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INSTITUTE FOR POLYMER RESEARCH
UNIVERSITY OF WATERLOO
WATERLOO, ONTARIO N2L 3G1

NEWSLETTER 2006

1. IPR SENATE RENEWAL

We will start this year's newsletter by repeating the first item of last year's newsletter, given that it might be of interest to new readers and a "refresher" to others. The Senate Research Council (of the Senate) of the University of Waterloo (UW) reviews all UW senate-approved institutes every five years. IPR was reviewed in October, 2005 and received approval with accolades. The next review will take place in the fall of 2010.

A brief excerpt from the 2005 five-year review report is cited below:

Special Thanks

Professor Penlidis and all IPR members (and students) would like to thank the IPR Administrative Assistant, Rosemary Anderson, for continuing, exemplary service since 1986. Rosemary's contributions to the IPR "day-to-day life" are simply outstanding.

Plan for the Next Five-Year Period

We are very proud of the new **Canada-wide** IPR/MSED (Macromolecular Science and Engineering Division of the Chemical Institute of Canada (CIC)) scholarship that we established in 2000 and also of the IPR scholarships to both graduate students and undergraduate work-term reports. Continuity of the research and teaching activities of IPR is guaranteed by (a) the increasing maturity exhibited in the last five years by its new/young members, and (b) the increased mentorship exhibited by its older, more established, members.

Some new initiatives in the next five years will include:

(a) polymeric materials property characterization facility
(b) new interactions with researchers in areas of novel polymeric material applications (e.g., Optometry, Pharmacology, dental, bio-degradable, bio-plastics, drug delivery, rubber modification, nano-composites, etc.)
(c) expansion into automotive materials (Mechanical Engineering, Automotive Centre),
(d) expansion of our modular industrial intensive short courses
(e) expansion of membership, both industrial (e.g., Lanxess) and academic (e.g., Professor P. Sullivan, Mechanical Eng, Professor M.A. Polak, Civil Engineering)
(f) the selection of an Associate Director for IPR to work with Professor Penlidis in 2008-2010 for future continuity.

2. ANNUAL IPR SYMPOSIUM

The 29th Annual IPR Symposium will be held May 15, 2007. A schedule and registration forms have been circulated electronically, as usual.

Many thanks to all who participated in the 2006 Symposium (an audience of about 50 people)—IPR received very positive feedback regarding the topics covered. A list of industrial participants and the 2006 program are attached (Appendix 1).

3. IPR INDUSTRIAL MEMBERS

An up-to-date list of our current industrial members is attached (Appendix 2).

4. IPR PREPRINTS

During 2006, the IPR office sent out 31 preprints to our members (Appendix 3).

5. RESEARCH PROGRAMS

We have about 40 research personnel (excluding faculty) involved in polymer research at the University of Waterloo. Industrial members may find it interesting to keep up to date with the various research projects that are underway (see list attached of research personnel, Appendix 4). For more information on any project please call the appropriate supervisor or the IPR office at 519/888-4789.

6. RECENTLY GRADUATED STUDENTS

R. Dhib

MASc	ChE	EdatManesh, M	Modeling and Optimization of an Advanced Oxydation Bio-reactor, Ryerson University, (co-supervised with Prof. Mehrvar)

T.A. Duever

M.Sc.	ChE	Aldin, S.	Models of Wastewater Disinfection by Ultraviolet Light
PhD	ChE	Jitjareonchai, J.	Implementation of Markov Chain Monte Carlo Techniques in Parameter Estimation for Engineering Models

J. Duhamel

M. Sc.	Chem	Queen, C.	Development of a Water-Soluble Dye/Quencher System to Study Polymer Chain Folding in Water by Fluorescence
M. Sc.	Chem	Shen, Y.	Synthesis, Characterization, and Dispersing Efficiency of a Series of Oil-Soluble Dispersants

X. Feng

PhD (PT)	ChE	Zhu, Z.	Layer-by-layer self-assembled polyelectrolyte membranes for solvent dehydration, with A. Penlidis (currently with Petrosep, Oakville, ON)
PhD	ChE	Francisco, G.	Facilitated transport membranes for CO_2 separation, with A. Chakma (currently Institut European des Membranes, France)
MASc	ChE	Henry, M.	Oxygen/nitrogen separation by cobalt containing membrane (currently with Inco Inc., Mississauga, ON)

MASc	ChE	Zarkaria, R.	Hydrogen separation using hollow fiber membranes (currently Lecturer at Universiti Putra Malaysia)

N. McManus

MASc	ChE	Psarreas, A.	Nitroxide-mediated controlled degradation of poly-propylene (with C. Tzoganakis/A. Penlidis)

A. Penlidis

MASc	ChE	Psarreas, A.	Nitroxide-mediated controlled degradation of poly-propylene (with C. Tzoganakis/N. McManus)
PhD (PT)	ChE	Zhu, Z.	Layer-by-layer self-assembled polyelectrolyte membranes for solvent dehydration, (with X. Feng) (currently with Petrosep, Oakville, ON)

J.B.P. Soares

PhD	ChE	Al-Harthi, M.	Mathematical Modelling of Atom Transfer Radical Polymerization (w/ L.C. Simon)
MASc	ChE	Maafa, I.	Dynamic Modeling and Simulation of Styrene Free-Radical Polymerization with Mono- and Bifunctional Initiators (w/ A. Elkamel)

C. Tzoganakis

MASc	ChE	Li, Q.	Functionalization of Polypropylene with Sulfonyl Azide through Reactive Processing
MASc	ChE	Psarreas, A.	Nitroxide-mediated controlled degradation of poly-propylene (with N. McManus/A. Penlidis)

E. Vivaldo-Lima

MEng	ChE	Pallares Diaz, J.	Development of a Detailed Model and Analysis of the Reversible Addition-Fragmentation Transfer (RAFT) Polymerization Process
MEng	ChE	de la Luz Castellanos-Cardenas, M.	Simulation of the Dispersion Polymerization of MMA in Supercritical Carbon Dioxide, Using PREDICI

7. ACADEMIC MEMBERS OF THE INSTITUTE FOR POLYMER RESEARCH

Please see brief description of research interests and projects, along with contact information, by visiting the following web link:

http://www.ipruw.com/contact/faculty-cl.htm

8. MEMBER COMPANIES

Currently we have 20 **member companies**: (refer also Appendix 2)

AT Plastics Inc.
BASF AG/Corporation
Borealis AS
Braskem, Brazil
Cadbury Schweppes, USA
Canadian General Tower
CID/DESC, Centro de Investigación Desarrollo Tecnologico, Mexico
CIQA, Saltillo, Mexico
Compuplast Canada Inc.
Cooper Standard Automotive
DSM Research
The Dow Chemical Company
Lanxess Inc.
Nacan Products Limited
National Starch & Chemical
OMNOVA Solutions Inc.
Princeton Polymer Consultants
Progression Inc.
SABIC EuroPetrochemicals
Sumitomo Chemical Co., Japan

9. STUDENT AWARDS

J. Duhamel
Christine Keyes-Baig, NSERC Scholar
Howard Siu, NSERC Scholar

X. Feng
Elaine Lin, NSERC Scholar

M. Gauthier
Jason Dockendorf, OGS scholar

A. Penlidis
Joy Cheng, NSERC scholar
Afsaneh Nabifar, OGSST-OMNOVA award

E. Vivaldo Lima
Bibiana Alejandra Yáñez-Martínez, First Place Winner of the “SPM-CIQA Award for the Best Thesis in Polymers”, Mexico, 2006 (the student graduated in 2005). Thesis Title: Implementation and Use of the Numerical Fractionation Technique for Calculation of Full Molecular Weight Distributions in Conventional and Controlled Radical Polymerization.

Gabriel Maramillo-Soto, CONACYT Scholar (PhD)
Pedro R. Garcia Moran, CONACYT Scholar (PhD)
Martha Roa-Luna, IAMC-CONACYT Scholar (PhD)
Irais A. Quintero-Ortega, CONACYT (PhD)

10. FACULTY AWARDS

J. Duhamel
Tier-2 Canada Research Chair (renewal)

X. Feng
UW Outstanding Performance Award

E. Vivaldo Lima
Promoted to the highest level (level "D"), of the UNAM "PRIDE" Program of Stimula for Productivity of the Full Time Academic Personnel (professors and researchers), August 2006, for 3 years.

11. FULL REFEREED JOURNAL PAPERS

R. Dhib
Scorah, M.J., R. Dhib and A. Penlidis (2006). Modelling of free radical polymerization of styrene and methyl methacrylate by a tetrafunctional initiator, Chem. Eng. Sci. 61, 4827 – 4859.

Scorah, M.J, R. Cosentino, R. Dhib, A. Penlidis (2006). Experimental Study of a Tetrafunctional Peroxide Initiator: Bulk Free Radical Polymerization of Butyl Acrylate and Vinyl Acetate, Polym. Bull. 57, 157–167.

Sanjabi S., S.R. Upeti , R. Dhib (2006). Optimal Control of Continuous Infrared Dryers, Drying Technology, 24 581–587.

T. A. Duever
Jitjareonchai, J., T.A. Duever, P.M. Reilly and D.B. Chambers (2006). Parameter Estimation in the Error-in-Variables Model Using the Gibbs Sampler. C.J.Ch.E., 84(1), 125-138.

J. Duhamel
Siu, H.; J. Duhamel (2006). Associations between a Pyrene-Labeled Hydrophobically Modified Alkali Swellable Emulsion Copolymer and Sodium Dodecyl Sulfate Probed by Fluorescence, Surface Tension, and Rheology. Macromol. 39, 1144-1155.

Irondi, K.; M. Zhang, J. Duhamel (2006). Study of the Semidilute Solutions of Poly(N,N-dimethylacrylamide) by Fluorescence and its Implications to the kinetics of Coil-to-Globule Transitions. J. Phys. Chem. B, 110, 2628-2637.

Duhamel, J. (2006) Polymer Chain Dynamics in Solution Probed with a Fluorescence Blob Model (2006)/ Chem. Res., 39, 953-960.

Fung, S.-Y, J. Duhamel, P. Chen (2006). Solvent effect on the photophysical properties of the anticancer agent ellipticine. J. Phys. Chem. A, 110, 11446-11454.

X. Feng

Xiao, S., R.Y.M. Huang and X. Feng (2006). Preparation and properties of trimesoyl chloride crosslinked poly(vinyl alcohol) membranes for pervaporation dehydration of isopropanol. J. Membrane Sci., 286, 245-254.

Liu, L, A. Chakma and X. Feng (2006). Sorption, diffusion, and permeation of light olefins in poly(ether block amide) membranes. Chem. Eng. Sci., 61, 6142-6153.

Shi, Y., C.M. Burns and X. Feng (2006). Poly(dimethyl siloxane) thin film composite membranes for propylene separation from nitrogen. J. Membrane Sci., 282, 115-123.

Svang-Ariyaskul, A., R.Y.M. Huang, P.L. Douglas, R. Pal, X. Feng, P. Chen, and L. Liu (2006). Blended chitosan and polyvinyl alcohol membranes for the pervaporation dehydration of isopropanol. J. Membrane Sci., 280, 815-823.

Liu, L., A. Chakma and X. Feng (2006). Propylene separation from nitrogen by poly(ether block amide) composite membranes. J. Membrane Sci., 279, 646-654.

Du, R., X. Feng and A. Chakma (2006). Poly(N,N-dimethylaminoethyl methacrylate)/ polysulfone composite membranes for gas separations. J. Membrane Sci., 279, 76-85.

Liu, Y., X. Feng and D. Lawless (2006). Separation of gasoline vapor from nitrogen by hollow fiber composite membranes for VOC emission control. J. Membrane Sci., 271, 114-124.

Zhu, Z., X. Feng and A. Penlidis (2006). Self-assembled nano-structured polyelectrolyte composite membranes for pervaporation. Mat. Sci. Eng. C, 26, 1-8.

M. Gauthier

Yuan, Z., M. Gauthier (2006). One-pot Synthesis of Arborescent Polystyrenes. Macromolecules, 39, 2063-2071.

Il Yun, S., R. M. Briber, R. A. Kee, M. Gauthier (2006). Dilute-solution Structure of Charged Arborescent Graft Polymer. Polymer, 47, 2750-2759.

N. McManus

Leamen, M.J., N. T. McManus and A. Penlidis (2006). Terpolymerization with Depropagation: Modelling the Copolymer Composition of the Methyl methacrylate /Alpha MethylStyrene/Butyl Acrylate System. Chem. Eng. Sci, 61, 7774-7785.

Tuinman,E., N. T. McManus, M. Roa-Luna, E. Vivaldo-Lima, L.M.F. Lona, and A. Penlidis (2006). Controlled Free-Radical Copolymerization Kinetics of Styrene and Divinylbenzene by Bimolecular NMRP using TEMPO and Benzoyl Peroxide. J Macromol. Sci. Pure and Appl. Chem 43, 995 – 1011.

Shankar, S., R. Khesareh, N. T. McManus and A. Penlidis (2006). Bulk copolymerization of styrene and methyl methacrylate at elevated temperatures. J Macromol. Sci. Pure and Appl. Chem 43, 871 – 878.

Khesareh, R., N. T. McManus and A. Penlidis (2006). High temperature bulk copolymerization of methyl methacrylate and acrylonitrile: III. Thermal. Polym.- Plast. Tech. Eng. 45, 1-6, (2006)

Khesareh, R., N. T. McManus and A. Penlidis (2006). High temperature bulk copolymerization of methyl methacrylate and acrylonitrile: II. Full Conversion. J Macromol. Sci. Pure and Appl. Chem. 43, 23-37.

McManus, N.T., S.–H. Zhu, C. Tzoganakis, and A. Penlidis (2006). Grafting of ethylene-ethyl acrylate-Maleic anhydride terpolymer with amino-terminated Polydimethylsiloxane in melt. J. Appl. Polym. Sci. 101, 4230-4237.

Khesareh, R., N. T. McManus and A. Penlidis (2006). High temperature bulk copolymerization of methyl methacrylate and acrylonitrile: I. Reactivity ratio estimation. J. Appl. Polym. Sci 100, 843-851.

A. Penlidis

Leamen, M.J., N.T. McManus and A. Penlidis (2006). Terpolymerization with depropagation: Modelling the copolymer composition of the methyl methacrylate/alpha-methyl styrene/butyl acrylate system. Chem. Eng. Sci., 61, 7774-7785.

Vivaldo-Lima, E., A. Penlidis, P.E. Wood and A. E. Hamielec (2006). 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.

Santhi, R., K.V. Babu, A.Penlidis and S. Nanjundan (2006). Studies on copolymers of 3-methacryloyloxystyryl-4'-methylphenyl ketone and methyl methacrylate. React. Funct. Polymers, 66, 1215-1226.

Shankar, S., R. Khesareh, N. McManus and A. Penlidis (2006). Bulk copolymerization of styrene and methyl methacrylate at elevated temperatures. J. Macromol. Sci., Pure and Appl. Chem., 43, 871-878.

Pallares, J., G. Jaramillo-Soto, C. Flores-Catano, E. Vivaldo-Lima, L.M.F. Lona and A. Penlidis (2006). A comparison of reaction mechanisms for reversible addition-fragmentation chain transfer polymerization using modeling tools. J. Macromol. Sci., Pure and Appl. Chem., 43 (9), 1293-1322.

Scorah, M.J., R. Cosentino, R. Dhib and A. Penlidis (2006). Experimental study of a tetrafunctional peroxide initiator: Bulk free radical polymerization of butyl acrylate and vinyl acetate. Polym. Bull. 57, 157-167.

Tuinman, E., N.T. McManus, M. Roa-Luna, E. Vivaldo-Lima, L.M.F. Lona and A. Penlidis (2006). Controlled free-radical copolymerization kinetics of styrene and divinylbenzene by bimolecular NMRP using TEMPO and dibenzoyl peroxide. J. Macromol. Sci., Pure and Appl. Chem., 43 (7), 995-1011.

Scorah, M.J., R. Dhib and A. Penlidis (2006). Modeling of free radical polymerization of styrene and methyl methacrylate by a tetrafunctional initiator. Chem. Eng. Sci., 61, 4827-4859.

Zhu, Z., X. Feng and A. Penlidis (2006). Self-assembled nanostructured polyelectrolyte composite membranes for pervaporation. Mat. Sci. Eng. C., C26, 1-8.

Khesareh, R., N.T. McManus and A. Penlidis (2006). High temperature bulk copolymerization of methyl methacrylate and acrylonitrile: II. Full conversion range experiments. J. Macromol. Sci., Pure and Appl. Chem., A 43, 23-37

McManus, N.T., S.-H. Zhu, C. Tzoganakis and A. Penlidis (2006). Grafting of ethylene-ethyl acrylate-maleic anhydride terpolymer with amino-terminated polydimethyl siloxane during reactive processing. J. Appl. Polym. Sci., 101 (6), 4230-4237.

Khesareh, R., N.T. McManus and A. Penlidis (2006). High temperature bulk copolymerization of methyl methacrylate and acrylonitrile: III. Thermal polymerization. Polymer-Plastics Techn. Eng., 45, 653-658.

Khesareh, R., N.T. McManus and A. Penlidis (2006). High temperature bulk copolymerization of methyl methacrylate and acrylonitrile: I. Reactivity ratio estimation. J. Appl. Polym. Sci., 100, 843-851.

J.B.P. Soares

Al-Harthi, M., JBP Soares, LC Simon (2006). Modelling atom-transfer polymerization with bifunctional initiators: diffusion effects and case studies. Macromol Chem Phys, 207, 469-483.

Franceschini, F., TT da R Tavares, JHZ dos Santos, ML Ferreira, JBP Soares (2006). Ethylene and propylene polymerization using in-situ supported $Me_2Si(Ind)_2ZrCl_2$ catalyst: Experimental and theoretical study. Macromol Mater Eng, 291, 279-287.

Al-Harthi, M., JBP Soares, LC Simon (2006). Mathematical modeling of atom-transfer radical polymerization using bifunctional initiators. Macromol Theory Simul, 15, 198-214.

Al-Harthi, M., JBP Soares, LC Simon (2006). Dynamic Monte Carlo simulation of atom-transfer radical polymerization. Macromol Mater Eng, 291, 993-1003.

Anantawaraskul, S. JBP Soares, P Jirachaithorn, N Sornprom, J Limtrajul (2006). Mathematical modeling of crystallization analysis fractionation (Crystaf) of polyethylene. J Polym Sci, Part B: Polym Phys, 44, 2749-2759.

C. Tzoganakis

McManus, N., Zhu, S-H, C. Tzoganakis and A. Penlidis (2006). Grafting of Ethylene-Ethyl Acrylate-Maleic Anhydride Terpolymer with Amino-Terminated Polydimethyl-siloxane During Reactive Processing. J. Appl. Polym. Sci., 101 (6), 4230-4237.

Park, H., C. B. Park, C. Tzoganakis, P. Chen and K. H. Tan (2006). Surface Tension Measurement of Polystyrene Melts in Supercritical Carbon Dioxide. Ind. Eng. Chem. Res., 45, 1650-1658.

E. Vivaldo Lima

Vargas, R.O., E. Vivaldo-Lima, and O. Manero (2006). Simulation of nonlinear polyurethane production in a twin-screw extruder. Polym-Plast Techn. Eng., 45(1), 9-21.

Sierra, J., J. Palacios, and E. Vivaldo-Lima (2006). Effect of Microwave Activation on Polymerization Rate and Molecular Weight Development in Emulsion Polymerization of Methyl Methacrylate. J. Macromol. Sci., Part A, Pure and Appl. Chem., 43(3), 589-600.

Tuinman, E., N. T. McManus, M. Roa-Luna, E. Vivaldo-Lima, L. M. F. Lona, and A. Penlidis (2006). Controlled Free-Radical Copolymerization Kinetics of Styrene and Divinylbenzene by Bimolecular NMRP using TEMPO and Dibenzoyl Peroxide. J. Macromol. Sci., Part A, Pure and Appl. Chem., 43(7), 995-1011.

Pallares, J., G. Jaramillo-Soto, C. Flores-Cataño, E. Vivaldo-Lima, L. M. F. Lona, and A. Penlidis (2006). A Comparison of Reaction Mechanisms for Reversible Addition-Fragmentation Chain Transfer Polymerization Using Modeling Tools. J. Macromol. Sci., Part A, Pure and Appl. Chem., 43(9), 1293-1322.

Vivaldo-Lima, E., A. Penlidis, P. E. Wood, and A. E. Hamielec (2006). Determination of the Relative Importance of Process Factors on Particle Size Distribution in Suspension Polymerization Using a Bayesian Experimental Design Technique. J Appl. Poly. Sci., 102(6), 5577-5586.

Zavala-Tejeda, V., A. Flores-Tlacuahuac and E. Vivaldo-Lima (2006). The bifurcation behavior of a polyurethane continuous stirred tank reactor. Chem. Eng. Sci., 61(22), 7368-7385.

12. PAPERS IN FULL IN REFEREED CONFERENCE PROCEEDINGS

T.A. Duever

Lou, S., T.A. Duever and H. Budman (2006). Fault Detection Using Projection Pursuit Regression: A Classification versus an Estimation Approach. Proceedings of ADCHEM-06, (International Symposium on Advanced Control of Chemical Processes), 699-704, Vol. II, 2006

Jourdan, J., D. Peters, H. Plaumann and T. Duever (2006). A Better Bowling Ball: Developing Subjective Structure-Property Relationships. API Conference, Salt Lake City, September 25-27, 2006.

J.B.P. Soares

Jirachaithorn, P, S Anatawaraskul, JBP Soares and J Limtrakul (2006). Modeling of crystallization analysis fractionation (Crystaf) of linear-low density polyethylene (LLDPE). International Conference on Modeling in Chemical and Biological Sciences, Bangkok, Thailand, October 25-27, 2006.

C. Tzoganakis

Li, Q. and C. Tzoganakis (2006). Functionalization of Polypropylene with Sulfonyl Azide through Reactive Blending. 64th Annual Technical Conference of the Society of Plastics Engineers, Charlotte, NC, USA, pp.1804-1808.

Xiao, K.K., and C. Tzoganakis (2006). Effect of Screw Geometries on Extrusion of Wood-HDPE Blends. 64th Annual Technical Conference of the Society of Plastics Engineers, Charlotte, NC, USA, pp.937-941.

13. CONFERENCE PRESENTATIONS

X. Feng

Mujiburohman, M. and X. Feng (2006). Pervaporation of propyl propionate-water mixtures through PEBA membranes. 56th Canadian Chemical Engineering Conference, Sherbrooke, QC, Oct 15-18, 2006.

Xiao, S., R.Y.M. Huang, X. Feng, H.L. Hsu, P. Chen, P. Douglas, R. Pal and M. Nawawi (2006). Preparation of crosslinked poly(vinyl alcohol) membranes by trimesic acid chloride for pervaporation dehydration of isopropanol. 56th Canadian Chemical Engineering Conference, Sherbrooke, QC, Oct 15-18, 2006.

Hsu, H.L., R.Y.M. Huang, P. Chen, X. Feng, R. Pal, P. Douglas and M. Nawawi (2006). Pervaporation separation of isopropanol/water mixtures through genipin crosslinked chitosan membranes. 56th Canadian Chemical Engineering Conference, Sherbrooke, QC, Oct 15-18, 2006.

Feng, X. (2006). Olefin/paraffin separation by nanostructured composite membranes(2006). A **Keynote Lecture** at the 3rd Aseanian Membrane Conference, Beijing, China, Aug 23-25, 2006.

Huck, P., S. Peldszus, C. Guay, G. Gagnon, K. Exall, X. Feng (2006). Dual-Objective Membrane Pre-treatment: Fouling Reduction and Removal of Pharmaceuticals/EDS. 2006 AWWA Annual Conference and Exposition, San Antonio, TX, June 11-15, 2006.

Okechukwu, A., L. Liu and X. Feng (2006). Recovery of Aroma Compounds from Dilute Aqueous Solutions by Pervaporation. 17th Annual North American Membrane Society Meeting, Chicago, IL, May 12-17, 2006.

Sun, A.C., X. Feng and W. Kosar (2006). Formation of poly(vinylidene fluoride) hollow fiber membranes: Kinetic and thermodynamic investigations. 17th Annual North American Membrane Society Meeting, Chicago, IL, May 12-17, 2006.

M. Gauthier

Dockendorff, J., M. Gauthier (2006). Arborescent Polymer Templates for the Preparation of Metallic Nanoparticles. Ontario Nano Symposium, Waterloo, ON., May, 2006.

Munam, A., M. Gauthier (2006). Solution Viscosity of Arborescent Polyelectrolytes. CSC Meeting, Halifax, NS, May, 2006.

Gauthier, M., G. Njikang (2006). Induced Association of Arborescent Polystyrene-graft-Poly(ethylene oxide) Copolymers at the Air-water Interface. CSC Meeting, Halifax, NS, May, 2006.

Dockendorff, J., M. Gauthier (2006). Arborescent Polymers as Templates for the Preparation of Metallic Nanoparticles. CSC Meeting, Halifax, NS, May, 2006.

Gauthier, M. (2006). Synthesis and Characterization of Graft Polymers with a Dendritic Architecture. First Bilateral Sino-Canadian Scientific Exchange, Hamilton, ON, August, 2006.

N. McManus

McManus, N.T., M. Roa-Luna, E. Vivaldo-Lima , L. M. F. Lona, and A. Penlidis (2006). Free Radical Copolymerization of Styrene and Divinylbenzene in the presence of TEMPO. CSChe, Sherbrooke Quebec, October 15-18, 2006.

Nabifar, A, J.B. Ximenes, M. Roa-Luna., N.T.McManus, E. Vivaldo-Lima, L.M.F. Lona, A. Penlidis (2006). Clarifying the effect of (TEMPO/dibenzoyl peroxide) ratio in the nitroxide mediated radical polymerization (NMRP) of styrene. CSChe, Sherbrooke Quebec, October 15-18, 2006.

Tzoganakis, C., A. Psarreas, N.McManus, A. Penlidis (2006). Nitroxide-Mediated Controlled Degradation of Polypropylene. 22nd Annual Meeting of the Polymer Processing Society, Yamagata, Japan, July 2-6, 2006.

A. Penlidis

Cheng, J.J., A. Penlidis and M.A. Polak (2006). Relationships between environmental stress cracking resistance and tensile strength of high density polyethylene for pipe applications. 56th CSChE Conf., Sherbrooke, Oct. 15-18, 2006.

Nabifar, A., N.T. McManus, A. Penlidis, M. Roa-Luna, E. Vivaldo-Lima, J.B. Ximenes and L.M.F. Lona (2006). Clarifying the effect of TEMPO/dibenzoyl peroxide ratio in the NMRP of styrene. 56th CSChE Conf., Sherbrooke, Oct. 15-18, 2006.

Fujisawa, T. and A. Penlidis (2006). Copolymer composition control policies and applications. 56th CSChE Conf., Sherbrooke, Oct. 15-18, 2006.

McManus, N.T., A. Penlidis, M. Roa-Luna, E. Vivaldo-Lima and L.M.F. Lona (2006). Free radical copolymerization of styrene and divinylbenzene in the presence of TEMPO. 56th CSChE Conf., Sherbrooke, Oct. 15-18, 2006.

Tzoganakis, C., A. Psarreas, N.T. McManus and A. Penlidis (2006). Nitroxide-mediated controlled degradation of polypropylene. 22nd Annual PPS, Yamagata, Japan, July 2-6, 2006.

Alvarado-Contreras, J.A., H. Liu, M.A. Polak and A. Penlidis (2006). Micro- and macro-mechanical approaches for modeling of polyethylene materials for pipes. Intern. Conf. on Adv. Eng. Structures, Waterloo, ON, May 14-17, 2006.

Alvarado-Contreras, J., M.A. Polak and A. Penlidis (2006). Simulation of the crystalline phase of polyethylene under tension and shear loading conditions. Intern. Congress on Numerical Methods in Eng. and Appl. Sci., CIMENICS 2006, Margarita, Venezuela, March 20-24, 2006.

Bulsari, M., Q. Li, C. Tzoganakis and A. Penlidis (2006). Post-reactor functionalization of polyolefins through non-free radical processes. SPE Polyolefins 2006 Conf., Houston, TX, Feb. 26 – Mar. 1, 2006.

J.B.P. Soares

Jirachaithorn, P., S Anatawaraskul, JBP Soares and J Limtrakul (2006). Modeling of crystallization analysis fractionation (Crystaf) of LLDPE and HDPE with broad molecular weight distribution. 13th Regional Symposium on Chemical Engineering, BSCE 2006, Singapore, December 3-5, 2006.

Sarzotti, DM, JBP Soares and LC Simon (2006). A comparative study of characterization techniques for polyolefins: Crystaf, TREF, solution DSC and solid state DSC of polyethylene and ethylene/1-hexene copolymers. First International Conference on Polyolefin Characterization (ICPC), Houston, TX, USA, October 16-18, 2006.

Anantawaraskul, S. and JBP Soares (2006). A kinetic model for crystallization analysis fractionation (Crystaf). First International Conference on Polyolefin Characterization (ICPC), Houston, TX, USA, October 16-18, 2006.

Soares, JBPS (2006). Polymer reaction engineering at the University of Waterloo: An overview of research projects and methods. First Annual Bilateral Sino-Canadian Scientific Exchange on Advanced Materials, McMaster University, Hamilton, Ontario, Canada, August 21-23, 2006.

Soares, JBPS (2006). Dynamic Monte Carlo simulation of olefin polymerization with coordination catalysts: Applications to stopped-flow reactors. Polymer Reaction Engineering VI, Halifax, NS, Canada, May 21-26, 2006.

Paredes, B., JBP Soares, R van Grieken, A Carrero, I Suarez (2006). Characterization of ethylene-1-hexene copolymers made with supported metallocene catalysts: Influence of support type. First International Conference on Polyolefin Characterization (ICPC), Houston, TX, USA, October 16-18, 2006.

E. Vivaldo Lima

McManus N.T., M. Roa-Luna, E. Vivaldo-Lima, L:M.F. Lona, A. Penlidis (2006). Free radical copolymerization of styrene and divinylbenzene in the presence of TEMPO. 56th Canadian Chemical Engineering Conference, Sherbrooke, Quebec, Canada, October 15-18, 2006.

Nabifar A., J.B. Ximenes, M. Roa-Luna, N.T. McManus, E. Vivaldo-Lima, L.M.F. Lona, and A. Penlidis (2006). Clarifying the effect of (TEMPO/dibenzoyl peroxide) ratio in the nitroxide mediated radical polymerization (NMRP) of styrene. 56th Canadian Chemical Engineering Conference, Sherbrooke, Quebec, Canada, October 15-18, 2006.

Quintero-Ortega, I.A., E. Vivaldo-Lima and G. Luna- Bárcenas (2006). Effect of pressure on polymerization performance and product properties in copolymerization of vinyl/divinyl monomers in carbon dioxide at supercritical conditions. XIX Congreso Nacional de Polímeros, Sociedad Polimérica de México, A.C., Saltillo, Coahuila, México, October 24-27, 2006.

Jaramillo-Soto, G., M. L. Castellanos-Cárdenas, I. A. Quintero-Ortega and E. Vivaldo-Lima (2006). Simulation of dispersion polymerization of MMA in CO_2 at supercritical conditions) (poster). XIX Congreso Nacional de Polímeros, Sociedad Polimérica de México, A.C., Saltillo, Coahuila, México, October 24-27, 2006.

14. INVITED SEMINARS

J. Duhamel

Siu, H., J. Duhamel (2006). Fluorescence and Rheological Study of a Fluorescently Labeled Associative Polymer. 231st ACS National Meeting & Exposition, Atlanta, March 26-30, 2006.

Zhang, M., J. Duhamel (2006). Characterizing the Behaviour of Individual Ethylene-Propylene Copolymers in Solution Using Fluorescence. 97th American Oil Chemists' Society Annual Meeting and Exposition, St. Louis, April 30-May 3, 2006.

Siddique, B., J. Duhamel (2006). Effect of Polypeptide Sequence on Polypeptide Self-Assembly. XV International Materials Research Congress, Cancun, August 20-24, 2006.

Duhamel, J. (2006). Characterizing the Distribution of the Associative Pendants of Associative Polymers by Fluorescence. BASF Research Center, Ludwigshafen, Germany, September 13, 2006.

Duhamel, J. (2006). Solution Properties of Ethylene-Propylene Copolymers Studied by Fluorescence. DSM Research Center, Geleen, The Netherlands, September 15, 2006.

Zhang, M., J. Duhamel (2006). Fluorescence Study of Microcrystal Formation of Ethylene-Propylene Copolymers in Solution. Polymex 2006, Huatulco, Mexico, November 5-9, 2006.

Duhamel, J. (2006). Synthesis and Characterization of Oil-Soluble Dispersants. Imperial Oil Research Center, Sarnia, ON, Canada, May 15, 2006.

Duhamel J. (2006). Characterizing the Distribution of the Associative Pendants of Associative Polymers by Fluorescence. Soft Matters Seminar Series, Guelph, ON, November 23, 2006.

X. Feng

Feng, X. (2006). Membranes for chemical and environmental applications. China Petroleum University, Dongying, China, Sept 13, 2006.

Feng, X. (2006). Membranes for gas separation and pervaporation. Zhejiang University, Hangzhou, China, Sept 11, 2006.

Feng, X. (2006). Lectures on Membrane Separations. A lecture series presented at Hebei University of Science and Technology, Shijiazhuang, China, Sept 4-8, 2006.

Feng, X. (2006). Gasoline vapour recovery by membranes. Tianjin University, Tianjin, China, Aug 26, 2006.

Feng, X. (2006). Poly(vinylidene fluoride) hollow fiber membranes and applications. Arkema Inc., King of Prussia, PA, June 23, 2006.

M. Gauthier

Gauthier, M. (2006). Dendrigraft Polymers: Mesoscale Control of Structure, Functionality, and Properties in Graft Polymers with a Dendritic Architecture. BASF Internal Research Conference, Lugwigshafen, Germany, October, 2006.

A. Penlidis

Penlidis, A. (2006). Two presentations during 3rd InterAmerican Materials Collaboration (CRO) Workshop, Campinas, Brazil (Waterloo; UNAM, Mexico; Univ. of Campinas, Brazil), December 4-12, 2006.

J.B.P. Soares

Soares, J.B.P.S. (2006). Simulation of polymerization processes. University Rey Juan Carlos, Madrid, Spain, June 30, 2006.

Soares, J.B.P.S. (2006). A Monte Carlo model for the synthesis of branch-block copolymers in semi-batch and continuous stirred-tank reactors. ExxonMobil Chemical Company, Baytown, Texas, USA, March 1, 2006.

Soares, J.B.P.S. (2006). A comparative study of characterization techniques for polyolefins. ExxonMobil Chemical Company, Baytown, Texas, USA, November 3, 2006.

Soares, J.B.P.S. (2006). Modelling the microstructure of polyolefins made with dual single-site catalysts: From bimodal MWD polyethylene to thermoplastic elastomers. ESCPE, Lyon, France, November 13, 2006.

C. Tzoganakis

Tzoganakis, C. (2006). Analysis of Polymer Flows in Co-Rotating Twin Screw Extruders. Japan Steel Works, Hiroshima, Japan, June, 2006.

E. Vivaldo-Lima

Vivaldo-Lima, E. (2006). Polymer Reaction Engineering Issues About Polymerization in Supercritical Carbon Dioxide. The 28th Annual Symposium on Polymer Science and Engineering, Institute for Polymer Research, University of Waterloo, Waterloo, Ontario, Canada, May 16, 2006.

Vivaldo-Lima, E (2006). On the six orders of magnitude difference in the fragmentation kinetic rate constant in RAFT polymerization. XIX Congreso Nacional de Polímeros, Sociedad Polimérica de México, A.C., Saltillo, Coahuila, México, October 24-27, 2006.

15. PATENTS/MAJOR TECHNICAL REPORTS/CHAPTERS IN BOOKS

A. Penlidis

Hutchinson, R.A. and A. Penlidis (2006). Free radical polymerization: Homogeneous. Chapter 3, 66 pages, in Polymer Reaction Engineering, J.M. Asua (Editor), Blackwell.

Scorah, M.J., A. Penlidis and A.E. Hamielec. Energy balances for emulsion copolymerization reactors: Heat removal capabilities of 5K and 10K gallon reactors, 17 pages, Jan. 17, 2006, for Benjamin Moore Paints, USA.

J.B.P. Soares

Soares, J.B.P. (2006). Monte Carlo simulation techniques for single site catalysts. The Metallocene and Single-Site Catalyst Monitor XV (3), 4-16.

16. OTHER HIGHLIGHTS

Many thanks to Dr. Carla McBain, a long-time friend of IPR, for coordinating many interesting interactions with OMNOVA Solutions Inc. IPR is grateful for OMNOVA's help for graduate student scholarships.

IPR was heavily involved in the co-organization of Polymer Reaction Engineering (PRE VI) conference, May 21-26, 2006, Halifax, NS. Our involvement will continue for the next one, PRE 7, May 2009.

Prof. Pearl Sullivan, newly appointed Chair of the Department of Mechanical Engineering, has recently joined IPR as an academic member. She is an expert in polymeric materials and properties, along with differential scanning calorimetry and other thermal and dynamic mechanical testing methods and we are looking forward to future interactions with her.

Professor Soares is a Member of the Executive Advisory Board of Wiley-VCH Macromolecular Journals and responsible for the Macromolecular Reaction Engineering section of Macromolecular Materials Engineering and Associate Editor of the Brazilian Journal of Chemical Engineering.

Nanotechnology Engineering: New undergraduate engineering program BASc Nanotechnology Engineering started in Sept 05. This is a co-op program and it will deliver skills on nanoengineered polymers and materials. For more information about the skills and hiring coop students visit www.nanotech.uwaterloo.ca.

Professor Penlidis is Editorial Board Member: J. Macromol. Sci.-Pure and Appl. Chem.; Polymer-Plastics Techn. And Eng.; Macromol. React. Eng. J.

Professors Penlidis, McManus and Vivaldo-Lima attended the 3rd Inter-American Materials Collaboration Meeting (Brazil-Canada-Mexico), December 5-11, 2006, held at the University of Campinas, in Campinas, São Paulo, Brazil.

In 2006, Prof. Tzoganakis served as the Associate Chair for Graduate Studies in the Department of Chemical Engineering from January to June.

Professor J.B.P. Soares gave the following short industrial courses in 2006: Polymer Reaction Engineering: An Industrial Short Course on Olefin Polymerization Processes, (w/ L.C. Simon and T. McKenna), Blue Tree Towers Hotel, Porto Alegre, RS, Brazil, July 10-14, 2006 and ESCPE, Lyon, France, November 15-17, 2006; Polyolefin Reaction Engineering, ExxonMobil, Baytown, Texas, USA, November 1-2, 2006.

Professor Soares hosted the following international visiting scholars in 2006: Francisco Perez, Repsol YPF, Madrid, Spain. Mathematical modelling of metallocene and Ziegler-Natta catalyzed polymerizations (Winter 2006 – Winter 2007); Beatriz Paredes, Rey Juan Carlos University, Madrid, Spain. Crystaf and TREF of polyethylene made on supported catalysts (Fall 2006); Wei Xia, JAIST, Ishikawa, Japan. Crystaf of HDPE made on chromium catalysts (Fall 2006).

Takuji Fujisawa, a research engineer from Sumitomo, Japan, spent a special research two-year leave (2005 – 2007) with Prof. A. Penlidis working on copolymer composition control.

A fruitful collaboration between Chemical Eng. (Prof. Penlidis) and Civil Eng. (Prof. Marianna Polak) in structural characteristics of pipes (relating micro-structural properties to macro-mechanical properties and modeling of damage mechanics) has led to the formation of the “Creeps” group (three PhD students, and several MASc and undergraduate design projects), with regular meetings and research interactions, including industrial collaborators like Imperial Oil.

Professor Soares was co-organizer of the 1st International Conference on Polyolefin Characterization (ICPC), Houston, TX, October 16-18, 2006 (w/ C. Li Pi Shan, Dow Chemical; B. Monrabal, Polymer Char).

Eduardo Vivaldo-Lima thanks IPR/MSED on behalf of the Mexican Polymer Society (SPM) for partial funding of the “SPM Awards to the Best Theses in Polymers”, 2003, 2004 editions (who presented at the 2004 and 2005 IPR Annual Symposia).

Eduardo Vivaldo-Lima spent his first sabbatical from FQ-UNAM at IPR/UW from September 05 to August 06, collaborating with Professors Penlidis and McManus on Controlled Radical Polymerization (CRP). He went back to FQ-UNAM in September 06 and has become External Academic Member of IPR as of September 06.

Professor Penlidis was organizer/lecturer for a 2-day in-house industrial course, Heterogeneous polymerization systems and emulsion/rubber production, OMNOVA Solutions, USA; Apr. 06, Calhoun, Georgia; audience; 19 scientists/engineers. He was also lecturer for training course on Polymer Reaction Engineering, Sumitomo, Japan, W06/S06/F06 (2 hrs/wk).

Professor Penlidis was Session chair, Oct. 06, Can. Soc. Chem. Eng. Conf., Sherbrooke, QC (session on polymer reaction engineering).

Other industrial visitors to IPR: (1) to A. Penlidis, Drs. T. Otani, and Y. Iseki, Sumitomo Chemicals, May 06; (2) to C. Tzoganakis, Dr. M. Farah, Braskem, Brazil, Sept. 06; (3) to A. Penlidis, Innovolve Group and Polymer Service Centre, Dutch Trade Mission, The Netherlands, Oct. 06; (4) to A. Penlidis, interactions with Schlumberger, Nov. 06.

APPENDIX 1

INSTITUTE FOR POLYMER RESEARCH
CELEBRATING 22 YEARS OF OFFICIAL INSTITUTE STATUS
TWENTY-EIGHTH ANNUAL SYMPOSIUM
ON POLYMER SCIENCE/ENGINEERING
2006

Conrad Grebel College
Great Hall
University of Waterloo, Waterloo, Ontario
Tuesday, May 16, 2006

8:30 a.m.	**Coffee**
8:50	**Welcome and Opening Remarks**
9:00 - 9:30	**Bob Li, Chemical Engineering, Waterloo** **(2005 IPR Scholarship Winner)** Functionalization of polypropylene with sulfonyl azide through reactive blending
9:30 - 10:00	**Professor Pearl Sullivan, Mechanical Engineering, Waterloo** The Matrix—Evolutions II
10:00 - 10:30	**Yu Shen, Chemistry, Waterloo** Characterization of the aggregation of non-ionic dispersants and their adsorption on carbon black particles
10:30 - 11:00	**Coffee**
11:00 - 11:30	**Professor Maria Anna Polak, Civil Engineering, Waterloo** Relationship between chemical and mechanical properties for polyethylene: structural applications and mechanical modelling
11:30 - 12:00 p.m.	**Cristina Quinn, Chemistry, Waterloo** Monitoring chain folding by luminescence using a long-lived ruthenium complex
12:15 - 1:00	**Lunch**
1:00 - 1:30	**Bushra Siddique, Chemistry, Waterloo** Characterization of polypeptide aggregates in aqueous solution
1:30 – 2:00	**Marie-Agnes Henry, Chemical Engineering, Waterloo** Cobalt containing membrane for oxygen/nitrogen separation
2:00 - 2:30	**Abdul Munam, Chemistry, Waterloo** Solution behaviour of branched polyelectrolytes

2:30 - 3:00	**Professor Eduardo Vivaldo Lima, UNAM, Mexico** Polymer reaction engineering issues about polymerization in supercritical carbon dioxide
3:00 - 3:30	**Coffee**
3:30 - 4:00	**Mark Ingratta, Chemistry, Waterloo** Are the pendants of a chain randomly distributed in solution?
4:00 - 4:30	**Dr. Shuihan Zhu, Chemical Engineering, Waterloo** Surface properties of hydrosilylated polyolefins annealed in supercritical carbon dioxide
4:30 - 5:00	**Jason Dockendorff, Chemistry, Waterloo** Arborescent polymers as templates for the preparation of metallic nanoparticles
5:00	**Closing remarks**
6:00 - 7:30	**IPR Industrial Member DINNER** University Club, Main Dining Room
7:30 - 9:30	**Poster Presentations and Informal Get-together** University Club, Main Dining Room (IPR graduate students/researchers and symposium participants)

POSTER SESSION
TUESDAY MAY 16, 2006
UNIVERSITY CLUB
7:30 pm

Mohammed Al-Saleh Chem Eng,Waterloo	Detailed modelling of LLDPE structure: kinetics-microstructure-properties relationship
Joy Cheng/Jose Alvarado Chem Eng/Civil Eng, Waterloo	Relating micro-structural with macro-mechanical properties and modelling
Feng Lin Chem Eng, Waterloo	Synthesis and characterization of polymer-TiO2 nanocomposites
Ibrahim Maafa Chem Eng, Waterloo	Prediction of the MWD of polystyrene made with mono-and bifunctional initiators by dynamic Monte Carlo simulation
Abdul Munam Chemistry, Waterloo	Rubber-compatible lightweight fillers
Afsaneh Nabifar Chem Eng, Waterloo	Controlled radical polymerizations
Alexandros Psarreas Chem Eng, Waterloo	Nitroxide-mediated controlled degradation of polypropylene
Cathy Wang Chem Eng, Waterloo	Conductive bipolar plates for polymer electrolyte membrane fuel cell

TWENTY-EIGHTH ANNUAL SYMPOSIUM
ON POLYMER SCIENCE/ENGINEERING
May 16, 2006, CONRAD GREBEL COLLEGE
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TWENTY-EIGHTH ANNUAL SYMPOSIUM
ON POLYMER SCIENCE/ENGINEERING
May 16, 2006
CONRAD GREBEL COLLEGE
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APPENDIX 2

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APPENDIX 3

PREPRINTS 2006

06/001 **Mathematical modelling of atom-transfer radical polymerization using bifunctional initiators**
M. Al-Harthi, J.B.P. Soares, L.C. Simon
Macromol. Theory and Sim., Acc., 01/06

06/002 **Modelling of atom transfer radical polymerization with bifunctional initiators: diffusion effects and case studies**
M. Al-Harthi, J.B.P. Soares, L.C. Simon
Macromol. Chem. And Phys., Acc., 01/06

06/003 **One-pot synthesis of arborescent polystyrenes**
Z. Yuan and M. Gauthier
Macromolecules, Acc., 02/06

06/004 **Dilute-solution structure of charged arborescent graft polymer**
S.I. Yun, R.M. Briber, R.A. Kee, M. Gauthier
Polymer, Acc., 02/06

06/005 **Bulk copolymerization of styrene and methyl methacrylate at elevated temperatures**
S. Shankar. R. Khesareh, N. McManus and A. Penlidis
J. Macromol. Sci., Pure and Appl. Chem., Acc., 01/06

06/006 **Controlled free-radical copolymerization kinetics of styrene and divinylbenzene by bimolecular NMRP using TEMPO and dibenzoyl peroxide**
E. Tuinman, N.T. McManus, M. Roa-Luna, E. Vivlado-Lima, L.M.F. Lona, A. Penlidis
J. Macromol. Sci., Pure and Appl. Chem., Acc., 02/06

06/007 **Experimental study of a tetrafunctional peroxide initiator: bulk free radical polymerization of butyl acrylate and vinyl acetate**
M.J. Scorah, R. Cosentino, R. Dhib, A. Penlidis
Polymer Bulletin, Acc., 03/06

06/008 **Modelling of free radical polymerization of styrene and methyl methacrylate by a tetrafunctional initiator**
M.J. Scorah, R. Dhib, A. Penlidis
Chem. Eng. Sci., Acc., 03/06

06/009 **Layer-by-layer self-assembled polyelectrolyte membranes for solvent dehydration by pervaporation**
Z. Zhu, X. Feng and A. Penlidis
Mat. Sci. Eng., Acc., 12/05

06/010 **Of the uses of the pyrene label for fluorescence studies of polymeric interfaces**
J. Duhamel
Ed. by P. Chen, Woodhead Publishing Co., 2005, pg. 214-248

06/011 **Study of the semidilute solutions of poly (*N,N*-dimethylacrylamide) by fluorescence and its implications to the kinetics of coil-to-globule transitions**
K. Irondi, M. Zhang, J. Duhamel
J. Phys. Chem. B 110 pg. 2628-2637, 2006

06/012 **NMR analysis of butyl acrylate-methyl methacrylate-alpha methyl styrene terpolymers**
N.T. McManus and A. Penlidis
J. Appl. Polym. Sci., Acc., 03/06

06/013 **Studies of copolymers of 3-methacryloyloxystyryl-4'-methylphenyl ketone and methyl methacrylate**
R. Santhi, K. V. Babu, A. Pelidis, S. Nanjundan
React. & Funct. Polym., Acc., 04/06

06/014 **A comparison of reaction mechanisms for reversible addition-fragmentation chain transfer polymerization using modeling tools**
J. Pallares, Gabriel Jaramillo-Soto, C. Flores-Catano, E. Vivaldo-Lima, L.M.F. Lona and A. Penlidis
J. Macromol Sci-Pure and Appl. Chem, Acc., 04/06

06/015 **Dynamic Monte Carlo Simulation of Atom-Transfer Radical Polymerization**
M. Al-Harthi, J.B.P. Soares, L.C. Simon
Macromol. Mtls and Engg, Acc., 05/06

06/016 **Determination of the relative importance of process factors in particle size distribution in suspension polymerization using a Bayesian experimental design technique**
E. Vivaldo-Lima, A. Penlidis, P.E. Wood, A. E. Hamielec
J. Appl. Polym. Sci, Acc., 06/06

06/017 **Mathematical modeling of crystallization analysis fractionation (Crystaf) of polyethylene**
S. Anantawaraskul, J.B.P. Soares, P. Jirachaithorn, J. Limtrakul
J. Poly. Sci, B: Poly. Phys., Acc., 06/06

06/018 **Chain length distributions of polyolefins made with coordination catalysts at very short polymerization times—analytical solution and Monte Carlo simulation**
J.B.P. Soares and A. E. Hamielec
Macromol. React. Eng., Acc., 07/06

06/019 **Modeling of the homogeneous free-radical copolymerization kinetics of fluoromonomers in carbon dioxide at supercritical conditions**
I.A. Quintero-Ortega, E. Vivaldo-Lima, R.B. Gupta, G. Luna-Bárcenas and A. Penlidis
Macromol. Sci., A: Pure Appl. Chem., Acc., 07/06

06/020 **Polymer chain dynamics in solution probed with a fluorescence blob model**
J. Duhamel
Accounts of Chemical Res., Acc., 08/06

06/021 **Micromechanical Approach to Modeling Damage in Crystalline Polyethylene**
J. Alvarado-Contreras, M.A. Polak, A. Penlidis
Polym. Eng. & Sci., Acc., 08/06

06/022 **Characterization by dilute solution and rheological methods of polystyrene and poly(methyl methacrylate) produced with a tetrafunctional peroxide initiator**
M.J. Scorah, C. Tzoganakis, R. Dhib, A. Penlidis
J. Appl. Poly. Sci., Acc., 08/06

06/023 **The bifurcation behavior of a polyurethane continuous stirred tank reactor**
V. Zavala-Tejeda, A. Flores-Tlacuahuac, E. Vivaldo-Lima
Chem. Eng. Sci., Acc., 08/06

06/024 **Another perspective on the nitroxide mediated radical polymerization (NMRP) of styrene using 2,2,6,6-tetramethyl-1-piperidinyloxy (TEMPO) and dibenzoyl peroxide (BPO)**
M. Roa-Luna, A. Nabifar, M.P. Diaz-Barber, N.T. McManus, E. Vivaldo-Lima, L.M.F. Lona and A. Penlidis
J. Macromol. Sci., A., Pure and Appl. Chem., Acc., 09/06

06/025 **Terpolymerization with depropagation: modeling the copolymer composition of the methyl methacrylate/alpha-methylstyrene/butyl acrylate system**
M.J. Leamen, N.T. McManus, A. Penlidis
Chem. Eng. Sci., Acc., 09/06

06/026 **Assessing the importance of diffusion-controlled effects on polymerization rate and molecular weight development in nitroxide-mediated radical polymerization of styrene**
M. Roa-Luna, M.P. Diaz-Barber, E. Vivaldo-Lima, L.M.F. Lona, N.T. McManus and A. Penlidis
J. Macromol. Sci., A., Pure and Appl. Chem. Acc., 09/06

06/027 **Dynamic Monte Carlo simulation of ATRP with bifunctional initiators**
M. Al-Harthi, J.B.P. Soares and L.C. Simon
Macromol. React. Eng., Acc., 09/06

06/028 **Coordination Polymerization**
J.B.P. Soares, T. McKenna, C.P. Cheng
Polym. React. Eng. (book chapter), Acc., 09/06

06/029 **A kinetic study of metallocene-catalyzed ethylene polymerization using different aluminoxane cocatalysts**
D.M. Sarzotti, D.J. Marshman, W.E. Ripmeester, J.B.P. Soares
J. Polym. Sci, Part A, Polym. Chem., Published, 12/06

06/030 **Nitroxide-mediated radical polymerization of styrene using mono- and di-functional initiators**
R.S. Dias, M.C. Goncalves, L.M.F. Lona, E.Vivaldo-Lima, N.T. McManus, A. Penlidis
Chem. Eng. Sci, Acc., 12/06

06/031 **Simulation of styrene polymerization by monomolecular and bimolecular nitroxide-mediated radical processes over a range of reaction conditions**
J.B. Ximenes, P.V.R. Mesa, L.M.F. Lona, E. Vivaldo-Lima, N.T. McManus, A. Penlidis
Macromol. Theory and Simul., Acc., 12/06

APPENDIX 4

Research Personnel

(S U P E R V I S O R)

NAME	CAT	DEPT	TD	JD	RD	XF	MG	NMc	AP	LS	JS	PS	CT	THESIS/PROJECT TOPIC	COMPL. DATE
S. Al-Alwan	1		X											Air Pollution monitoring optimization	Apr 07
M. Al-Harthi	2	ChE								X	X			Synthesis of polyolefins with functional long branches made with ATRP	Jan 07
S. Aliakbari	2	Chem					X							Thermal interface materials for the microelectronics industry	Sep 07
M. Al-Saleh	2	ChE	X							X				Parameter estimation in polyolefinic systems using Monte Carlo Models	Aug 10
J. Alvarado	2	Civil							X					Finite element analysis for pipe applications (with M. Polak (Civ. Eng.))	May 07
M. Bulsari	4	ChE							X				X	Reactive polymer processing	Mar 06
J. Cheng	2	ChE							X					Tensile properties of pipes (with M. Polak (Civ. Eng.))	May 08
J. Dockendorff	2	Chem					X							Metal-loaded micelles as catalysts	Sep 07
M. EdatManesh	1	ChE			X									Modelling and optimization of an advanced oxidation bioreactor (with Prof. Mehrvar, Ryerson)	Dec 06
P. Faridi	1	ChE			X									Optimization and modelling of a copolymer system	Sep 06
M. Golbabaie	1	ChE								X				Characterization with natural fibers (with L. Erickson)	Dec 07
P. HareshKumar	1	ChE			X									Studying the effect of mixing of a polymerization system using a CFD package	Sep 07
M. Henry	1	ChE				X								Oxygen/nitrogen separation by cobalt containing membrane (currently with Inco Inc., Mississauga, ON)	Apr 06
M. Ingratta	2	Chem		X										Synthesis and characterisation by fluorescence of polypeptides	May 07
J. Jitjareonchai	2	ChE	X											Markov chain Monte Carlo methods for parameter estimation	Feb 06
W. Jung	1	ChE	X						X					Modeling and estimation for multicomponent polymerization	Aug 08
P. Khazrae	1	ChE			X									Optimization and modelling of a high-pressure co-polymer system	Sep 06
S. Kim	1	ChE				X								Extraction of Sericin	May 07
P. Kruger	1									X				Polymer natural fiber composites	Dec 07
S. Kundu	2	ChE								X				Properties and degradation of polymers in hydrogen fuel cells (with M. Fowler)	Dec 08
M. Leamen	2/3	ChE							X					Terpolymerization of alpha-methyl styrene at elevated temperature	Aug 06
M. Leung	1												X	Scheduling of a polymer compounding plant (co-supervised by A. Elkamel)	Dec 07
Q. Li	1	ChE											X	Functionalization of polypropylene with sulfonyl azide	Dec 06
E. Lin	1	ChE				X								Diffusivity of metal ions in membranes	May 07
F. Lin	1	ChE								X				Polymer-TiO2 nanocomposites	Aug 06

1 = MASc 2 = PhD 3 = Postdoctoral Fellow 4 = Res. Associate 5 = Technician
TD=T.A.Duever JD=J. Duhamel RD=R. Dhib XF=X. Feng MG=M. Gauthier NMc=N. McManus AP=A. Penlidis LS=L. Simon JS=J.B.P. Soares
PS=Pearl Sullivan CT=C. Tzoganakis

NAME	CAT	DEPT	TD	JD	RD	XF	MG	NMc	AP	LS	JS	PS	CT	THESIS/PROJECT TOPIC	COMPL. DATE
T. Liu	1	ChE				X								Gas separation membranes	Aug 08
I. Maafa	1	ChE									X			Modelling of industrial reactors for suspension polymerization of styrene (with A. Elkamel)	May 06
A. Maneshi	2	ChE								X	X			Synthesis and mathematical modelling of lay/polyolefin nanocomposites	Aug 08
S. Mehdiabadi	2	ChE									X			Synthesis and modelling of branched polyolefins with complex structures	Sep 09
F. Moingeon	3	Chem					X							Branched polymers as processing additives for polyolefins	Feb 07
M Mujiburohman	2	ChE				X								Aroma recovery from juices by membranes	Apr 08
A. Munam	2	Chem					X							Branched polyelectrolyte smartgels	Jul 07
A. Nabifar	1	ChE						X	X					Controlled radical copolymerization	Sep 07
O. Nguon	1	Chem					X							Polymer–stabilized nickel nanoparticle catalysts	Jun 07
V. Noei	1	ChE	X										X	Compounding of pigments in polymer blends	Dec 07
N. Omidbachsh	2 PT	ChE	X											Computer aided product design and development	Apr 09
E. Ortiz	2	ChE											X	Numerical simulations of reactive flows in twin-screw extruders	Apr 10
H.S. Park	2	ChE											X	Surface tension measurements in PS/CO_2 systems (co-supervision by. P. Chen and C.B. Park)	Dec 07
A. Psarreas	1	ChE						X	X				X	Degradation of polypropylene with nitroxyl initiators	Sep 06
C. Quinn	1	Chem		X										Development of a water-soluble dye/quencher system to study polymer chain folding in water by fluorescence	Sep 06
W. Ripmeester	2	ChE	X								X			Parameter estimation for olefin polymerization with single site catalysts	May 08
A. Rogalsky	1	ChE										X	X	Mechanical properties of PC/BBT b lends	
A. Saleh	1	ChE								X				Polymer wood fiber composites (with M. Sain)	Aug 07
A. Sartipi	1	ChE			X									Laminar natural convection in concentril domed skylight cavities heated from inside using a CFD package (with David Naylor, Mechanical Engineering)	Sep 09
D. Sarzotti	2	ChE								X	X			Polypropylene thermoplastic elastomers: synthesis, characterization, modeling	May 08
M. Scorah	2/3	ChE			X				X					Tetrafunctional initiators and branching	Feb 06
Y. Shen	4	Chem		X										Structure-property study of oil soluble dispersants	Sep 07
S.-Y. A. Shin	2	ChE								X	X			In-situ preparation of clay-thermpolastic nanocomposites	April 08
B. Siddique	2	Chem		X										New biocompatible drug delivery systems	May 06
H. Siu	2	Chem		X										Fluorescence and rheological studies of surfactant-associative polymers associations	Sept 07

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TD=T.A.Duever JD=J. Duhamel RD=R. Dhib XF=X. Feng MG=M. Gauthier NMc=N. McManus AP=A. Penlidis LS=L. Simon JS=J.B.P. Soares
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NAME	CAT	DEPT	TD	JD	RD	XF	MG	NMc	AP	LS	JS	PS	CT	THESIS/PROJECT TOPIC	COMPL. DATE
L. Sui	1	ChE											X	Rubber devulcanization and compounding	Dec 07
C. Sun	2	ChE				X								Development of PVDF membranes	Aug 09
H. Tareque	1	ChE											X	PC/PBT Compounding	Aug -9
M. Wang	2	Chem		X										Use of EAK16 II for gene delivery applications	May 07
I. Washington	1	ChE	X						X					Modeling and optimization of an NBR process	Aug 08
R. Zakaria	1	ChE				X								Hydrogen separation using hollow fiber membranes (currently lecturer at Univ. Putra Malaysia)	Apr 06
Y. Zhang	3	ChE											X	Preparation of TPU/Polyolefin blends	Dec 06
Y. Zhou	3	ChE				X								Reverse osmosis membranes	Dec 08
S. Zhu	3												X	Reactive rubber modification	Apr 08
Z. Zhu	2(PT)	ChE				X			X					Pervaporation for solvent dehydration, with A. Penlidis	Oct 06

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