

**INSTITUTE FOR POLYMER RESEARCH (IPR)
UNIVERSITY OF WATERLOO
WATERLOO, ONTARIO N2L 3G1**

NEWSLETTER 2012

1. NOTE FROM PROFESSOR JEAN DUHAMEL, IPR DIRECTOR

The last two years have seen dramatic changes within the IPR. In 2011, Professor Penlidis, the 16-year-long-serving Director of the IPR, stepped down, and in 2012, Rosemary Anderson, the 27-year-long-serving Administrative Coordinator, retired. For many years, they had been both the driving force and steadfast heart of the IPR. It is testimony to the foresight of the IPR founders, Profs. Rudin and O'Driscoll that the institution they created has been able to not only withstand these major changes, but also continue to produce both academic and industry-leading research and premium calibre graduate students in Polymer Science and Engineering. In 2012, with 67 publications and a population of 80 graduate students and post-doctoral fellows, the IPR continues to thrive thanks to the vitality of its terrific members who lead and guide the next generation of researchers.

As mentioned above, Rosemary, who for many of us youngsters quickly became the reassuring face of the IPR, retired in October 2012 after 27 years of outstanding service. Needless to say, I would not sit so confidently in the IPR director's seat today had it not been for her patient guidance in teaching me the ropes of the office. Her unwavering commitment to the Institute, along with her awareness of the IPR mission and status, has been an inspiration to us all. We will miss her sound judgement and witty spirit, and wish her a wonderful retirement.

To ensure a transition as smooth as possible, Rosemary was replaced by Melissa Meyer in November 2012 who has stepped into the position with remarkable ease.

Our ranks have also grown to 15 after Professors Yuning Li (Chem. Eng.) and Jamie Forrest (Physics and Astronomy) became members of the IPR in 2012. Professor Li is an expert in the study of electronic materials for organic electronic applications like organic thin film transistors or photovoltaics. His group is at the forefront of research aiming at producing polymer semiconductors with high mobility. Professor Forrest conducts research on the characterization of physical phenomena occurring at interfaces, such as the study of polymer dynamics in confined spaces such as in thin polymer films. The research achievements by Professors Li and Forrest have attracted worldwide attention and I am delighted to welcome them to the IPR.

2012 also saw a new format for the IPR symposium allowing more students to present their research with the introduction of a number of 5-minute teaser talks. These were very well received and the new format will continue in this year's IPR symposium which will be held on May 8, 2013.

I would like to close this Introduction to the 2012 IPR Newsletter by congratulating my colleagues; Professor Gauthier for receiving the Hubei Province High-end Foreign Experts Program Scholarship (2012-2014), and Professors Penlidis and Vivaldo-Lima for receiving the C.O. Batista Montes 2012 IMIQ (Mexican Institute of Chemical Engineering) Award.

I look forward to seeing you at the 2013 IPR symposium on May 8th to share with you the exciting ground-breaking research being conducted at the IPR.

NEW IPR ACADEMIC MEMBERS

Dr. Jamie Forrest has recently joined the IPR. His research deals with the physical phenomena that are observed in soft materials in general and more particularly in polymer thin films. He is interested in the characterization of confined polymer chains through the study of their glass transition and the properties of polymer interfaces and adhesion phenomena.

Dr. Yuning Li has recently joined the IPR. His research is in the areas of design and synthesis of conducting and semiconducting polymers. Processing and molecular organization control of crystalline polymers. Polymer nanocomposites and printed organic electronics including organic thin film transistors (OTFTs), organic photovoltaics (OPVs), and organic light-emitting diodes (OLEDs).

Dr. Xiaosong Wang has recently joined the IPR. His research is in the areas of polymer supramolecular chemistry for functional (nano)materials, including metal containing monomers and building blocks synthesis; polymer and organometallic molecules self-assembly; and material applications for the resulting supramolecular materials, e.g. catalysts, electronic devices, sensors etc.

2. ANNUAL IPR SYMPOSIUM

The 35th Annual IPR Symposium will be held May 8, 2013. A schedule and registration forms have been circulated electronically, as usual.

Many thanks to all who participated in the 2012 Symposium (an audience of about 60 people). IPR received very positive feedback regarding the topics covered. The 2012 program and the list of industrial participants 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 2012, the IPR office sent out 26 preprints to our members (Appendix 3).

5. RESEARCH PROGRAMS

We have more than 80 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 email/call the appropriate supervisor or the IPR office at <ipr@uwaterloo.ca>, 519/888-4789.

6. RECENTLY GRADUATED STUDENTS

J. Duhamel

| | | | |
|-------|------|----------|---|
| M.Sc. | Chem | Hall, T. | Studying Pyrene Excimer Formation in Poly(glutamic acid) Arborescent Polymers |
|-------|------|----------|---|

X. Feng

| | | | |
|------|-----|------------|--|
| MASc | ChE | Eslami, S. | Chitosan-sericin blend membranes for controlled release of drugs |
|------|-----|------------|--|

| | | | |
|------|-----|-----------|--|
| MASc | ChE | Ulloa, C. | Remediation of Cellulose Acetate Gas Separation Membranes Contaminated by Heavy Hydrocarbons |
|------|-----|-----------|--|

M. Gauthier

| | | | |
|-----|------|----------------|---|
| PhD | Chem | Ali-Akbari, S. | Thermal Interface Materials with Metallic Fillers |
|-----|------|----------------|---|

| | | | |
|-------|------|--------------|--|
| M.Sc. | Chem | Courtney, W. | Arborescent poly(ϵ -caprolactone) copolymers |
|-------|------|--------------|--|

| | | | |
|-------|------|------------|---|
| M.Sc. | Chem | Alturk, A. | Arborescent Polybutadienes (Saudi Arabia Scholarship) |
|-------|------|------------|---|

| | | | |
|-------------------------------|-------------|-----------------------|--|
| M.Sc. | Chem | Alzahrary, Y. | Amphiphilic Arborescent Copolymers (Saudi Arabia Scholarship) |
| M.Sc. | Chem | Hall, T. | Long-range Chain Dynamics of Arborescent Polypeptides |
| <u>Y. Li</u> | | | |
| MASc. | ChE | Sun, B. | High-Performance Polymer Semiconductors for Organic Thin Film Transistors |
| <u>N. McManus</u> | | | |
| PhD | ChE | Nabifar, A. | Bayesian design of experiments in emulsion and controlled radical polymerization (with A. Penlidis) |
| <u>A. Penlidis</u> | | | |
| MASc | ChE | Hazlett, M. | Sensor selection studies in controlled radical polymerization |
| PhD | ChE | Nabifar, A. | Bayesian design of experiments in emulsion and controlled radical polymerization |
| MASc | ChE | Stewart, K. | Polymeric sensors for detection of toxic vapours (with N. McManus and E. Abdel Rahman (Sys. Des.)) |
| <u>M. Tam</u> | | | |
| PhD | ChE | Yao, Z. | Targeted Drug Delivery using Stimuli-Responsive Fullerene Polymeric Systems |
| <u>C. Tzoganakis</u> | | | |
| PhD | ChE | Meysami, M. | Devulcanization of Tire Rubber Crumb with Supercritical CO ₂ |
| <u>E. Vivaldo-Lima</u> | | | |
| PhD | ChE UNAM | Hernández Ortiz, J.C. | Modeling of the copolymerization kinetics with crosslinking of vinyl/divinyl monomers in the presence of RAFT, NMRP and ATRP controllers |
| <u>X. Wang</u> | | | |
| PhD | Chem | Cao, K. | Synthesis metal and inorganic elements containing supramolecular polymers |
| MASc | Chem | Liu, Y. | Synthesis iron containing polymers |
| MASc | Chem | Nayyar, B. | Synthesis iron containing polymers with varied Tg |
| MASc | Chem | Singh, N. | Synthesis organometallic monomers containing iron elements |
| <u>B. Zhao</u> | | | |
| MASc | ChE | Yang, F. | Self-polymerized Dopamine Thin film as Bioadhesive |

7. ACADEMIC MEMBERS OF THE INSTITUTE FOR POLYMER RESEARCH

| | | | |
|-------------|----------------------|------------|--------------|
| Professors: | R. Dhib | Chem Eng. | Ryerson |
| | T.A. Duever | Chem Eng. | Waterloo |
| | J. Duhamel, Director | Chemistry | Waterloo |
| | X. Feng | Chem Eng. | Waterloo |
| | J. Forrest | Phys Astro | Waterloo |
| | M. Gauthier | Chemistry | Waterloo |
| | Y. Li | Chem Eng. | Waterloo |
| | N. McManus | Chem Eng. | Waterloo |
| | A. Penlidis | Chem Eng. | Waterloo |
| | L.C. Simon | Chem Eng. | Waterloo |
| | M. Tam | Chem Eng. | Waterloo |
| | C. Tzoganakis | Chem Eng. | Waterloo |
| | E. Vivaldo-Lima | Chem Eng. | UNAM, Mexico |
| | X. Wang | Chemistry | Waterloo |
| | B. Zhao | Chem Eng. | Waterloo |

For a brief description of research interests and projects, along with contact information, please visit the following web link:
<http://www.ipruw.com/contact/faculty-ria.htm>

8. MEMBER COMPANIES—2012

Currently we have **8 member companies**: (refer also Appendix 3)

BASF SE

Compuplast Canada Inc.

Eclipse Scientific, Waterloo

Lanxess Inc.

OMNOVA Solutions Inc.

PolyVation, The Netherlands

Princeton Polymer Consultants, USA

SABIC Europe, B.V.

9. STUDENT AWARDS

J. Duhamel

S. Chen IPR Award 2012, Institute for Polymer Research, University of Waterloo, Waterloo, ON, May 2, 2012.

M. Gauthier

A. Alturk, M.Sc., 2012, Saudi Arabia Scholarship – given to the best students to allow them to conduct graduate research work abroad.

Y. Alzahrany, M.Sc., 2012, Saudi Arabia Scholarship – given to the best students to allow them to conduct graduate research work abroad.

M. Alsehli, Ph.D., 2012, Saudi Arabia Scholarship – given to the best students to allow them to conduct graduate research work abroad.

Y. Li

L. Murphy, M.A.Sc., OGS Award (September 2012 – August 2013).

A. Penlidis

A. Sardashti, PRE 8, Cancun, Mexico, May 2012, presented a prize-winning poster which was 1 of 3 prizes awarded out of 80 posters at the conference.

M. Tam

P. Baoliang, D. Bacinello, P. Akhlaghi, September 2012, 1 year Fellowship awarded by the Waterloo Institute for Nanotechnology.

E. Vivaldo-Lima

Hernández Ortiz, J.C., co-winner (with E. Vivaldo-Lima) of the IMIQ 2012 Prize: "Ing. César O. Baptista Montes" for the technical work of excellence in Chemical Engineering, Coatzacoalcos, Veracruz, October 26, 2012.

B. Zhao

B. McDonald, Master's graduate student (2011-2013) Second Place Winner of the 2012 Excellence in Thermoset Polymer Research Award on his paper entitled, "Biomimetic Micro-Structured Surfaces: Pattern Transfer and Fabrication of Icephobic Epoxy Surfaces".

10. FACULTY AWARDS

M. Gauthier

Recipient of the **Hubei Province High-end Foreign Experts Program Scholarship (2012-2014)**, awarded to start collaborative work with Professor Guang Yang, at the College of Life Science & Technology, Huazhong University of Science and Technology, Wuhan, China. The goal of the project is to investigate the applications of micelles derived from arborescent polypeptides in drug delivery and tumor treatment.

A. Penlidis

2012 C.O. Batista Montes 2012 IMIQ Award for excellence in technical work in Chemical Engineering (IMIQ is the Mexican Institute of Chemical Engineering, counterpart to AIChE and CSChE)

11. FULL REFEREED JOURNAL PAPERS

T. Duever

Masoumi, S., T.A. Duever, P.M. Reilly (2012). Sequential Markov Chain Monte Carlo (MCMC) Model Discrimination. *Can. J. Chem. Eng.*, DOI 10.1002/cjce.21711.

Al-Saleh, M.A., J.B.P. Soares, T. Duever (2012). The Integrated Deconvolution Estimation Model: Effect of Inter-Laboratory ¹³C-NMR Analysis on IDEM Performance. *Macromol. React. Eng.*, 6, 189-199.

J. Duhamel

Siu, H., J. Duhamel (2012). Molar Absorption Coefficient of Pyrene Aggregates in Water Generated by a Poly(ethylene oxide) Capped at a Single End with Pyrene. *J. Phys. Chem. B*, 116, 1226-1233.

Duhamel, J. (2012). Internal Dynamics of Dendritic Molecules Probed by Pyrene Excimer Formation. *Polymers*, 4, 211-239.

Duhamel, J. (2012). New Insights in the Study of Pyrene Excimer Fluorescence to Characterize Macromolecules and their Supramolecular Assemblies in Solution. *Langmuir*, 28, 6527-6538. **Invited featured article.**

Gelover-Santiago, A.; M.A. Fowler, J. Yip, J. Duhamel, G. Burillo, E. Rivera (2012). Unexpected Absorbance Enhancement upon Clustering Dyes in a Polymer Matrix. *J. Phys. Chem. B*, 116, 6203-6214.

Zaragoza-Galán, G., M. Fowler, J. Duhamel, R. Rein, N. Solladié, E. Rivera (2012). Synthesis and Characterization of Novel Pyrene-Dendronized Porphyrins Exhibiting Efficient Fluorescence Resonance Energy Transfer (FRET): Optical and Photophysical Properties. *Langmuir*, 28, 11195-11205.

Keyes-Baig, C., M. Mathew, J. Duhamel (2012). Lateral Distribution of Charged Species along a Polyelectrolyte Probed with a Fluorescence Blob Model. *J. Am. Chem. Soc.*, 134, 16791-16797.

Fowler, M.A., J. Duhamel, G.J. Bahun, A. Adronov, G. Zaragoza-Galán, E. Rivera (2012). Studying Pyrene-Labeled Macromolecules with the Model Free Analysis. *J. Phys. Chem. B*, 116, 14689-14699.

X. Feng

Hu, S.Y., Y. Zhang, D. Lawless, X. Feng (2012). Composite membranes comprising of polyvinylamine-poly(vinyl alcohol) incorporated with carbon nanotubes for dehydration of ethylene glycol by pervaporation. *Journal of Membrane Science*, 417-418, 34-44.

Zou, Y., Z.F. Tong, K. Liu, X. Feng (2012). Diffusion of pure solvents through linear low density polyethylene (LLDPE) membranes. *Journal of Zhejiang University (Engineering Science)*, 46, 744-748.

Xu, J., X. Feng, P. Chen, C. Gao (2012). Development of an antibacterial copper (II) - chelated polyacrylonitrile ultrafiltration membrane. *Journal of Membrane Science*, 413-414, 62-69.

Kundu, P., A. Chakma, X. Feng (2012). Simulation of binary gas separation with hollow fiber asymmetric membranes and case studies of air separation. *Canadian Journal of Chemical Engineering*, 90, 1253-1268.

Liu, X., L. Ni, Y. Zhang, Z. Liu, X. Feng, L. Ji (2012). Polypropylene hollow fiber membranes prepared by melt-spinning and cold-stretching for artificial lungs. *Advanced Materials Research*, 418 - 420, 26-29.

J. Forrest

Bäumchen, O., J.D. McGraw, J.A. Forrest, K. Dalnoki-Veress (2012). Reduced Glass Transition Temperatures in Thin Polymer Films: Surface Effect or Artifact?. *Phys. Rev. Lett.* 109, 055701.

Daley, C.R., Z. Fakhraai, M.D. Ediger, J.A. Forrest (2012). Comparing Surface and Bulk Relaxation in a Molecular Glass Former. *Soft Matter* 8, 2206-2212.

Kaur, K., J.A. Forrest (2012). Influence of Particle Size on the Binding Activity of Proteins Adsorbed onto Gold Nanoparticles. *Langmuir* 28, 2736-2744.

Hall, B., L.W. Jones, J.A. Forrest (2012). Measuring the activity of adsorbed proteins: Kinetics of in vitro lysozyme quality and quantity deposited onto contact lenses over short time periods. *Journal of Biomedical Materials*, DOI: 10.1002/jbm.a.34357.

M. Gauthier

Huh, M. Y.S. Park, M.-H. Jung, S.J. Kang, T.-B. Kang, A. Munam, M. Gauthier, S.I. Yun (2012). pH-Responsive Films of Electrostatically Adsorbed Arborescent Copolymers. *J. Macromol. Sci., Part A: Pure Appl. Chem.* 43, 251-258.

Moingeon, F., Y.R. Wu, L.-E. Sánchez Cadena, M. Gauthier (2012). Synthesis of Arborescent Styrene Homo- and Copolymers from Epoxidized Substrates. *J. Polym. Sci., Part A: Polym. Chem.* 50, 1819-1826.

Gauthier, M., A. Munam (2012). Arborescent Polystyrene-graft-Poly(2-vinylpyridine) Copolymers: Solution Polyelectrolyte Behavior. *RSC Advances* 2, 3100-3108.

Y. Li

Zeng, W.J., K.S. Yong, Z.M. Kam, Z.K. Chen, Y.N. Li (2012). Effect of MoO₃ as an interlayer on the performance of organic solar cells based on ZnPc and C-60. *Synth. Met.*, 161, 23.

Hong, W., C. Guo, Y. Li, Y. Zheng, C. Huang, S. Lu, A. Facchetti (2012). Synthesis and thin-film transistor performance of benzodipyrrolinone and bithiophene donor-acceptor copolymers. *J. Mater. Chem.*, 22, 22282.

Sun, B., W. Hong, H. Aziz, Y. Li (2012). Diketopyrrolopyrrole-based semiconducting polymer bearing thermocleavable side chains. *J. Mater. Chem.*, 22, 18950.

Hong, W., B. Sun, H. Aziz, W.-T. Park, Y.-Y. Noh, Y. Li (2012). A conjugated polyazine containing diketopyrrolopyrrole for ambipolar organic thin film transistors. *Chem. Commun.*, 48 (67), 8413-8415.

Sonar, P., T.F.R. Bao, S.P. Singh, Y. Li, A. Dodabalapur (2012). Furan-Containing Conjugated Polymer for High Mobility Ambipolar Organic Thin Film Transistors. *Chem. Commun.*, 48 (67), 8383-8385.

Guo, C., W. Hong, H. Aziz, Y. Li (2012). Recent Progress in High Mobility Polymer Semiconductors for Organic Thin Film Transistors. *Reviews in Advanced Sciences and Engineering (RASE)*, 1, 200-224.

Li, Y., P. Sonar, S.P. Singh, Z.E. Ooi, E.S.H. Lek, M.Q.Y. Loh (2012). Poly(2,5-bis(2-octyldodecyl)-3,6-di(furan-2-yl)-2,5-dihydro-pyrrolo[3,4-c]pyrrole-1,4-dione-co-thieno[3,2-b]thiophene): a high performance polymer semiconductor for both organic thin film transistors and organic photovoltaics. *Phys. Chem. Chem. Phys.*, 14, 7162-7169.

Li, Y., B. Sun, P. Sonar, S.P. Singh (2012). Solution processable poly(2,5-dialkyl-2,5-dihydro-3,6-di-2-thienylpyrrolo[3,4-c]pyrrole-1,4-dione) for ambipolar organic thin film transistors. *Organic Electronics*, 13, 1606-1613.

Sonar, P., S.P. Singh, E.L. Williams, Y. Li, M.S. Soh, A. Dodabalapur (2012). Furan Containing Diketopyrrolopyrrole Copolymers with Phenylene, Naphthalene and Anthracene Comonomer Blocks: Synthesis, Characterization, Organic Field Effect Transistor Performance and Photovoltaic Properties. *J. Mater. Chem.*, 22, 4425-4435.

Liu, H., W.P. Goh, M.Y. Leung, Y. Li, T.B. Norsten (2012). Effect of nanoparticle stabilizing ligands and ligand-capped gold nanoparticles in polymer solar cells. *Sol. Energy Mater. Sol. Cells*, 96, 302-306.

N. McManus

Izadi, H., Y. Han, B. Zhao, N.T. McManus, A. Penlidis (2012). Teflon Hierarchical Nanopillars with Dry and Wet Adhesive Properties. *Journal of Polymer Science, Polymer Phys.* 50 846 -851.

A. Penlidis

Zamecnik, C., M.J. Loureiro, C. Postnikoff, Y. Kong, A. Penlidis (2012). Synthesis and morphology of poly (NIPAM) nanocomposites with emulsion templated nanoporous structure. *J. Macromol. Sci., Pure and Appl. Chem.*, 49, 906-909.

Sardashti, A., C. Tzoganakis, M.A. Polak, A. Penlidis (2012). Improvement of hardening stiffness test as an indicator of environmental stress cracking resistance of polyethylene. *J. Macromol. Sci., Pure and Appl. Chem.*, 49 (9), 689-698.

Izadi, H., B. Zhao, Y. Han, N. McManus, A. Penlidis (2012). Teflon hierarchical nanopillars with dry and wet adhesive properties. *J. Polym. Sci., Polym. Phys.*, 50, 846-851. **Selected to feature in Material Views.**

Consolante, V., M. Maric, A. Penlidis (2012). Routes to carboxylic acid functional acrylonitrile copolymers via NMRP. *J. Appl. Polym. Sci.*, 125, 3963-3976.

Hernandez-Ortiz, J.C., E. Vivaldo-Lima, A. Penlidis (2012). Modelling of network formation in NMRP copolymerizations of vinyl/divinyl monomers using a multifunctional polymer molecule approach. *Macromol. Theory Simul.*, 21, 302-321.

Received 2012 IMIQ Award, Mexico.

M. Tam

Dhar, N.A., S.P. Akhlaghi, K.C. Tam (2012). Biodegradable and biocompatible polyampholyte microgels derived from chitosan, carboxymethyl cellulose and modified methyl cellulose. *Carbohydrate Polymers*, 87, 101-109.

Yuen, F., K.C. Tam, (2012). alpha-Cyclodextrin Assisted Self-Assembly of Poly(ethylene glycol)-block-Poly(N-isopropylacrylamide) in Aqueous Media. *Journal of Applied Polymer Science*, DOI: 10.1002/APP.38072.

Yao, Z.L., K.C. Tam, (2012). Temperature induced micellization and aggregation of biocompatible poly (oligo(ethylene glycol)methyl ether methacrylate) block copolymer analogs in aqueous solutions. *Polymer*, 53, 3446-3453.

Liang, Y.N., J. Hu, K.C. Tam, X. Hu (2012). CuOx nanotubes via an unusual complexation induced block copolymer-like self-assembly of poly(acrylic acid). *RSC Adv.*, 2, 9531-9537.

Dhar, N., D. Au, R.C. Berry, K.C. Tam (2012). Interactions of nanocrystalline cellulose with an oppositely charged surfactant in aqueous medium. *Colloids & Surface A.*, 415, 310-319.

Peng, B.L., N. Grishkewich, Z.L. Yao, X. Han, H.L. Liu, K.C. Tam (2012). Self-Assembly Behavior of Thermo-responsive Oligo(ethylene glycol) Methacrylates Random Copolymer, *ACS Macro Letters.*, 1, 632-635.

C. Tzoganakis

Ortiz-Rodriguez, E., C. Tzoganakis (2012). A 3D Simulation Analysis of Reactive Flow in Screw Elements of Closely Intermeshing Twin Screw Extruders. *Intern. Polymer Processing.*, XXVII, 442-451.

Kolarik, R., M. Zatloukal, C. Tzoganakis (2012). Stability Analysis of Non-Isothermal Film Blowing Process for Non-Newtonian Fluids Using Variational Principles. *Chem.Eng.Sci.*, 73, 439-543.

Kubik, P., J. Vlcek, C. Tzoganakis, L. Miller (2012). Method of Analyzing and Quantifying the Performance of Mixing Sections. *Polym. Eng. Sci.*, 52, 1232–1240.

Tzoganakis, C., S. Zhu (2012). Reactive Extrusion of Polymers. *Encyclopedia of Polymer Science and Technology*, DOI: 10.1002/0471440264.pst537.

Zhu, S.-H., A. Penlidis, C. Tzoganakis, E. Ginzel (2012). Ultrasonic Properties and Morphology of Devulcanized Rubber Blends. *J. Appl. Polym. Sci.*, 124, 2062–2070.

E. Vivaldo-Lima

Tenorio-López, J.A., J.J. Benvenuta-Tapia, E. Vivaldo-Lima, M.A. Ríos-Enriquez, M. Nieto-Peña, (2012). Modeling of Polymerization Rate and Microstructure in the Anionic Polymerization of Isoprene using n-Butyl lithium and N,N,N',N'-Tetramethylethylenediamine Considering Different Reactivities of the Structural Units. *J. Polym. Res.*, 19(9909), 1-12.

Jaramillo-Soto, G., E. Vivaldo-Lima (2012) RAFT Copolymerization of Styrene/Divinylbenzene in Supercritical Carbon Dioxide. *Aust. J. Chem.*, 65, 1177-1185.

Zapata-González, I., E. Saldívar-Guerra, A. Flores-Tlacuahuac, E. Vivaldo-Lima, J. Ortiz-Cisneros (2012). Efficient Numerical Integration of Stiff Differential Equations in Polymerization Reaction Engineering. *Computational Aspects and Applications. Can. J. Chem. Eng.*, 90(4), 804-823.

Hernandez-Ortiz, J.C., E. Vivaldo-Lima, A. Penlidis (2012). Modelling of network formation in NMRP copolymerizations of vinyl/divinyl monomers using a multifunctional polymer molecule approach. *Macromol. Theory Simul.*, 21, 302-321.

Received 2012 IMIQ Award, Mexico.

X. Wang

Cao, K., J.T. Xu, X.S. Wang (2012). Synthesis and characterization of Fe(II)-coordinated PS-b-P[NIPAM-co-(VBC-Fe-DMAP)] block copolymers. *Chinese Journal of Polymer Science*, 30, 674-681.

Ghasdian, N., Y.B. Liu, R. McHale, J.J. He, Y.Q. Miao, X.S. Wang (2012). Synthesis of Prussian Blue Metal Coordination Polymer Nanocubes via Cyanoferrate Monomer Design. *J. Inorg. Organomet. Polym.*, 10 1007/s10904-012-9748-y.

Jiang, K., C.N. Ye, P.P. Zhang, X.S. Wang, Y.L. Zhao (2012). One-Pot Controlled Synthesis of Homopolymers and Diblock Copolymers Grafted Graphene Oxide Using Couplable RAFT Agents. *Macromolecules*, 45, 1346-1355

Liu, Y.B., X.S. Wang (2012). Synthesis, characterization, micellization and metal coordination polymerization of pentacyanoferrate-coordinated block copolymers for monodispersed soluble Prussian blue nanospheres. *Polym. Chem.*, 3, 2632 - 2639.

B. Zhao

Arunbabu, D., H. Shahsavan, W. Zhang, B. Zhao (2012). Poly(AAc-co-MBA) Hydrogel Films: Adhesive and Mechanical Properties in Aqueous Medium. *J. Physical Chemistry B* DOI: 10.1021/jp3101688.

Amoli, B.M., S. Gumfekar, A. Hu, Y.N. Zhou, B. Zhao (2012). Thiocarboxylate Functionalization of Silver Nanoparticles: Effect of Chain Length on the Electrical Conductivity of Nanoparticles and Their Polymer Composites. *J. Materials Chemistry*, 22, 20048-20056.

Shahsavan H., B. Zhao (2012). Biologically inspired enhancement of pressure-sensitive adhesives using a thin film-terminated fibrillar interface. *Soft Matter*, 8, 8243-8243.

Peng P., A. Hu, B. Zhao, A.P. Gerlich, Y.N. Zhou (2012). Reinforcement of Ag Nanoparticle Paste with Nanowires for Low Temperature Pressureless Bonding. *J. Mater. Sci.*, 47 (19), 6801-6811.

Yang, F.K., W. Zhang, Y. Han, S. Yoffe, Y. Cho, B. Zhao (2012). "Contact" of Nanoscale Stiff Films. *Langmuir*, 28 (25), pp 9562–9572.

Peng, P., A. Hu, H. Huang, A.P. Gerlich, B. Zhao, Y.N. Zhou (2012). Room-Temperature Pressureless Bonding with Silver Nanowire Paste: Towards Organic Electronic and Heat-Sensitive Functional Devices Packaging. *J. Mater. Chem.*, 22, 12997-13001.

Izadi, H., B. Zhao, Y. Han, N. McManus, A. Penlidis (2012). Teflon AF Hierarchical Nanopillars with Dry/Wet Switchable Adhesive Properties. *J. Polymer Science B: polymer physics*, 50(12) 846-851.

Shahsavan, H., D. Arunbabu, B. Zhao (2012). Biomimetic Modification of Polymeric Surfaces - A Promising Pathway for Tuning of Wetting and Adhesion. *Macromolecular Materials & Engineering*, 297, 743-760, **February, 2012 – Invited Feature Article.**

13. CONFERENCE PRESENTATIONS/INVITED SEMINARS

T. Duever

Masoumi, S., T.A. Duever (2012). Adaptive Metropolis Sampling in Sequential Model Discrimination and Design of Experiments. 8th World Congress in Probability and Statistics, Istanbul, Turkey, July 9-14, 2012.

Masoumi, S., T.A. Duever (2012). A Bayesian Sequential Approach in Model Discrimination. 11th ISBA 2012 World Meeting, Kyoto Terra Conference Center, Kyoto, Japan, June 25-29, 2012.

J. Duhamel

Duhamel, J. (2012). Internal Dynamics of Macromolecules Probed by Fluorescence. 2nd Bordeaux 1/Waterloo Institute for Nanotechnology Workshop, Bordeaux, France, May 23 – 25, 2012.

Duhamel, J., M.A. Fowler, G. Zaragoza- Galán, R. Rein, N. Solladié, E. Rivera (2012). Introducing the $(I_E/I_M)^{SPC}$ Scale to Probe the Internal Dynamics of Pyrene-Labeled Macromolecules. XXI IMRC, Cancun, Mexico, August 12-17, 2012.

Duhamel, J. (2012). Probing the Internal Dynamics of Macromolecules in Solution Quantitatively by Using Time-Resolved Fluorescence Institute for Polymer Research, November 29, 2012.

X. Feng

Kundu, P., A. Chakma, X. Feng (2012). A techno-economical analysis of membranes, amine absorption and membranes-amine hybrid process for CO₂ removal from flue gases. The 2012 AIChE Annual Meeting, Pittsburg, PA, Oct 28 - Nov 2, 2012.

Sampranpiboon, P., P. Charnkeitkong, X. Feng (2012). Intraparticle diffusion in lead adsorption onto paper and pineapple wastes as adsorbents. 2nd TICHÉ International Conference, Nakornratchasima, Thailand, October 25-26, 2012.

Feng, X. (2012). Removal of heavy metals from wastewater by adsorption and membrane separation based on naturally occurring eco-materials. 1st International Symposium on Polymer Ecomaterials, Changchun, China, Aug 19-23, 2012. **Invited Keynote Presentation.**

Du, J.R., S. Peldszus, P.M. Huck, X. Feng (2012). Surface modification of ultrafiltration membranes for fouling control. 7th Conference of Aseanian Membrane Society (AMS7), Pusan, Korea, July 4 - 6, 2012.

Ulloa, C., X. Feng (2012). Remediation of cellulose acetate-based hollow fiber gas separation membranes contaminated by nonvolatile hydrocarbons. 22nd Annual North American Membrane Society Meeting, New Orleans, LA, June 11-13, 2012.

Zhang, Y., J.W. Rhim, X. Feng (2012). Layer-by-layer self-assembled polyelectrolyte membranes for solvent dehydration by pervaporation. 22nd Annual North American Membrane Society Meeting, New Orleans, LA, June 11-13, 2012.

Feng, X. (2012). Separation of carbon dioxide from flue gas and landfill gas by hollow fiber membranes. The Membrane Society of Korea Meeting, Seoul, Korea, May 18, 2012. **Plenary Lecture.**

M. Gauthier

Gauthier, M. (2012). Dendritic Graft (Arborescent) Polymers for Applications in Water Decontamination and Drug Release. 2nd SUN-WIN Workshop on Nano Science and Technology, February 21, 2012, Suzhou, China.

Gauthier, M. (2012). Polyion Complex (PIC) Micelles with Predetermined Characteristics Derived from Arborescent Polymers. XXI International Materials Research Congress, August 13, 2012, Cancún, Mexico.

Gauthier, M. (2012). Dendritic Graft Homo- and Copolymers of Glutamic Acid for Biomedical Applications. Huazhong University of Science and Technology, Wuhan, China, February 27, 2012.

Gauthier, M. (2012). Metal-loaded Arborescent Copolymers. Université Bordeaux 1/CNRS, Bordeaux, France, March 20, 2012.

Gauthier, M. (2012). Arborescent Polymers: From Basics to Recent Developments. BASF SE, Ludwigshafen, Germany, April 3, 2012.

Y. Li

Li, Y. (2012). Development of enabling materials for printed organic electronics. University of Bordeaux 1, Bordeaux, France, October 17, 2012.

Li, Y. (2012). Development of high mobility polymers for organic thin film transistors. Chilworth Technical Centre Merck Chemicals Ltd., UK, October 16, 2012. **Invited talk.**

Li, Y. (2012). Donor-acceptor polymer semiconductors for organic electronics. Invited talk. 24th Canadian Materials Science Conference (CMSC), Western University, London, Ontario, June 5-8, 2012.

Hong, W., S. Sun, H. Aziz, W.-T. Park, Y. Noh, Y. Li (2012). A conjugated polyazine (PAZ) containing diketopyrrolopyrrole for ambipolar organic thin film transistors. 3rd Nano Ontario Conference 2012, University of Waterloo, October 11-12, 2012.

Sun, B., W. Hong, H. Aziz, Y. Li (2012). Diketopyrrolopyrrole-based semiconducting polymer bearing thermocleavable side chains. 3rd Nano Ontario Conference 2012, University of Waterloo, Oct 11-12, 2012.

Murphy, L., Y. Li, H. Aziz (2012). High Mobility Donor Polymer Semiconductor for Organic Solar Cells. 3rd Nano Ontario Conference 2012, University of Waterloo, Oct 11-12, 2012.

A. Penlidis

Kazemi, N., T.A. Duever, A. Penlidis (2012). An EVM optimal design criterion for reactivity ratio estimation in multicomponent polymerizations. 62nd Can. Soc. Chem. Eng. (CSChE) Conf., Vancouver, BC, Oct. 14-17, 2012.

Stewart, K.M.E., A. Penlidis (2012). A polymeric sensor for the detection of formaldehyde. Polym. React. Eng. (PRE 8), Cancun, Mexico, May 6-11, 2012. **Invited talk.**

Penlidis, A. (2012). Principles of polymeric sensor design. Dept. of Chemical Engineering, Ryerson Univ. Toronto, ON, June 7, 2012. **Invited talk.**

C. Tzoganakis

Tzoganakis, C. (2012). Rubber Devulcanization through Extrusion with Supercritical Carbon Dioxide. Polymer Processing Society Americas Conference, Niagara Falls, Ontario. May 21-24, 2012.

Tzoganakis, C. (2012). Chemical Modification of Polypropylene through Reactive Extrusion. Braskem, Pittsburgh, PA, USA. September 17, 2012.

Tzoganakis, C. (2012). Chemical Modification of Polymers and Extrusion with Supercritical CO₂. Milliken and Company, Spartanburg, SC, USA. July 30, 2012.

Tzoganakis, C. (2012) Rubber Devulcanization with Supercritical CO₂. Producta, Montelupone, Italy. December 1-5, 2012.

E. Vivaldo-Lima

Vivaldo-Lima, E. (**key note invited speaker**), J. C. Hernández-Ortiz (2012). Modeling of polymer network formation by nitroxide-mediated radical copolymerization of vinyl/divinyl monomers using a multifunctional polymer molecule approach. 33rd Australasian Polymer Symposium, Hobart, Tasmania, Australia, February 12-15, 2012.

Vivaldo-Lima, E. (2012). RAFT Polymerization with a Polymer Reaction Engineering Perspective at FQ-UNAM: Modeling of Linear and Nonlinear Polymerizations. CSIRO, Melbourne, Australia, February 20, 2012. **Invited seminar.**

Vivaldo-Lima, E. (2012). Reduction of heterogeneity in the production of polymer networks using green chemistry. Centro de Investigación en Materiales Avanzados, S.C. (CIMAV), Monterrey Unit, Monterrey, Nuevo León, México, August 17, 2012. **Invited seminar.**

X. Wang

Wang, X. S. (2012). Organometallic and Metal Coordination Chemistry for Polymer Supramolecular Functional Nanomaterials. TaiWan-WIN Second Reciprocal Workshop, Hualien, Taiwan, Dec. 5-7, 2012.

Wang, X. S. (2012). Organometallic and Metal Coordination Chemistry for Polymer Supramolecular Functional Nanomaterials. University of Toronto, Toronto, ON, November 8, 2012.

Wang, X. S. (2012). Block copolymer solution self-assembly for designed synthesis of metal coordination nanoparticles. 95th Canadian Chemistry Conference and Exhibition, Calgary, Alberta, May 26-30, 2012.

Wang, X. S. (2012). Supramolecular Functional Nanomaterials: Block copolymer Synthesis and Self-Assembly. University Bordeaux 1 and Waterloo Institute for Nanotechnology. 2nd Strategic Research Workshop, Bordeaux, France, May 23-25, 2012.

Wang, X. S. (2012). Design and Synthesis of Polymer Supramolecular Functional Nanomaterial. Institute for Polymer Research, Thirty-Fourth Annual Symposium on Polymer Science/Engineering, University of Waterloo, Waterloo, ON, May 3, 2012.

B. Zhao

McDonald, B., B. Zhao (2012). Biomimetic Micro-Structured Surfaces: Pattern Transfer and Fabrication of Icephobic Epoxy Surfaces. 3rd International Conference on Nanotechnology: Fundamentals and Applications, Montreal, Quebec, Canada, August 7-9, 2012.

Amoli, B.M, B. Zhao, A. Hu, N. Zhou (2012). Surface functionalization of silver nanoparticles as conductive fillers in adhesive nanocomposites. 3rd International Conference on Nanotechnology: Fundamentals and Applications, Montreal, Quebec, Canada, August 7-9, 2012.

Yang, F.K., W. Zhang, Y. Han, B. Zhao (2012). Contact dynamics of marine mussel-inspired polydopamine thin films. Biomedical Engineering Society (BMES) Annual Meeting, Atlanta, GA, October 24-27, 2012.

Shahsavan, H., D. Arunbabu, B. Zhao (2012). Biologically Inspired Modification of Polymeric Surfaces for Tuning of Wetting and Adhesion. 62nd Canadian Chemical Engineering Conference, Vancouver, BC, October 14-17, 2012.

Shahsavan, H., B. Zhao (2012). Biomimetic Micro-structured Polymer Surfaces for Controlled Adhesion. Materials Research Society (MRS) Fall Meeting, Boston, MA, November 25-30, 2012.

McDonald, B., H. Shahsavan, B. Zhao (2012). Tuning of Hydrophobicity and Friction Behavior of Biomimetic Micro-patterned Thermoset Epoxy Coatings. Thermoset Resin Formulators Association 2012 Annual Meeting, Orlando, FL, October 28-30, 2012.

14. PATENTS/MAJOR TECHNICAL REPORT/CHAPTERS IN BOOKS/OTHER

J. Forrest

WO Patent 2,012,058,775,2012 Forrest, J., Jones, L. (2012). Using Metallic Nanoparticles To Modify The Optical Properties Of Hydrogel Contact Lens Materials.

M. Gauthier

Xiao, L., B. Wang, G. Yang, M. Gauthier (2012). *Poly(lactic acid)-based biomaterials: Synthesis, Modification, and Applications* (Open access). Biomedical Science, Engineering and Technology, Ghista, D.N., Ed. InTech: Rijeka, 247-282.

Y. Li

US Provisional Appl. No. 61724461 Li, Y. (2012). Monomeric, Oligomeric and Polymeric Semiconductors Containing Fused Rings and Their Devices.

US Provisional Appl. No. 61716615 Li, Y. (2012). Fused Ring Organic Semiconductors and Devices.

US Provisional Appl. No. 61673628 Li, Y. (2012). Organic Semiconductor Having Azo-Containing Moiety and Devices Generated Therefrom.

US Provisional Appl. No. 61597818 Li, Y. (2012). Solubilizing Side Chains For Polymer Semiconductors.

WO 2012/109747 A1 Li, Y. (2012). Organic semiconducting compounds and devices generated therefrom.

US 20120178890 Li, Y., Y. Wu, P. Liu, P.F. Smith (2012). Organic Thin-Film Transistors.

US 20120161117 Chen, Z., J. Li, B. Ong, P. Sonar, K.H. Ong, G.M. Ng, S.L. Lim, S.P. Singh, Y. Li (2012). P-Type Materials and Organic Electronic Devices.

US 20120157689 Wu, Y., B.S. Ong, Y. Qi, Y. Li (2012). Substituted Indolocarbazoles.

US20120153274 Sonar, P., S.P. Singh, M.S. Soh, Y. Li (2012). Ambipolar Polymeric Semiconductor Materials and Organic Electronic Devices.

US 20120034736 Wu, Y., H. Pan, P. Liu, Y. Li, P.F. Smith (2012). Thin-Film Transistors.

US Patents Awarded

US 8,334,391 Li, Y., Y. Wu, B.S. Ong, P. Liu (2012). Functionalized heteroacenes.

US 8,319,206 Wu, Y., Y. Li, Y., P. Liu, P.F. Smith, H.K. Mahabadi (2012). Thin film transistors comprising surface modified carbon nanotubes.

US 8,298,314 Li, Y. (2012). Silver nanoparticles and process for producing same.

US 8,293,363 Wu, Y., H. Pan, P. Liu, Y. Li, P.F. Smith (2012). Thin film transistors.

US 8,222,076 Wu, Y., Y. Li, B.S. Ong (2012). Fabricating amorphous zinc oxide semiconductor layer.

US 8,154,013 Li, Y., Y. Wu, P. Liu, P.F. Smith (2012). Organic thin-film transistors.

US 8,153,755 Ong, B. S., H. Pan, Y. Li, Y. Wu, P. Liu (2012). Electronic devices.

US 8,110,690 Wu, Y., B.S. Ong, Y. Qi, Y. Li (2012). Substituted indolocarbazoles.

US 8,106,387 Wu, Y., P. Liu, Y. Li, P. Smith (2012). Organic thin film transistors.

M. Tam

Tan, B.H., J.P.K. Tan, K.C. Tam (2012). *pH-Responsive Nanogels: Synthesis and Physical Properties*. Hydrogel Micro and Nanoparticles, Eds. Lyon, L.A., Serpe, M.J., Wiley-VCH, 81-115.

B. Zhao

Yang, F.K., B. Zhao (2012). Method and Apparatus for Adhesive Bonding in an Aqueous Medium. PCT application (#PCT/CA2012/ CA2012/050855) filed on November 27, 2012.

15. OTHER HIGHLIGHTS FOR YEAR 2012

Professor Duever ended a nine-year term as Department Chair on April 30, 2012.

Prof. Li is the Associate Editor, *Materials Focus*, June 2012 – present and is also on the Editorial Advisory Board for *Organic Photonics and Photovoltaics*, October 2012 – present.

Prof Penlidis was a consultant with twelve companies (Canada, USA, Europe).

Prof Penlidis was an Editorial Board Member for *J. Macromol. Sci.-Pure and Appl. Chem.*, *Polymer-Plastics Techn. and Eng.*, and *Macromol. React. Eng.*

International academic collaborations (regular basis with co-authored articles): Universities of UNAM (Mexico), Los Andes (Venezuela), and (more locally), University of Toronto and McGill University.

Prof Penlidis was an Early Research Award (ERA), Government of Ontario, panel member, January-February 2012.

Prof Penlidis organized and lectured in an industrial in-house 4-day course on Polymerization Reactor Design and Polymer Processing, SABIC, Maastricht, The Netherlands, Apr. 21-28, (with Prof. Tzoganakis), audience of 12 scientists/engineers.

Prof Penlidis organized and lectured in an industrial in-house 2-day course on Emulsion Polymerization Reactor Design, OMNOVA Solutions, USA, Oct. 29-30, 2012, audience of 50 scientists/engineers.

Prof Penlidis co-organized and co-chaired one half-day session (with Dr. Klaus-Dieter Hungenberg of BASF, Germany) in the recent PRE 8 conference, Cancun, Mexico, May 2012.

Prof. Vivaldo-Lima obtained Level 3 (the highest) in his 2012 evaluation of the Mexican National Researchers System (S.N.I.). This official distinction granted by the Mexican Federal Government through CONACYT is valid for 5 years, from January 1, 2013 to December 31, 2017.

Prof. Vivaldo-Lima was co-winner (with J.C. Hernández-Ortiz) of the “IMIQ 2012 Prize: “Ing. César O. Baptista Montes” to the technical work of excellence in Chemical Engineering”, Coatzacoalcos, Veracruz, October 26, 2012. This first place award was based on the paper “Modeling of Bimolecular Nitroxide-Mediated Radical Copolymerization with Crosslinking of Vinyl/Divinyl Monomers Using a Multifunctional Polymer Molecule Approach” (Hernández-Ortiz et al., *Macromol. Theory Simul.*, **21**, 302-321, 2012).

Prof. Vivaldo-Lima was appointed Conference Chair of the prestigious conference Polymer Reaction Engineering 9, which will occur in May 2015, in a yet to be determined location. The appointment took place during PRE-8 in Cancún, México, May 2012.

Prof. Vivaldo-Lima continues as a Member for UNAM in the Scientific Committee and technical coordinator for the UNAM team, in Project “BABETHANOL” (www.babethanol.com), funded by the European Community's Seventh Framework Programme (FP7/2007-2013) under grant agreement n° 227498.

During 2012, IPR had several interactions with non-member companies: In addition, the IPR office and Director respond to numerous calls and emails (all requests for information) and help the public at large (who have questions on polymers) as well as other UW Institutes (e.g., WIN).

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 awards and scholarships.

Many thanks to Dr. Klaus-Dieter Hungenberg of BASF, a long-time friend of IPR, for coordinating many interesting interactions with BASF in Germany, USA and Canada.

INSTITUTE FOR POLYMER RESEARCH
 CELEBRATING 28 YEARS OF OFFICIAL INSTITUTE STATUS
 THIRTY-FOURTH ANNUAL SYMPOSIUM
 ON POLYMER SCIENCE/ENGINEERING
 2012
 Conrad Grebel College
Great Hall
 University of Waterloo, Waterloo, Ontario
 Wednesday, May 2, 2012

| | |
|--------------------|--|
| 8:30 a.m. | Coffee |
| 8:50 | Welcome and Opening Remarks |
| 9:00 - 9:30 | <p>Shaohua Chen, Chemistry, Waterloo Interactions between a series of pyrene end-labelled poly(ethylene oxide)s and sodium dodecyl sulphate in aqueous solution probed by fluorescence (Winner of 2011 IPR Award for Academic Excellence in Polymer Science/Engineering)</p> |
| 9:30 - 10:30 | <p>Professor Xiaosong Wang, Chemistry, Waterloo Design and synthesis of polymer supra-molecular functional nanomaterial</p> |
| 10:30 - 11:00 | Coffee |
| 11:00 - 12:00 p.m. | <p><u>Mini Presentations</u></p> |
| | <p>1) Greg Whitton, Chemistry, Waterloo Arborescent polymers based on amino acids</p> |
| | <p>2) Mosa Alsehli, Chemistry, Waterloo Arborescent polypeptide micelles for drug release</p> |
| | <p>3) Yahya Alzahrany, Chemistry, Waterloo Arborescent amphiphilic copolymers</p> |
| | <p>4) Shiva Farhangi, Chemistry, Waterloo Utilizing fluorescence to probe the chain flexibility of different polymer backbones in solution</p> |
| | <p>5) Mike Fowler, Chemistry, Waterloo Scaling laws to probe the internal dynamics of macromolecules in solution by pyrene excimer formation</p> |
| | <p>6) Mark Hazlett, Chemical Engineering, Waterloo Modelling insights into the nitroxide-mediated radical polymerization of styrene</p> |
| | <p>7) Lu Li, Chemistry, Waterloo Characterization of emulsions of hydrocarbons and temperature-responsive polymeric surfactants</p> |

- 8) **Ilias Mahmud, Chemistry, Waterloo**
A facile “click” chemistry to synthesize butyl rubber ionomers
- 9) **Olivier Nguon, Chemistry, Waterloo**
Arborescent copolymers as catalyst supports
- 10) **Kate Stewart, Chemical Engineering, Waterloo**
A polyaniline-based sensor for the detection of formaldehyde
- 11) **Bingqing Yang, Chemistry, Waterloo**
Synthesis and characterization of block copolymer of PNIPAM and PEO prepared by ATRP

12:15 - 1:00

Lunch

1:00 - 1:30

Ala Alturk, Chemistry, Waterloo
Synthesis of arborescent polybutadiene

1:30 - 2:00

Tim Hall, Chemistry, Waterloo
Internal dynamics of poly(glutamic acid) arborescent polymers probed by fluorescence

2:00 - 2:30

Yasaman Amintowlieh, Chemical Engineering, Waterloo
Modification of polypropylene by UV-radiation

2:30 - 3:00

Pouyan Sardashti, Chemical Engineering, Waterloo
Improvement of the hardening stiffness test as an indicator of environmental stress cracking resistance of polyethylene resins
(Winner of the 2011 IPR Award for Academic Excellence in Polymer Science/Engineering)

3:00 - 3:30

Coffee

3:30 - 4:00

Solmaz Pirouz, Chemistry, Waterloo
Modification of polyisobutylene-based oil-soluble dispersants

4:00 - 4:30

Sarang Gumfekar, Chemical Engineering, Waterloo
Fabrication and characterization of silver-polyaniline-epoxy electrical conductive adhesive

4:30 - 5:00

Shideh Fathi Roudsari, Chemical Engineering, Ryerson
The effect of mixing on the molecular weight and size distribution in emulsion polymerization

5:00

Closing remarks

6:00 - 7:30

IPR Industrial Member DINNER
University Club, Main Dining Room

7:30 - 9:00

Poster Presentations and Informal Get-together
University Club, Main Dining Room
(IPR graduate students/researchers and symposium participants)

POSTER SESSION
 WEDNESDAY, MAY 2, 2012
UNIVERSITY CLUB
7:30 – 9:00 pm

| | |
|---|---|
| Mosa Alsehli Chemistry, Waterloo | Arborescent peptide micelles for drug release |
| Yahya Alzahrany Chemistry, Waterloo | Arborescent amphiphilic copolymers |
| Daniel Bacinello Chem. Eng., Waterloo | Enzyme-responsive polymersomes for tumour targeted drug delivery |
| Mike Fowler Chemistry, Waterloo | Scaling laws to probe the internal dynamics of macromolecules in solution by pyrene excimer formation |
| Dina Hamad Chem. Eng., Ryerson | Photo oxidative degradation of polyacrylamide in waste water |
| Camille Legros Chem. Eng., Waterloo | Design and development of biocompatible and responsive nanogels made from poly(2-alkyl-2-oxazoline) for drug delivery |
| Alice Yang and Lu Li Chemistry, Waterloo | Preparation and characterization of well-defined thermoresponsive polymer surfactants |
| Ilias Mahmud Chemistry, Waterloo | Synthesis of aminated butyl rubbers by “click” chemistry |
| Mohammad Meysami Chem. Eng., Waterloo | Study of the effect of process parameters on the properties of devulcanized scrap rubber |
| Prashant Mutyala Chem. Eng., Waterloo | Preparation of TPVs from devulcanized rubber crumbs |
| Olivier Nguon Chemistry, Waterloo | Arborescent copolymers as catalyst supports |
| Kate Stewart Chem. Eng., Waterloo | Test system for sensing materials and sensors |
| Greg Whitton Chemistry, Waterloo | Arborescent polymers based on amino acids |

**THIRTY-FOURTH ANNUAL SYMPOSIUM
ON POLYMER SCIENCE/ENGINEERING
May 2, 2012--CONRAD GREBEL COLLEGE
LIST OF PARTICIPANTS**

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**THIRTY-FOURTH ANNUAL SYMPOSIUM
ON POLYMER SCIENCE/ENGINEERING
May 2, 2012--CONRAD GREBEL COLLEGE
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PREPRINTS 2012

- 12/001 **Synthesis of arborescent styrene homopolymers and copolymers from epoxidized substrates**
F. Moingeon, Y.R. Wu, L.-E. Sanchez-Cadena, M. Gauthier
J. Polym. Sci., Part A: Polym. Chem., Acc., 01/12
- 12/002 **Poly(lactic acid)-based biomaterials: synthesis, modification and applications**
L. Xiao, B. Wang, G. Yang, M. Gauthier
Biomed. Sci., Eng and Techn., Acc., 01/12
- 12/003 **pH-Responsive films of electrostatically adsorbed arborescent copolymers**
M. Huh, Y.S. Park, M.-H. Jung, S.J. Kang, T.-B. Kang, A. Munam, M. Gauthier, S.I. Yun
Macromol. Sci., Part A: Pure and Appl. Chem. 49, 251-258.
- 12/004 **Arborescent polystyrene-graft-poly(2-vinylpyridine) copolymers: solution polyelectrolyte behavior**
M. Gauthier, A. Munam
RSC Advances, Acc., 02/12
- 12/005 **Routes to carboxylic acid functional acrylonitrile copolymers via N-tert-butyl-N-(1-diethylphosphono-2, 2-dimethylpropyl) free nitroxide based nitroxide-mediated polymerization**
V. Consolante, M. Maric, A. Penlidis
J. Polym. Sci., Acc., 01/23 (DOI-36547)
- 12/006 **New insights in the study of pyrene excimer fluorescence to characterize macromolecules and their supramolecular assemblies in solution**
J. Duhamel
Langmuir, Acc., 02/12
- 12/007 **Teflon Hierarchical nanopillars with dry and wet adhesive properties**
H. Izadi, B. Zhao, Y. Han, N. McManus, A. Penlidis
J. Polym. Sci., Polym. Phys., Acc., 03/12
- 12/008 **Unexpected absorbance enhancement upon clustering dyes in a polymer matrix**
A. Gelover-Santiago, M.A. Fowler, J. Yip, J. Duhamel, G. Burillo, E. Rivera
J. Phys. Chem. B, Acc., 04/12
- 12/009 **Rheological detection of caging and solid-liquid transitions in soft colloid-polymer mixtures**
D. Truzzolillo, D. Vlassopoulos, M. Gauthier
J. Non-Newt. Fluid Mech., Acc., 04/12
- 12/10 **Improved operating scenarios for the production of acrylonitrile-butadiene emulsions**
C.R. Madhuranthakam, A. Penlidis
Polym. Eng. Sci., Acc., 05/12
- 12/011 **Improvement of hardening stiffness test as an indicator of environmental stress cracking resistance of polyethylene**
P. Sardashti, C. Tzoganakis, M.A. Polak, A. Penlidis
J. Macromol. Sci., Pure and Appl. Chem., Acc., 05/12

- 12/012 **Self-Assembly behavior of thermoresponsive Oligo(ethylene glycol) methacrylates random copolymer**
B. Peng, N. Grishkewich, Z. Yao, X. Han, H. Liu, K.C. Tam
ACS Macro Lett., Acc., 04/12
- 12/013 **Biomimetic modification of polymeric surfaces: a promising pathway for tuning of wetting and adhesion**
H. Shahsavan, D. Arunbabu, B. Zhao
Macromol. Mater. Eng., Acc., 05/12
- 12/014 **Synthesis and morphology of poly(N-isopropylacrylamide) nanocomposites with emulsion template nanoporous structure**
C. Zamecnik, M.J. Loureiro, C. Postnikoff, Y. Kong, A. Penlidis
J. Macromol. Sci., Pure and Appl. Chem., Acc., 06/12
- 12/015 **Synthesis and characterization of novel pyrene-dendronized Porphyrins exhibiting efficient fluorescence resonance energy transfer (FRET): optical and photophysical properties**
G. Zaragoza-Galán, M.A. Fowler, J. Duhamel, R. Rein, N. Solladié, E. Rivera
Langmuir, Acc., 06/12
- 12/016 **Synthesis, characterization, micellization and metal coordination polymerization of pentacyanoferrate-coordinated block copolymers for monodispersed soluble Prussian blue nanospheres**
Y. Liu, X. Wang
Polymer Chemistry, Acc., 07/12
- 12/017 **Modelling of polymerization rate and microstructure in the anionic polymerization of isoprene using n-butyl lithium and N, N, N', N'-tetramethylethylenediamine considering different reactivities of the structural units**
J.A. Tenorio-Lopez, J.J. Benvenuta-Tapia, E. Vivaldo-Lima, M.A. Rios-Enriquez, M. Lourdes de Nieto-Pena
J. Polym. Res. 19, 7
- 12/018 **RAFT Copolymerization of styrene/divinylbenzene in supercritical carbon dioxide**
G. Jaramillo-Soto, E. Vivaldo-Lima
Australian J. Chem., Acc., 07/12
- 12/019 **Cross-linking nitroxide-mediated radical copolymerization from a Bayesian experimental design angle**
A. Nabifar, J. Hernandez-Ortiz, E. Vivaldo-Lima, A. Penlidis
Macromol. Symp., Acc., 07/12
- 12/020 **Novel test system for gas sensing materials and sensors**
K.M.E. Stewart, A. Penlidis
Macromol. Symp., Acc., 08/12
- 12/021 **Synthesis of Prussian blue metal coordination polymer nanocubes via cyanoferrate monomer design**
N. Ghasdian, Y. Liu, R. McHale, J. He, Y. Miao, X. Wang
J. Inorg. & Organometallic Polym. & Matl., Acc., 08/12
- 12/022 **A powerful estimation scheme with the error-in-variables-model for nonlinear cases: reactivity ratio estimation examples**
N. Kazemi, T.A. Duever, A. Penlidis
Comput. & Chem. Eng., Acc., 08/12

- 12/023 **Lateral distribution of charged species along a polyelectrolyte probed with a fluorescence blob model**
C. Keyes-Baig, M. Mathew, J. Duhamel
J. Am. Chem. Soc., Acc., 09/12
- 12/024 **Studying Pyrene-Labelled Macromolecules with the Model Free Analysis**
M.A. Fowler, J. Duhamel, G.J. Bahun, A. Adronov, G. Zaragoza-Galán, E. Rivera
J. Phys. Chem., Acc., 10/12
- 12/025 **RAFT Copolymerization with Crosslinking of Methyl Methacrylate and Ethylene Glycol Dimethacrylate in Supercritical Carbon Dioxide**
G. Jaramillo-Soto, C.M. Villa-Ávila, E. Vivaldo-Lima
J. Macromol. Sci., Part A: Pure and Appl. Chem., Acc., 10/12
- 12/026 **Enhanced Adhesion and Friction by Electrostatic Interactions of Double-Level Teflon Nanopillars**
H. Izadi, M. Golmakani, A. Penlidis
Soft Matter, Acc., 12/12

Research Personnel

(SUPERVISOR)

| NAME | CAT | DEPT | TD | JD | RD | XF | JF | MG | YL | NMc | AP | MT | CT | XW | BZ | THESIS/PROJECT TOPIC | COMPL. DATE |
|----------------|-----|--------|----|----|----|----|----|----|----|-----|----|----|----|----|----|--|-------------|
| P. Akhlaghi | 2 | ChE | | | | | | | | | | X | | | | Cosmetic delivery systems using nanocrystalline cellulose | Apr 14 |
| M. Alsehli | 2 | Chem | | | | | | X | | | | | | | | Arborescent polypeptide micelles (Saudi Arabia Scholarship) | Aug 15 |
| A. Alturk | 2 | Chem | | | | | | X | | | | | | | | Arborescent polybutadienes | Dec 16 |
| Y. Alzahrany | 1 | Chem | | | | | | X | | | | | | | | Amphiphilic arborescent copolymers | May 12 |
| Y. Amintowlieh | 2 | ChE | | | | | | | | | X | | X | | | UV cross linking of polyethylene | Sep 14 |
| B.M. Amoli | 2 | ChE | | | | | | | | | | | | | X | Functionalization and dispersion of silver nanofillers (co-supervised with N. Zhou in MME) | Dec 14 |
| R. Amos | 2 | Chem | | | | | | X | | | | | | | | Hydrophobic Modification of Starch Nanoparticles | Aug 17 |
| T. Aridi | 2 | Chem | | | | | | X | | | | | | | | New grafting techniques | Jun 13 |
| D. Arunbabu | 3 | ChE | | | | | | | | | | | | | X | Development of bionanomaterials for biomedical applications | Nov 12 |
| D. Bacinello | 2 | ChE | | | | | | | | | | X | | | | Development of block copolypeptide systems for drug delivery applications | Jun 12 |
| K. Bailey | 1 | ChE | | | | X | | | | | | | | | | Biopolymers for controlled release of drugs | Apr 13 |
| R. Batmaz | 1 | ChE | | | | | | | | | | X | | | | Cyclodextrin modified nanocrystalline cellulose system | May 13 |
| K. Cao | 2 | Chem | | | | | | | | | | | | X | | Synthesis and characterization of PFpP | May 14 |
| Y. Chai | 2 | PhyAst | | | | | X | | | | | | | | | Surface dynamics of polymer films | Aug 15 |
| S. Chen | 2 | Chem | | X | | | | | | | | | | | | Characterization of solutions of pyrene end-labelled poly(ethylene oxide) by fluorescence and Rheology | Jun 12 |

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|--------------|-----|--------|----|----|----|----|----|----|----|-----|----|----|----|----|----|--|-------------|
| C. Daley | 2 | PhyAst | | | | | X | | | | | | | | | Select nanoscale experiments on novel polymer system | Sep 14 |
| Y. Du | 2 | ChE | X | | | | | | | | | | | | | Fault detection in chemical processes | Aug 15 |
| S. Eslami | 2 | ChE | | | | X | | | | | | | | | | Membrane reactors | Dec 13 |
| S. Farhangi | 2 | Chem | | X | | | | | | | | | | | | Characterizing polymer chain dynamics in solution of various polymeric backbones by pyrene excimer formation | Apr 16 |
| M. Farooq | 2 | ChE | | | | X | | | | | | | | | | Waste water treatment by membrane/adsorption | Apr 13 |
| J. Fernandez | 1 | Chem | | | | | | X | | | | | | | | Grafting of Starch Nanoparticles | Aug 14 |
| J. Flannery | 1 | PhyAst | | | | | X | | | | | | | | | A Study of Protein Conformational Alterations on Polymer Thin Films using Raman Spectroscopy | Aug 14 |
| M. Fowler | 2 | Chem | | X | | | | | | | | | | | | Characterization of the properties of polypeptide aggregates | Aug 13 |
| D. Francisco | 4 | ChE | | | | X | | | | | | | | | | Coffee aroma enrichment | Mar 13 |
| M. Guan | 1 | ChE | | | | X | | | | | | | | | | Waste water treatment by adsorption and membranes | Sep 13 |
| S. Gumfekar | 1 | ChE | | | | | | | | | | | | | X | In-situ electromechanical characterization of conductive adhesives | Dec 12 |
| E. Gungor | 2 | Chem | | | | | | X | | | | | | | | Carboxylated butyl rubber ionomers by "click" chemistry | Apr 12 |
| B. Hall | 2 | PhyAst | | | | | X | | | | | | | | | Fundamentals of Protein Adsorption at the Solid-Liquid Interface over Short Time Periods | Dec 13 |
| T. Hall | 1 | Chem | | X | | | | X | | | | | | | | Long range chain dynamics of poly(glutamic acid) | Apr 12 |
| M. Hazlett | 2 | ChE | | | | | | | | | X | | | | | Sensor selection studies in controlled radical polymerization | Sep 12 |
| Y. Hu | 2 | ChE | | | | X | | | | | | | | | | Facilitated transport membranes | Aug 13 |
| Y. Huang | 2 | ChE | | | | X | | | | | | | | | | Micelle-enhanced ultrafiltration | Aug 14 |
| H. Izadi | 2 | ChE | | | | | | | | | X | | | | | Polymers with tailor-made adhesive properties at nano-scale | Sep 13 |
| N. Kazemi | 2 | ChE | | | | | | | | | X | | | | | Parameter estimation in terpolymerization | May 14 |
| P. Kundu | 2 | ChE | | | | X | | | | | | | | | | CO ₂ capture from flue gas for greenhouse gas emission control | Apr 13 |

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|----------------|-----|------|----|----|----|----|----|----|----|-----|----|----|----|----|----|---|-------------|
| S. Lai | 2 | ChE | | | | X | | | | | | | | | | Heavy metal removal from waste water | Aug 15 |
| C. Legros | 2 | ChE | | | | | | | | | | X | | | | Biodegradable and biocompatible nanogels for drug delivery applications | Oct 14 |
| L. Li | 2 | Chem | | X | | | | | | | | | | | | Studies of oil-in-water emulsion prepared with PNIPAM-based thermo-responsive polymeric surfactants | Aug 16 |
| Y. Liu | 1 | Chem | | | | | | | | | | | | X | | Synthesis and polymerization of FpP | May 13 |
| I. Mahmud | 3 | Chem | | | | | | X | | | | | | | | Butyl rubber ammonium ionomers by "click" chemistry (PDF) | Apr 14 |
| M. Mathew | 1 | ChE | X | | | | | | | | | | | | | Parameter estimation in nonlinear models using MCMC | Aug 13 |
| S. Masoumi | 2 | ChE | X | | | | | | | | | | | | | Model discrimination using MCMC methods | Aug 12 |
| B. McDonald | 1 | ChE | | | | | | | | | | | | | X | Biomimetic anti-icing superhydrophobic coatings | Sep 13 |
| M. Meysami | 2 | ChE | | | | | | | | | | | X | | | Devulcanization of tire rubber crumb with supercritical CO ₂ | Mar 12 |
| F. Moingeon | 3 | Chem | | | | | | X | | | | | | | | Photocatalysts for H ₂ production | May 14 |
| P. Mutyala | 2 | ChE | | | | | | | | | | | X | | | Production of TPVs from devulcanized rubber crumb | Mar 13 |
| A. Nabifar | 2 | ChE | | | | | | | | X | X | | | | | Bayesian design of experiments in emulsion and controlled radical polymerization | Sep 12 |
| L.Y. Nan | 2 | ChE | | | | | | | | | | X | | | | Nanoparticle synthesis using polyacrylic acids | Apr 14 |
| B. Nayyar | 1 | Chem | | | | | | | | | | | | X | | Synthesis PFpP with varied Tg | May 14 |
| O. Nguon | 2 | Chem | | | | | | X | | | | | | | | Polymer chain dynamics | May 13 |
| Z. Pan | 2 | ChE | | | | | | | | | | | | | X | Development of low friction and oleophobic coating materials | Sep 16 |
| B.L. Peng | 2 | ChE | | | | | | | | | | X | | | | Interactions between functionalized biocompatible polymer systems and surfactants | Sep 14 |
| M. Reza | 2 | ChE | | | | X | | | | | | | | | | Membrane bioreactor for wastewater treatment | Aug 14 |
| M. Riahinezhad | 2 | ChE | | | | | | | | X | X | | | | | Copolymerization kinetics of acrylic acid and acrylamide for enhanced oil-recovery applications | Sep 15 |

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|------------------|-----|--------|----|----|----|----|----|----|----|-----|----|----|----|----|----|--|-------------|
| S. Roudsari | 2 | ChE | | | X | | | | | | | | | | | CFD Analysis and Experimental Study of MMA Emulsion Polymerization | Aug 13 |
| A. Saika | 1 | ChE | | | | | | | | | | | X | | | DSC analysis of curing of devulcanized rubber | Sep 14 |
| A. Sardashti | 2 | ChE | | | | | | | | | X | | X | | | Evaluation and Modification of Properties of Polyethylene Resins | Dec 14 |
| K. Schreiter | 2 | PhyAst | | | | | X | | | | | | | | | Heat capacity of ultra-thin polymer films | Dec 15 |
| N. Singh | 1 | Chem | | | | | | | | | | | | X | | Functionalization of CpCOFeCOMe for metal containing polymers | May 13 |
| M. Snow | 1 | ChE | | | | X | | | | | | | | | | Olefin/paraffin separation by membranes | Apr 13 |
| K. Stewart | 2 | ChE | | | | | | | | | X | | | | | Polymeric sensors for detection of toxic analytes | May 16 |
| J. Sun | 2 | ChE | | | | X | | | | | | | | | | Polyelectrolyte membranes | Aug 14 |
| C. Ulloa | 1 | ChE | | | | X | | | | | | | | | | Hollow fiber membranes | Apr 12 |
| D. Vishnu | 3 | Chem | | | | | | X | | | | | | | | Butyl rubber ammonium ionomers by "click" chemistry (PDF) | Jun 14 |
| A. Vo Thu Nguyen | 2 | Chem | | | | | | X | | | | | | | | Magnetic micelles as therapy and diagnostic (theranostic) agents | Aug 15 |
| G. Whitton | 2 | Chem | | | | | | X | | | | | | | | Arborescent polymers form amino acids | Apr 13 |
| A. Worku | 2 | Chem | | | | | | X | | | | | | | | Arborescent Micelles from Polyelectrolyte Complexes | Aug 17 |
| D. Wu | 2 | ChE | | | | X | | | | | | | | | | Nanofiltration membranes | Dec 14 |
| X. Xu | 2 | ChE | | | | X | | | | | | | | | | Surface modification of membranes | Dec 14 |
| A. Yang | 1 | Chem | | X | | | | | | | | | | | | Synthesis and characterization of block copolymers of PNIPAM and PEO prepared by ATRP | Dec 13 |
| F. Yang | 1 | ChE | | | | | | | | | | | | | X | Fabrication and characterization of biomimetic hydrogels for biomaterials applications | Aug 12 |
| Y. Yang | 4 | ChE | | | | X | | | | | | | | | | Wastewater treatment by hollow fibers | Dec 13 |
| W. Yi | 1 | Chem | | X | | | | | | | | | | | | Characterization of Starch Nanoparticles by Fluorescence Quenching | Aug 14 |
| M. Zaman | 4 | ChE | | | | | | | | | | X | | | | Cationic modification of nanocrystalline cellulose | Jan 12 |

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|-------------|-----|------|----|----|----|----|----|----|----|-----|----|----|----|----|----|---|-------------|
| B. Zhang | 2 | ChE | | | | X | | | | | | | | | | Aroma compound recovery from aqueous solutions | Aug 15 |
| W. Zhang | 2 | ChE | | | | | | | | | | | | | X | Surface and tribological behaviour of Mussel-inspired polydopamine thin films | Sep 16 |
| Y. Zhang | 2 | ChE | | | | X | | | | | | | | | | Solvent dehydration by pervaporation | Apr 13 |
| Y. Zhaoling | 3 | ChE | | | | | | | | | | X | | | | Water-soluble fullerene polymers for drug delivery applications | Jun 12 |

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