

Robin A. HUTCHINSON, PhD, PEng

Professor, Department of Chemical Engineering, Queen's University
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Most Significant Contributions to the Profession

- Kinetic modeling of high-temperature radical acrylic copolymerization
- Elucidation of radical acrylate polymerization kinetics
- Measurement of radical rate coefficients using pulsed-laser polymerization techniques
- Cu(0)-mediated polymerization process development for industrial applications
- Measurement and modeling of aqueous-phase radical polymerization kinetics
- Synthesis, polymerization kinetics and applications of novel functional (macro)monomers

Professional Experience

Professor at Queen's University, currently Department Associate Head

Associate since 2000, Tenured since 2003, Full since 2007, teaches 3 courses/academic year

Former Duties: Undergraduate Program Chair, Graduate Program Chair

Leads an internationally recognized research program focused on improving understanding of radical polymerization kinetics, coupled with establishment of fundamental modeling as a reliable tool for design and optimization of industrial processes and development of new polymeric materials. Over 150 refereed publications, including numerous feature articles and 4 book chapters. *Web of Science* (May 2020) h-index of 40 with over 6,000 total citations. Received over \$CDN3 million in equipment and infrastructure funding to date, with a current annual operating budget of over \$CDN300,000 from industrial and federal sources. Strong record of HQP training including graduate student exchange with academic and industrial research institutions in North America, Asia, and Europe.

Established on-going international research collaborations with academic groups in Mexico, Slovakia, Germany, and Belgium. Split 2013-14 sabbatical year between four different European locations: BASF (Ludwigshafen, Germany), POLYMAT (University of the Basque Country, San Sebastian, Spain), Politecnico di Milano (Milan, Italy), and the Polymer Institute of the Slovak Academy of Sciences (Bratislava, Slovakia), receiving financial support from all four institutions. During this sabbatical, gave 12 presentations at companies, universities and conferences in Europe and Asia. Spent 2006-07 sabbatical year in Europe: 6 months at the University of Göttingen, Germany, and 4 months at the Laboratory for Chemistry, Catalysis, Polymers and Processes at CPE (Lyon, France) under a funded CNRS Visiting Researcher Program.

Received 2006 Queen's Chancellor's Award, recognizing researchers who have demonstrated research excellence and exceptional potential.

Senior Research Engineer, Central Research and Development, E. I. du Pont de Nemours and Co., Inc. (Experimental Station, Wilmington, Delaware USA 1991- 1997, European Technical Center, Geneva, Switzerland, 1997-2000)

Engaged in polymer reaction engineering research to support existing businesses and aid the development of new processes. Established a research program utilizing pulsed-laser techniques to measure radical polymerization rate coefficients. Modeled and measured kinetics for radical and condensation polymerizations resulting in significant improvements to two major processes. Served as liaison with several academic research programs, as gatekeeper for related commercial software packages, and as internal champion for polymer reaction engineering activities.

Education**Doctorate in Chemical Engineering, University of Wisconsin-Madison, USA, 1990**

“Modeling of Particle Growth in Heterogeneous Catalyzed Olefin Polymerization” under Professor W. Harmon Ray. Awarded NSERC 1967 Scholarship (1985-89).

Bachelor of Engineering in Chemical Engineering, McMaster University (Hamilton, Ontario), 1985

Graduated Summa Cum Laude. Awarded Society of Chemical Industry Merit Award, and the CSChE Medal for the top graduating student in the class.

Highly Qualified Personnel Training

The Hutchinson group currently consists of 2 PDFs, 2 PhD and 4 MSc students, with an additional 16 PhD and 16 MSc students that have graduated since he joined Queen’s University in 2000. As well as learning specialized experimental techniques to characterize polymer structure and to study polymerization kinetics, the graduate students gain a firm grounding in reaction engineering and the methods used to model polymerization systems. Most embark on related technical careers. Hutchinson continues to maintain contact and to mentor his students after graduation; while on sabbatical in 2013-14 he visited three former group members in China, one in Peru, and one in Zimbabwe. With several other students pursuing careers in Europe and many in North America, his academic family tree has spread around the world.

Whenever possible, Hutchinson pursues opportunities for the researchers in his group to directly interact with industrial and academic colleagues. Many of the graduate students present results of their work to industrial researchers at sponsoring companies through regularly scheduled teleconference and web meetings. In addition, the students are often provided the opportunity to spend time at industrial or academic institutions abroad (United States, Singapore, Germany, Italy, Slovakia, Belgium) in order to enhance their educational experience and gain a new perspective on their research; they also interact with international researchers (from Mexico, Belgium, Italy, Germany) who have spent time in the Hutchinson laboratory at Queen’s. He also ensures that sufficient project funding is available for the students to present their research at important international conferences where they get a chance to meet and interact with PIs and students from other leading research groups. All of his graduate students attend at least one conference.

Over 30 undergraduate students have been involved with the Hutchinson research program since 2010, either in the summer or conducting research for their independent 4th year thesis project. These students also gain exposure to a research environment, learn about polymerization chemistry and reaction engineering, and become trained in specialized polymer characterization techniques. In a number of cases, the results from these projects are included in an undergraduate-coauthored publication, and many of the students have gone on to graduate studies under his encouragement. The primary responsibility of guiding these projects is delegated to the graduate students in the group, thus providing them an opportunity to gain experience in a supervisory role.

Doctorate [16 total graduated, 10 since 2012]

2018/9 – Co-Supervisor	Derek Russell (In Progress)
2017/9 –	Maryam Agboluaje (In Progress)
2017/1 – 2020/5	Amin Nasresfahani Present Position: PDF, Queen’s University
2015/5 – 2020/1	Ikenna Ezenwajiaku Present Position: PDF, Queen’s University
2015/9 – 2018/9	Mingmin Zhang Present Position: PDF, Queen’s University

2013/1 – 2017/5	Jan Schier Present Position: Research Scientist, Axalta Coating Systems (Wuppertal, Germany)
2012/9 – 2017/4	Thomas Rooney Present Position: Research Engineer, BASF (Ludwigshafen, Germany)
2011/9 – 2016/4	Weiwei Yang Present Position: Assistant Professor, School of Textile and Clothing, Nantong University (China)
2010/9 – 2015/8	Calista Preusser Present Position: Pilot Plant Engineer, BASF (Wyandotte, MI USA)
2010/9 – 2015/9 Co-Supervisor	Kevin Payne Present Position: Research Engineer, BASF (Wyandotte, MI USA)
2009/1 – 2013/1	Kun Liang Present Position: Global Technical & Marketing Manager, Toray Plastics (Front Royal, VA USA)
2006/5 – 2012/5 Co-Supervisor	Nicky Chan Present Position: Research Engineer, Saint-Gobain Research (Northboro, MA USA)

Master's Thesis [16 total graduated, 8 since 2012]

2020/9 –	Elizabeth Bygott (in progress)
2020/5 –	Gagandeep Kaur (in progress)
2020/1 –	Ibrahim Refai (in progress)
2020/1 –	Morgan Cooze (in progress)
2018/9 – 2020/5	Kyle Lister
2017/9 – 2019/4	Niloofer Shirali zadeh Present Position: Analytical Chemist, Toronto Research Chemicals Inc (Toronto, ON)
2016/9 – 2019/1	Loretta Idowu Present Position: Research Engineer, Axalta Coating Systems (Cornwall, ON)
2016/9 – 2018/4	Georges Younes Present Position: PhD Student, McGill University (Montreal QC)
2015/9 – 2017/8	Sharmaine Luk Present Position: PhD Student, McGill University (Montreal, QC)
2013/9 – 2015/8 Co-Supervisor	Mingmin Zhang Present Position: Post-Doctoral Fellow, Queen's University (Kingston, ON)
2013/9 – 2015/11	Otlaatla Monyatsi Present Position: Project Leader, Kingston Process Metallurgy (Kingston, ON)
2012/9 – 2014/9	Mohammad Ali Parsa Present Position: QA Automation Engineer, Proofpoint (Toronto, ON)

Publications

Over 150 refereed journal and conference proceedings (half published since 2012) have garnered more than 6000 citations; a number of these are invited contributions. Most of the studies focused on measurement of polymerization kinetics are published in well-regarded polymer journals such as the ACS journal *Macromolecules*, the RSC journals *Polym. Chem.* and *React. Chem. Eng.*, and the Wiley-VCH family of journals that include *Macromol. Rapid Commun.* and *Macromol. Chem. Phys.* The more engineering-focused modeling studies have appeared in well-regarded journals such as *Ind. Eng. Chem. Res.*, *AIChE J.*, *Chem. Eng. J.*, and *Macromol. React. Eng.* An asterisk indicates the corresponding author(s) of the publications; students under Hutchinson's supervision are listed in bold type.

Refereed Contributions [143 total, 69 since 2012]

- R143** Heidarzadeh, N., E. G. Bygott, R. A. HUTCHINSON*, "Exploiting Addition-Fragmentation Reactions to Produce Low Dispersity Poly(isobornyl Acrylate) and Blocky Copolymers by Semi-Batch Radical Polymerization", *Macromol. Rapid Commun.*, submitted (2020).
- R142** Nasresfahani, A., R. A. HUTCHINSON*, "A Deterministic Approach to Estimate Functionality of Chains Produced by Radical Copolymerization in the Presence of Secondary Reactions", *Macromolecules*, under revision (2020).
- R141** Ezenwajaku, E. H., R. Zigelstein, A. Chovancová, I. Lacič, R. A. HUTCHINSON*, "Experimental and Modeling Investigation of Aqueous-Phase Radical Copolymerization of 2-(Methacryloyloxyethyl)trimethylammonium Chloride with Acrylic Acid", *Ind. Eng. Chem. Res.* **59**, 3359–3374 (2020).
- R140** Heidarzadeh, N., R. A. HUTCHINSON*, "Maximizing Macromonomer Content Produced by Starved-Feed High Temperature Acrylate/Methacrylate Semi-Batch Polymerization", *Polym. Chem.* **11**, 2137–2146 (2020).

- R139** Russell, D. A., L. Meunier*, R. A. HUTCHINSON*, "Characterization of Degradation Products from a Hydrolytically Degradable Cationic Flocculant", *Polym. Degrad. Stab.* **174**, 109097 (2020).
- R138** Ezenwajiaku, E. H., A. Chovancová, K. C. Lister, I. Lacík, R. A. HUTCHINSON*, "Experimental and Modeling Investigation of Radical Homopolymerization of 2-(Methacryloyloxyethyl) Trimethylammonium Chloride in Aqueous Solution", *Macromol. React. Eng.* **14**, 1900033 (2020).
- R137** Shirali Zadeh, N., M. J. Cooze, N. R. Barr, R. A. HUTCHINSON*, "An Efficient Process for the Cu(0)-Mediated Synthesis and Subsequent Chain Extension of Poly(methyl acrylate) Macroinitiator", *React. Chem. Eng.* **4**, 2000-2010 (2019).
- R136** Nasresfahani, A., L. A. Idowu, R. A. HUTCHINSON*, "Extractable Content of Functional Acrylic Resins Produced by Radical Copolymerization: A Comparison of Experiment and Stochastic Simulation", *Chem. Eng. J.* **378**, 122087 (2019).
- R135** Van Steenberge, P.*, R. A. HUTCHINSON*, "Design of HEMA-functional Macromonomer Dispersants by Semi-batch Cobalt Chain Transfer Polymerization", *AIChE J.* **65**, e16723 (2019).
- R134** HUTCHINSON, R. A.*, S. Beuermann, "Critically Evaluated Propagation Rate Coefficients for Radical Polymerization: Acrylates and Vinyl Acetate (IUPAC Technical Report)", *Pure Appl. Chem.* **91**, 1883–1888 (2019).
- R133** Idowu, L. A., R. A. HUTCHINSON*, "Solvent Effects on Radical Copolymerization Kinetics of 2-Hydroxyethyl Methacrylate and Butyl Methacrylate", *Polymers* **11**, 487 (2019).
- R132** Zhang, M., R. A. HUTCHINSON*, "Modeling the Synthesis of Butyl Methacrylate Macromonomer by Sequential ATRP-CCTP", *Macromol. React. Eng.* **13**, 1800062 (2019).
- R131** Nikitin, A. N.,* I. Lacík, R. A. HUTCHINSON*, M. Buback, G. T. Russell, "Detection of PLP Structure for Accurate Determination of Propagation Rate Coefficients over an Enhanced Range of PLP-SEC Conditions", *Macromolecules* **52**, 55-71 (2019).
- R130** Zhang, M., R. A. HUTCHINSON*, "Synthesis and Utilization of Low Dispersity Acrylic Macromonomer as Dispersant for Nonaqueous Dispersion Polymerization", *Macromolecules* **51**, 6267-6275 (2018).
- R129** Younes, G. R., A. R. Proper, T. R. Rooney, R. A. HUTCHINSON*, S. B. Gumfekar, J. B. P. Soares, "Structure Modifications of Hydrolytically-Degradable Polymer Flocculant for Improved Water Recovery from Mature Fine Tailings", *Ind. Eng. Chem. Res.* **57**, 10809-10822 (2018).
- R128** Nasresfahani, A., R. A. HUTCHINSON*, "Modeling the Distribution of Functional Groups in Semibatch Radical Copolymerization: An Accelerated Stochastic Approach", *Ind. Eng. Chem. Res.* **57**, 9407-9419 (2018).
- R127** Zhang, M., R. A. HUTCHINSON*, "Design of Acrylic Dispersants for Nonaqueous Dispersion Polymerization: The Importance of Thermodynamics", *Macromol. React. Eng.* **12**, 1800025 (2018).
- R126** Schier, J. E. S., M. Zhang, M. C. Grady, R. A. HUTCHINSON*, "Modeling of Semi-batch Solution Radical Copolymerization of Butyl Methacrylate and 2-Hydroxyethyl Acrylate", *Macromol. React. Eng.* **12**, 1800008 (2018).
- R125** Rooney, T. R.*, R. A. HUTCHINSON*, "Monomer Structure and Solvent Effects on Copolymer Composition in (Meth)acrylate Radical Copolymerization", *Ind. Eng. Chem. Res.* **57**, 5215-5227 (2018) [invited contribution].
- R124** Gumfekar, S. P., T. R. Rooney, R. A. HUTCHINSON*, J. B. P. Soares*, "Dewatering Oil Sands Tailings with Degradable Polymer Flocculants", *ACS Appl. Mater. Interfaces* **9**, 36290-36300 (2017).
- R123** Luk, S. B., R. A. HUTCHINSON*, "Radical Copolymerization Kinetics of Bio-Renewable Butyrolactone Monomer in Aqueous Solution", *Processes* **5**, 55 (2017) [invited contribution, featured on issue cover].
- R122** Rooney, T. R., A. Chovancová, I. Lacík*, R. A. HUTCHINSON*, "Pulsed Laser Studies of Cationic Reactive Surfactant Propagation Kinetics", *Polymer* **130**, 39-49 (2017).
- R121** Schier, J. E. S., D. Cohen-Sacal, O. R. Larsen, R. A. HUTCHINSON*, "The Effect of Hydrogen Bonding on Radical Semi-Batch Copolymerization of Butyl Acrylate and 2-Hydroxyethyl Acrylate", *Polymers* **9**, 368-382 (2017) [invited contribution].
- R120** Luk, S. B., J. Kollár, A. Chovancová, M. Mrlík, I. Lacík, J. Mosnáček*, R. A. HUTCHINSON*, "Superabsorbent Hydrogels made from Bio-sourced Butyrolactone Monomer in Aqueous Solution", *Polym. Chem.* **8**, 1943-1952 (2017) [featured on issue cover].
- R119** Rooney, T. R., D. Moscatelli, R. A. HUTCHINSON*, "Polylactic Acid Macromonomer Radical Propagation Kinetics and Degradation Behaviour", *React. Chem. Eng.* **2**, 487-497, 2017 [invited contribution].
- R118** Brandl, F., M. Drache, J. E. S. Schier, T. Nentwig, D. Contreras-López, E. Saldívar-Guerra, R. A. HUTCHINSON*, S. Beuermann*, "Propagation Kinetics of Isoprene – Glycidyl Methacrylate Copolymerizations Investigated via PLP-SEC", *Macromol. Rapid Commun.* **38**, 10.1002/marc.201700105, (2017).
- R117** Schier, J. E. S., D. Cohen-Sacal, R. A. HUTCHINSON*, "Hydrogen Bonding in Radical Copolymerization of Acrylates and Methacrylates: A Comparison of Hydroxy- and Methoxy- Functionality", *Polym. Chem.* **8**, 6039-6049 (2017).
- R116** Yang, W., R. A. HUTCHINSON*, "The Influence of Adding Functionality to Dispersant and Particle Core Compositions in Non-Aqueous Dispersion Polymerization", *React. Funct. Polym.* **114**, 31-37 (2017).
- R115** Rooney, T. R., O. Monyatsi, R. A. HUTCHINSON*, "Polyester Macromonomer Syntheses and Radical Copolymerization Kinetics with Styrene", *Macromolecules* **50**, 784-795 (2017).
- R114** Barner-Kowollik, C., S. Beuermann, M. Buback, R. A. HUTCHINSON*, T. Junkers, H. Kattner, B. Manders, A. N. Nikitin, G. T. Russell, A. M. van Herk, "Critically Evaluated Rate Coefficients in Radical Polymerization – 8. Propagation Rate Coefficients for Vinyl Acetate in Bulk", *Macromol. Chem. Phys.* **218**, 1600357 (2017).
- R113** Preusser, C., R. A. HUTCHINSON*, "Measuring and Modeling the Peculiarities of Aqueous-Phase Radical Polymerization", *Can. J. Chem. Eng.* **94**, 2045-2051 (2016) [invited contribution].

- R112** Nikitin, A. N.*, I. Lacić, R. A. HUTCHINSON, "A 3D Simulation Investigation of the Influence of Temperature Increases on the Accuracy of Propagation Rate Coefficients Determined by Pulsed-Laser Polymerization", *Macromolecules* **49**, 9320-9335 (2016).
- R111** Preusser, C., I. H. Ezenwajiaku, R. A. HUTCHINSON*, "The Combined Influence of Monomer Concentration and Ionization on Acrylamide/Acrylic Acid Composition in Aqueous Solution Radical Batch Copolymerization", *Macromolecules* **49**, 4746-4756 (2016).
- R110** Schier, J. E. S., R. A. HUTCHINSON*, "The influence of hydrogen bonding on radical chain-growth parameters for butyl methacrylate/2-hydroxyethyl acrylate solution copolymerization", *Polym. Chem.* **7**, 4567-4574 (2016).
- R109** Preusser C., A. Chornocová, I. Lacić, R. A. HUTCHINSON*, "Modeling The Radical Batch Polymerization of Acrylamide in Aqueous Solution", *Macromol. React. Eng.* **10**, 490-501 (2016).
- R108** Rooney, T. R., S. P. Gumfekar, J. B. P. Soares, R. A. HUTCHINSON*, "Cationic Hydrolytically Degradable Flocculants with Enhanced Water Recovery for Oil Sands Tailings Remediation", *Macromol. Mat. Eng.* **301**, 1248-1254 (2016).
- R107** Lacić, I.*, A. Chornocová, L. Uhelská, C. Preusser, R. A. HUTCHINSON, M. Buback, "PLP-SEC Studies into the Propagation Rate Coefficient of Acrylamide Radical Polymerization in Aqueous Solution", *Macromolecules* **49**, 3244-3253 (2016).
- R106** Monyatsi, O., R. A. HUTCHINSON*, "Vinyl Pivalate Propagation Kinetics in Radical Polymerization", *Macromol. Chem. Phys.* **217**, 51-58 (2016).
- R105** Zapata-González I., R. A. HUTCHINSON, K. A. Payne, E. Saldívar-Guerra*, "Mathematical modeling of the full molecular weight distribution in ATRP techniques", *AIChE J.* **62**, 2762-2777 (2016).
- R104** Wittenberg, N. F. G., C. Preusser, H. Kattner, M. Stach, I. Lacić, R. A. HUTCHINSON*, M. Buback*, "Modeling Acrylic Acid Radical Polymerization in Aqueous Solution", *Macromol. React. Eng.* **10**, 95-107 (2016).
- R103** Payne K. A., J. Debling, P. Nesvadba, M. F. Cunningham R. A. HUTCHINSON*, "NMP of styrene in batch and CSTR at elevated temperatures: Modeling experimental trends", *Eur. Polym. J.* **80**, 186-199 (2016) [invited contribution].
- R102** Yang W., R. A. HUTCHINSON*, "Investigating the Effectiveness of Reactive Dispersants in Non-Aqueous Dispersion Polymerization", *Macromol. React. Eng.* **10**, 61-71 (2016) [invited contribution].
- R101** Zhang M., M. F. Cunningham, R. A. HUTCHINSON*, "Aqueous Copper(0) Mediated Reversible Deactivation Radical Polymerization of 2-Hydroxyethyl Acrylate", *Polym. Chem.* **6**, 6509-6518 (2015).
- R100** Payne K. A., P. Nesvadba, J. Debling, M. F. Cunningham, R. A. HUTCHINSON*, "Nitroxide-Mediated Polymerization at Elevated Temperatures," *ACS Polym. Lett.* **2015**, *4*, 280-283 (2015).
- R99** Rooney T. R., E. Mavroudakis, I. Lacić, R. A. HUTCHINSON*, D. Moscatelli*, "Pulsed Laser and Quantum Mechanics Study of n-Butyl Cyanoacrylate and Methyl Methacrylate Free-Radical Copolymerization", *Polym. Chem.* **6**, 1594-1603 (2015).
- R98** Monyatsi, O., A. N. Nikitin*, R. A. HUTCHINSON*, "Effect of Head-to-Head Addition on Vinyl Acetate Propagation Kinetics in Radical Polymerization", *Macromolecules* **47**, 8145-8153 (2014).
- R97** Uhelská, L., D. Chorvát, R. A. HUTCHINSON*, S. Santanakrishnan, M. Buback, I. Lacić*, "Radical Propagation Kinetics of N-Vinylpyrrolidone in Organic Solvents Studied by Pulsed-Laser Polymerization– Size-Exclusion Chromatography (PLP–SEC)", *Macromol. Chem. Phys.* **215**, 2327-2336 (2014).
- R96** Hamzehlou, S., Y. Reyes, R. A. HUTCHINSON, J. R. Leiza*, "Copolymerization of n-Butyl Acrylate and Styrene: Terminal vs Penultimate Model", *Macromol. Chem. Phys.* **215**, 1668-1678 (2014).
- R95** Parsa, M. A., I. Kozhan, M. Wulkow, R. A. HUTCHINSON*, "Modeling of Functional Group Distribution in Copolymerization: A Comparison of Deterministic and Stochastic Approaches", *Macromol. Theory Simul.* **23**, 207-214 (2014) [invited contribution].
- R94** Liang, K., T. R. Rooney, R. A. HUTCHINSON*, "Solvent Effects on Kinetics of 2-Hydroxyethyl Methacrylate Semibatch Radical Copolymerization", *Ind. Eng. Chem. Res.* **53**, 7296-7304 (2014) [invited contribution].
- R93** Zapata-González, I., R. A. HUTCHINSON, K. Matyjaszewski, E. Saldívar-Guerra*, J. Ortiz-Cisneros, "Copolymer Composition Deviations from Mayo-Lewis Conventional Free Radical Behavior in Nitroxide Mediated Copolymerization", *Macromol. Theory Simul.* **23**, 245-265 (2014) [featured on issue cover page].
- R92** Payne, K. A., P. H. M. Van Steenberge, D. R. D'hooge, M.-F. Reyniers, G. B. Marin, R. A. HUTCHINSON*, M. F. Cunningham*, "Controlled synthesis of poly(BMA-co-BA) via ARGET ATRP: Insights and Improvement", *Polym. Int.* **63**, 848-857 (2014) [invited contribution].
- R91** Barner-Kowollik*, C., S. Beuermann, M. Buback, P. Castignolles, B. Charleux, M. L. Coote, R. A. HUTCHINSON, T. Junkers*, I. Lacić, G. T. Russell, M. Stach, A. M. van Herk, "Critically Evaluated Rate Coefficients in Radical Polymerization - 7. Secondary-Radical Propagation Rate Coefficients for Methyl Acrylate in Bulk" *Polym. Chem.* **5**, 204-212 (2014).
- R90** Nikitin, A.N.*, R. A. HUTCHINSON, P. Hesse, "Determination of the Mode of Radical Termination from Pulsed Laser Polymerization Experiments in Presence of Retardation and Chain Transfer to Agent," *Macromol. Chem. Phys.* **214**, 2670-2682 (2013).
- R89** Chan, N., J. Meuldijk, M. F. Cunningham*, R. A. HUTCHINSON*, "Continuous ARGET ATRP of Methyl Methacrylate and Butyl Acrylate in a Stirred Tank Reactor", *Ind. Eng. Chem. Res.* **52**, 11931-11942 (2013).
- R88** Ferrari, R., T. R. Rooney, M. Lupi, P. Ubezio, R. A. HUTCHINSON, D. Moscatelli*, "A Methyl Methacrylate - HEMA-CL_n Copolymerization Investigation: from Kinetics to Bio-Applications", *Macromol. Biosci.* **13**, 1347-1357 (2013).

- R87.** Payne, K. A., D. R. D'hooge, P. H. M. Van Steenberge, M.-F. Reyniers*, M. F. Cunningham, R. A. HUTCHINSON*, G. B. Marin, "ARGET ATRP of Butyl Methacrylate: Utilizing Kinetic Modeling to Understand Experimental Trends", *Macromolecules* **46**, 3828-3840 (2013).
- R86.** Chan, N., M. F. Cunningham*, R. A. HUTCHINSON*, "Copper Mediated Controlled Radical Polymerization in Continuous Flow Processes: Synergy between Polymer Reaction Engineering and Innovative Chemistry", *J. Polym. Sci., Part A: Polym. Chem.* **51**, 3081-3096 (2013) [featured invited contribution].
- R85** Santanakrishnan, S., R. A. HUTCHINSON*, "Free-Radical Polymerization of *N*-Vinylimidazole and Quaternized Vinylimidazole in Aqueous Solution", *Macromol. Chem. Phys.* **214**, 1140-1146 (2013).
- R84** Wittenberg, N. F. G., M. Buback*, R. A. HUTCHINSON, "Kinetics and Modeling of Methacrylic Acid Radical Polymerization in Aqueous Phase", *Macromol. React. Eng.* **7**, 267-276 (2013).
- R83** Lessard, B. H., Y. Guillauneuf, M. Mathew, K. Liang, J.-L. Clement, D. Gigmes, R. A. HUTCHINSON, M. Marić*, "Understanding the Controlled Polymerization of Methyl Methacrylate with Low Concentrations of 9-(4-Vinylbenzyl)-9H-Carbazole Comonomer by Nitroxide Mediated Polymerization: The Pivotal Role of Reactivity Ratios," *Macromolecules* **46**, 805-813 (2013).
- R82** Moraes, R. P., R. A. HUTCHINSON, T. F. L. McKenna*, "Small-Particle High-Solid-Content Bimodal Latexes: Highly Crosslinked Small Particles as Pseudo-Inert Nanofillers," *Macromol. React. Eng.* **7**, 36-53 (2013).
- R81** Nerkar, M., J. A. Ramsay, B. A. Ramsay, M. Kontopoulou, R. A. HUTCHINSON*, "Determination of Mark-Houwink Parameters and Absolute Molecular Weight of Medium-Chain-Length Poly(3-Hydroxyalkanoates)," *J. Polym. Environ.* **21**, 24-29 (2013).
- R80** Mavroudakos, E., K. Liang, D. Moscatelli, R. A. HUTCHINSON*, "A Combined Computational and Experimental Study on the Free Radical Copolymerization of Styrene and Hydroxyethyl Acrylate", *Macromol. Chem. Phys.* **213**, 1706-1713 (2012).
- R79** Santanakrishnan, S., M. Stach, I. Lacík, R. A. HUTCHINSON*, "Aqueous-Phase Copolymerization of *N*-vinylpyrrolidone and *N*-vinylformamide," *Macromol. Chem. Phys.* **213**, 1330-1338 (2012).
- R78** Chan, N., M. F. Cunningham*, R. A. HUTCHINSON*, "Copper Mediated Controlled Radical Polymerization of Methyl Acrylate in the Presence of Ascorbic Acid in a Continuous Tubular Reactor", *Polym. Chem.* **3**, 1322-1333 (2012).
- R77** Smeets, N. M. B., R. A. HUTCHINSON, T. F. McKenna*, "Determination of the Critical Chain Length of Oligomers in Dispersion Polymerization" *ACS Macro Lett.* **1**, 171-174 (2012).
- R76** Chan, N., M. F. Cunningham*, R. A. HUTCHINSON*, "Continuous Controlled Radical Polymerization of Methyl Acrylate with Copper Wire in a CSTR", *Polym. Chem.* **3**, 486-498 (2012).
- R75** Moraes, M., I. Zavecs, P. Lauvernier, N. M. B. Smeets, R. A. HUTCHINSON, T. F. L. McKenna*, "The Effect of Cosurfactants and the Initiator Concentration on the Polymer to Surfactant Concentration in Nanolatex", *J. Polym. Sci. Part A: Polym. Chem.*, **50**, 944-956 (2012).

Refereed Conference Proceedings [14 total, 3 since 2012]

- RC14** Preusser, C., R. A. HUTCHINSON*, "An in-situ NMR study of Radical Copolymerization Kinetics of Acrylamide and Non-Ionized Acrylic Acid in Aqueous Solution", *Macromol. Symp.* **333**, 122-137 (2013).
- RC13** Liang, K., R. A. HUTCHINSON*, "Solvent Effects in Semibatch Free Radical Copolymerization of 2-Hydroxyethyl Methacrylate and Styrene at High Temperatures", *Macromol. Symp.* **325-326**, 203-212 (2013).
- RC12** Payne, K. A., M. F. Cunningham*, R. A. HUTCHINSON*, "ARGET ATRP of BMA and BA: Exploring Limitations at Low Copper Levels", *ACS Symp. Ser.* **1100**, 183-202, (2012).

Presentations (since 2013)

The International Chemical Congress of Pacific Basin Societies (PACIFICHEM), Honolulu HI USA (Dec 2020).

70th Canadian Chemical Engineering Conference, Ottawa, Ontario (Oct 2020). **Invited lecture.**

ACS Fall 2020 National Meeting, San Francisco, CA USA (Aug 2020). **Invited lecture.**

2020 IUPAC World Polymer Congress, Jeju Island, Korea (Jul 2020 – postponed).

New Frontiers in Advanced Polymer Manufacturing, Poros Island, Greece (Jun 2020 – postponed). **Invited lecture.**

ACS Spring 2020 National Meeting, (Philadelphia, PA USA) (Mar 2020 – cancelled). **Invited lecture.**

AICHE Annual Meeting, Orlando, FL USA (Nov 2019).

AICHE Annual Meeting, Orlando, FL USA (Nov 2019). **Invited lecture.**

13th International Workshop on Polymer Reaction Engineering, Hamburg, Germany (June 2019). **Invited Keynote lecture.**

DSM Coatings Research, Waalijk, Netherlands (Aug 2018).

2018 IUPAC World Polymer Congress, Cairns, Australia (Jul 2018).

Polymer Reaction Engineering X (PRE 10), Punta Cana, Dominican Republic (May 2018). **Invited lecture.**

MACROMEX 2017 4th US-Mexico Symposium on Polymer Science, Los Cabos, Mexico (Dec 2017). **Invited Plenary lecture.**

67th Canadian Chemical Engineering Conference, Edmonton, Alberta (Oct 2017).

IUPAC 2017 46th World Chemistry Congress, São Paulo, Brazil (Jul 2017).

Institute for Chemical Technology of Organic Materials, Johannes Kepler University, Linz, Austria (June 2017).

Hangzhou International Polymer Forum, Hangzhou, China (May 2017). **Invited lecture.**

Coatings Innovation Center, Allison Park, PA USA (Feb 2017).

1st Canadian Nitroxide Mediated Polymerization Symposium, Ottawa, Ontario (Feb 2017). **Invited lecture.**

ISCRE 24: Foundations and Vistas of Chemical Reaction Engineering, Minneapolis, US (Jul 2016).

Polymer Institute of the Slovak Academy of Sciences, Bratislava, Slovakia (May 2016).

Technical University of Clausthal, Clausthal, Germany (May 2016).

65th Canadian Chemical Engineering Conference, Calgary, Alberta (Oct 2015).

Faculty of Engineering, Laurentian University, Sudbury, Ontario (Sep 2015).

UNESCO/IUPAC Workshop and Conference on Macromolecules and Materials, Port Elizabeth, South Africa (Sept 2015).

Saint-Gobain R&D Center, Northboro, MA, USA (Jul 2015).

3rd US-Mexico Symposium on Advances in Polymer Science, Nuevo Vallarta, Mexico (Dec 2014). **Invited lecture.**

7th Symposium on Controlled/Living Radical Polymerization (CRP), 2014 ACS National Meeting, San Francisco, United States (Aug 2014). **Invited lecture.**

Dalian Clean Energy National Laboratory, Dalian, China (Jul 2014).

Axalta Coating Systems Research Center, Shanghai, China (Jul 2014).

2014 IUPAC World Polymer Congress, Chiang Mai, Thailand (Jul 2014).

IUPAC World Polymer Congress, Chiang Mai, Thailand (Jul 2014).

Bratislava Young Polymer Scientists Workshop, Zazriva, Slovakia (Jun 2014). **Invited Keynote lecture.**

Polymer Institute of the Slovak Academy of Sciences, Bratislava, Slovakia (Apr 2014).

Politecnico di Milano, Milan, Italy (Feb 2014).

Institute of Physical Chemistry, Göttingen University, Göttingen, Germany (Nov 2013).

Department of Engineering and Macromolecular Architecture, Montpellier University, Montpellier, France (Nov 2013).

POLYMAT, University of the Basque Country, San Sebastián, Spain (Nov 2013).

BASF Competence Center Advanced Materials and Systems Research, Ludwigshafen, Germany (Sep 2013).

9th World Congress of Chemical Engineering, Seoul, Korea (Aug 2013). **Invited lecture.**

Research Funding (since 2012)

Source	Start Date	Duration	Role	Project Title	Total \$
CURRENT					
NSERC Discovery Grant	Apr 2020	5 years	PI	Measurement and Modeling of Polymerization Kinetics for Process and Product Development (\$55,000/yr)	265,000
Mitacs (with PnuVax)	Jun 2019	2 year	PI	Investigating polysaccharide-protein conjugation: characterization and effects of glycation conditions	141,800
BASF	Jun 2019	3 years	PI	Kinetic coefficients and models for polymerization processes: co- and terpolymerization studies in water, alcohols and their mixtures (120,000 Euro)	180,000
Axalta Coating Systems	Feb 2019	2.5 year	PI	Unrestricted grant for research in Polymer Reaction Engineering (\$150,000 USD)	200,000
Nippon Paint (China) Ltd.	Jan 2018	3.5 years	PI	Cu-Catalyzed Routes for Macromonomer Development (\$210,000 USD)	280,000
COMPLETED (SINCE 2012)					
NSERC Discovery Grant	Apr 2015	5 years	PI	Radical Polymerization Kinetics and Processes (\$58,000/yr)	290,000
Saint-Gobain Ceramics and Plastics	Sep 2018	1 year	PI	Synthesis of Acrylic Macromonomers via High Temperature Free Radical Polymerization	117,600
BASF	Oct 2015	3 years	PI	Polymerization Kinetics of Water-soluble systems (105,000 Euro)	150,000
Axalta Coating Systems	Jan 2016	3 years	PI	Non-Aqueous Dispersion Polymerization for Automotive Coatings (\$120,000 USD)	160,000
Axalta Coating Systems	Feb 2017	2 years	PI	Unrestricted grant for research in Polymer Reaction Engineering (\$110,000 USD)	150,000
NSERC RTI	Apr 2017	1 year	CI	MW Analysis of Water Soluble Polymers	150,000
NSERC CRD	Oct 2014	2 years	PI	Measurement and modeling of vinyl acetate polymerization kinetics (matching funds proposal)	29,000
DuQuIP	Feb 2014	2 years	PI	Free-Radical Polymerization Kinetics studied by Pulsed-Laser Polymerization	25,000
Axalta Coating Systems	Feb 2014	3 years	PI	Unrestricted grant for research in Polymer Reaction Engineering	150,000
BASF	Feb 2013	2 years	PI	High Temperature Controlled Radical Polymerization	88,000
DuPont Coatings	Feb 2013	1 year	PI	Unrestricted grant for research in Polymer Reaction Engineering.	40,000
NSERC CRD	Feb 2013	3 years	PI	Particle Nucleation in Non-Aqueous Dispersions: Solventborne Particles (matching funds proposal)	60,000
DuQuIP	Jan 2013	3 years	PI	Particle Nucleation in Non-Aqueous Dispersions: Solventborne Particles for Automotive Coatings	50,000
BASF	Apr 2012	3 years	PI	Free-Radical Polymerization Kinetics of Water-soluble Monomers (90,000 Euro)	117,000
NSERC RTI	Apr 2012	1 year	PI	500 Hz Laser for Investigations of Free-Radical Polymerization Kinetics	68,250

Service to Chemistry and Chemical Engineering Community

Polymer Reaction Engineering Conferences. Triennial conferences which are the major North American conference on emerging technologies and scientific advancements in polymer reaction engineering. Major roles include invited speaker (1994, 2000, 2018), organizer (Finance co-chair in 2003, Conference chair in 2006, Session Chairs in 1997 and 2015), and member of the Advisory Committee (since 2009).

International Workshop on Polymer Reaction Engineering. Triennial conferences sponsored by DECHEMA are the European counterpart to the North American conferences (similar in size and scope). Keynote lectures (1995, 2019), and member of the International Scientific Committee (one of three from North America) since 2001.

67th Canadian Chemical Engineering Conference (Edmonton AB, Oct 2017). Organized (with João Soares and Jeffrey Brinen) a two day symposium held to honour the pioneering work of Professor Archie Hamielec, Professor Harmon Ray, and Dr. Charlie Cozewith in the area of Polymer Reaction Engineering. Session featured 30 speakers (many international) from both industry and academia. Co-edited issue of *Macromol. React. Eng.* (2018) featuring contributions arising from the symposium.

PACIFICHEM (The International Chemical Congress of Pacific Basin Societies). Principal organizer of symposium "Polymerization Kinetics and Mechanisms: The Pathway to Improved Products and Processes", to be held in Honolulu HI USA in Dec 2020. Also organized a similar symposium for PACIFICHEM 2015.

IUPAC Macro 2022 (Winnipeg, Jul 2022). Program co-chair. Organizing technical tracks for one week meeting with ~1000 expected attendees.

Other External Service

- 25-40 reviews per year for leading polymer science and engineering journals.
- 1993-present: Appointed (July 2012) as co-chair of the IUPAC Working Party on *Modeling of Kinetics and Processes of Polymerization*; vice-chair 2005-12; task group chair 2002-04 and 2013-current.
- Titular Member (2017-present) and Associate Member (2013-2016) of IUPAC Polymer Division.
- 2006-present: Editorial Board of *Macromolecular Reaction Engineering* (Wiley-VCH).
- Editor of *Macromolecular Symposia Issue 243* (2007) containing 27 manuscripts submitted from the PRE VI conference (Halifax, May 2006).
- 2004-2006: Served on provincial adjudication panel for Ontario Council of Graduate Studies PhD scholarships awards. Also served on 2015-2016 NSERC RTI adjudication panel.

Service at Queen's University

Associate Department Head (Jul 2018 to present; Jul 2011 to Jun 2013). Duties include organizing teaching and TA assignments, coordinating Adjunct hiring, chairing the Departmental Curriculum committee, and planning for remote delivery of the undergraduate program for fall 2020. Serve as departmental representative on the Faculty *Dean's Curriculum Review Committee*, and led the efforts to develop Learning Outcomes for all departmental courses for the transition to the CEAB outcome assessment accreditation process. **Engineering Chemistry Undergraduate Chair** (Jan 2017 to Jun 2018) for the Chemical Engineering Department, responsible for maintaining and improving the Engineering Chemistry (ENCH) undergraduate curriculum. **Transfer and Exchange Coordinator** (Sep 2014 to Dec 2016) for the department, identifying and approving appropriate course substitutes for undergraduate students who go on exchange. Significantly increased participation in exchange and internship programs. Served as **Graduate Chair** (Jan 2002 to Jun 2006), established and ran the departmental seminar series (Sept 2001 to Oct 2005), and was **TA Coordinator** (Jan 2003 to Jun 2006), providing leadership during a time of substantial growth in our graduate student population.

Wrote and coordinated the successful "Advanced Polymeric Materials and Processes" proposal selected in early 2002 for \$2,000,000 funding by CFI and OIT to purchase a range of equipment for polymer synthesis and characterization, as well as to setup a new characterization lab. Led the effort to hire an Instrumentation Manager to aid with the installation and to coordinate operation, student training and maintenance of the characterization and polymerization equipment. Set up and administered a testing account to establish an ongoing flow of funds for operation and maintenance of the equipment.

Serve on thesis committees 5-10 times per year, served as a member of the University Advisory Research Committee Engineering Subcommittee (2001-2003), and served on numerous committees for both the Faculty of Engineering and Applied Science, and the Department of Chemical Engineering.