal, Anil	Ph.D. Saga University (Japan)	(R. H. Pelton)
Zhang, Junwei (Joe)	Ph.D. Zhejiang University (China)	(S. Zhu)

TECHNICAL STAFF

Cornelius, Rena	Research Assistant	(J.L. Brash/Dept)
Derkach, Justyna	Undergraduate Lab and Research Assistant	
Gatt, Paul	Technician/Machinist	
Keller, Doug	Lab Manager	(Dept./R.H. Pelton/A.E. Hamielec)
Kostanski, Kris	Research Scientist	(A.E. Hamielec/J.F. MacGregor)
Lei, James	Instrumentation Technician	
Liu, Lina	Research Associate	(H. Sheardown)
McClung, Glenn	Research Assistant	(J.L. Brash)
Takacs, Elizabeth	Lab Manager	(MMRI)

OFFICE STAFF

Cole, Nanci	Graduate Assistant	
Falkiner, Lynn	Undergraduate Assistant	
Goodram, Kathy	Administrator	
Lima, Frances	Office Administrator	(SENTINEL)

CHEMICAL ENGINEERING FACULTY

BAIRD, MALCOLM H.I. (Professor, Emeritus)

Research Interests: fluid mechanics (including 2 phase flow), transport phenomena, mixing and the extraction/refining of non-ferrous metals.

Professional Organizations

Member:

- Association of Professional Engineers of Ontario
- Chemical Institute of Canada

Recent Papers in Refereed Journals

P.A.Moysey and M.H.I.Baird
"Size Segregation of Spherical Nickel Pellets in the Free Surface Flow of a Packed Bed: Experiments and Discrete Element Method Simulations", Powder Technology (submitted Sept. 2008)

M.H.I.Baird, N.V.Rama Rao, E.Tackie and A.Vahed, "Heat transfer to a moving packed bed of nickel pellets", Can.J.Chem.Eng. 86, 142-150 (2008)

N.V.Rama Rao, M.H.I.Baird, A.N.Hrymak and P.E.Wood, "Dispersion of high viscosity liquid-liquid systems by flow through SMX stationary packing" Chem.Eng.Sci. 62, 6885-6896 (2007)

M.H.I.Baird and S.W.Marcuson, Industry/academic collaboration -- challenges and rewards", CIM Magazine 2 (9), 3-7 (Feb.2007).

J.Liu, M.H.I.Baird, P.Kenny, B.Macnamara and A.Vahed, "Flash Furnace off-gas cooling in a plate column: reduction of pressure drop by column design modification", Canadian Metallurgical Quarterly 45, 409-416 (2006).

M.Zaki, I.Nirdosh, M.H.I.Baird and G.H.Sedahmed, "Effect of Superimposed Pulsating Flow on Liquid-solid Mass Transfer in Fixed Beds", Can. J.Chem.Eng. 83, 593-598 (2005)

P.A.Moysey, N.V.Rama Rao and M.H.I.Baird "Size Segregation of Nickel Pellets Flowing into a Packed Bed", Can.J.Chem.Eng. 82, 424-432 (2004)

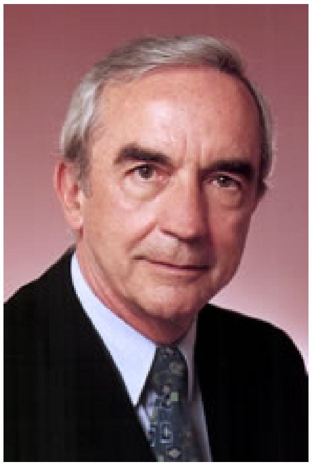
X.Ni, M.R.Mackley, A.P.Harvey, P.Stonestreet, M.H.I.Baird and N.V.Rama Rao, "Mixing through Oscillations and Pulsations -- a Guide to achieving Process Enhancements in the Chemical and Process Industries", Chem.Eng.Research & Design, 81, 373-383 (2003).

Current Research Projects

Dr. Baird no longer has any current research projects and therefore he cannot take on any research assistants, graduate students or summer students. However he occasionally consults industrially and reviews grant applications and papers in the following areas: fluid mechanics,mixing, transport phenomena and non-ferrous metal refining.

BRASH, JOHN L. (Distinguished University Professor)

Research Interests: biomaterials, biocompatibility, blood-material interactions, blood compatible materials, surface modification of polymers.



Professional Organizations

Member:

- Canadian Biomaterials Society
- Professional Engineers Ontario

Awards, Honours

- Fellow Royal Society of Canada, 2004
- R.S. Jane Memorial Award, Canadian Society for Chemical Engineering, 2006
- Guest Professor, Wuhan University of Technology, Wuhan, China, 2007
- Founders Award, US Society for Biomaterials, 2009

Papers in Refereed Journals

Du, YJ, Brash JL, McClung G, Berry L, Klement P, Chan AKC. Protein adsorption on polyurethane catheters modified with a novel antithrombin-heparin covalent complex. J. Biomed. Mater. Res., 80A, 216-225 (2007).

McClung, WG, Babcock, DE, and Brash, JL. Fibrinolytic properties of lysine-derivatized polyethylene in flowing whole blood (Chandler Loop model). J. Biomed. Mater. Res., 81A, 644-651 (2007).

Feng W, Nieh M-P, Zhu S, Brash JL, Harroun TA, Katsaras J. "Characterization of protein resistant grafted methacrylate polymer layers bearing oligo(ethylene glycol) and phosphorylcholine side chains by neutron reflectometry". Biointerphases, 2, 34-43 (2007).

Massa T, McClung G, Yang M, Ho JYC, Brash JL, Santerre JP, Fibrinogen adsorption and platelet lysis characterization of fluorinated surface modified polyetherurethanes, J Biomed Mater Res., 81A, 178-185 (2007).

Li L, Hitchcock AP, Cornelius R, Brash JL, Scholl A, Doran A. "X-ray microscopy studies of protein adsorption on a phase segregated polystyrene/ polymethylmethacrylate surface. II. Effect of pH on site preferences." J Phys Chem B, 112, 2150-58 (2008).

Unsworth LD, Sheardown H, Brash JL. "Protein-resistant poly(ethylene oxide)-grafted surfaces: chain density-dependent multiple mechanisms of action." Langmuir, 24, 1924-29 (2008).

Tan J and Brash JL. "Non-foulin biomaterials based on polyethylene oxide containing amphiphilic triblock copolymers as surface modifying additives in a segmented polyurethane matrix: Synthesis and characterization of copolymers and surface properties of copolymer-polyurethane blends". J Appl Polym Sci, 108, 1617-28 (2008).

Tan J and Brash JL. "Non-fouling biomaterials based on polyethylene oxide-containing amphiphilic triblock copolymers as surface modifying additives: solid state structure of PEO-copolymer/polyurethane blends." J Biomed Mater Res, 85A, 862-872 (2008).

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Leung BO, Hitchcock AP, Brash JL, Scholl A, Doran A, Henklein P, Overhage J, Hilpert K, Hale JD, Hancock REW. "An X-ray Spectromicroscopy Study of Protein and Peptide Competitive Adsorption to Thin Films of Polystyrene-Poly(methyl methacrylate)". Biointerphases, 3, FB27-35 (2008).

Gao X, Feng W, Zhu S, Sheardown H, Brash, JL. "A facile method of forming nanoscale patterns on poly(ethylene glycol) (PEG)-based surfaces by self-assembly of randomly grafted block copolymer brushes". Langmuir, 24, 8303-08 (2008).

Sun F, Sask K, Brash JL, Zhitomirsky I. "Surface modifications of Nitinol for biomedical applications". Colloid Surfaces

B: Biointerfaces, 67, 132–139 (2008)

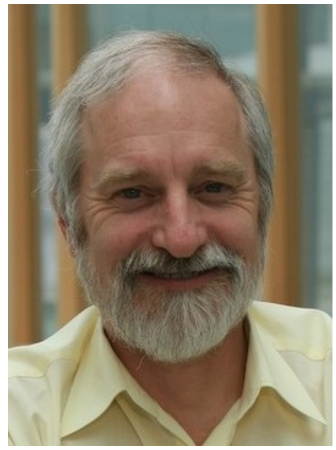
Chen H, Wang L, Zhang Y, Li D, McClung WG, Brook MA, Sheardown H, Brash JL. Fibrinolytic Poly(dimethyl siloxane) Surfaces. Macromol Biosci, 8, 863-870 (2008).

Invited lectures

Gordon Research Conference on Biomaterials, Biompatibility and Tissue Engineering, Plymouth, New Hampshire, 2003.
Symposium on Biocompatibility, University of Washington Center for Engineered Biomaterials, Seattle, Washington, 2003.
Dept of Biomedical Engineering, Georgia Institute of Technology, Atlanta, Georgia, 2004.
Albert Lager Lecture, McMaster University, 2004.
International Conference on Physical Chemistry of Bio-Interfaces, Adelaide, Australia, 2004.
Canadian Society for Chemistry Conference, London, Ontario, 2004.
American Society for Artificial Internal Organs, Chicago, 2006.
German Society for Biomaterials, Essen, 2006.
RS Jane award lecture CSChE, Sherbrooke, 2006.
University of Western Ontario, 2007.
Materials Science & Technology Conference, Detroit MI, 2007.
University of Sherbrooke, 2007.
International Forum on Functional Materials, Wuhan, China, 2007.
University of Alberta, 2008.
Zhejiang University, Hangzhou, China, 2008.
Wuhan University of Technology, Wuhan, China, 2008.

BROOK, Michael A. (Associate Member, Professor, Department of Chemistry)

Research Interests: Organosilicon Chemistry, Silicon-biopolymer copolymers, Organofunctional silicones, Silica surface modification, Silane coupling agents.



Professional Organizations

Books authored:

BROOK, M. A. *SILICON IN ORGANIC METALLICAND POLYMER CHEMISTRY*, WILEY: NEW YORK, 2000, 608 pages, (704 Including tables, and indices, SOLE AUTHOR).

Chapters in Books:

Weian Zhao, Michael A. Brook and Yingfu Li (invited) Protocols in Nanostructure Design. The Methods in Molecular Biology series by Humana Press. 2007, Submitted.

Paul M. Zelisko, Amro M. Ragheb, Michael Hrynyk, and Michael A. Brook, Proteins at Silicone Interfaces, in Synthesis and Properties of Silicones and Silicone-Modified Materials, Clarson, S. J.; Fitzgerald, J. J.; Owen, M. J.; Smith, S. D.; Van Dyke, M. E., Eds, 2007, ACS Symposium Series 964, (Science and Technology of Silicones and Silicone-Modified Materials), 256-266.

3M. Liu, A. Ragheb, P. Zelisko, and M. A. Brook, Preparation and Application of Silicone Emulsions Using Biopolymers, In Colloidal Biomolecules, Biomaterials, and Biomedical Applications (Surfactant Science, Vol. 116), Elaïssari, Abdelhamid, Ed.; Mercel Dekker Inc., 2004, Chapter 11, pages-309-329, invited manuscript.

Brook, Michael A.; Zelisko, Paul; Walsh, Meaghan. Permeability of silicone – water interfaces in water-in-oil emulsions. Organosilicon Chemistry V: From Molecules to Materials, [Scientific Contributions presented at the European Silicon Days], 1st, Munich, Germany, Sept., 2001 (2003), Meeting Date 2001, 606-611, invited manuscript.

Paul Zelisko, Vasiliki Bartzoka and Michael A. Brook, Exploiting Favorable Silicone-Protein Interactions: Stabilization Against Denaturation At Oil-Water Interfaces, in Synthesis and Properties of Silicones and Silicone-Modified Materials, Clarson, S. J.; Fitzgerald, J. J.; Owen, M. J.; Smith, S. D.; Van Dyke, M. E., Eds, ACS Symposium Series 838, 2003, Ch. 19, pp. 212-221, invited manuscript (ISBN 0-8412-3804-9).

Laronde, F.; Brook, M .A. Amino acid catalysts For the enantioselective duction of carbonyl groups, In Catalysts for the Fine Chemical Synthesis, Vol. 1, Hydrolysis, Oxidation and Reduction, Roberts, Stan M.; Poignant, G., Eds., 2002, pp. 169-172.

Bartzoka, V.; McDermott, M. R.; Brook, M .A., Protein-Silicone Interactions at Liquid/Liquid Interfaces, In Emulsions, Foams and Thin Films, Mittal, K. L.; Kumar, P., Eds., Dekker, New York, 2000, Chap. 21, pp. 371-380, Invited manuscript.

Papers in refereed Journals (Last 3 years)

Gonzaga, S. Singh, M. A. Brook, Biomimetic Synthesis of Gold Nanocrystals Using a Reducing Amphiphile, Small accepted Feb. 4, 2008.

Lawson, G.; Brook, M .A.; Gonzaga, F.; de Silveira, G.; Adronov, A., Au carbon nanotube composites from self-reduction of Au3+ upon poly(ethylene imine) functionalized SWNT thin films, J. Mater. Chem., accepted Feb. 4, 2008. B715277A

Zhao, Weian; Chiuman, William; Lam, Jeff; McManus, Simon; Chen, Wei; Cui, Yuguo; Brook, Michael; Li, Yingfu DNA Aptamer Folding on Gold Nanoparticle: from Colloid Chemistry to Biosensors, accepted for publication to J. Am. Chem. Soc.

Weian Zhao, Jeffrey Lam, William Chiuman, Michael A. Brook,* Yingfu Li.* Enzymatic cleavage of nucleic acid on gold nanoparticle: a generic platform for facile biosensors. 2007, Small, accepted Nov. 28, 2007.

David B. Thompson and Michael A. Brook, Rapid Assembly of Complex 3D Siloxane Architectures, J. Am. Chem. Soc. 2008, 130, 32-33. DOI: 10.1021/ja0778491.

Michael A. Brook,Hanns – Ulrich Saier, Julia Schnabel, Kaitlin Town, and Michael Maloney, Pretreatment of Liquid Silicone Rubbers (LSR) to Remove Volatile Siloxanes, IECR (Industrial and Engineering Chemical Research) 2007, 46, 8796-8805. DOI: 10.1021/ie061666q.

Rebecca Voss, Michael A. Brook,* Jordan Thompson, Yang Chen, Robert H. Pelton and John D. Brennan. Non-destructive horseradish peroxidase immobilization in porous silica nanoparticles, Journal of Materials Chemistry, 2007, 17, 4854 – 4863 DOI:10.1039/B709847B.

Weian Zhao, William Chiuman, Jeffrey C. F. Lam, Michael A. Brook,* and Yingfu Li*, Simple and rapid colorimetric enzyme sensing assays using non-crosslinking gold nanoparticle aggregation, Chem. Commun. 2007, 3729-3731.

Weian Zhao, Ferdinand Gonzaga, Yingfu Li,* and Michael A. Brook*, Highly Stabilized Nucleotide-capped Small Gold Nanoparticles (d < 5 nm) with Tunable Size, Advanced Materials 2007, 19, 1766-71 http://dx.doi.org/10.1002/adma.200602449.

Weian Zhao, William Chiuman, Michael A. Brook,* and Yingfu Li*, Simple and Rapid Colorimetric Biosensors Based on DNA Aptamer and Non-crosslinking Gold Nanoparticle Aggregation, Chem. Biochem., 2007, 8, 727-731.

Lu Ye, Robert Pelton, Michael A. Brook, Biotinylation of TiO2 Nanoparticles and Their Conjugation with Streptavidin, Langmuir, 2007, 23, 5630-5637.

Paul M. Zelisko, Aimé Lopez Aguilar, and Michael A. Brook,Delivery of both active enzyme and bleach from water-in-silicone oil (D4) emulsions, Langmuir, 2007, 23, 3620-3625. doi=10.1021/la063340s.

Sanela Martic, John D. Brennan, Michael A. Brook, Suzanne Ackloo and Noemi Nagy, Towards the development of a covalently tethered MALDI system: A study of allyl-modified MALDI matrices, Can. J. Chem., 2007, 85, 66-76.

Li Gan and Michael A. Brook,Competitive Substitution Reactions at Extracoordinate Silicon During Asymmetric Hydrosilylation, Organometallics 2007, 26, 945-951.

Li Gan and Michael A. Brook, Hydrosilylation of Ketones Catalyzed by C2-Symmetric, Proline Derived Complexes, Can. J. Chem. 2006, 84, 1416-1425.

Robert Pelton, Xinglian Geng, and Michael Brook, Photocatalytic Paper From Colloidal TiO2 – Fact or Fantasy, Adv. Colloid Interface Sci., 2006, 127, 43-53.

Yunyu Yi, Yang Chen, Michael A. Brook and John D. Brennan, Development of Macroporous Titania Monoliths by a Biocompatible Method. Part 2: Enzyme Entrapment Studies, asap Sept. 29, Chem. Mater 2006, 18, 5336-42.

Yang Chen, Yunyu Yi, John D. Brennan, Michael A. Brook, Development of Macroporous Titania Monoliths using a Biocompatible Method. Part 1: Material Fabrication and Characterization, Chem. Mater. 2006, 18, 5326-35.

Weian Zhao, Yan Gao, Michael A. Brook,* and Yingfu Li,* Wrapping Single-Walled Carbon Nanotubes with Long Single-Stranded DNA Molecules Produced by Rolling Circle Amplification, Chem. Commun. 2006, 3582-84, DOI: 10.1039/b606518j

Brook, Michael A., Comments on Total Platinum Concentration and Platinum Oxidation States in Body Fluids, Tissue, and Explants from Women Exposed to Silicone and Saline Breast Implants by IC-ICPMS, Anal. Chem. 2006, 76, 5609-5611.

Liang Liang, James M. Dickson, Jianxiong Jiang, Michael A. Brook, Mass Transfer of Dilute 1,2-Dimethoxyethane Aqueous Solutions During Pervaporation Process, J. Appl. Poly. Sci. 2006, 100, 2075–2084.

Weian Zhao, Yan Gao, Srinivas A. Kandadai, Michael A. Brook∗ and Yingfu Li. DNA Polymerization on Gold Nanoparticles via Rolling Circle Amplification: Towards Novel Scaffolds for Three-Dimensional Periodical Nanoassembly, Angew. Chem. Ed. Engl. 2006, 45, 2409 –2413.

Elodie Pacard, Michael A. Brook, Amro M. Ragheb, Christian Pichot and Carole Chaix, Elaboration of silica colloid/polymer hybrid support for oligonucleotide synthesis, Colloids Surf. B: Biointerfaces 2006, 47, 176-188.

Michael A. Brook, Platinum in Silicone Breast Implants, Biomaterials, 2006, 27, 3274-86 (doi:10.1016/j.biomaterials.2006.01.027)

Sui, Xihua; Lin, Tsai-Yin; Tleugabulova, Dina; Chen, Yang; Brook, Michael A.; Brennan, John D. Monitoring the Distribution of Covalently Tethered Sugar Moieties in Sol-Gel-Based Silica Monoliths with Fluorescence Anisotropy: Implications for Entrapped Enzyme Activity. Chem. Mater. 2006, *18*, 887-896

Chen, H., Brook, M .A., Sheardown, H. D., Chen, Y., Klenkler, B. A Generic Bioaffinity Surfaces, Bioconjugate Chemistry 2006, 17, 21-28.

CHACHUAT, Benoit (Assistant Professor)

Research Interests: optimization of transient systems, global optimization,optimization-based process control, real-time optimization, bioprocess operations.

Professional Organizations

Member:

- Canadian Society for Chemical Engineering
- American Institute of Chemical Engineers

Papers in Refereed Journals

Gros, S., B. Srinivasan, B. Chachuat, and D. Bonvin “Neighbouring-extremal control for singular dynamic optimisation problems. I-Single input case” *International Journal of Control*, in press.

Gros, S., B. Chachuat, and D. Bonvin “neighbouring-extremal control for singular dynamic optimisation problems. II-Multiple input case” *International Journal of Control*, in press.

Yunt, M., B. Chachuat, A. Mitsos, and P. I. Barton “Designing man-portable power generation systems for varying power demand” *AIChE Journal*, 54(5):1254-1269, 2008.

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Mitsos, A., B. Chachuat, and P. I. Barton “Methodology for the design of man-portable power generation devices” *Industrial & Engineering Chemistry Research*, 46(22):7164-7176, 2007.

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Bernard, O., B. Chachuat, A. Helias, and J. Rodriguez “Can we assess the model complexity for a bioprocess: theory and example of the anaerobic digestion process” *Water Science & Technology*, 53(1):85-92, 2006.

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Chachuat, B., A. Mitsos, and P. I. Barton “Optimal design and steady-state operation of micro power generation employing fuel cells” *Chemical Engineering Science*, 60(16):4535-4556, 2005.

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Bernard O., Chachuat B., Steyer J.P., “State estimation for wastewater treatment processes”. In: Quevauviller P., Thomas O., van der Beken A. (Eds.), *Wastewater Quality Monitoring and Treatment*, series in Water Quality Measurements, Volume 6, John Wiley & Sons Ltd, Chapter 4.1, pp. 247-265, 2007.

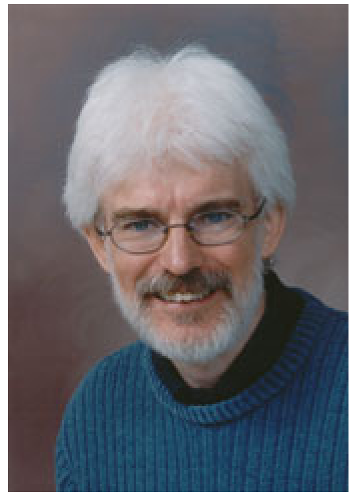
Refereed Conference Proceedings:

Chachuat B., Srinivasan B., Bonvin D., “Model parameterization tailored to real-time optimization”. In: Braunschweig B. and Joulia X. (Eds.), *European Symposium on Computer Aided Process Engineering-18*, Elsevier, Volume 25, pp. 1-13, 2008.

Chachuat B., Barton P.I., “Numerical simulation of a class of PDAEs with a separation of time scales”. In: Bonilla L.L., Moscoso M., Platero G., Vega J.M. (Eds.), *Progress in Industrial Mathematics at ECMI 2006*, series in Mathematics in Industry , Springer, pp. 512-517, 2007.

DICKSON, JAMES M. (Professor)

Research Interests: transfer phenomena in membranes, reverse osmosis, ultrafiltration, electrodialysis, novel polymers.



Professional Organizations

Member:

- Canadian Society for Chemical Engineering
- American Institute of Chemical Engineers
- North American Membrane Society

Papers in Refereed Journals

Hu, K., Dickson, J.M. Modelling of the pore structure variation with pH for pore-filled pH-sensitive poly(vinylidene fluoride)-poly(acrylic acid) membranes J. Membrane. Sci. Accepted April 2008.

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Liang, L., Dickson, J.M, Jiang, J., Brook, M.A, “Mass Transfer of Dilute 1,2-Dimethoxyethane Aqueous Solutions during Pervaporation Process” J. Appl. Polym. Sci., 2006, 100, 2075-2084.

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Liang, L., Dickson, J.M, Zhu, Z., Jiang, J., Brook, M.A, “Removal of 1,2-Dichloroethane from Aqueous Solutions with Novel Composite Polydimethylsiloxane Pervaporation Membranes”, J. Appl. Polym. Sci., 2005, 98, 1477-1491

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Mika, A.M., Childs, R.F., Dickson, J.M, “Salt Separation and Hydrodynamic Permeability of A Porous Membrane Filled with pH Sensitive Gel”, J. Membr. Sci., 2002, 206, 19-30

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Patents

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R.F. Childs, J.M. Dickson, D.R. Gagnon, K. Rilling, “Membrane preparation from porous substrates by interfacial polymerization in pores, preferably containing photochemically active groups for further derivatization”, US Patent 5,627,217, May 6, 1997 and a European Patent in 2002.

FILIPE, CARLOS D.M. (Associate Professor)

Research Interests: environmental biotechnology, wastewater treatment, metabolic modelling, membrane bioreactors.

Professional Organizations

Member:

- Water Environment Federation
- Water Environment Association of Ontario
- American Society for Microbiology
- Association of Environmental Engineering and Science Professors

Papers in Refereed Journals

L.M. Whang, C.D.M. Filipe, J.K. Park, (2007) Model-based evaluation of competition between polyphosphate- and glycogen-accumulating organisms, Water Research 41 1312-1324

D.R. Latulippe, R. Ghosh, C.D.M. Filipe, (2007) Pulse injection technique for membrane characterization: Ultrafiltration of dextran solutions, Journal of Membrane Science 289 268-276.

S. Su, R. Nutiu, C.D.M. Filipe, Y.F. Li, R. Pelton, (2007) Adsorption and covalent coupling of ATP-binding DNA aptamers onto cellulose, Langmuir 23 1300-1302.

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GHOSH, RAJA (Associate Professor)

Research Interests: bioseparations engineering, biopharmaceuticals, ultrafiltration, membrane chromatography, membrane bioreactors and biomimetic membranes.

Professional Organizations

Member:

- American Institute of Chemical Engineers
- American Chemical Society

Papers in Refereed Journals (last 3 years)

D.Q. Yu, M.D. McLean, J.C Hall, R. Ghosh, Purification of a human immunoglobulin G1 monoclonal antibody from transgenic tobacco using membrane chromatographic processes, Journal of Chromatography A, 1187 (2008) 128.

L. Wang, R. Ghosh, Fractionation of monoclonal antibody aggregates using membrane chromatography, Journal of membrane Science, 318 (2008) 311.

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K. Mohanty, R. Ghosh, Novel tangential-flow countercurrent cascade ultrafiltration configuration for continuous purification of humanized monoclonal antibody, Journal of Membrane Science, 307 (2008) 117.

L. K. Kostanski, R. X. Huang, R. Ghosh, C.D.M. Filipe, Biocompatible poly(N-vinyllactam)-based materials with environmentally-responsive permeability, Journal of Biomaterials Science-Polymer Edition, 19 (2008) 275.

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L. Wang, X. Sun, R. Ghosh, Purification of equine IgG using membrane based enhanced hybrid bioseparation technique: A potential method for manufacturing hyperimmune antibody, Biotechnology and Bioengineering, 99 (2008) 625.

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R. Ghosh, Rapid antibody screening by membrane chromatographic immunoassay technique, Journal of Chromatography B, 844 (2006) 163.

L. Wang, G. Hale, R. Ghosh, Non-size-based membrane chromatographic separation and analysis of monoclonal antibody aggregates, Analytical Chemistry, 78 (2006) 6863.

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L. Wang, D.M. Kanani, R. Ghosh, Purification of humanized monoclonal antibodies by membrane-based hybrid bioseparation technique, Journal of Immunological Methods, 314 (2006) 1.

R. Ghosh, Enhancement of membrane permeability by gas-sparging in submerged hollow fibre ultrafiltration of macromolecular solutions: Role of module design, Journal of Membrane Science, 274 (2006) 73.

R. Ghosh, L. Wang, Purification of humanized monoclonal antibody by hydrophobic interaction membrane chromatography, Journal of Chromatography A, 1107 (2006) 104.

R. Ghosh, Membrane chromatographic immunoassay method for rapid quantitative analysis of specific serum antibodies, Biotechnology and Bioengineering, 93 (2006) 280.

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Books

R. Ghosh, Protein Bioseparation Using Ultrafiltration: Theory, Applications and New Developments, Imperial College Press/World Scientific Publishing Pte Ltd. ISBN: 1-86094-317-9 (2003).

R. Ghosh, Principles of Bioseparation Engineering, World Scientific Publishing Pte Ltd. ISBN: 981-256-892-1 (2006)

Chapters in Books:

R. Ghosh, Ultrafiltration based protein bioseparation, in Handbook of Membrane Separations: Chemical, Pharmaceutical, and Biotechnological Applications (Editors: A. K. Pabby, A. M. Sastre and S. S. H. Rizvi), CRC Press ISBN-10: 0849395496 (2008).

R. Ghosh, Application of ultrafiltration in the biopharmaceutical industry, in Advanced Membrane Technology and Applications (Editors: N. Li, A.G. Fane, W.S. Winston Ho, T. Matsuura), John Wiley and Sons ISBN: 978-0-471-73167-2 (2008).

R. Ghosh, Protein bioseparation using membrane adsorbers: combining high-resolution with high-throughput, in Protein Production, Aggregation and Degradation in Recombinant Bacterial Factories (Editor: A. Villaverde), Research Signpost ISBN: 81-7736-110-4 (2002).

HAMIELEC, ARCHIE (Emeritus Professor)

Research Interests: polymer production technology, kinetics, reactors, characterization.

Professional Organizations

Member:

- American Institute of Chemical Engineers
- Canadian Society for Chemical Engineering
- Fellow, Chemical Institute of Canada
- Fellow, Royal Society of Canada

Recent Papers in Refereed Journals

J.B.P. Soares and A.E. Hamielec, “Chain Length Distributions of Polyolefins Made In Stopped-Flow Reactors for Non-Instantaneous Site Activation” Macromol. Reaction Engineering, 2, 115-125 (2008)

L. K. Kostanski, Y.-M. Kim, J. F. Macgregor and A. E. Hamielec, “Cationic Polymerization Using Mixed Cationic Photoinitiator Systems”, Designed Monomers and Polymers, 10, 327–345 (2007).

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E.Vivaldo-Lima, A. Penlidis, P.E. Wood and A.E. Hamielec, "Determination of the Relative Importance of Process Factors on Particle Size Distribution in Suspension Polymerization Using a Bayesian Experimental Design Technique", J.Appl.Polym.Sci, 102, 5577-5586 (2006).

E. Kolodka, W.-J. Wang, P. A. Charpentier, S. Zhu, and A. E. Hamielec, "Rheological and Thermomechanical Properties of Long-Chain Branched Polyethylene Prepared by Slurry Polymerization with Metallocene Catalysts, J. Appl. Polym. Sci., 92, 307- 316 (2004).

Y.-M. Kim, L. K. Kostanski, J. F. MacGregor, and A. E. Hamielec, "Thermal and Real-Time FTIR Spectroscopic Analysis of the Photopolymerization of Vinyl ether-Diepoxide Mixtures." J.Therm.Anal.Calorim., 78, 153-164 (2004).

H. Fathi, K. Schittkowski, and A. E. Hamielec, "Dynamic Modeling of Living Anionic Solution Polymerization of Styrene/Butadiene/Divinylbenze in a Continuous Stirred Tank Reactor Train", Polym. Plast. Techn. Eng., 43, 571-613 (2004).

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Y.-M. Kim, L. K. Kostanski, J. F. MacGregor, and A. E. Hamielec, “Thermal and Spectroscopic Analysis of Photopolymerized Oligomeric Reactive Ether Blends”, Internat. Symp.Polym.Anal.Charact., 2004, Heidelberg, Germany.

E. Kolodka, W-J. Wang, S. Zhu and A.E. Hamielec, “Synthesis and Characterization of Long-Chain Branched Polyolefins with Metallocene Catalysts: Copolymerization of Propylene with Poly (ethylene-co-propylene) Macromonomer.” Macromol. Rapid Comm. 24, 311-315 (2003).

E. Kolodka, W-J. Wang, S. Zhu and A.E. Hamielec, "Copolymerization of Propylene with Poly (ethylene-co-propylene) Macromonomer and Branch Chain-Length Dependence of Rheological Properties", Macromolecules, 35, 10062-10070 (2002).

E. Kolodka, W-J. Wang, S. Zhu and A.E. Hamielec, “Molecular Weight Dependence on Domain Formatin of Grafted Poly(Ethylene-Co-Propylene) In Polypropylene Matrix”, Macromol. Rapid Commun., 23, 470-473 (2002).

E. Kolodka, W.-J. Wang, J.V. Seppala and S. Zhu, “Structural Analysis of Dimethylsilyl-Bis(Indenyl)Zirconium Dichloride/Methylaluminoxane Catalyzed Polyethylene”, J. Polym. Sci., Polym. Chem., 40, 3292-3301 (2002).

J.B.P. Soares and A.E. Hamielec, “Polymer reactor principles: Polyolefins”. 1st North American Symposium on Chemical Reaction Engineering, Houston, Texas, U.S.A., January 6-9 (2001).

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Chapters in Books

A.E. Hamielec, and T. Tobita, “Polymerization Processes” in: Industrial Polymer Handbook; Wilkes, E.S. (Ed.), Vol.1, pp. 3-199; Wiley-VCH (2001).

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Recent Patents

EP #1,070,281 (2001); United States Patent, #6,093,211(2000), “Polymer Property Distribution Functions Methodology and Simulators”, A.E. Hamielec, M. Osias, S. Ramanathan, A. Sirohi, C.-C. Chen;.

Most Significant Research Contributions

Considered to be one of “the founding fathers” of polymer reaction engineering and well known, among others, for:

- Development of “Instantaneous Property Methods”;
- Discovery of the Pseudo-Kinetic Rate Constant Method;
- Solution of Population Balance Equations for Chain-Growth Copolymerization with Long Chain Branching;
- Development of the Method of Chemical Pulses to Track Polymer Properties;
- Development of the Method of Physical Pulses for living anionic polymerization;
- Fundamental studies on Size Exclusion Chromatography.

HOARE, TODD (Assistant Professor)

Research Interests: nanotechnology, interfacial engineering, biomaterials engineering, polymer science, pharmaceutical science

Selected Publications

Ciolino, J.; Hoare, T.; Langer, R.; Kohane, D.S. "A drug-eluting contact lens". Investigative Ophthalmology and Vision Science, in press.

Hoare, T.; Langer, R.; Zurakowski, D.; Kohane, D.S. "Rheological blends for drug delivery. I: Characterization *in vitro*" *Journal of Biomedical Materials Research A*, in press.

Hoare, T.; Bellas, E.; Zurakowski, D.; Kohane, D.S. "Rheological blends for drug delivery. II: Prolongation of nerve blockade, biocompatibility, and *in vivo-in vitro* correlations" *Journal of Biomedical Materials Research A*, in press.

Hoare, T.; Pelton, R. "Characterizing Charge and Crosslinker Distributions in Polyelectrolyte Microgels". *Current Opinion in Colloid and Interface Science*, 2008, *13*, 413-428.

Hoare, T.R.; Kohane, D.S. "Hydrogels in Drug Delivery: Progress and Challenges". *Polymer* 2008, *49*, 1993-2007.

Hoare, T.; Pelton, R. "Charge-Switching, Amphoteric Glucose-Responsive Microgels with Physiological Swelling Activity". *Biomacromolecules*, 2008, *9*, 733-740.

Hoare, T.; Pelton, R. "The Impact of Microgel Morphologies on Functional Microgel-Drug Interactions". *Langmuir* 2008, *24*, 1005-1012.

Hoare, T.; Pelton, R. "Functionalized Microgel Swelling: Comparing Theory and Experiment". *Journal of Physical Chemistry B*, 2007 *111*, 11895-11906.

Hoare, T.; Pelton, R. "Calorimetric Analysis of Thermal Phase Transitions in Functionalized Microgels". *Journal of Physical Chemistry B* 2007, *111*, 1334-1342.

Hoare, T.; Pelton, R. "Engineering Glucose Swelling Responses in Poly(N-isopropylacrylamide)-Based Microgels". *Macromolecules* 2007, *40*, 670-678.

Hoare, T.; McLean, D. "Kinetic Prediction of Functional Group Distributions in Microgels". *Journal of Physical Chemistry B* 2006, *110*, 20327-20336.

Hoare, T.; McLean, D. "Multi-Component Kinetic Modeling for Controlling Local Compositions in Thermosensitive Polymers". *Macromolecular Theory and Simulations* 2006 *15*, 619-632.

Hoare, T.; Pelton, R. "Dimensionless Plot Analysis: A New Way to Analyze Functional Group Distributions in Microgels". *Journal of Colloid and Interface Science.* 2006, *303*, 109-116.

Hoare, T.; Pelton, R. "Titrametric Characterization of pH-Induced Phase Transitions in Functionalized Microgels". *Langmuir* 2006, *22*, 7342-7350.

Hoare, T.; Pelton, R. "Electrophoresis of Functionalized Microgels: Morphological Insights". *Polymer* 2005, *46*, 1139-1150.

Hoare, T.; Pelton, R. "Highly pH and Temperature-Responsive Microgels Functionalized with Vinylacetic Acid". *Macromolecules* 2004, *37*, 2544-2550.

Selected Patent Applications

Simons, M.; Hoare, T.; Kohane, D.; Langer, R. "Membrane Permeating Ear Drops and Methods of
Treatment of Ear Diseases Using Same". U.S. Patent Application No 61/054,339

McLean, D.; Hoare, T.; Jones, K. "Novel Vaccine Adjuvants: Polymer Microgels". US Patent Application 61/040,350; Canadian Patent Application 2,627,903, filed March, 2008.

Hoare, T.; Pelton, R. "Glucose-Responsive Microgels". United States Provisional Patent Application
No. 60/667,114; April 1, 2005

HRYMAK, ANDREW N. (Professor, Chair)

Research Interests: polymer processing, mixing, complex fluids, and computational fluid dynamics.

Professional Organizations

Member:

- Canadian Society for Chemical Engineering (Fellow)
- American Institute of Chemical Engineers
- Polymer Processing Society
- Society of Plastics Engineers
- Society of Rheology
- Professional Engineers of Ontario

Current Projects

- Complex fluid rheology and mixing for liquid-liquid and liquid-solid systems
- Polymer adhesives for automotive applications
- Rheology of heavy oil
- Coating models and experiments for air knife galvanized hot dip coatings
- Experimental and modeling studies of dispersions of particles in slot coating dies and dip coating
- Development of packaging materials using starch-based thermoplastics and blends
- Mixing studies using the SMX static mixer, including the effects of heat transfer on crystallization
- Micromolding

Papers in Refereed Journals (last three years)

Apostolou, K. and A. N. Hrymak, "Discrete element simulation of liquid-particle flows", Computers & Chemical Engineering, vol 32, 841-856, 2008.

Katbab, A., A.N. Hrymak and K. Kasmadjian, "Preparation of Interfacially Compatibilized PP-EPDM Thermoplastic Vulcanizate/Graphite Nanocomposites: Effects of Graphite Microstructure upon Morphology, Electrical Conductivity, and Melt Rheology, Journal of Applied Polymer Science, vol 107, 3425-3433 (2008)

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Motlagh, G.H., A.N. Hrymak and M.R. Thompson, "Properties of a Carbon Filled Cyclic Olefin Copolymer", J of Polymer Science: Part B Polymer Physics, vol 45 1808-1820 (2007)

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X. Qin, M.R. Thompson, A.N. Hrymak, A. Torres, "Rheological Comparison Of Chemical And Physical Blowing Agents In A Thermoplastic Polyolefin", IEC Research, 45, 2734-2740 (2006)

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V.L. Bravo and A.N. Hrymak, “Nozzle injection of physical blowing agents in the injection molding of microcellular foams”, International Polymer Processing, 20, 149-156 (2005).

Torres, A.N. Hrymak and J. Vlachopoulos, “Fast and efficient simulation of 3D creeping flow in ducts using a space-time marching algorithm”, Polymer Engineering and Science, 45, 249-259 (2005).

JONES KIM (Associate Professor)

Research Interests: Tissue engineering, regenerative medicine, immune and inflammatory responses to biomaterials,
host remodelling of implanted constructs.

Professional Organizations

Member:

- Canadian Society for Chemical Engineering
- Canadian Biomaterials Society

Papers in Refereed Journals

Dong, Y and Jones, KS (2008) Effect of alginate on innate immune activation of macrophages. Journal of Biomedical Materials Research: Part A. Jun 3 Epub. Impact factor: 2.497.

Jones, K.S., Gorczynski, R.M., Sefton, M.V. (2006) Suppressed splenocyte proliferation following a xenogeneic skin graft due to implanted biomaterials. Transplantation, 2006 Aug 15;82(3):415-21. Impact factor: 3.972.

Jones, K.S., Gorczynski, R.M., Sefton, M.V. (2004) In vivo recognition by the host adaptive immune system of microencapsulated xenogeneic cells. Transplantation. 2004 Nov 27;78(10):1454-62. Impact factor: 3.972.

Jones, K.S., McKersie, B.D., Paroschy, J. (2000) Prevention of ice propagation by permeability barriers in bud axes of Vitis vinifera. Canadian Journal of Botany 78: 3-9.

McKersie, B.D., Murnaghan, J., Jones, K.S., Bowley, S.R. (2000) Iron-superoxide dismutase expression in transgenic alfalfa increases winter survival without a detectable increase in photosynthetic oxidative stress tolerance. Plant Physiology 122: 1427-1437. Impact factor 6.125.

Proceedings of Meetings

McLean, D., Jones, K.S. and Hoare, T. (2008) Novel vaccine adjuvants: Polymer microgels. Patent application submitted March 2008.

Jones, KS (2007) Host Immunity: The Yin and Yang of Regenerative Medicine. Presented at the Biomedical Engineering Society Annual Conference, September 2007, Los Angeles, California.

Mahadevan G, Jones, KS, Selvaganapathy P, Sheardown H. (2008) An Intravitreal Device for Drug Delivery to the Posterior Eye for the Treatment of Age Related Macular Degeneration presented at the Physiology/Pharmacology Poster Session at the 2007 Annual Conference for the Association of Research in Vision and Ophthalmology (ARVO), May 2007, Orlando, Florida

Thakur, A. and Jones K.S. (2007) Tissue Engineering Cells for Allogeneic Transplantation, presented at the Tissue Engineering and Regenerative Medicine International Society Conference, December 2007, Toronto, Ontario

Lung, P. and Jones K.S. (2007) Immunological study on alginate-based model systems presented at the Tissue Engineering and Regenerative Medicine International Society Conference, December 2007, Toronto, Ontario

Mikhail A.S., Jones K.S., Sheardown, H. (2006) Cell Adhesion Peptide Modified Silicone Rubber: Potential for Use in Blood Contacting Applications. Society for Biomaterials Annual Meeting, April 26-29, 2006, Pittsburgh, Pennsylvania.

McKersie, B.D., Bowley, S.R. Jones, K.S., Samis, K. (2003) Enhanced Storage Organ Production in Plants. U.S. Patent No. 6,518,486.

Jones, K.S., Gorczynski, R.M., Sefton, M.V. (2002) T-cells and B-cells are affected by implanted, microencapsulated xenogeneic cells. Experimental Biology 2002, April 19-24, New Orleans, LA.

Jones, K.S., Gorczynski, R.M., Sefton, M.V. (2002) T-cells and B-cells are affected by implanted, microencapsulated xenogeneic cells. Canadian Society for Transplantation Annual Meeting, February 28 – March 2, Mont Tremblant, QC.

Jones, K.S., Tsang, E., Gorczynski, R.M., Sefton, M.V. (2001) T-helper cells recognise implanted, microencapsulated xenogeneic cells. Biomedical engineering society annual meeting October 4-7, Durham, NC.

Jones, K.S., Tsang, E., Gorczynski, R.M., Sefton, M.V. (2001) T-helper cells recognise implanted, microencapsulated xenogeneic cells. American Institute of Chemical Engineers Annual Meeting, November 4-9, Reno, NV.

Jones, K.S., Tsang, E., Gorczynski, R.M., Sefton, M.V. (2000) Making microencapsulation work: Strategies for minimising host response. Tissue Engineering Society International Annual Meeting, November 30 – December 3, Orlando, FL.

Patents

McKersie, B.D., Bowley, S.R. Jones, K.S., Samis, K. Enhanced Storage Organ Production in Plants. Patent # 6,518,486 - Awarded February 11, 2003

Chapters in Books

McKersie, B.D., Bowley, S.R., Jones, K.S., Gossen, B. (1999) Winter survival of transgenic Medicago sativa over-expressing superoxide dismutase. In M.F. Smallwood, Calvert, C.M. and Bowles (eds.) Plant Responses to Environmental Stress, Bios Scientific Publishers.

Current Research

I have several ongoing projects in the fields of recipient interactions with biomaterials and tissue-engineered constructs. For details, please see my website: www.chemeng.mcmaster.ca/faculty/jones/

JONES, LYNDON (Adjunct Professor, University of Waterloo)

Research Interests: assessment of protein and lipid deposits on hydrogel contact lens materials, wettability, friction and the general interaction of contact lens materials with the ocular environment.

Professional Organizations

Member:

- ISCLR (International Society for Contact Lens Research)
- Canadian Biomaterials Society
- OAO (Ontario Association of Optometrists)
- IACLE (International Association of Contact Lens Educators)
- ARVO (Association for Research in Vision and Ophthalmology)
- BCLA (British Contact Lens Association)
- AOP (Association of Optometrists)

Books authored:

Common Contact Lens Complications: Recognition and Management. L Jones, D Jones. A text-book aimed principally at optometry students and practitioners with basic contact lens knowledge. Butterworth-Heinemann, Oxford, UK. ISBN 0 7506 3542 8. Published April 2000.

Chapters in Books:

Soft Contact Lens Fitting. L Jones**,** K Dumbleton. Chapter 10 in "*Contact Lenses 5th Edn*". Editors L Speedwell, A Phillips. Butterworth-Heinemann, Oxford, UK. ISBN 978 0 7506 8818 5. Published October 2006.

Soft Extended Wear and Complications. L Jones, K Dumbleton. Chapter 20 in "*Manual of Contact Lens Prescribing and Fitting"*, Editors M Hom, A Bruce. Butterworth-Heinemann, Oxford, UK. ISBN 0 7506 7517 9. Published February 2006.

Clinical Instruments. Chapter 4 in "Contact Lens Practice", by Nathan Efron. Butterworth-Heinemann, Oxford, UK. ISBN 0 7506 4690 X. Published February 2002.

Slit Lamp Biomicroscopy. L Jones, D Jones. Chapter 1 in "The Cornea", by Nathan Efron. Butterworth-Heinemann, Oxford, UK. ISBN 0 7506 4798 1. Published April 2001.

Papers in refereed Journals - in press

Immobilized hyaluronic acid containing model silicone hydrogels reduce protein adsorption. M van Beek, L Jones, H Sheardown. J Biomat Sci Polym Ed. In press.

Kinetics of in vitro lactoferrin deposition on silicone hydrogel and FDA group II and group IV hydrogel contact lens materials. L Chow, L Subbaraman, H Sheardown, L Jones. J Biomat Sci Polym Ed. In press.

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Protein deposition on a lathe-cut silicone hydrogel contact lens material (sifilcon A). L Subbaraman, J Woods, J Teichroeb, L Jones. Optom Vis Sci. In press.

Papers in refereed Journals (since 2006)

*Publications by co-authors who were undergraduate students at the time of the presentations are indicated with *, research associates with ˜ and graduate students with †.*

Thickness mapping of the cornea and epithelium using optical coherence tomography. S Haque†, **L Jones**, T Simpson. Optom Vis Sci 2008; 85 (10): 963 – 976.

Conjunctival and corneal hyperesthesia to pneumatic cool stimulation of subjects with symptoms of ocular dryness. P Situ†, T Simpson, L Jones, D Fonn. Optom Vis Sci 2008; 85(9): 867 – 872.

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Physical properties of contact lens solutions. K Dalton†, L Subbaraman†, R Rogers†, L Jones. Optom Vis Sci 2008; 85: 122 – 128. *Role: Designed study and assidted with writing manuscript*.

Atypical manifestation of upper lid margin staining in silicone hydrogel lens wearers with symptoms of dry eye: A case report. J Varikooty†, S Srinivasan†, L Jones. Contact Lens and Anterior Eye 2008; 31; 1:44-46.

Conformational and quantitative characterization of lysozyme extracted from galyfilcon and senofilcon silicone hydrogel contact lenses. MA Glasier˜, A Keech*, H Sheardown, L Subbaraman†, L Jones. Curr Eye Res 2008; 33: 1-11.

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Variability of the analysis of the tear meniscus height by Optical Coherence Tomography. E Bitton, A Keech*, T Simpson, L Jones. Optom Vis Sci 2007; 84 (9): 903 – 908.

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Apparent time-dependent differences in inferior tear meniscus height in human subjects with mild dry eye symptoms. S Srinivasan†, C Chan*, L Jones. Clin Exp Optom 2007; 90 (5): 345 – 350.

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Quantity and conformation of lysozyme deposited on conventional and silicone hydrogel contact lens materials using an in vitro model. M Suwala*, MA Glasier˜, L Subbaraman†, L Jones. Eye and Contact Lens 2007; 33 (3): 138 - 143.

Corneal refractive therapy with different lens materials, part 1: corneal, stromal, and epithelial thickness changes. S Haque†, D Fonn, T Simpson, L Jones. Optom Vis Sci 2007; 84;4: 343 - 348.

Lipid deposition on hydrogel contact lenses: How history can help us today. H Lorentz†, L Jones. Optom Vis Sci 2007; 84;4: 286 - 295.

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Anomalous thermal denaturing of proteins adsorbed to nanoparticles. J Teichroeb†, J Forrest, L Jones. Eur Phys J E Soft Matter 2006, 21 (1): 19-24. *Role: Assisted with manuscript writing.*

Objective and subjective responses in patients refitted to daily wear silicone hydrogel contact lenses. K Dumbleton, N Keir†, A Moezzi, Y Feng, L Jones, D Fonn. Optom Vis Sci 2006, 83 (10): 758 – 768.

Validity of pachymetric measurements by manipulating the acoustic factor of Orbscan II. F Lu†, T Simpson, D Fonn, L Sorbara, L Jones. Eye and Contact Lens 2006, 32 (2): 78 - 83.

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Rewetting drops containing surface active agents improve the clinical performance of silicone hydrogel contact lenses. L Subbaraman†, M Glasier˜, H Sheardown, M Senchyna, L Jones. Optom Vis Sci 2006; 83(3): 143-151.

KOSTANSKI, L. KRIS (Adjunct, Assistant Professor)

Research Interests: polymer synthesis and characterization, reactive and responsive polymer systems, polymer composites, photopolymerization, biomaterials

Professional Organizations

Member:

- American Chemical Society, Rubber Division

Recent Papers in Refereed Journals

L.K.Kostanski, R.Huang, C.D.M.Filipe and R.Ghosh, "Interpenetrating Polymer Networks As A Route To Tunable Multiresponsive Biomaterials – Development of Novel Concepts", J.Biomat.Sci. Polym.Ed., submitted (2008).

L. K. Kostanski, M.A. Pope, A. N. Hrymak, M. Gallant, W. L. Whittington, L. Vesselov, "Development of Novel Tunable Light Scattering Coating Materials for Fiber Optic Diffusers in Photodynamic Cancer Therapy', J.Appl.Polymer,Sci., in print.

M.R.Theompson, J.Jiu, H.Krump, L.K.Kostanski, P.D.Fasulo and W.R.Rodgers, "Interaction of Supercritical CO2 with Alkyl-ammonium Organoclays: Changes in Morphology", J.Colloid Interface Sci., 324, 177 (2008).

L.K.Kostanski, R.Huang, C.D.M.Filipe and R.Ghosh, "Biocompatible Poly(N-vinyllactam)-based Materials with Environmentally-Responsive Permeability", J.Biomat.Sci. Polym.Ed., 19, 275 (2008).

L. K. Kostanski, Y.-M. Kim, J. F. Macgregor and A. E. Hamielec, "Cationic Polymerization Using Mixed Cationic Photoinitiator Systems", Designed Monomers and Polymers, 10, 327–345 (2007).

C.Lu, L.Kostanski, H.Ketelson, D.Meadows, and R.Pelton, "Hydroxypropyl Guar-Borate Interactions with Tear Film Mucin and Lysozyme", Langmuir, 21, 10032-10037 (2005)

Y.M.Kim, L.K.Kostanski, and J.F.MacGregor, "Kinetic Studies of Cationic Photopolymerization of Cycloaliphatic Epoxide, Triethyleneglycol Methyl Vinyl Ether and Cyclohexene Oxide", Polym. Eng. Sci., 45**,** 1546 (2005).

Y.M.Kim, J.F.MacGregor, and L.K.Kostanski, "Principal component analysis of FTIR spectra for cationic photopolymerization of mixtures of two monomers", Chemometr. Intell. Lab. Syst., 75**,** 77-80 (2005).

L. K. Kostanski, D. M .Keller, and A. E. Hamielec, "Size-Exclusion Chromatography-A Review of Calibration Methodologies", J. Biochem. Biophys. Methods, 58, 159-186 (2004).

Y.-M. Kim, L. K. Kostanski, J. F. MacGregor, and A. E. Hamielec, "Thermal and Real-Time FTIR Spectroscopic Analysis of the Photopolymerization of Vinyl ether-Diepoxide Mixtures." J.Therm.Anal.Calorim., 78, 153-164 (2004).

Y.-M. Kim, L. K. Kostanski, J. F. MacGregor, and A. E. Hamielec, "Thermal and Spectroscopic Analysis of Photopolymerized Oligomeric Reactive Ether Blends", Internat. Symp.Polym.Anal.Charact., 2004, Heidelberg, Germany.

Y.M.Kim, L.K.Kostanski, and J.F.MacGregor, "Photopolymerization of 3,4-epoxycyclohexylmethyl-3',4'-epoxycyclohexane carboxylate and triethyleneglycol methyl vinyl ether" Polymer, 44**,** 5103-5110 (2003).

E. Kolodka, W.-J. Wang, S. Zhu A.E. Hamielec and L.K. Kostanski "Temperature Rising Elution Fractionation and Characterization of Ethylene/Octene-1 Copolymers Synthesized With Constrained Geometry Catalyst" Macromol. Chem. Phys. 200, 2146–2151 (2000).

KOURTI, THEODORA (Adjunct, Associate Professor)

Research Interests: multivariate statistical methods for modeling, data mining, process analysis and improvement, monitoring and fault diagnosis, process analytical technology.

Professional Organizations

Member:

- American Institute of Chemical Engineers
- Canadian Society of Chemical Engineers, Chemical Institute of Canada
- Technical Chamber of Greece (Greek Professional Engineers)
- International Chemometrics Society
- International Society for Pharamaceutical Engineering

Chapters in books

Kourti, T. (2008). Multivariate Statistical Process Control Comprehensive Chemometrics, Elsevier, The Netherlands, (Brown, Tauler, Walzak, eds) in press

Refereed Journal Papers

Kourti, T. (2006) Process Analytical Technology Beyond Real-Time Analyzers: The Role of Multivariate Analysis Critical Reviews in Analytical Chemistry, Critical Reviews in Analytical Chemistry, 36:257–278.

Garcia Munoz, S, Kourti, T., MacGregor, J.F., Francesca Apruzzese, and Marc Champagne| (2006) Optimization of Batch Operating Policies. Part I. Handling Multiple Solutions

Garcia Munoz, S, MacGregor, J.F., Kourti, T. (2005) Product Transfer between Sites using Joint Y_PLS. Chemometrics and Intelligent Laboratory Systems, 79, 101-114.

Kourti, T., (2005). Application of Latent Variable Methods to Process Control and Multivariate Statistical Process Control in Industry. International Journal of Adaptive Control and Signal Processing; 19, 213-246.

Garcia Munoz, S, MacGregor, J.F., Kourti, T. (2004). Model predictive monitoring for batch processes with multivariate methods. Ind. Eng. Chem. Res, 43, 5929-5941 .

T. Kourti, Abnormal Situation Detection, Three way data and Projection Methods – Robust Data archiving and Modeling for Industrial Applications. Annual Reviews In Control, 27 (2), 131-138.

S. Garcia-Munoz, T. Kourti, J. F. MacGregor, A. G. Mateos, G. Murphy. Troubleshooting of an Industrail Batch Process Using Multivariate Methods. Ind. Eng. Chem. Res. 42, 3592-3601.

T. Kourti, "Multivariate Dynamic Data Modelling for Analysis and Statistical Process Control of Batch Processes, Start–Ups and Grade Transitions", J. Chemometrics, 17(1), 93-109 (2003).

T. Kourti, "Process Analysis and Abnormal Situation Detection: From Theory to Practice", IEEE Control Systems, 22(5), 10-25 (2002).

C. Duchesne, T. Kourti, and J.F. MacGregor, "Multivariate SPC for Start ups and Grade Transitions", AICHE Journal, 48 (12), 2890-2901 (2002).

O. Svensson, T. Kourti, J.F. MacGregor, "A Comparison of Orthogonal Signal Correction Algorithms and Characteristics", Journal of Chemometrics, 16 pp 176-188 (2002).

D.R. Woods, T. Kourti, P.E. Wood, H. Sheardown, C.M. Crowe, and J.M. Dickson, "Assessing Problem solving skills:1. The context for assessment", Chemical Engineering Education, American Society for Engineering education Fall 2001 issue.

D.R. Woods, T. Kourti, P.E. Wood, H. Sheardown, C.M. Crowe, and J.M. Dickson, "Assessing Problem solving skills: 2. Assessing the Process of problem solving skills", Chemical Engineering Education, American Society for Engineering education Winter 2001 issue

Refereed Conference Proceedings

J. F. MacGregor, T. Kourti, J. Liu, J. Bradley, K. Dunn, H.Yu (2007). Multivariate Latent Variable Methods for the Analysis of Data-bases, Process Monitoring, and Control in the Material Processing Industries. IFAC MMM Conference, Quebec City, Aug., 2007

Garcia Munoz, S., Kourti, T., MacGregor (2004). "Multivariate Forecasting of batch evolution for monitoring and fault detection" in DYCOPS 2004. 7th Internat. Symposium on Dynamics and Control of Process Systems, Boston, July 2004

T. Kourti "Abnormal Situation detection, three way data and projection methods – robust modeling for industrial applications". In SAFEPROCESS 2003, 5th IFAC Symposium on Fault Detection, Supervision and Safety of Technical Processes, Washington, D.C., U.S.A., June 9-11, 2003.

C. Dushesne, T. Kourti and J.F. MacGregor, "Multivariate Monitoring of Startups, Restarts and Grade Transitions using projection methods". American Control Conference, Denver, Colorado, June 4-6, 2003.

Current Research Projects

TOPICS IN MULTIVARIAT ANALYSIS, DATA MINING, ABNORMAL SITUATION DETECTION IN PROCESS INDUSTRIES
T. Kourti
A variety of projects related to the above topics are available. Multivariate analysis as a tool for analysis and monitoring of processes has originated in this group. There are several theoretical issues to be resolved to extend the applicability of the methods at a wider range of process industries. Multivariate methods as well as other methods, may be applied for data mining in a wide range of applications. Interdisciplinary projects in conjunction with other departments and industry are available. Finally, industrial employees are strongly encouraged to seek a part time Master's degree where important problems in their own companies (related to data mining and abnormal situation detection) can be addressed as projects in their thesis; similar experience in the past led to very successful interactions, and as a result of the projects, enormous savings for the companies.

LIU, QIANG (Adjunct, Associate Professor)

Research Interests: molecular structure and functional properties of starch from various sources; resistant starch; starch modification/confersion, blending, processing and characterization; starch for food and industrial uses; biplastics.

Professional Organizations

Member:
- American Association of Cereal Chemist
- Institute of Food Technologists

Papers in Refereed Journals:

E.A. Donner, Q. Liu, W. J. Arsenault, J. A. Ivany, P. J. Wood. 2008. Physicochemical properties of starch and dry matter from organically and conventionally grown potatoes. *Food. Global Science Books* (in press)

J. Jayakody, R. Hoover, Q. Liu, E. Donner. 2008. Studies on tuber starches III. Impact of annealing on the molecular structure, composition and physicochemical properties of yam (Dioscorea sp.) starches grown in Sri Lanka, *Carbohydr. Polym.* doi: 10.1016/j.carbpol.2008.10.003.

H. Chung, Q. Liu, R. Hoover. 2008. Impact of annealing and heat-moisture treatment on rapidly digestible, slowly digestible and resistant starch levels in native and gelatinized corn, pea and lentil starches. *Carbohydr. Polym.* (in press).

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high amylose bread wheat starches, *Food Chem.* 111: 663-675.

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Q. Liu, T. R. Tarn, D. Lynch and N. M. Skjodt. 2007. Physicochemical properties of dry matter and starch from potatoes grown in Canada. *Food Chem.* 105 (3): 897-907.

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D.R. Lynch, Q. Liu, T.R. Tarn, B. Bizimungu, Q. Chen , P. Harris, C. L. Chik and N. M. Skjodt. 2007. Glycemic Index – a review and implications for the potato industry. *Am. J. Potato Res.* 84: 179-190.

Q. Liu, Z. Gu, E. Donner, I. Tetlow and M. Emes 2006. Investigation of digestibility *in vitro* and physicochemical properties of A- and B-granular starch from soft and hard wheat flour. *Cereal Chem.* 84: 15-21.

L. Jayakody, R, Hoover, Q. Liu, E. Donner. 2006. Studies on tuber starches. II. Molecular structure, composition and physicochemical properties of yam (Dioscorea sp) starches grown in Sri Lanka. *Carbohydr. Polym.* 69:148-163.

Q. Liu, E. Donner, Y. Yin, R. Huang and M. Fan. 2005. The physicochemical properties and *in vitro* digestibility of selected cereal, legume and tuber grown in China. *Food Chem.* 99 (3) 470-477.

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X. Xie, Q. Liu and W. Cui. 2005. Studies on granular structure of resistant starch (type 4) from normal, high amylose and waxy corn starch citrates. *Food Res. Int.* 39 (3): 332-341.

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Q. Liu. 2005. Book Review: Chemical and functional properties of food saccharides. *Tre. in Food Sci. Tech.* 16(4) 173.

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Q. Liu, Q., E. Donner, R. Tarn, J. Singh and H. Chung. 2008. Advanced Analytical Techniques to Evaluate the Quality of Potato and Potato Starch. In Advances in Potato Chemistry and Technology. Singh, J. and Kaur L. eds. Elsevier, SanDiego, in press

L. Kaur, J. Singh and Q. Liu. 2007. Starch – a potential biomaterial for biomedical applications. In Nanomaterials and Nanosystems for Biomedical Applications. Mozafari, M. R. Ed. Springer Publishing Company, New York, pp 83-99.

X.Q. Li, M.G. Scanlon, Q. Liu, and W.K. Coleman. 2006. Processing and Value Addition. In: Handbook of Potato Production, Improvement, and Postharvest Management. Gopal, J. and Khurana, A. M. P. eds, Haworth Press, New York, pp. 523-555.

R. Tarn, G. Tai and Q. Liu. 2006. Quality Improvement. In Potato Production, Improvement and Post-harvest Management, Gopal, J. and Khurana, A. M. P. eds, Haworth Press, New York, Pp. 147-178.

Q. Liu. 2005. Understanding starches and their roles in foods. In Food Carbohydrates: Chemistry, Physical Chemistry and Applications, CRC Press, Taylor & Francis Group, Boca Raton, FL. Pp309-356

Xie, X., Q. Liu and S.W. Cui. 2005. Starch Modifications and Applications. In Food Carbohydrates: Chemistry, Physical Chemistry and Applications, CRC Press, Taylor & Francis Group, Boca Raton, FL. Pp 357-406.

LOUTFY, RAFIK (Professor)

Research Interests: Entrepreneurship, Innovation, knowledge management, alternate energy sources, solar cells, photovoltaic engineering.

Papers in refereed Journals:

Beng, S. Ong, ChenSha Li, Yuning Li, Yiliang Wu and Rafik Loutfy Stable, Solution-Processed, High-Mobility ZnO thin-film Transistors, Journal Americal Chemical Society (2007)

Loutfy, R.O.; Belkhir, L Managing innovation at Xerox, Research Technology Management, Volume 44, Issue 4, 2001, Pages 15-24

.

MacGREGOR, JOHN, F.
(Distinguished University Professor)

Research Interests: multivariate statistical methods for process monitoring and optimisation, polymer reaction engineering.

Professional Organizations

Member:

- Association of Professional Engineers of Ontario
- Canadian Institute of Chemical Engineering
- American Institute of Chemical Engineers
- Cheomometrics Society of North America

Chapters in Books:

Wold, S, N. Kettanh-Wold, **J**.F. MacGregor and K. Dunn, "Batch Processes: Modeling.Analysis and Control", Chapter to appear in the encyclopedia Comprehesive Chemometrics, Elsevier Publishing.

Papers in Refereed Journals (Last 3 years)

Liu, J.and J.F. MacGregor, "Froth-Based Monitoring and Control of Flotation Processes", Minerals Engineering, Accepted, Nov, 2007

M. Goharian, M.J. Bruwer, A. Jegatheesan , G.R. Moran, J.F.MacGregor, "A novel approach for EIT regularization via spatial & spectral Princpal Component Analysis" Physiological Measurement, 28, 1001-1016, Published on-line Aug, 2007

Liu, Z., H. Yu and J.F. MacGregor, "Standardization of Line Scan NIR Imaging Spectroscopes", J. Chemometrics, 2007

Bruwer, M.J., J.F. MacGregor and W.M. Bourg, "Fusion of sensory and mechanical testing data to define measures of snack food texture", Food Quality and Preference, 2007

Bruwer, M.J., J.F. MacGregor and W.M. Bourg, "Soft Sensor for the On-line prediction of snack food textural properties using vibration measurements", Ind. & Eng. Chem. Res., 46, 864-870, 2007

Mumford, K, J.F. MacGregor, S.E. Dickson and R.H. Frappa, "Multivariate analysis of groundwater and soil data from a waste disposal site", Ground Water Monitoring & Remediation, 92-102, 2007.

Muteki, K., J.F. MacGregor, and T. Ueda, "Mixture designs and models for the simultaneous selection of ingredients and their ratios", Chemometrics & Intell. Lab. Systems, 86, 17-25, 2007.

Muteki, K. and J.F. MacGregor, "Sequential design of mixture experiments for the development of new products", J. Chemometrics, 21, 496-505, 2007

Muteki, K. and J. F. MacGregor "Multi-block PLS Modeling for L-shaped Data Sturctures, with Applications to Mixture Modeling" Chemometrics & Intell. Lab Systems, Published on line Aug 2006

Liu, J. J. and J. F. MacGregor "Estimation and Monitoring of the Aesthetic Quality of Manufacgtured Stone Countertops" Machine Vision & applications, 16, 374-383, 2006

Bruwer, M.-J. and J. F. MacGregor "Robust Multivariate Identification: Optimal Experimetal Design with Constraints" J. Process Control, 16, 581-600, 2006

Liu, J. J. and J. F. MacGregor "On the Extraction of Spectral and Spatial Information for Image Analysis" Chemometrics & Intell. Lab Systems Published on line July 2006

Nelson, P.R.C., J.F. MacGregor and P.A. Taylor, "The Impact of Missing Data on PCA and PLS Prediction and Monitoring Applications", Chemometrics & Intell. Lab. Systems,80, 1-12, 2006

MAHALEC, VLADIMIR (Professor)

Research Interests: supply chain planning and scheduling, real-time optimization, distributed computing software architecture, process modeling.

McDERMID, JOE (Associate Member, Associate Professor, Mechanical Engineering)

Research Interests: Metallic and non-metallic coatings for Advanced Steels, Materials and Microstructural Engineering, Process Control and Analysis

Selected Publications

J.R. McDermid, S. Dionne, O. Dremailova, B. Voyzelle, E. Essadiqi, E. Baril and F.E. Goodwin, "The Effect of Continuous Galvanizing Process Parameters on the User Properties of Hot-Rolled Transformation Induced Plasticity Steels," paper 2005-01-0495, *2005 SAE World Congress* , Society for Automotive Engineers, Detroit, Michigan (2005).

S. Dionne, B. Voyzelle, E. Essadiqi, O. Dremailova, É. Baril, J. R. McDermid, and F. Goodwin, "Galvanizing of a Hot Rolled C-Mn-Si TRIP Steel", *Proceedings of the International Conference on Advanced High-Strength Sheet Steels for Automotive Applications* , Association for Iron and Steel Technology, Winter Park CO (2004), pp. 405-415.

J.R. McDermid, E. Baril and F.E. Goodwin, "Galvanizing Bath Management During Galvanize to Galvanneal and Galvanneal to Galvanize Product Transitions," *6th International Conference on Zinc and Zinc Alloy Coated Sheet Steels: Galvatech'04 Conference Proceedings* , Association for Iron and Steel Technology, Chicago IL (2004), pp. 855-869.

J.R. McDermid, E. Baril and W.T. Thompson, "The Solubility in the Zn-Al-Fe System for Use in Continuous Galvanizing and Galvannealing," *6th*

International Conference on Zinc and Zinc Alloy Coated Sheet Steels: Galvatech'04 Conference Proceedings , Association for Iron and Steel Technology, Chicago IL (2004),
pp. 491-499.

E. Baril, M. Gaug and J.R. McDermid, "Transient Flow Patterns and Temperature Distribution in a Continuous Galvanising Bath Resulting from the Operation of Heating Inductors," *6th International Conference on Zinc and Zinc Alloy Coated Sheet Steels: Galvatech'04 Conference Proceedings* , Association for Iron and Steel Technology, Chicago IL (2004), pp. 927-937.

S. Dionne, B. Voyzelle, É. Baril, J. R. McDermid and F. Goodwin, "Effect of Reheating Parameters on Galvanizing Behaviour and Properties of High Strength Hot Rolled Steels," *6th International Conference on Zinc and Zinc Alloy Coated Sheet Steels: Galvatech'04 Conference Proceedings* , Association for Iron and Steel Technology, Chicago IL (2004), pp. 751-762.

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J.R. McDermid and B. Maag, "Numerical Modelling of Ingot Charging Configurations at Pro-Tec CGL2", Proceedings of the 94th Galvanizer's Association Meeting, Dearbourn MI (2002).

J.R. McDermid and W.T. Thompson, "Fe Solubility in the Zn-rich Corner of the Zn-Al-Fe System for use in Continuous Galvanizing," Proc. 44th Mechanical Working and Steel Processing Conference, vol. XL, Iron and Steel Society, Orlando FL (2002) pp. 805-813.

M. Gauthier, F. Ajersch and J.R. McDermid, "Phase transformation mechanisms of intermetallic particles suspended in hot-dip galvanizing and galvannealing baths," 5th International Conference of Zinc and Zinc Alloy Coated Steel Sheet: Galvatech' 2001, M Lamberights Ed. Verlag Stahleisen, Duseldorf (2001),
pp. 352-358.

J.R. McDermid and C.E. Dewey, "Optimizing the GA to GI Transition at ProTec CGL#1," Proceedings of the 92nd Galvanizer's.

MHASKAR, PRASHANT (Assistant Professor)

Research Interests: Control and Systems Theory, nonlinear, robust and predictive control, Hybrid systems and control, Facult-detection and isolation and fault-tolerant control.

Chapters in Books:

Mhaskar, P., N. H. El-Farra and P. D. Christofides, “Techniques for Uniting Lyapunov based and Model Predictive Control,” Assessment and Future Directions of Nonlinear Model Predictive Control-05, Lecture Notes in Control and Information Sciences Series, R. Findeisen, L. Biegler and F. Allgwer (Eds.), 14 pages, in press, Springer-Verlag, Berlin, 2006

Papers in refereed Journals (last 3 years)

Mahmood, M., Gandhi, R. and P. Mhaskar, ``Safe-Parking of Nonlinear Process Systems: Handling Uncertainty and Unavailability of Measurements,'' *Chem. Eng. Sci.*, 63, 5434-5446, 2008.

Gandhi, R. and P. Mhaskar, ``Safe-parking of Nonlinear Process Systems,'' *Comp. & Chem. Eng*, 32, 2113-2122, 2008.

Mahmood, M. and P. Mhaskar, ``Enhanced Stability Regions for Nonlinear Process Systems using Model Predictive Control,'' *AIChE J.*, 6, 1487-1498, 2008.

Mhaskar, P. and A. Kennedy ``Robust Model Predictive Control of Nonlinear Process Systems: Handling Rate Constraints," *Chem. Eng. Sci.*, 63*, 366-375,* 2008.

Mhaskar, P., C. McFall, A. Gani, P. D. Christofides and J. F. Davis, "Isolation and Handling of Actuator Faults in Nonlinear Systems," *Automatica*, 44, 53-62, 2008.

Gani, A., P. Mhaskar and P. D. Christofides, "Handling Sensor Malfunctions in Control of Particulate Processes," *Chem. Eng. Sci.*, 63, 1217-1229, 2008.

Christofides, P. D., N. H. El-Farra, M. H. Li and P. Mhaskar, "Model-Based Control of Particulate Processes," *Chem. Eng. Sci.*, 63, 1156-1172, 2008.

Mhaskar, P., N. H. El-Farra and P. D. Christofides, "Robust Predictive Control of Hybrid Systems: Satisfying Uncertain Schedules Subject to State and Control Constraints," *Int. J. Adapt. Contr. & Sign. Process.*, 22, 161-179, 2008.

Mhaskar, P. and S. Aumi, "Transition From Batch to Continuous Operation in Bio-Reactors: A Model Predictive Control Approach and Application", Can. J. Chem. Eng., 85, 416-423, 2007.

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Mhaskar, P., A. Gani, C. McFall, P. D. Christofides and J. F. Davis, "Fault-Tolerant Control of Nonlinear Process Systems Subject to Sensor Faults," *AIChE J.*, 53, 654-668, 2007.

P. Mhaskar, ``Robust Model Predictive Control Design for Fault-Tolerant Control of Process Systems," *Ind. Eng. & Che. Res.*, 45, 8565-8574, 2006.

Dubljevic, S., N. H. El-Farra, P. Mhaskar and P. D. Christofides, "Predictive Control of Parabolic PDEs with State and Control Constraints," *Inter. J. Rob. & Non. Contr.*, 16, 749-772, 2006.

Mhaskar, P., A. Gani, N. H. El-Farra, C. McFall, P. D. Christofides and J. F. Davis, "Integrated Fault Detection and Fault-Tolerant Control of Nonlinear Process Systems," *AIChE J.*, 52, 2129-2148, 2006.

Mhaskar, P., N. H. El-Farra and P. D. Christofides, "Stabilization of Nonlinear Systems with State and Control Constraints Using Lyapunov-Based Predictive Control," *Syst. & Contr. Lett.*, 55, 650-659, 2006.

Mhaskar, P., A. Gani and P. D. Christofides, "Fault-Tolerant Control of Nonlinear Processes: Performance-Based Reconfiguration and Robustness," *Int. J. Rob. & Non. Contr.*, 16, 91-111, 2006.

Mhaskar, P., N. H. El-Farra and P. D. Christofides, "Predictive Control of Switched Nonlinear Systems with Scheduled Mode Transitions," *IEEE Trans. Automat. Contr.*, 50, 1670-1680, 2005.

El-Farra, N. H., P. Mhaskar and P. D. Christofides, "Output Feedback Control of Switched Nonlinear Systems Using Multiple Lyapunov Functions," *Syst. & Contr. Lett.*, 54, 1163-1182, 2005.

Mhaskar, P., N. H. El-Farra and P. D. Christofides, "A Framework for Classical Controller Tuning Using Nonlinear Control Techniques," *AIChE J.,* 51, 3292-3299, 2005.

Dubljevic, S., P. Mhaskar, N. H. El-Farra and P. D. Christofides, "Predictive Control of Transport-Reaction Processes," *Comp. & Chem. Eng.*, 29, 2335-2345, 2005.

Shi, D., N. H. El-Farra, P. Mhaskar, M. Li and P. D. Christofides, "Predictive Control of Particle Size Distribution in Particulate Processes," *Chem. Eng. Sic.*, 61, 268-281, 2005.

Shi, D., P. Mhaskar, N. H. El-Farra and P. D. Christofides, "Predictive Control of Crystal Size Distribution in Protein Crystallization," *Nanotechnology*, 16, S562-S574, 2005.

Mhaskar, P., N. El-Farra and P. D. Christofides, "Robust Hybrid Predictive Control of Nonlinear Systems," *Automatica*, 41, 209-217, 2005.

Mhaskar, P., N. El-Farra and P. D. Christofides, "Hybrid Predictive Control of Process Systems," *AIChE J.*, 50, 1242-1259, 2004.

El-Farra, N., P. Mhaskar and P. D. Christofides, "Hybrid Predictive Control of Nonlinear Systems: Method and Applications to Chemical Processes," *Int. J. Rob. & Non. Contr.*, 14, 199-225, 2004.

El-Farra, N., P. Mhaskar and P. D. Christofides, "Uniting Bounded Control and MPC for Stabilization of Constrained Linear Systems," *Automatica*, 40, 101-110, 2004.

Papers in Refereed Conference Proceedings

Maaz Mahmood and Prashant Mhaskar, ``Enhanced Stability Region for Model Predictive Control of Nonlinear Systems”, Proceedings of the American Control Conference, 1133-1138., Seattle, Washington, 2008.

Rahul Gandhi and Prashant Mhaskar, `` Safe-Parking of Nonlinear Process Systems”, Proceedings of the American Control Conference, 1487-1492, Seattle, Washington, 2008.

Mhaskar, P. and A. Kennedy, ``Robust Model Predictive Control of Nonlinear Processes with State, Input and Rate Constraints,'' Proceedings of the American Control Conference, 5188--5193, New York City, New York, 2007.

Mhaskar, P., C. McFall, A. Gani, P. D. Christofides and J. F. Davis, “Fault-tolerant Control of Nonlinear Systems: Fault Detection and Isolation and Controller Reconfiguration,” Proceedings of the American Control Conference, 5115-5122, Minneapolis, Minnesota, 2006 (Best Presentation in Session Award).

Mhaskar, P., A. Gani and P. D. Christofides, “Fault-Tolerant Process Control: Performance-Based Reconfiguration and Robustness,” Proceedings of the American Control Conference, 6020-6025, Minneapolis, Minnesota, 2006.

Mhaskar, P., N. H. El-Farra and P. D. Christofides, “Fault-Tolerant Control of Nonlinear Process Systems: Recent Developments and Future Directions,” Proceedings of Chemical Process Control-7, 6 pages, Lake Louise, Alberta, Canada, 2006.

Mhaskar, P., N. H. El-Farra, S. Dubljevic, and P. D. Christofides, “Predictive Control of Distributed Process Systems,” Proceedings of Chemical Process Control-7, 6 pages, Lake Louise, Alberta, Canada, 2006.

Mhaskar. P. ,N. H. El-Farra and P. D. Christofides, “Techniques for Uniting Lyapunov-based and Predictive Control,” Proceedings of International Workshop on Assessment and Future Directions of Nonlinear Model Predictive Control, 12 pages, Freudenstadt- Lauterbad, Germany, 2005.

Mhaskar, P., A. Gani, N. H. El-Farra, P. D. Christofides and J. F. Davis, “Integrated Fault Detection and Fault-Tolerant Control of Process Systems,” Proceedings of 16th International Federation of Automatic Control World Congress, 6pages, Prague, Czech Republic, 2005.

Mhaskar, P., N. H. El-Farra and P. D. Christofides, “Robust Stabilization of Nonlinear Systems Using Hybrid Predictive Control, ”Proceedings of 16th International Federation of Automatic Control World Congress, 6 pages, Prague, Czech Republic, 2005

Shi, D., P. Mhaskar, N. H. El-Farra and P. D. Christofides, “Predictive Control of Crystal Size Distribution in Protein Crystallization,” Proceedings of the American Control Conference, 943-948, Portland, Oregon, 2005

Mhaskar, P., N. H. El-Farra and P. D. Christofides, “Stabilization of Nonlinear Systems with State and Control Constraints Using Lyapunov-Based Predictive Control,” Proceedings of the American Control Conference, 828-833, Portland, Oregon, 2005 (Best Presentation in Session Award).

El-Farra, N. H., P. Mhaskar and P. D. Christofides, “Output Feedback Control of Switched Nonlinear Systems Using Multiple Lyapunov Functions,” Proceedings of the American Control Conference, 3792-3799, Portland, Oregon, 2005.

Dubljevic, S., P. Mhaskar, N. H .El-Farra and P. D. Christofides, “Predictive Control of Diffusion-Reaction Processes,” Proceedings of the American Control Conference, 45514556, Portland, Oregon, 2005.

Mhaskar, P., N. H. El-Farra and P. D. Christofides, “Predictive Control of Switched Nonlinear Processes with Scheduled Mode Transitions,” Proceedings of 7th IFAC Symposium on Dynamics and Control of Process Systems, 6pages, Boston, Massachusetts, 2004.

Mhaskar, P., N. H. El-Farra and P. D. Christofides, “Stabilization of Switched Nonlinear Systems Using Predictive Control,” Proceedings of the American Control Conference, 560-565, Boston, Massachusetts, 2004.

Mhaskar, P., N. H. El-Farra and P. D. Christofides, “A Method for PID Controller Tuning Using Nonlinear Control Techniques,” Proceedings of the American Control Conference, 2925-2930, Boston, Massachusetts, 2004.

Dubljevic, S., P. Mhaskar, N. H. El-Farra and P. D. Christofides, “Predictive Control of Parabolic PDEs with State and Control Constraints,”

Proceedings of the American Control Conference, 254-260, Boston, Massachusetts, 2004.

Mhaskar, P., N. H. El-Farra and P. D. Christofides, “A Hybrid Predictive Control Approach to Output Feedback Stabilization of Constrained Linear Systems,” Proceedings of the American Control Conference, 578-583, Boston, Massachusetts, 2004 (Best Presentation in Session Award)

Mhaskar, P., N. H. El-Farra and P. D. Christofides, “Hybrid Control: Implementing Output Feedback MPC with Guaranteed Stability Region,” Proceedings of 5th International Symposium on Advanced Control of Chemical Processes, 998-1003, Hong Kong, P. R. China, 2004.

El-Farra, N. H., P. Mhaskar and P. D. Christofides, ”Hybrid Control of Uncertain Process Systems,” Proceedings of 8th International Symposium on Process Systems Engineering, 814-819, Kunming, P. R. China, 2004.

Shi, D., N. H. El-Farra, M. Li, P. Mhaskar and P. D. Christofides, “Predictive Control of Particle Size Distribution in Particulate Processes,” Proceedings of 2nd International Conference on Population Balance Modeling, 17 pages, Valencia, Spain, 2004.

MARLIN, THOMAS E. (Emeritus Professor)

Research Interests: computer process control, real-time plant optimization, control structure design.

Professional Organizations

Member:

- Instrument Society of America
- American Institute of Chemical Engineers

Books authored:

1. Marlin, T., Process Control, Designing Processes and Control Systems for Dynamic Performance 2nd Edition, McGraw Hill, New York, 2000 (ISBN 0-07-039363-1)

Books edited:

Chapters in Books:

Forbes, F., W. S. Yip and T. Marlin, "Real-time Optimization", in Sunggyu Lee, C. W. LaPierre Professor (ed.) Encyclopedia of Chemical Processing, Marcel Dekker, New York, 2005

Dorf, Richard (ed.), The Engineering Handbook, 2nd Edition, CRC Press, Boca Raton, 2003: Chapter titled "Process Control", 35 manuscript pages

Papers in refereed Journals:

Yip, W. S. and T. Marlin, The Effect of Model Fidelity on Real-Time Operations Optimization, Comp. Chem. Engr., 28, 267-280 (2004)

Yip, W.S., and T. Marlin, Designing Plant Experiments for Real-Time OptimizationSystems, Control Engineering Practice, 11, 8, 837-845 (2003).

Yip, W. S. and Marlin, T. E. Multiple Data Sets for Model Updating in Real-Time Operations Optimization. Computers Chem.Engng. 26[10], 1345-1362. 2002

Marlin, T., Brisk, M., Barton, G., and Perkins, J., Experiences from an Industry-University Study on Control Benefits, Pulp and Paper Canada, 102, 4, 34-37 (2000)

Kassidas, A., Patry, J. and T. Marlin, Integrating Process and Controller Models for theDesign of Self-Optimizing Control, Comp. Chem. Eng.,24, 2589-2602 (2000)

Papers in Refereed Conference Proceedings

Zyngier, D. and T. Marlin, Regret and Revise, Managing the Uncertain LP, Second Mathematical Programming Society International Conference on Continuous Optimization, ICCOPT II & MOPTA-07, Hamilton, Ontario, August 13-16, 2007

Zyngier, D. and T. Marlin, Monitoring and improving LP optimization with uncertain parameters, Escape/PSE 2006, Garmish, Germany, Elsevier (Best Conference Poster Award)

Zhong, W., Selection of Sensors for Successful Real-Time Optimization, IFAC Conference DYCOPS 2004, Boston, MA, July 5-7, 2004

Cai, Y.S. and T. Marlin, Control Structure Design To Achieve Multiple Performance Criteria, IFAC Conference DYCOPS 2004, Boston, MA, July 5-7, 2004

Warren, A.L. and T. Marlin, Constrained MPC under Closed-Loop Uncertainty, American Automatic Control Conference, Boston, MA, June 29-July 1, 2004

Warren, A. L. and T. E. Marlin, Improved Performance Of Robust MPC With Feedback Model Uncertainty, ADCHEM 2003, Hong Kong, June 2003, in Allgower, F. and F. Gao, Preprints for 7th International Symposium on Advanced Control of Chemical Processes, IFAC, 980-985 (2003)

Yip, W. S. and T. E. Marlin, Results analysis in a constrained real-time optimization (RTO) system, ADCHEM 2003, Hong Kong, June 2003 in Allgower, F. and F. Gao, Preprints for 7th International Symposium on Advanced Control of Chemical Processes, IFAC, 501-506 (2003)

Education

T.E. Marlin, “Process Control, Designing Processes and Control Systems for Dynamic performance”, 2nd Edition, McGraw-Hill, New York, (2000).

M. Hough, E. Wood, W.S. Yip and T.E. Marlin, “A WEB Site to Support Active Student Learning in Process Control”, Amer. Assoc. of Eng. Ed., Annual Conference, Session 3513, Montreal, Canada, June 16-19, (2002).

T.E. Marlin and D.R. Woods, “Trouble Shooting for CAPE Undergraduate Education”, ESCAPE 12, The Hague, Netherlands (2002).

PELTON, ROBERT H. (Professor)

Research Interests: polymer colloids, water soluble polymers, interfacial engineering, flocculation, and latex's.

Professional Organizations

Member:

- Canadian Institute of Chemistry
- Canadian Society for Chemical Engineering
- American Chemical Society
- International Polymer Colloid Group (elected)
- Technical Association of the American Pulp and Paper Industry
- Pulp and Paper Association Technical Association of Canada

Papers in Refereed Journals (Last 3 years)

Xinglian Geng, Carlos Filipe and Robert Pelton, "Antibacterial Paper from Photocatalytic TiO2", Submitted to Appita Aug 07

Todd Hoare and Robert Pelton Current Accounts of Colloid and Interface Science, submitted March 08

Xianhua Feng, Dan Zhang and Robert Pelton, "Adhesion to Wet Cellulose – Comparing Adhesive Layer-By-Layer Assembly to Film Casting", Holzforschung, submitted Feb. 08,

W. Zhao, W. Chiuman, J.C.F. Lam, S.A. McManus, W. Chen, Y. Cui, R. Pelton, M. A. Brook, Y. Li, DNA Aptamer Folding on Gold Nanoparticles: From Colloid Chemistry to Biosensors J. Am. Chem. Soc. To appear (2008)

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Deqiang Yu, Xiaonong Chen, Robert Pelton, Raja Ghosh, "Paper-PEG Based Membranes for Hydrophobic Interaction Chromatography: Purification of Monoclonal Antibody", Biotechnology and Bioengineering, to appear

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Boxin Zhao, Robert Pelton and Vasiliki Bartzoka, “Peeling Sensitive Tape From Paper”, Transactions of the Fundam Research Society, Cambridge, 827-852 (2005)

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Chen Lu and Robert Pelton, “Flocculation with Sticky Poly(ethylene oxide)/Tyrosine-rich Polypeptide Complexes”, Langmuir, 21, 3765-3772 (2005).

Xiaonong Chen, Ruixiang Huang, and Robert Pelton “The Reinforcement of Calcium Carbonate Filled Papers with Phosphorous-containingnd Engineering Chemistry Research, 44, 2078-2085 (2005).

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Todd Hoare and Robert Pelton “Electrophoresis of Functionalized Microgels: Morphological Insights”, Polymer 46,1139–1150 (2005)

Current Research Projects

R.H. Pelton
I have many projects dealing with the application of colloids, nanoparticles, microgels and surfaces. For a current listing, please see: www.papersci.mcmaster.ca

Potter, David K. (Associate Professor)

Research Interests: innovation, entrepreneurship, emerging technologies, technology strategy, polymer structure-property relationships, reactive polymer systems, polymer nanocomposities

Professional Organizations:

Chair, Innovation Council, Conference Board of Canada

Member, Society of Plastics Engineers, Ontario Section

Recent Presentations:

“Open Innovation and Entrepreneurial Skill Development During Technology Transfer at McMaster University”, Poster Presentation, ACCT Canada Conference, Ottawa, 2008.

“Some Emerging Market Trends and the Potential for Adoption in the Plastics Industry”, Society of Plastics Engineers Industry – University Night, McMaster University, 2008.

“Understanding MFI and Viscosity: what if your plastic flowed like water? Reactive olefin prepolymers: now you can make PE and PP parts anywhere”, Innovation in Plastics Conference, Toronto, Ontario, 2007.

“Thinking like an Entrepreneur”, British Consulate General and Trade, United Kingdom Trade and Investment (UKTI) Canadian Network conference, Hamilton, Ontario, 2007.

Patents:

Lam, C.N., Steele, R.E., and Potter, D.K., “Bondably Coated Metallic Member”, Canadian Patent Application, CA 2504791, April 2005.

Chand, W.G., Lam, C.N., Landreth, N.A., Phillips, C.L., Potter, D.K., and Steele R.E., “Method of Imparting Patterns of Surface Relief to Rigid Substrates", WO 2004/086147 A2, October 2004.

Kozakiewicz, W.E., Potter, D.K., and Young, S.A., "Moisture-Curable Modified Acrylic Copolymer Sealant Composition", US 5,705,561, January 1998.

SHEARDOWN, HEATHER (Associate Professor)

Research Interests: biomaterials, tissue engineering, mathematical modeling of physiologic processes, ophthalmic drug delivery

Professional Organizations

Member:

- Association of Professional Engineers of Ontario

Papers in Refereed Journals (Last 3 years)

Chen H, Liang W, Zhang Y, McClung G, Brook MA, Sheardown H, Brash JL. Poly (dimethyl siloxane) with fibrinolytic properties. Macromol Biosci 8: 863-870 (2008).

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Benhabbour RS, Liu L, Sheardown H, Adronov A. Protein resistance of surfaces prepared by chemisorption of mono-thiolated polyethylene glycol to gold and dendronization with aliphatic polyester dendrons. Macromolecules 41: 256 -2576 (2008).

Duan X, Sheardown H. Incorporation of cell Adhesion peptides into collagen scaffolds promotes corneal epithelial stratification. J Biomater Sci Polym Edn 18: 701-707 (2007).

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corneas. Expert Rev Med Dev 3: 59-72 (2006).

Duan X, Sheardown H. Crosslinking of collagen with dendrimers. J Biomed Mater Res 75A: (3): 510-518 (2005).

Mequanint K, Sheardown H. 2-Methacryloyloxyethyl N-butylcarbamate: A new comonomer for hydrogel syntheses with improved hydrophilicity and mechanical properties for ophthalmic applications. J. Biomater Sci Polym Edn. 16: 1303-1318 (2005).

Unsworth LD, Sheardown H., Brash J.L. Effect Of chain density, chain length and end group Chemistry of poly(ethylene oxide)-thiol thin films Adsorption evaluated using immunoblots and Vroman type experiments. Biomaterials 26: 5927-5933 (2005).

Chen H, Chen Y, Sheardown H, Brook MA. Immobilization of heparin on a silicone surface through a PEG spacer. Biomaterials. 26: 7418-7424 (2005).

Suuronen EJ, Sheardown H, Newman K, McLaughlin CR, Griffith M. Building in vitro models of organs. Intl Rev Cytol. 244: 139-175 (2005).

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Chen H, Zhang Z, Chen Y, Brook MA, Sheardown H. Protein repellant silicone surfaces by covalent immobilization of poly (ethylene oxide). Biomaterials. 26: 2391-2399 (2005).

Chen H, Brook MA, Chen Y, Sheardown H. Surface properties of PEO silicone composites: Controlling protein adsorption. J Biomater Sci Polym Edn 16:531-538 (2005).

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Book Chapters

Griffith M, Sheardown H. Regenerative Medicine in the Cornea. Regenerative Medicine. A. Atala (ed) 2007.

Griffith M, Li F, Lohman C, Sheardown H, Shimmura S, Carlsson DJ. Tissue engineering of the cornea. Scaffolding in Tissue Engineering. Ma P, Ellsieff J. (eds). 2003.

Griffith CM, Watsky M, Trinkaus-Randall V, Chua C, and Sheardown H. "The Cornea" Methods in Tissue Engineering, Academic Press, 2001. (contributed 12 of 28 pages).

Sheardown H, Saltzman M. Novel drug delivery systems for posterior segment ocular disease. Angiogenesis in the eye, Barnstable C. (editor). 2004.

Contributions to books

M. Griffith, F. Li, C. Lohmann, E.J. Vascotto H. Sheardown, S. Shimmura and D.J. Carlsson. "Tissue engineering of the cornea" in Scaffolding in Tissue Engineering. P. Ma and J. Ellseff (eds) 2003

Current Research Projects

ARTIFICIAL CORNEA
H. Sheardown
Study of corneal cell interactions with polymeric materials and design of a device for use as a corneal implant. The research has two general paths: development of synthetic polymer based corneas and the development of primarily collagen based corneas. Surfaces have been designed to promote interactions with corneal cells using growth factors and cell adhesion peptides. Delivery of appropriate wound healing stimulants are also being examined. The polymers have been designed to incorporate hydrophilicity of the surface and of the bulk as well as glucose permeability. .

NEW INTRAOCULAR LENS MATERIALS
H. Sheardown
While cataract surgery is the most common surgery performed worldwide and implantation of synthetic intraocular lenses is routine in developed countries, existing lens materials suffer from complications and limitations. The formation of secondary cataracts is relatively common, occurring in as many as 30% of patients and requires additional procedures. Furthermore, existing lens materials cannot perform the "accommodation" function of the native lens – i.e. the ability to focus on near and far objects. Work is aimed at understanding and manipulating the wound healing response in order to minimize the formation of secondary cataracts. As well, ongoing work involving the development of novel in situ polymerizable gels is aimed at the development of accommodating intraocular lens materials.

DENDRIMERS IN BIOMATERIALS APPLICATIONS
H. Sheardown
Evaluating the potential of dendrimers in biomaterials applications. We have previously studied the modification of DAB dendrimers with long chain hydrocarbons and evaluated the potential of these modified dendrimers as scavengers for hydrophobic toxins in blood with the goal of improving the design of artificial liver devices. Current studies are focussed in three areas: a) Dendrimer enzyme immobilization, b) Biomaterials development based on incorporated dendrimers and c) Surface modification with dendrimers.

OPHTHALMIC DRUG DELIVERY
H. Sheardown
An important theme of the work in the Sheardown lab involves the development of materials for delivery of drugs to the eye. This includes novel drug delivering contact lens materials for the delivery of wound healing agents as well as steroids and antibiotics as well as devices for delivery of drugs to the relatively inaccessible back of the eye. A variety of materials and techniques are under study to overcome the problems of ophthalmic delivery and to generate novel methods of delivering drugs and cells to the eye for the treatment of a host of ophthalmic diseases.

SWARTZ, CHRISTOPHER L.E. (Professor)

Research Interests: Computer process control, optimization.

Professional Organizations

Member:

- Society for Industrial and Applied Mathematics
- American Institute of Chemical Engineers

Chapters in Books:

Swartz, C.L.E**.**, "The Use of Controller Parametrization in the Integration of Design and Control," in The Integration of Process Design and Control, P. Seferlis and M.C. Georgiadis, eds., Elsevier, pp 239-263 (2004).

Papers in refereed Journals:

Baker, R. and C.L.E. Swartz**,** "Interior Point Solution of Multilevel Quadratic Programming Problems in Constrained predictive Control Applications", Ind. Eng. Chem. Res., 47(1), 81-91 (2008).

Nikandrov, A. and C.L.E. Swartz**,** "Sensitivity Analysis of LP-MPC Cascade Control Systems", In press (available on-line), Journal of Process Control (2008).

Soliman, M., C.L.E. Swartz and R. Baker, "A Mixed-Integer Formulation for Back-Off Under Constrained Predictive Control," In press (available on-line), Comput. Chem. Engng (2008).

Nikandrov, A. and C.L.E. Swartz**,** "Calculation of Closed-Loop Steady-State of Constrained MPC

Systems", Under revision (minor), Comput. Chem. Engng (2008)

Lam, D.K., R. Baker and C.L.E. Swartz, "Reference Trajectory Optimization Under Constrained Predictive Control", Can. J Chem. Eng., 85 (4), 454-464 (2007).

MacRosty, R.D.M. and C.L.E. Swartz, "Dynamic Optimization of Electric Arc Furnace Operation," AIChE J., 53(3), 640-653 (2007).

MacRosty, R. and C.L.E. Swartz, "Dynamic Modeling of an Electric Arc Furnace," Ind. Eng. Chem. Res., 44 (21), 8067-8083 (2005).

Baker, R. and C.L.E. Swartz, "Rigorous Handling of Input Saturation in the Design of Dynamically Operable Plants," Ind. Eng. Chem. Res., 43 (18), 5880-5887 (2004).

Young, J.C.C., R. Baker and C.L.E. Swartz, "Input Saturation Effects in Optimizing Control – Inclusion Within a Simultaneous Optimization Framework," Comput. Chem. Engng., 28 (8), 1347-1360 (2004).

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Lam, D.K. and C.L.E. Swartz, "Optimal Steady-State Transitions Under Constrained Predictive Control," Proceedings, 16th European Symposium on Computer Aided Process Engineering and 9th International Symposium on Process Systems Engineering, W. Marquardt and C. Pantelides, eds., Elsevier, pp 1593-1598 (2006).

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Baker, R. and C.L.E. Swartz, "Inclusion of Actuator Saturation as Complementarity Constraints in Integrated Design and Control," 7th International Symposium of Dynamics and Control of Process Systems (DYCOPS 7), Boston (2004).

Soliman, M., A.K.S. Balthazaar and C.L.E. Swartz, "Modeling and Model-Based Control of an Oxygen Delignification Unit," Control Systems 2004 Conference, Quebec City (2004).

Dunn, K.G. and C.L.E. Swartz, "On the Use of Controller Parametrization in the Optimal Design of Dynamically Operable Plants," International Symposium on Advanced Control of Chemical Processes (ADCHEM 2003), Hong Kong (2003)

Swartz, C.L.E., J.D. Perkins and E.N. Pistikopoulos, "Incorporation of Controllability in Process Design through Controller Parametrization," In *Process Control and Instrumentation 2000*, 49-54, University of Strathclyde (2000).

Smith, P.D., C.L.E. Swartz and S.T.L. Harrison, "Control and Optimization of a Multiple Effect Evaporator," 74th Annual Congress of the South African Sugar Technologists Association, Durban, (31July-2 August 2000).

THOMPSON, MICHAEL R. (Associate Professor)

Research Interests: polymer processing, extrusion of food, pharmaceutical and polymeric materials, reactive extrusion, studies of composites and foams, compounding practices and material properties.

Professional Organizations

Member:

- American Institute of Chemical Engineers (AIChE)
- Society of Plastics Engineers (SPE)
- Polymer Processing Society (PPS)

Papers in Refereed Journals

P.A. Moysey, A. Al Otaibi, K.L. Cloet, and M.R. Thompson, “Effective Thermal Properties of the Solid Bed in Extrusion Machinery” Intern Polym Process, 2008, 23, 301-311

M. R. Thompson, J. Lui, H. Krump, L. K. Kostanski, P. D. Fasulo, and W. R. Rodgers, Interaction of Supercritical CO2 with Alkyl-Ammonium Organoclays”, J Coll Interf Sci., 2008, 324, 177-184

G. H. Motlagh, A. N. Hrymak, M. R. Thompson, Improved through-Plane electrical conductivity in a Carbon-filled thermoplastic via Foaming” Polymer Engineering and Science, 2008, 48, 687-696

P.A. Moysey, M. R. Thompson, “Discrete Particle Simulations of Solids Compaction and Conveying in a Single-Screw Extruder”, Polymer Engineering and Science, 2008, 46, 62-73

P. A. Moysey and M. R. Thompson "Determining the collision properties of semi-crystalline and amorphous thermoplastics for DEM simulations of solids transport in an extruder" Chemical Engineering. Science, 2007, 62, 3699-3709

G. H. Motlagh, A. N. Hrymak, M. R. Thompson “Properties of a Carbon Filled Cyclic Olefin Copolymer”, Journal of Polymer Science: Part B-Polymer Physics., 2007, 45, 1808-1820

Qin, X., M. R. Thompson, A.N. Hrymak, “Rheology Studies of Foam Flow during Injection Molding”, Poly Eng Sci, vol 47, 522-529, (2007)

M. R. Thompson, M.R., X. Qin, G.Zhang and A.N. Hrymak, “Aspects of Foaming a Glass-Reinforced Polypropylene with Chemical Blowing Agents”, J. App Poly Sci, 2006, 102, 4696-4706

X. Qin, M. R. Thompson, A.N. Hrymak, A. Torres, “Rheological Comparison Of Chemical And Physical Blowing Agents In A Thermoplastic Polyolefin”, IEC Research, 2006 45, 2734-2740

M. R. Thompson and K. K Yeung “Recyclability of a Layered Silicate-termoplastic Olefin Elastomer Nanocomposite” Polymer Degradation and Stability, 2006, 91, 2396-2407

P. A. Moysey, and M. R. Thompson “Modelling the solids inflow and solids conveying of single-screw extruders using the discrete element method” Powder Technology, 2005, 153, 95-107

X. Qin, M. R. Thompson, A.N. Hrymak “Rheology Studies of Polyethylene/Chemical Blowing Agent Solutions within an Injection Molding Machine”, Polymer Engineering and Science, 2005 45, 8. 1101-1118

G. Zhang, M. R. Thompson “Reduced fibre breakage in a glass-fibre reinforced thermoplastic through foaming”, Composite Science and Technology, 2005, 65, 14, 2240-2249.

I. Rex, B. A. Graham, M. R. Thompson, “Studying single-pass degradation of a high-density polyethylene in an injection molding process”, Polym. Deg. Stab., 2005, 90, 136-146

K. Rogers, E. Takacs, M. R. Thompson, “Contact Angle Measurement of Select Compatibilizers for Polymer-Silicate Layer Nanocomposites”, Polym. Test., 2005, 24, 423-427

M. R. Thompson, C. Xi, E. Takacs, M. Tate, and J. Vlachopoulos, “Experiments and Flow

Analysis of a Micropelletizing Die", Polymer Engineering and Science, 2004, 44, 7, 1391-1402

P. A. Moysey and M. R. Thompson "Investigation of Solids Transport in a Single-Screw Extruder Using a 3-D Discrete Particle Simulation", Polymer Engineering and Science, 2004, 44, 12, 2203-2215

M. R. Thompson*, G. Donoian, and J. P. Christiano "Mechanisms for Mixing Powdered Filler into High-Density Polyethylene under Starve-Fed Conditions in a Single-Screw Extruder", Polymer Engineering and Science, 2000 Vol. 40, No. 9 2014-2026

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M. R. Thompson, J. Lui, W. R. Rodgers, P. D. Fasulo, "Supercritical Carbon Dioxide as an Exfoliating Agent in the Preparation of a Layered Silicate Polymer Nanocomposite", Society of Plastics Engineers TPO Conference, Sterling Heights, Michigan, Oct 2008

K. L. Rogers, M. R. Thompson, A. N. Hrymak, "Mechanical properties associated with the interface of a co-injection molded structural TPO foam", SAE World Congress & Exhibition, Detroit, April 2008

P. A. Moysey, M. R. Thompson "Solids Compaction and conveying in a Single-Screw Extruder by Discrete Particle Modeling" Annual Technical Meeting for the Society of Plastics Engineers, (ANTEC) May 2007

G. H. Motlagh, A. N. Hrymak, M. R. Thompson "Impact of foaming on electrical conductivity and fiber Orientation of COC-Carbon Fiber Composites in Injection Molding" Annual Technical Meeting for the Society of Plastics Engineers, (ANTEC) May 2007

P. A. Moysey, M. R. Thompson, Plastic contact Mechanics and its Impact on DEM Simulations os Solids Transport in Extruders" Annual Technical Meeting for the society of Plastics Engineers, (ANTEC) May 2006

X. Qin, M. R. Thompson and A. N. Hrymak, "Rheology Studies of Two-Phase Gas-Polymer Suspensions During Mold Filling" Annual Technical Meeting for the Society of Plastics Engineers (ANTEC) May 2006

G. Zhang and M. R. Thompson, "Reduced Fiber Breakage in an Injection Molding Machine",Annual Technical Meeting for the Society of Plastics Engineers (ANTEC), May 2005

C. Xi, E. Takacs, M. Tate, M. R. Thompson, J. Vlachopoulos, "Study of the Micropelletization Process",Annual Technical Meeting for the Society of Plastics Engineers (ANTEC), 61, 278-282 (2003).

M. R. Thompson, J. P. Christiano, "Analysis of Feed Characteristics on the Performance of Groove-Feed Extruders", ANTEC, 59, 190-194 (2001)

K. R. Slusarz, M. R. Thompson, J. P. Christiano, "An Experimental Comparison of the Improved Mixing Obtained from a New Barrier Screw Design", ANTEC, 59, 262-266 (2001)

J. P. Christiano, M. R. Thompson, "A New Barrier Screw Design Utilizing Solid Bed Deformation with Forced Melt Removal", ANTEC, 58, 78-82 (2000)

M. R. Thompson, J. P. Christiano, "Investigation of the Melting Mechanism within a Groove-Feed Single-Screw Extruder", ANTEC, 58, 129-133 (2000)

Patents

M.R. Thompson, J.P. Christiano, .*Extruder Screw*., Davis-Standard Corporation, US Patent No. 6,176,606, (Jan. 23, 2001)

J.P. Christiano, M.R. Thompson, .*Extruder Screw*., Davis-Standard Corporation, US Patent No. 6,179,461 (Jan. 30, 2001)

J.P. Christiano, M.R. Thompson, .*Extruder Screw having Multi-Channeled Barrier Section*., Davis-Standard Corporation., US Patent No. 6,139,179 (Oct. 31, 2000)

Research Interests

MATERIALS DEVELOPMENT

M.R. Thompson

Development of new value-added polymeric materials through extrusion, injection molding and compression molding processes. Our interests lie in exploring the complex interactions that arise between processing history, evolved morphology of the material, and product properties. Current materials under study include clay and graphite nanocomposites, electrical conductive composites, polymer foams, and reinforced polymer foams. Philosophically, our research relies heavily on experiments, however, use of numerical methods is encouraged to complement our analysis.

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FUNDAMENTALS OF POLYMER PROCESSING

M.R. Thompson

Gain improved understanding of the fundamental mechanims which control various polymer processes, particularly extrusion and its downstream operations. Complementary use of experimental trials and numerical techniques allows us to gain knowledge of a process. Model development upon these fundamental mechanisms provided improved tools for systems design and troubleshooting.

DISCRETE MODELLING OF THE SOLIDS-CONVEYING AND MELTING ZONES OF A GROOVE-FEED EXTRUDER

M.R. Thompson

Current models of solids-conveying in a conventional single-screw extruder simplify the phenomenon by disregarding the true discrete nature of the medium, instead choosing to treat the solids flow as a continuum that responds isotropically to applied stresses. Occasionally, a lateral stress ratio parameter is incorporated to account for the true anisotropic nature of solid granulates. These models provide a suitable match to trends observed experimentally but lack sufficient resolution to be useful when greater accuracy is required, as in feedscrew design. In addition, these current solids-conveying models prove to be completely unreliable when applied to groove-feed extrusion – a type of extrusion where the output rate is solids-conveying dependent rather than melting dependent as in conventional extrusion. Clearly, a discrete approach is needed to provide the necessary level understanding needed to accurately understand solids-conveying. In addition, melting and solids-conveying are intimately linked in groove-feed extrusion, unlike conventional extrusion where these mechanisms normally follow sequentially.

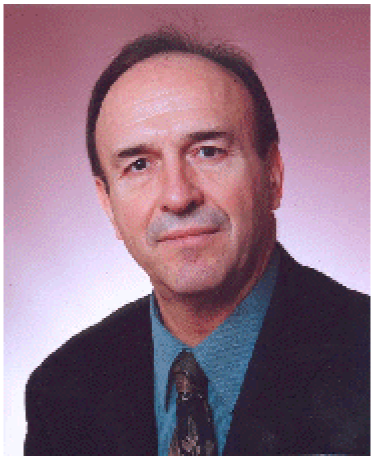
In this project, discrete modelling techniques coupled with experimental observations are used to generate a level of understanding not currently possessed by researchers in our field of plastics extrusion. The goal of the project is to develop an accurate modeling technique capable of assisting rapid, prototype feedscrew development for the extrusion and injection molding industries.

CURRENT PROJECTS

- *Discrete Particle Simulations of Solids Transport in Extrusion*
- *Polymer degradation in Processing Machinery*
- *Processing of foamed Polymers and Composites*
- *Granulation of pharmaceutical excipient in a twin screw continuous process*
- *Manufacturing Industrial Starch Materials through Reactive Extrusion*
- *Development of Polymer Supercapacitors*
- *Supercritical carbon dioxide suspension in processing machinery*

VLACHOPOULOS, JOHN (Emeritus Professor)

Research Interests: Polymer processing, rheology, computer flow simulation, extrusion, rotomolding.



Professional Organizations

Member:

- Canadian Society for Chemical Engineering (C.I.C. Fellow)
- American Institute of Chemical Engineers
- Sigma Xi
- Canadian Society of Rheology
- Society of Rheology
- Professional Engineers of Ontario
- Society of Plastics Engineers (Fellow)
- Polymer Processing Society (Past President)
- Verein Deutscher Ingenieure
- Hellenic Society of Rheology

Books edit:

J. Vlachopoulos and J.R. Wagner (Editors), "The SPE Guide on Extrusion Technology and Troubleshooting", SPE, Brookfield, CT (2001).

Chapters in Books:

J. Vlachopoulos and D. Strutt, "Heat Transfer", in SPE Plastics Technicians Toolbox, 2, 21-33 (2002).

J. Vlachopoulos and V. Sidiropoulos, "Polymer Film Blowing: Technology and Modelling", Encycl. of Mat. Sci. & Tech., 7296-7101 Elsevier (2001).

Papers in refereed Journals:

C.R. Santi , E. Hage Jr., C.A. Correa and J. Vlachopoulos, “Torque Viscometry of Molten Polymer Composites”, Appl. Rheol., To appear.

E.S. Takacs and J. Vlachopoulos, “Biobased biodegradable polymers for biomedical applications: Properties and Processability”, Plast. Engineer., 64(9), 28-23, Oct. 2008.
V. Hristov and J. Vlachopoulos, “Effects of Polymer Molecular Weight and Filler Particle Size on Flow Behavior of Wood Polymer Composites”, Polym. Comps., 29, 831-839 (2008).

D. Kanev, E. Takacs and J. Vlachopoulos, “Rheological Evaluation and Observationsk of Extrusion Instabilities of Biodegradable Polyesters”, Intern. Polym. Proc., 22, to appear (2007).

V. Hristove and J. Vlachopoulos, “A study of Entrance Presssure Loss in Filled Polymer Melts”, Appl. Rheol., 17, to appear (2007).

V. Hristove and J. Vlachopoulos, “Thermoplastic Silicone Elastomer Lubricant in Extrusion of Polypropylene Wood Flour Composites”, Adv. Polym. Tech, 26, 100-108 (2007).

V. Hristov and J. Vlachopoulos, “Influence of Coupling Agents on Melt Flow Behavior of Natural Fiber Composites”, Macrom. Mat. Eng., 292, 608-619 (2007).

V. Hristove and J. Vlachopoulos, “A Study of Viscoelasticity and Extrudate Disttortions of Wood Polymer Composites”, Rheol. Acta, 46, 773-783 (2007).

Hristov, V. Takacs E. Vlachopoulos, J. Surface tearing and wall slip phenomena in extrusion of hightly filled HDPE/wood flour composites. Polymer Engineering and Science 46, (9) 1204-1214.

Larrazabal, H. Hrymak, A. N. and Vlachopoulos, J. (2006) On the relationship between the work of adhesion and the critical shear stress for the onset of flow instabilities Rheologica Acta, 45 (5) 705-715.

Larrazabal, H. J. Hrymak, A. N. Vlachopoulos, J. (2006) Effect of the chemical and morphological conditions of the die wall on the extrusion of linear polyolerins. International Polymer processing 21, (2) 132-140.

V. Sidiropoulos and J. Vlachopoulos, (2005) "Temperature Gradients in Blown Film Bubbles", Adv. Polym. Techn., 24, 83-90.

Tinson, E. Takas and J. Vlachopoulos, (2005), “The Role of Surface Tension inSintering for Rotational Molding”, Rotoworld, 1, 43-47.

Torres, A. Hrymak, J. Vlachopoulos, D. Moran and Z. DaFonseca, (2005) "The Fast and Efficient Simulation of 3D Creeping Flow in Ducts Using a Space Matching Algorithm", Polym. Eng. Sci., 45, 249-259.

M. Thompson, C. Xi, E. Takacs, M. Tate and J. Vlachopoulos, (2004) "Experiments and Flow Analysis of a Micropelletizing Die", Polym. Eng. Sci., Vol. 44, 1391-1402.

D. D'Agostino, E. Takacs and J. Vlachopoulos, (2004) "Foaming with Polymer Microspheres in Rotational Molding: The Effect of Coupling Agent", J. Cell. Plast., Vol. 40, 61-75.

V. Sidiropoulos and J. Vlachopoulos, (2003), "The Aerodynamics of Blown Film Cooling", Jap. Soc. Polym. Proc. Journal (Seikei Kaku), 15, 740-744.

J. Vlachopoulos and D. Strutt, (2003) "Overview: Polymer Processing", Mat. Sci. Tech., 19, 1153-1160.

Greco, A. Mafezzoli and J. Vlachopoulos, (2003) "Simulation of Heat Transfer During Rotational Molding", Adv. Polym. Tech., 22, 271-279.

Current Research Projects

POLYMER PROCESSING
J. Vlachopoulos
Several projects are underway in cooperation with Drs. A.N. Hrymak and M.R. Thompson involving polymer processing.

ROTATIONAL MOLDING OF POLYMERS
J. Vlachopoulos
Rotational molding is a process for the production of hollow plastic parts such as containers, tanks and automative parts. It involves the tumbling, heating and melting of thermoplastic powder, in a biaxially rotating mold, followed by coalescence, fusion or sintering and cooling. Our research involves experimental work with particle sintering observations under the microscope, rotational molding in uniaxial and biaxial machines accompanied by material characterization and property determination. Some studies are aimed at foams in rotational molding. Attempts are made for development of mathematical models for the description of the various fundamental mechanisms. The ultimate objectives are the expansion of the range of materials used in rotational molding and the improvement of end use properties.

BLOWN FILM EXTRUSION
J. Vlachopoulos
Blown film extrusion is the most important process for the production of plastic films. The polymer is melted in an extruder and the hot melt is pumped through a die to form a thin walled tube which is simultaneously axially drawn and radially expanded. We are involved in both computer modelling and experimental work. The ultimate objectives are output increase, defect reduction and the prediction of film properties (dart impact, tear, optics, etc.). It appears that most film properties correlate with the strains and stresses at the freeze line. Defect reduction depends on many factors including die design and bubble control. Output rates depend on cooling capacity and bubble stability. Our methodology combines computer simulations with rheological material characterization.

WOOD PLASTIC COMPOSITES EXTRUSION
J.Vlachopoulos
Extrusion of woodfibre/Polymer composites is a rapidly growing industry, mostly for decking applications. Rheological studies have been carried out. The viscosity increases with the woodfibre content. Measurements were made with up to 70% fibre loadings. Capillary dies are not suitable for such measurements. Dynamic measurement were in good agreement with extrusion from large diameter rod dies. In extrusion a new phenomenon has been observed that appears like some sort of an exaggerated sharkskin, which is referred to as skin rupture. This can be reduced or eliminated by addition of lubricants to promote slip or die cooling to strengthen the skin. An evaluation of several patents has also been carried out. Current efforts are aimed at improving the mechanical properties of extruded profiles using compatibilizers and coupling agents.

WEST-MAYS, JUDITH (Associate Member, Associate Professor, Pathology & Molecular Medicine

Research Interests: Molecular and Genetic Mechanisms Regulating Eye Development and Disease

Selected Publications

Bassett EA, Pontoriero GF, Feng W, Marquardt T, Fini ME,Williams T, West-Mays JA**.** Conditional Deletion of AP-2□in the Developing Retina Demonstrates Non-Cell Autonomous Roles for AP-2a in Optic Cup Development. Molecular Cellular Biology*.* 2007; 27:7497-7510.

Robertson JV, Nathu Z, Najjar A, Dwivedi D, Gauldie J, West-Mays JA. Adenoviral Gene Transfer of Bioactive TGF-b1 to the Rodent Eye as a Novel Model for Anterior Subcapsular Cataract. Molecular Vision 2007 ;13:457-69.

Pontoriero GF, Deschamps P, Ashery-Padan R, Wong R,Yang Y, Zavadil J, Ales Cvekl A**,** Sullivan S, Williams T, West-Mays JA. Conditional Deletion of AP-2□ in the Lens Alters Multiple Pathways Controlling the Lens Epithelia Cell Phenotype. *Developmental Dynamics.* 2008 Mar;237(3):602-17.

Pontoriero GF, Smith AN, Miller LE, Radice GL, West-Mays JA*, Lang RA*. Co-operative roles for E-cadherin and N-cadherin during lens vesicle separation and lens epithelial cell survival. *Developmental Biology*. In Press *equal senior author contribution.

WOOD, PHILIP E. (Professor)

Research Interests: Experimental and computational fluid mechanics, heat transfer.

Professional Organizations

Member:

- Association of Professional Engineers of Ontario
- American Institute of Chemical Engineers
- Canadian Society for Chemical Engineers

Papers in Refereed Journals

S. Liu, A. N. Hrymak and Philip E. Wood, Design Modifications to SMX Static Mixer for Improving Mixing, AIChE Journal, 52, 150-157 (2006)

S. Liu, A.N. Hrymak and P.E. Wood**,** Laminar Mixing of Shear Thinning Fluids in a SMX Static Mixer, Chemical Engineering Science, 61, 1753-1759 (2006)

S. Liu, A.N. Hrymak, and Philip E. Wood, Drop Breakup in an SMX Static Mixer in Laminar Flow, Canadian Journal of Chemical Engineering, 83, 793-807 (2005)

Jaffer, S. A., Bravo, V. L., Wood, P. E., and Hrymak, A. N. “Experimental validation of Numerical Simulations of the Kneading Disk Section in a Twin Screw Extruder”. Polymer Eng. & Sci., 40, pp. 892-901, 2000.

Johnson, D. A. and Wood, P. E., “Self-sustained oscillations in opposed impinging jets in an enclosure”, Can. J. Chem. Eng., 78, 867-875, 2000

WU, Yiliang (Adjunct, Associate Professor)

Research Interests: Materials, processes, and device physics for organic thin-film transistors. Photo-responsive polymer.

Professional Organizations

Member:

- American Chemical Soceity (ACS)
- Materials Research Society

Selected Journal Papers

Direct Observation of Alkyl Chain Interdigitation in Conjugated Polyquarterthiophene Self-Organized on Graphite Surfaces, Peisi Keg, Anup Lohani, Denis Fichou, Yeng Ming Lam, Yiliang Wu, Beng S. Ong, Subodh G. Mhaisalkar *Macromolecular Rapid Communication (front cover*) 2008, *29*, 1197-1202.

Thiophene Polymer Semiconductors for Organic Thin-Film Transistors
Beng S. Ong, Yiliang Wu, Yuning Li, Ping Liu, Hualong Pan, *Chem. A Europe Journal* 2008, *14*, 4766-4778.

Performance improvement for solution-processed high-mobility ZnO thin-film transistors, Chensha Li, Yuning Li, Yiliang Wu, Beng S. Ong, Rafik Loutfy. *J. Phys. D: Appl. Phys.* 2008, *41*, 125102.

ZnO field-effect transistor prepared by aqueous solution-growth ZnO crystal thin film, Chensha Li, Yuning Li, Yiliang Wu, Beng S. Ong, Rafik Loutfy. *J. Appl. Phys*. 2007, *102*, 076101.

Unique Polymorphism of oligothiophenes
Hualong Pan, Ping Liu, Yuning Li, Yiliang Wu, Beng Ong, Gu Xu, Shiping Zhu
Adv. Mater., 2007, *19*, 3240-3243.

Benzodithiophene Copolymer - A Low-temperature, Solution-processed High-Performance Semiconductor for Thin-film Transistors, Hualong Pan, Yiliang Wu, Yuning Li, Ping Liu, Beng S. Ong, Shiping Zhu, Gu Xu *Adv. Funct. Mater*. 2007, *17,* 3574-3579.

Organic Thin-film Transistor Integration using Silicon Nitride Gate Dielectric
Flora M. Li, Arokia Nathan, Yiliang Wu, and Beng S. Ong, *Appl. Phys. Lett*., 2007, *90*, 133514.

Low-temperature, Solution-processed for Thin-film Transistors, Hualong Pan, Yuning Li, Yiliang Wu, Ping Liu, Beng S. Ong, Shiping Zhu, Gu Xu, *J. Am. Chem. Soc*. 2007, *129*, 4112-4113.

Stable, solution-processed, high-mobility ZnO thin-film transistors, Beng S. Ong, Chensha Li, Yuning Li, Yiliang Wu, Rafik Loutfy, *J. Am. Chem. Soc*. 2007, *129*, 2750-2751.

A Simple and Efficient Approach to Printable Silver Conductor for Printed Electronics, Yiliang Wu, Yuning Li, Beng S. Ong, *J. Am. Chem. Soc.* 2007, *129*, 1862-1863.

Solution-processable, High-mobility Pentacenes with Enhanced Stability
Yuning Li, Yiliang Wu, Ping Liu, Zorica Prostran, Beng S. Ong. *Chem. Mater.*, 2007, *19*, 418-423.

Poly(2,5-bis(2-thienyl)-3,6-dialkylthieno[3,2-b]thiophene)s – High-mobility Semiconductors for Thin-film Transistors
Yuning Li, Yiliang Wu, Ping Liu, Maria Birau, Hualong Pan, Beng S. Ong, *Adv. Mater.*, 2006, *18*, 3029-3032.

Study of Gold Nanoparticles as Printable Conductive Precursor to Print Source and Drain Electrodes for Organic Thin-Film Transistors, Yiliang Wu, Yuning Li, Ping Liu, Sandra Gardner, Beng S. Ong, *Chem. Mater*., 2006, *18*, 4627-4632.

Polyindolo[3,2-b]carbazoles: a novel class of p-channel semiconductors for organic thin-film transistors, Yuning Li, Yiliang Wu, Beng S. Ong, *Macromolecules*, 2006, *39*, 6521-6527.

Synthesis and thin-film transistor performance of poly(4,8-didodecylbenzo[1,2-b:4,5-b']dithiophene). Hualong Pan, Yuning Li, Yiliang Wu, Ping Liu, Beng S. Ong, Shiping Zhu, Gu Xu, *Chem. Mater*., 2006, *18*, 3237-3241.

Organic Thin Film Transistor with Poly(methyl silsesquioxane) modified dielectric interface.
Yiliang Wu, Ping Liu, Beng S. Ong.
Appl. Phys. Lett., 2006, *89*, 013505.

Enabling Gate Dielectric Design for All-Solution Processed, High-Performance, Flexible Organic Thin-Film Transistors. Ping Liu, Yiliang Wu, Yuning Li, Beng S. Ong. *J. Am. Chem. Soc*. 2006, *128*, 4554-4555.

Printed Silver Ohmic Contacts for High-Mobility Organic Thin-Film Transistors
Yiliang Wu, Yuning Li, Beng S. Ong
J. Am. Chem. Soc. 2006, *128*, 4202-4203.

Structurally ordered polythiophene nanoparticles for high-performance organic thin-film transistors. Beng S. Ong, Yiliang Wu, Ping Liu,Sandra Gardner, *Adv. Mater*., 2005, *17*, 1141-1144.

Control orientation of liquid crystalline polythiophenes for high performance organic transistors.
Yiliang Wu, Ping Liu, Beng S. Ong, Tharan Srikumar, Ni Zhao, Gianluigi Botton, Shiping Zhu *Appl. Phys. Lett.,* 2005, *86*, 142102.

Facile Synthesis of Silver Nanoparticles Useful for Fabrication of High-conductivity Elements for Printed Electronics, Yuning Li, Yiliang Wu, Sandra Gardner, Beng S. Ong
J. Am. Chem. Soc., 2005, *127*, 3266-3267.

High-Performance Organic Thin-Film Transistors with Solution-printed Gold Contacts.
Yiliang Wu, Yuning Li, Ping Liu, Sandra Gardner, Brian Chiang, Beng S. Ong
Adv. Mater. 2005, *17*, 184-187.

Poly(3,3"-dialkylterthiophene)s: Room-temperature, solution-processed, high-mobility semiconductors for organic thin-film transistors
Yiliang Wu, Ping Liu, Sandra Gardner, Beng S. Ong. *Chem. Mater*., 2005, *17*, 221-223.

Indolo[3,2-b]carbazole-based Thin-film Transistors with High Mobility and Stability.
Yiliang Wu, Yuning Li, Sandra Gardner, Beng S. Ong. *J. Am. Chem. Soc.,* 2005, *127*, 614-618.

Lamination Method for the Study of Interfaces in Polymeric Thin Film Transistors.
Michael L. Chabinyc, Alberto Salleo, Yiliang Wu, Ping Liu, Beng S. Ong, Martin Heeney, Iain McCulloch. *J. Am. Chem. Soc*., 2004, *126*, 13928-13929.

High-Performance Semiconducting Polythiophenes for Organic Thin-Film Transistors. Beng S. Ong, Yiliang Wu, Ping Liu, Sandra, Gardner. *J. Am. Chem. Soc*. 2004, *126*, 3378-3379.

Photoinduced Chirality in Thin Films of Achiral Liquid-Crystalline Copolymers Containing Azobenzene Chromophores.
Yiliang Wu, Almeria Natansohn, Paul Rochon *Macromolecules*, 2004, *37*, 6801-6805.

Photoinduced Birefringence and Surface Relief Gratings in Polyurethane Elastomers with Azobenzene Chromophore in the Hard Segment. Yiliang Wu, Almeria Natansohn, Paul Rochon *Macromolecules* 2004, *37*, 6090-6095.

Selected Patents

US 7456424 *Thin Film Transistors Including Indolocarbazoles*
Yiliang Wu, Beng S. Ong, Yu Qi, Yuning Li

US 7449542 *Polymers*
Yiliang Wu, Ping Liu, Lu Jiang, Beng S. Ong

US 7443027 *Electronic Device Having Coalesced Metal Nanoparticles*
Yiliang Wu, Yuning Li, Beng S. Ong

US 7397086 *Top-gate thin-film transistor*
Yiliang Wu, Beng S. Ong, Paul F. Smith

US 7306969, *Methods to minimize contact resistance*
Yiliang Wu, Beng S. Ong, Yuning Li

US 7294850, *Device with small molecular thiophene compound having divalent linkage*
Beng S. Ong, Ping Liu, Yiliang Wu

US 7282735, *TFT having a fluorocarbon containing layer*
Yiliang Wu, Ping Liu, Beng S. Ong

US 7282733, *Polythiophene and devices thereof*
Beng S. Ong, Ping Liu, Lu Jiang, Yu Qi, Yiliang Wu

US 7270694, *Stabilized silver nanoparticles and their uses*
Yuning Li, Yiliang Wu, Beng S. Ong

US 7256418, *Polythiophenes and devices thereof*
Beng S. Ong, Ping Liu, Yiliang Wu, Yu Qi

US 7250625, *Polythiophenes and electronic devices generated therefrom*
Beng S. Ong, Ping Liu, Yu Qi, Yiliang Wu

US 7170093**,** *Dielectric Materials for Electronic Devices*
Yiliang Wu, Beng S. Ong, Ping Liu

US 7169883**,** *Polymer*
Yiliang Wu, Ping Liu, Lu Jiang, Beng S. Ong

US 7112649, *Polythiophenes and Devices thereof*
Ping Liu, Yiliang Wu, Lu Jiang, Beng S. Ong

US 7105375, *Reverse printing*
Yiliang Wu, Nan-Xing Hu, Beng S. Ong.

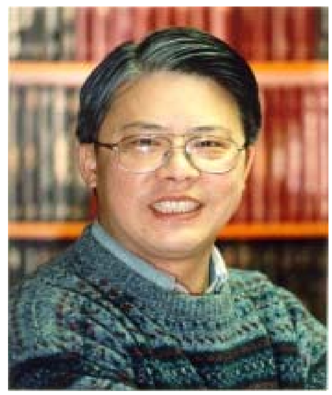
US 7102017, *Process to prepare small molecular thiophene compounds*
Ping Liu, Yiliang Wu, Beng S. Ong, Maria Birau

US 7049629, *Semiconductor Polymers and Devices Thereof*
Yiliang Wu, Ping Liu, Lu Jiang, Beng S. Ong

US 7005672, *Thin Film Transistor with a Semiconductor Layer That Includes a Gelable Self-organizable Polymer*
Yiliang Wu, Ping Liu, Beng S. Ong, Dasarao K. Murti.

ZHU, SHIPING (Professor)

Research Interests: polymer synthesis and characterization, polymerization kinetics and reactor engineering polymer materials, polymer interfaces, polymer modifications, polymerization modeling, controlled/living radical polymerization, catalyst supporting, catalysis and polymerization of olefins, long chain branched polyolefins, polymers for biomedical applications, polymer coating/grafting, water-soluble polymers, polymers for microelectronic applications, semiconductors, dielectric materials



Professional Organizations

Member:

- Registered Professional Engineer of Ontario (P.Eng.)
- Canada Society of Chemical Engineers (CSChE)
- American Institute of Chemical Engineers (AIChE)
- American Chemical Society (ACS)
- International Union of Pure and Applied Chemistry (IUPAC)

Editing and Chair activities:

- Associate Editor, Canadian Journal of Chemical Engineering, 2007-2009
- Special Editor, Macromolecular Symposia, Vol 261, 2007, Wiley-VCH
- Editorial Board, Chinese Journal of Chemical Engineering – University Edition, 2005-
- Editorial Board, Frontier of Chemical Engineering in China, 2008-

- Organizer (with Tim McKenna), Symposium on Advanced Polymer Hybrids, 8th World Congress of Chemical Engineering, Montreal, Canada, August 23–27, 2009.
- Organizer (with Bo-Geng Li, Qiang Zhen), 1st Hangzhou International Polymer Forum – Advanced Materials and Reaction Engineering, Hangzhou, China, May 14-17, 2007.
- Organizer (with John Preston, Luke Chan), 1st Sino-Can Scientific Exchange Conference on Advanced Materials, McMaster University, Hamilton, Canada, August 20-26, 2006.
- Discussion Leader, Ionic Living Polymerizations III and Non-ionic Living Polymerization I,
- Pacific Polymer Conference IX, Hawaii, USA, December 11-14, 2005
- Organizer and Chair (with Mike Cunningham), Polymerization and Reaction Engineering, 87th Canadian Chemistry Conference and Exhibition, London, Canada, May 29–June 1, 2004.
- Chair (with M. Destarac), 5th Controlled/Living Radical Polymerization Symposium – Industrial Aspects of CLP, ACS Annual Meeting, Philadelphia, PA, USA, August 17-21, 2008
- Chair (Marco Apostolo), North American Polymer Reaction Engineering Conference PRE 7, Engineering Foundation, Niagara Falls, ON, May 3-8 2009.

Papers in Refereed Journals (last 3 years)

J. Mahon, S. Zhu "Size Exclusion Chromatography of Poly (2-methacryloyloxyethyl phosphorylcholine) and Its Interactions with Various Salts", *Coll. Polym. Sci.* 286, 1443-1454, 2008

R. Gong, S. MacLaughlin, S. Zhu, "Surface initiated atom transfer radical polymerization of polymethylmethacrylate brush from metals" *Appl. Surf. Sci.*, 254, 6802-6809, 2008

Yanlei Su, Chao Li, Wei Zhao, Qing Shi, Haijing Wang, Zhongyi Jiang, Shiping Zhu "Modification of polyethersulfone ultrafiltration membranes with phosphorylcholine copolymer can remarkably improve the antifouling and permeation properties", *Journal of Membrane Science*, 322, 171–177, 2008

J.D. Ye, Z.B. Ye, S.P. Zhu "Synthesis and Characterization of Hyperbranched Polyethylenes Containing Cross-linking Structures by Chain Walking Copolymerization of Ethylene with Diacrylate Comonomer" *Polymer*, 49, 3382-3392, 2008

X.X. Zhu, B.G. Li*, L.B. Wu, Y.G. Zheng, S. Zhu, K.D. Hungenberg, S. Mussig, B. Reinhard B "Kinetics and modeling of vinyl acetate graft polymerization from poly(ethylene glycol)" *Macromol React Eng*, 2 , 321-333, 2008

X. Gao, S. Zhu, J.L. Brash, H. Sheardown "A facile method to introduce nanoscale patterns through self-assembly of PEG brushes randomly grafted from surface" *Langmuir*. 24, 8303-8308, 2008

Jun-Wei Zhang, Bo-Geng Li,* Hong Fan, Shiping Zhu "Supported tandem catalysis in synthesis of ethylene-1-hexene copolymer from ethylene stock" *IECR*, 47, 5369-5375, 2008

Qiang Yu, Zhongqiong Qin, Jianping Xu, and Shiping Zhu "Diffusion-Controlled Kinetics and Livingness of Atom Transfer Radical Polymerization in Network Formation Systems", *Polym. Engn. Sci*. 48, 1254-1260, 2007

Qing Shi, Yanlei Su, Wei Zhao, Chao Li, Yaohui Hu, Zhongyi Jiang, Shiping Zhu "Zwitterionic polyethersulfone ultrafiltration membrane with superior antifouling propert" *Journal of Membrane Science*, 319, 271–278, 2008.

Renxu Chen, Shiping Zhu, Shane Maclaughlin "Grafting Polymers from Flat Nickel and Copper Surfaces by Surface-initiated Atom Transfer Radical Polymerization", Langmuir, 24, 6889-6896, 2008

R. Subramanian, S. Zhu, P. Reed "Synthesis and Performance of Graft and Random Microgel Copolymers of Dimethylaminoethylacrylate Methyl Chloride Quaternary and Acrylamide as Flocculants", J. Dispersion Sci. & Tech. 29, 835-841, 2008

Junwei Zhang, Bo-Geng Li, Hong Fan, and Shiping Zhu "Modeling of Tandem Polymerization of Ethylene Catalyzed by Bis(2-dodecylsulfanyl-ethyl)amine-CrCl3 and Et(Ind)2ZrCl2" Chemical Engineering Science, 63, 2057-2065, 2008

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Current Research Projects

Non-biofouling materials by surface grafting of biomimetic polymers

S. Zhu

This work prepares biomaterials that have non-biofouling surfaces through grafting biomimetic phosphorylcholine polymers. We use atom-transfer radical polymerization approach for modifying polyurethane and polydimethylsiloxane materials. We develop technologies in dealing with surface modification of soft materials substrates. We collaborate with Prof John Brash and Prof Heather Sheardown in this area.

Catalyst support and reactor technology for controlled/living radical polymerization

S. Zhu

The work is to develop catalyst support systems and packed-column reactor technologies for continuous controlled/living radical polymerization. The group has made significant contributors to catalyst supporting and reduction of catalyst loading in atom-transfer radical polymerization systems. A packed-column reactor system that can be readily used for continuous production of block copolymers by atom-transfer radical polymerization has been developed.

Model-based semi-batch technology

S. Zhu

Model-based semi-batch technology is being developed for designing and production of controlled gradient copolymers. Gradient copolymers are a novel class of polymers that have composition changing from end to end along individual chain backbones. Gradient copolymers are often produced in batch processes and the gradient profiles are not controlled (determined by comonomer reactivity ratios only). With this technology, one can design and control any desired gradient profiles at will. We collaborate with Prof B.G. Li of Zhejiang University Hangzhou China in this area

Hyper-branched polyethylene materials

S. Zhu

This project is to modify high molecular weight hyperbranched polyethylenes that were developed in the lab. This type of PE synthesized by Ni/Pd-diimine catalysts has very low viscosities and behaves as a Newtonian fluid. We are interested in testing the materials as high performance engine oil additives. The project is to tailor-make the PE structure to meet the industrial requirements. We collaborate with Prof Zhibin Ye in this area.

Polymer grafting for metal corrosion protection

S. Zhu

This project is to modify steel surfaces for corrosion protection that is of interest to Canadian major steel makers. We develop new polymerization recipes and technologies for grafting acrylic polymers from active metal surfaces. These thin films having nanometer thickness provide great resistance in industrial corrosion testing.

Microcytometer

S. Zhu

This contract is to fabricate optical waveguide-based microcytometer. Zhu's role is to develop materials that meet the specific requirements in the application, while Prof. Xu is to make devices and testing. The materials is based on silane chemistry.

Polyshell technology

S. Zhu

This project is to develop a Polyshell technology. We prepare functional polymers as additives for polyacrylic and polycarbonate glass sheets. The new sheets will have strong resistance to scratching. Polyshell technology is anticipated to be a clear

advantage over existing coating technologies in terms of versatility in glass processing. We collaborate with Dr. Faucher in this area.

CHEMICAL ENGINEERING Ph.D. THESES, 2007-

Name	Supervisor	Thesis Title
Bruwer, Mark-John	J. MacGregor	Process Systems Approaches to Diagnostic Imaging and Identification
Cai, Yongsong	T. Marlin	Systematic Approach for Control Structure Design
Chen, Wei	R. Pelton	Wet Adhesion of Polyvinylamine-phenylboronic Acid to Cellulose Hrydrogel
Duan, Derek	H. Sheardown	Dendrimer Crosslinked Collagen Scaffolds for Corneal Tissue Engineering
Faucher, Santiago	S. Zhu	Engineering Atom Transfer Radical Polymerization: Catalyst Technology
Feng, Wei	S. Zhu	Surface Modification through Atom Transfer Radical Polymerization Grafting for the Preparation of Protein-Resistant Materials
Feng, Xianhua	R. Pelton	Polyvinylamine Carboxymethyl Cellulose Complexes
Ge. Xin	C. Filipe	In Vivo and In Vitro Application of Elastin-Like Polypeptides
Hristov, Velichko	J. Vlachopoulos	Rheological Aspects of Wood Polymer Composites Extrusion
Hu, Kang	J. Dickson	Development & Characterization of Poly (Vinylidene Floride)-Poly (Acrylic-Acid) Pore-Filled pH-Senstive membrane and Potential Application on Controlled Drug Release for Ruminant Animals
Hashemi Motlagh, Ghodratollah	A. Hrymak/ M. Thompson	Carbon fiber-black interactions and Fiber Orientation in Electronically Conductive Amorphous Thermoplastic Composites
Kanani, Dharmesh	R. Ghosh	Protein Bioseparation Using Synthetic Membranes: Enhancement of Selective and Throughput
Klenkler, Bettina	H. Sheardown	Epidermal Growth Factor-Modified Polydimethylsuloxane for Artificial Cornea Applications
Miao, Chuawei	R. Pelton	Synthesis of Polyvinylamine Microgels and Their Effect on Paper Strength
Moysey, Paul	M. Thompson	Discrete Element Simulation of the Solids Conveying Zone of Single-Screw Extruder
Su, Shungxing	R. Pelton	Biomacromolecules in Paper Strength and Bio-Detection
Ye, Lucy	R. Pelton	Bioactivbe Titania Colloidal Particles: Preparation, Characterization and Applications

CHEMICAL ENGINEERING MASTER's THESES, 2007-

Name	Supervisor	Thesis Title
Bai, Yu Qing	A. Hrymak	Properties of Thermoplastic Starch/Poly (Lactic Acid) Blends
Chang, Albert	K. Jones	The Mechanism of Fibrosis Induced by Biomaterials
Davies, Kristin	C. Swartz	Milp Formulations for Optimal Steady-State Buffer Levels and Flexible Maintenance Scheduling
Emami, Maryam	J. Vlachopoulos	Rotational Foam Molding of Metallocene Catalyzed Polyethylene
Gong, Rachel	S. Zhu	Surface Modification of Metals Through ATRP Grafting of Acrylics
Hu, Zhen	R. Pelton	Study of Hdroxylpropylguar (HPGG) properties at Solid-Liquid Interface
Huang, Ruxiang	C. Filipe/R. Ghosh	Responsive Membranes for Bioseparations
Kanev, Damyan	J. Vlachopoulos	Study of Rheological Properties of Biodegradable Polyesters
Li, Ruilin	R. Pelton	Kinetics of T102 Photocatalytic Decomposition
Li, Xiaoyun	A. Hrymak	Thermal Debinding of Metal Injection Molded Parts with an Agar-gel Binder System
Lin, Junhai	R. Pelton/C. Filipe	The Influence of Paper Surface Chemistry on Bacteriophage Activity
Liu, Jinling	M. Thompson	Interaction of Supercritical Carbon Dioxide with Quaternary-ammonium Organoclays in the Processing of Thermoplastic Elastomer Nanocomposites
Lu, Haiqian	A. Hrymak	Multivariable Model-based Predictive Control for Injection Molding
Lui, Han	C. Filipe	Optimization of ELP-Intein Protein Purification System by Comparing Four Different Self-Cleavage ELP Fusion Proteins
Lung, Pearline	K. Jones	The in vitgro and in vivo Effects of Alginate on Immune Response in Model Systems
Machado, Mark	S. Zhu	Initiation and Termination of a Hybrid Atom Transfer Radical Polymerization System
Marshall, Meghan	H. Sheardown	Lens Epithelial Cell Migration Model: Understanding Motile Behaviour During Posterior Capsule Opacification on Protein and Synthetic Substrates
Nikandrov, Alexei	C. Swartz	Performance Analysis of LP-MPC Cascade Control Systems
Rogers, Karen	M. Thompson/ A. Hrymak	Hybrid Foamed Co-injection Molding

Salari, Siamak	J. MacGregor	Vibration Analysis of Human Knee Joint in Healthy and Osteoarthritic Knees
Stahel, Marlene	J. MacGregor	Inferential Latent Variable Models for Combustion Processes
Sun, Junfeng	M. Thompson	Wet Granulation in a Twin Screw Extruder
VanBeek, Mark	H. Sheardown	Protein Rejecting Myaluronic Acid containing Hydrogel Materials
Xu, Jie	R. Pelton/C. Filipe	A General Platform for Aptamer Mediated Capture of Specific Targets
Zoghi, Parisa	R. Pelton	Development of Antibacterial Efficacy Testing Method for Ti02 Coated Paper in the Presence of Light