

CHADRON M. FRIESEN, Ph.D.

EDUCATION:

Ph.D. in Chemistry, May 2000

The University of Alabama, Tuscaloosa, AL, 35487 USA

Dissertation: Perfluoropolyalkylethers (PFPAE): *The Synthesis and Characterization of Lubricant Derivatives for New Industrial Applications and Improvements in Thermal Oxidative Environments.*

Research Advisor: Joseph S. Thrasher, Ph.D.

Major: Analytical; **Minor:** Organic **G.P.A. 3.45/4.00**

Specialty: Organofluorine Chemistry

B.S. Degree in Chemistry, December 1995

B.S.E Degree in Chemistry, December 1995

John Brown University, Siloam Springs, AR, 72761USA

Magnum Cum Laude, G.P.A.: 3.78/4.00

RECOGNITIONS:

- Nominated for the Davis Distinguished Teaching Award (2018)
- Executive Member, American Chemical Society Division of Fluorine Chemistry (2018-2020)
- Past Chair, American Chemical Society Division of Fluorine Chemistry (2014)
- Chaire Total Fondation Balard (2014)
- Chair, American Chemical Society Division of Fluorine Chemistry (2013)
- Vice-Chair/Secretary, American Chemical Society Division of Fluorine Chemistry (December 2009-2012)
- Trinity Western University Research Fellowship (2005)
- The University of Alabama Graduate Council Research Fellowship (1999)

AREA OF RESEARCH:

We would like to thank Halocarbon for their generous donation of starting reagents to support our work on perfluoroalkoxides (PFAs).



Our research focus is in Industrial Fluorine Chemistry. The difference aspects of our work is listed below:

- Anionic ring-opening polymerization of fluorinated and partially fluorinated epoxides and oxetanes
- Mono- and multi-functional perfluoropolyalkylethers (PFPAEs) for use in surfactants, theranostics, fluoropolymer coatings, and fluorous biphasic catalysis
- Formation and the use of perfluoroalkoxides (PFAs) derived from hydrofluoroethers (HFEs)
- Late-stage fluorination of small molecules for both pharmaceutical and fluoropolymer applications
- New transition metal catalysts for polymerization
- Novel fluorinated and partially fluorination polymerization initiators

PEER REVIEWED JOURNALS:

Note: **bolded names** are highly qualified personnel (HQP, trained students in research)

1. **Céline Bonneaud, Julia Burgess, Alessandra Vitale, Giuseppe Trusiano**, Christine Joly-Duhamel, Chadron M. Friesen and Roberta Bongiovanni “New perfluoropolyether maleimides for protection from oxygen inhibition and surface modification of UV-cured polymers.” *Frontiers in Materials*, **2019**, *submitted*
2. **Trevor J. Burgess**, Alessandra Vitale, Christine Joly-Duhamel, Roberta Bongiovanni, Abdelatif Manseri, Taizo Ono, Bruno Améduri and Chadron M. Friesen “Synthesis of poly[oligo(hexafluoropropylene oxide) perfluoroisopropenylether (PIPE)] graft copolymers with vinylidene fluoride (VDF) using CF₃ radicals.” *Polymer Chemistry* **2019**, Accepted manuscript. (DOI: 10.1039/C9PY01453E).
3. **Giuseppe Trusiano**, Alessandra Vitale, **Melania Rizzello, Céline Bonneaud**, Christine Joly-Duhamel, Chadron Friesen, Roberta Bongiovanni “Controlling perfluoropolyalkylether rearrangements at the surface of photocured networks.” *European Polymer Journal* **2019**, *12*, 109285. (DOI: 10.1016/j.eurpolymj.2019.109285).
4. **Josiah Newton, Daniel Driedger**, Matthew B. Nodwell, Paul Schaffer, Rainer E. Martin, Robert Britton, Chadron M. Friesen “A Convenient Synthesis of Difluoroalkyl Ethers from Thionoesters using Silver(I) Fluoride.” *European Journal of Chemistry* **2019**, accepted manuscript (DOI: 10.1002/chem.201904132).
5. **Céline Bonneaud, Julia Burgess**, Roberta Bongiovanni, Christine Joly-Duhamel, and Chadron M. Friesen "Photopolymerization of Maleimide Perfluoropolyalkylethers without a Photoinitiator." *Journal of Polymer Science, Part A: Polymer Chemistry* **2019**, *57*(6), 699-707 (DOI: 10.1002/pola.2931).

6. **Giuseppe Trusiano, Melania Rizzello, Julia Burgess**, Chadron M. Friesen, Christine Joly-Duhamel, Roberta Bongiovanni, Alessandra Vitale “Modification of photocurable epoxides by new perfluoropolyalkylether alcohols for obtaining self-cleaning coatings.” *Progress in Organic Coatings* **2019**, *132*, 257-263 (DOI: 10.1016/j.porgcoat.2019.02.043).
7. **Josiah J. Newton**, Robert Britton, and Chadron M. Friesen “Base-Catalyzed Transesterification of Thionoesters.” *The Journal of Organic Chemistry* **2018** *83* (20), 12784–12792 (DOI: 10.1021/acs.joc.8b02260).
8. **Céline Bonneaud, Mélanie Decostanzi, Julia Burgess, Giuseppe Trusiano, Trevor Burgess**, Roberta Bongiovanni, Christine Joly-Duhamel, and Chadron M. Friesen “Synthesis of α,β -unsaturated esters of perfluoropolyalkylethers (PFPAEs) based on hexafluoropropylene oxide units for photopolymerization.” *RSC Advances*, **2018**, *8*, 32664 – 32671 (DOI: 10.1039/c8ra06354k).
9. **Trevor J. Burgess; Addison D. G Pasiuk**, Benson J. Jelier, and Chadron M. Friesen “Synthetic access to an elusive high-temperature perfluoroisopropenyl ether prepolymer for radical copolymerization.” *Chemical Communications*, **2018**, *54*, 10439 - 10442. (DOI: 10.1039/c8cc05241g).
10. Michael Meanwell, Bharani Shashank Adluri, Zheliang Yuan, **Josiah Newton**, Philippe Prevost, Matthew B. Nodwell, Chadron M. Friesen, Paul Schaffer, Rainer E. Martin, Robert Britton. “Direct heterobenzylic fluorination, difluorination and trifluoromethylthiolation with dibenzenesulfonamide derivatives.” *Chemical Science* **2018**, *9* (25), 5608-5613 (DOI: 10.1039/C8SC01221K).
11. Chadron M. Friesen and Bruno Améduri “Outstanding Telechelic Perfluoropolyalkylethers and Applications Therefrom.” *Progress in Polymer Science* **2018**, *81*, 238-280. (DOI:10.1016/j.progpolymsci.2018.01.005).
12. Chadron M. Friesen and Bruno Améduri “Radical Copolymerization of Vinylidene fluoride (VDF) with Oligo(Hexafluoropropylene oxide) perfluorovinyl Ether Macromonomer to Obtain PVDF-g-oligo(HFPO) Graft Copolymers.” *Macromolecules* **2015**, *48* (19), 7060–7070. (DOI: 10.1021/acs.macromol.5b01199).
13. **Benson J. Jelier**, Jon L. Howell, Daniel B. Leznoff, Craig D. Montgomery, Chadron M. Friesen “A Convenient Route to Tetraalkylammonium Perfluoroalkoxides from Hydrofluoroethers.” *Angewandte Chemie, International Edition* **2015**, *54*(10), 2945-2949 (DOI: 10.1002/anie.201410639).
14. **Jiří Lapčík**, Olinda Gimello, Vincent Ladmiral, Chadron M. Friesen, and Bruno Améduri “A new oligo(hexafluoropropylene oxide)-b-oligo(ethylene oxide) diblock surfactant obtained by radical reactions.” *Polymer Chemistry* **2015**, *6*, 79-96 (DOI: 10.1039/C4PY00965G).
15. Gregory A. Mountain, **Benson J. Jelier**, Christina Bagia, Chadron M. Friesen, and Jelena M. Janjic “Design and formulation of nanoemulsions using 2-(poly(hexafluoropropylene oxide))perfluoropropyl benzene in combination with linear perfluoro(polyethylene glycol dimethyl ether).” *Journal of Fluorine Chemistry*, **2014**, *162*, 38–44 (DOI: 10.1016/j.jfluchem.2014.03.007).
16. Chadron M. Friesen, Craig D. Montgomery, **Sebastian A. J. U. Temple** “The First Fluorous Biphasic Hydrogenation Catalyst Utilizing A Perfluoropolyalkylether: $[\text{RhCl}(\text{PPh}_2(\text{C}_6\text{H}_4\text{C}(\text{O})\text{OCH}_2\text{CF}(\text{CF}_3)(\text{OCF}_2\text{CF}(\text{CF}_3)_n\text{F}))_3]$ with $n= 4-9$.” *Journal of Fluorine Chemistry* **2012**, *144*, 24-32 (DOI: 10.1016/j.jfluchem.2012.09.001).
17. Alexander B.Shtarov, Jon L. Howell, Joseph S. Thrasher, Alfred Waterfeld, Murata Koichi, Chadron M. Friesen, Erik W. Pérez “Synthesis of New Linear Perfluoroalkyl Polyethers

- Starting from Diols and Tetrafluoroethylene.” *Lubrication Science* **2011**, 23, 61-80 (DOI: 10.1002/ls.144).
18. Jon L. Howell, Chadron M. Friesen, **Krista L. Laugesen, Alice E. van der Ende**, “Reactions of Poly(hexafluoropropylene oxide) perfluoroisopropyl ketone with Various Amines.” *Journal of Fluorine Chemistry* **2008**, 129(3), 178-184 (DOI: 10.1016/j.jfluchem.2007.10.006).
 19. Chadron M. Friesen, Jon L. Howell, **Ashley Jamieson, Daryl A. Nyvall** “Understanding the Influence of Hydrocarbon Insulators in Fluorinated Amines: Reactivity of Poly(hexafluoropropylene oxide) Amine Containing Methylene Spacers.” *Journal of Fluorine Chemistry* **2008**, 129(3), 193-203 (DOI: 10.1016/j.jfluchem.2007.10.009).
 20. Jon L. Howell, Chadron M. Friesen, Alexander B. Shtarov, Joseph S. Thrasher, Alfred Waterfeld, Erik W. Pérez, Jonathan F. Sullivan “Improved Thermal Stability of Perfluoropolyalkylethers (PFPAEs).” *Journal of Synthetic Lubrication* **2007**, 24(4), 227-234 (DOI: 10.1002/jsl.42).
 21. Jon L. Howell, Norman Lu, Chadron M. Friesen “New Derivatives of poly-Hexafluoropropylene Oxide from the Corresponding Alcohol.” *Journal of Fluorine Chemistry* **2005**, 126(3), 281-288 (DOI: 10.1016/j.jfluchem.2004.09.020).
 22. Jon L. Howell, Norman Lu, Chadron M. Friesen, Erik W. Perez, Irek Novak, Alfred Waterfeld, Joseph S. Thrasher “The Preparation of Primary Poly-Hexafluoropropylene Oxide Halides (Poly-HFPO-CF₂X where X = I, Br, Cl and F).” *Journal of Fluorine Chemistry* **2004**, 125(10), 1513-1518 (DOI: 10.1016/j.jfluchem.2004.06.002).
 23. Jon. L. Howell, A. B Shtarov, Joseph S. Thrasher, Alfred Waterfeld,; Erik W. Pérez, Chadron M. Friesen, Jonathan F. Sullivan, “Degradation of Hexafluoropropylene Oxide (HFPO) Polymers Containing Various End Groups in the Presence of Aluminum Fluoride.” in *Fluoropolymer 2000: Current Frontiers and Future Trends*; Smith, Jr., D. W., Ed.; EPS, a division of eMedix, Inc.: Hattiesburg, MS, 2001; pp 130-135.
 24. Jon L. Howell, Michael. A. Hofmann, Alfred Waterfeld, Alexey M. Sipyagin, Chadron M. Friesen, Joseph S. Thrasher "Reactions of Perfluoropolyether (PFPE) Acids and Their Corresponding Salts." *Polymer Preprints, American Chemistry Society, Division of Polymer Chemistry* **1998**, 39(2), 822.
 25. Jon L. Howell, Michael. A. Hofmann, Alfred Waterfeld, Alexey M. Sipyagin, Chadron M. Friesen, Joseph S. Thrasher “Reactions of Poly-Hexafluoropropylene Oxide Acids and Their Corresponding Salts.” *Journal of Fluorine Chemistry* **1998**, 89(1), 131-135 (DOI: 10.1016/S0022-1139(98)00099-2).

TECHNICAL REPORTS:

1. Friesen, Chadron M.; Van Dyke, J. D. (Jack). “PART II-B: Study of the Chlorination of Nylon (PA12), Butyl Rubber(CIIR) & Nylon/Butyl Rubber Blends with and without Isocyanuric Acid (ICA) in Aqueous Sodium Hypochlorite.” *Defence R&D Canada – Technical Report DRDC-SUFFIELD-TR-2011*, **2011**.
2. Friesen, Chadron M.; Van Dyke, J. D. (Jack). “Part II-A: Study of the Chlorination of Nylon & Nylon/Butyl Rubber (CIIR) Blends with and without Isocyanuric Acid (ICA) In Hexanes.” *Defence R&D Canada – Technical Report DRDC-SUFFIELD-TR-2011*, **2011**.
3. Friesen, C. M.; Howell, J. L.; Thawley. V. A. *DuPont Technical Report DSCE-JL-2007-3*, **2007**.
4. Friesen, C. M.; Howell, J. L.; Nyvall, **Daryl A.** *DuPont Technical Report DSCE-JL-2007-2*, **2007**.

5. Friesen, C. M.; Howell, J. L. and **Nyvall, Daryl A.** *DuPont Technical Report* DSCE-JL-2006-24, **2006**.
6. Friesen, C. M.; Howell, J. L. and **Nyvall, Daryl A.** *DuPont Technical Report* DSCE-JL-2006-23, **2006**.
7. Friesen, C. M.; Howell, J. L.; **Jamieson A. L.**; and **Nyvall, Daryl A.** *DuPont Technical Report* DSCE-JL-2006-18, **2006**.
8. Lu, N.; Howell, J. L.; Friesen, C. M. *DuPont Technical Report* DC-JL-2003-8, **2003**
9. Friesen, C.M. “A Chemical Perspective of Wood Composites in A Steam Injection Continuous Press.” *Trus Joist, A Weyerhaeuser Business Technical Report* **2002**.
10. Friesen, C. M. “Tricaine Methane Sulfonate (TMS): Improvements in manufacturing quality and quantitative control while minimizing solvent disposal.” *Western Chemical Inc. Technical Report*; WCI-2001-1, **2001**.
11. Friesen, C. M. and Howell, J. L. *DuPont Technical Report*; DCSE-JL-2001-8, **2001**.
12. Friesen, C. M. and Howell, J. L. *DuPont Technical Report*; DCSE-JL-2001-13, **2001**.
13. Friesen, C. M. and Howell, J. L. “Low Molecular Weight Krytox® Oil Fluorination.” *DuPont Technical Report* DCSE-JL-99-09, **1999**.

PATENTS:

1. Chadron Mark Friesen; **Benson Jacob Jelier**, Jon L. Howell “Quarternary ammonium perfluoroalkoxy salts for preparation of perfluoropolyethers.” US Patent 9,725,456 B2, August 8, **2017**.
2. Chadron Mark Friesen; **Benson Jacob Jelier**, Jon L. Howell “Quarternary ammonium perfluoroalkoxy salts for preparation of perfluoropolyethers.” PCT Int. Appl. WO2014110329 A1, July 17, **2014**.
3. J. L. Howell, E. W. Pérez, A. Waterfeld, C. M. Friesen, J. S. Thrasher, “Thermally stable perfluoropolyethers and processes thereof and therewith,” U.S. Patent 7,232,932, June 19, **2007**.
4. Chadron Mark Friesen; **Kevin Anthony Hay, Daryl Nyvall**, Jon L. Howell “Insulated perfluoropolyalkylether (PFPAE) alcohols.” U.S. Pat. Appl. 2006/0287559 A1, December 21, **2006**.
5. Howell, Jon L.; Pérez, Erik W.; Waterfeld, Alfred; Friesen, Chadron Mark; Thrasher, Joseph Stuart; Nowak, Ireneusz. “Perfluoropolyether primary bromides and iodides.” U.S. Pat. 7148385 B2, December 12, **2006**.
6. J. L. Howell, E. W. Pérez, A. Waterfeld, C. M. Friesen, J. S. Thrasher “Perfluoropolyethers and processes therefor and therewith.” EP1632516, March 8, **2006**.
7. Chadron M. Friesen Jon L. Howell, Erik W. Pérez, Joseph S. Thrasher, Alfred Waterfeld. “Thermally Stable Perfluoropolyethers And Processes Therefore and Therewith.” U.S. Pat. 6,753,301 B2, June 22, **2004**.
 - a. Howell, Jon L.; Pérez, Erik William; Waterfeld, Alfred; Friesen, Chadron Mark; Thrasher, Joseph Stuart. “Perfluoro-C_{≥3}-alkyl-terminated perfluoropolyoxyalkylenes and perfluoroolefin-perfluoropolyoxyalkylenes as thermal stabilizers for lubricants.” U.S. Pat. Appl. Publ. (2003), 12 pp.
8. Howell, Jon L.; Pérez, Erik W.; Waterfeld, Alfred; Friesen, Chadron Mark; Thrasher, Joseph Stuart; Nowak, Ireneusz. “Perfluoropolyether primary bromides and iodides.” U.S. Pat. 6,653,511 B2, Nov 25, **2003**.
 - a. Howell, Jon L.; Pérez, Erik William; Waterfeld, Alfred; Friesen, Chadron Mark; Thrasher, Joseph Stuart; Nowark, Ireneusz. Perfluoropolyether primary bromides and

- iodides prepared from reactions of perfluoroether acid fluorides with metal iodide and bromides.” U.S. Pat. Appl. Publ. (2003), 5 pp.
9. Chadron M. Friesen Jon L. Howell, Erik W. Pérez, Joseph S. Thrasher, Alfred Waterfeld. “Thermally Stable Perfluoropolyethers And Processes Therefore and Therewith.” *World Intellectual Property Organization*, WO 0206375/ A2, **2002**.

CONFERENCE AND INVITED PRESENTATIONS:

1. Brooke, Allan*; **Newton, Josiah; Pulfer, Jason**; Britton, Robert A.; Friesen, Chadron M. “A practical synthesis of fluorinated catechol using silver(I) fluoride.” 28th Annual Murdock College Science Research Conference, Vancouver, Washington, November 7-9, 2019 (Awarded 1st Place Prize).
2. Chadron M. Friesen* “Advancements and applications of telechelic perfluoropolyalkyl-ethers.” Southern Illinois University, Carbondale, Illinois, USA, November 1, 2019.
3. Chadron M. Friesen* “The multi-facets of perfluoromethylene oxy (-CF₂O-) architecture, 2nd Edition.” Solvay Corporation, Bollate, Italy and Politecnico di Milano, Italy, October 2, 2019.
4. Chadron M. Friesen* “The multi-facets of perfluoromethylene oxy (-CF₂O-) architecture, 1st Edition.” Clemson University, Clemson, South Carolina, USA, September 19, 2019
5. Céline Bonneaud, Medhi Belqat, Arnaud Spangenberg, Roberta Bongiovanni, Chadron M. Friesen, Christine Joly-Duhamel* “Maleimide monomers: an alternative to the UV formulation based on a radical photoinitiator.” Photopolymerization Fundamentals 2019, Monterey, California, USA, September 15-18, 2019.
6. Chadron M. Friesen*, **Josiah Newton, Daniel Driedger**, Robert Britton, Rainer Martin “Difluoroalkyl Ethers from Thionoesters using Silver(I) Fluorides.” 19th European Symposium on Fluorine Chemistry, Warsaw, Poland, August 25-30, 2019. (Invited Lecturer)
7. **Josiah J. Newton***, **Daniel Driedger**, Matthew Nodwell, Rainer E. Martin, Paul Schafer, Robert A. Britton, Chadron M. Friesen. “**Nucleophilic Fluorination of Thionoesters with Silver(I) Fluoride.**” 102nd Canadian Chemistry Conference and Exhibition Québec City, Québec, Canada, June 3-7, 2019.
8. **Daniel Driedger***, **Josiah J. Newton**, Rainer E. Martin, Robert A. Britton, Chadron M. Friesen. “Oxidative Desulfuration-fluorination of Thionoesters using Silver (I) Fluoride: optimization and demonstration of functional group tolerance.” 24th Winter Fluorine Conference, Clearwater, Florida, USA, January 13-18, 2018.
9. **Josiah J. Newton***, **Daniel Driedger**, Rainer E. Martin, Robert A. Britton, Chadron M. Friesen. “Recent advances in nucleophilic fluorination of thiocarbonyl compounds with silver(I) fluoride.” 24th Winter Fluorine Conference, Clearwater, Florida, USA, January 13-18, 2018.
10. Chadron M. Friesen*, **Josiah Newton, Daniel Driedger, Céline Bonneaud, Addison Pasiuk, Trevor Burgess, Julia Burgess, Giuseppe Trusiano, Melania Rizzello, Alessandra Vitale, Roberta Bongiovanni, Christine Joly-Duhamel.** “Leveraging perfluoromethylene oxy simply.” 24th Winter Fluorine Conference, Clearwater, Florida, USA, January 13-18, 2018 (Invited Lecturer).
11. Driedger, Daniel, **Newton, Josiah. J.** Friesen, Chadron M. “Oxidative Desulfuration-fluorination of Thionoesters using Silver (I) Fluoride.” 27th Annual Murdock College Science Research Conference, Vancouver, Washington, November 8-10, 2018.

12. **Newton, J. J.***, Driedger, D., Martin, R. E., Friesen, C. M., and Britton, R. “Recent Advances in Nucleophilic Fluorination of Thiocarbonyl Compounds with Silver(I) Fluoride.” Graduate Student Poster Competition (Institutional), Simon Fraser University, Burnaby, Canada Fall 2018.
13. Chadron M. Friesen*, **Addison Pasiuk, Josiah Newton, Benson Jelier**. “Hydrofluoroethers and fluorinated alkoxides: how the two are related and leveraged in synthetic strategies.” 22nd International Symposium on Fluorine Chemistry Oxford (United Kingdom) July 22-27, 2018 (Invited Lecturer).
14. **Josiah Newton***, Robert Britton, Chadron M. Friesen, “Base-Catalyzed Transesterification and Oxidative Fluorodesulfuration of Aryl and Heteroaryl Thionoesters.” 22nd International Symposium on Fluorine Chemistry Oxford (United Kingdom) July 22-27, 2018 (Poster)
15. Chadron M. Friesen, **Addison Pasiuk***, **Josiah Newton, Benson Jelier**, Daniel Leznoff. “Preparation of fluorinated alkoxides bearing α -fluorines and other fluorinated alkoxides from hydrofluoroethers.” 22nd International Symposium on Fluorine Chemistry Oxford (United Kingdom) July 22-27, 2018 (Poster, Awarded 2nd Place Prize)
16. Chadron M. Friesen*, **Céline Bonneaud, Addison Pasiuk, Trevor Burgess, Julia Burgess**, Roberta Bongiovanni, Christine Joly-Duhamel. “Advancements and applications of telechelic poly(hexafluoro-propylene oxide).” Fluoropolymer 2018, Denver, Colorado (USA) June 24-27, 2018 (Invited Lecturer).
17. Roberta Bongiovanni*, Giuseppe Trusiano, Alessandra Vitale, Christine Joly-Duhamel, Chadron M. Friesen. “Perfluoropolyether building blocks for photopolymerisation processes.” Fluoropolymer 2018, Denver, Colorado (USA) June 24-27, 2018
18. **Céline Bonneaud***, **Julia Burgess, Trevor Burgess, Addison Pasiuk, Giuseppe Trusiano**, Alessandra Vitale, Chadron M. Friesen, Christine Joly-Duhamel*, Roberta Bongiovanni. “Synthesis and radical photopolymerization of novel maleimide, maleate and vinyl ether perfluoropolyalkylethers.” 17th Polymer and Organic Chemistry Conference, Palava-Les-Flots, France, 3-7 June 2018 (Poster)
19. **Addison Pasiuk***, **Céline Bonneaud, Giuseppe Trusiano**, Alessandra Vitale, Benson J. Jelier, Roberta Bongiovanni, Christine Joly-Duhamel, Chadron M. Friesen. “Synthesis, characterization and optimization of telechelic oligo(hexafluoropropylene oxide) macromonomers from diacyl fluorides and novel initiators.” 17th Polymer and Organic Chemistry Conference, Palava-Les-Flots, France, 3-7 June 2018 (Poster)
20. Chadron M. Friesen* “Progress in telechelic and functional perfluoropolyalkylethers (PFPAEs).” 4 May, 2018, ENSCM, Montpellier (France) (Invited Lecturer)
21. **Céline Bonneaud, Julia Burgess, Trevor Burgess, Addison Pasiuk, Giuseppe Trusiano**, Alessandra Vitale, Chadron M. Friesen, Christine Joly-Duhamel*, Roberta Bongiovanni. “Synthèses de perfluoroalkyléthers maléimides et étude de leur photopolymérisation.” "Groupe Français des Polymères" Conference 2017, 21-24 November, Paris (France)
22. **Josiah Newton, Benson Jelier**, Chadron M. Friesen. “Strategic Synthesis of Difunctional Hydrofluoroethers.” 8th *Banff Symposium on Organic Chemistry (BSOC) Banff*, Alberta, Canada October 27-30, 2017.
23. **Céline Bonneaud***, **Julia Burgess, Trevor Burgess, Addison Pasiuk, Giuseppe Trusiano**, Alessandra Vitale, Chadron M. Friesen, Christine Joly-Duhamel, Roberta Bongiovanni. “Radical photopolymerization of novel perfluoropolyalkylethers (PFPAEs).” Photopolymerization Fundamentals 2017, 17-20 September, Boulder CO (USA).

24. Roberta Bongiovanni*, Alessandra Vitale, Céline Bonneaud, Julia Burgess, Chadron M. Friesen, Christine Joly-Duhamel. “Novel perfluoropolyethers for photopolymerisation processes.” Photopolymerization Fundamentals 2017 , 17-20 September, Boulder CO (USA).
25. **Céline Bonneaud, Julia Burgess**, Chadron M. Friesen, Christine Joly-Duhamel, Roberta Bongiovanni, Alessandra Vitale*. “Novel perfluoropolyethers for photopolymerization processes.” European Polymer Federation Conference 2017 , 2-7 July, Lyon (France).
26. **Céline Bonneaud*, Julia Burgess**, Alessandra Vitale, Christine Joly-Duhamel, Chadron M. Friesen, Roberta Bongiovanni. “Photopolymérisation de nouveaux perfluoropolyakyléthers.” PolyRay Conference 2017 , 20-21 March, Mulhouse (France).
27. **Trevor J. Burgess*, Benson J. Jelier, Addison D. G. Pasiuk**, Chadron M. Friesen. “Synthesis of a Unique Fluoropolymer Material for Light-Cured 3D Printing and Aerospace Surface Protectants.” Thompson Rivers University Annual Undergraduate Research & Innovations Conference, Kamloops, British Columbia, March 31-April 1, 2017
28. **Julia M. Burgess***, Christine Joly-Duhamel, **Céline Bonneaud**, Chadron M. Friesen. “Development of New Light-Cured Fluoropolymers for High Performance Coatings and Aerospace Elastomers.” Thompson Rivers University Annual Undergraduate Research & Innovations Conference, Kamloops, British Columbia, March 31-April 1, 2017
29. **Trevor. J. Burgess, Addison D. G. Pasiuk, Benson J. Jelier** and Chadron M. Friesen ¹ * “Challenges in the successful synthesis of oligo(hexafluoropropylene oxide) perfluoroisopropenyl ether (PIPE)” 23rd Winter Fluorine Conference, Clearwater Beach, Florida, USA January 15-20, 2017.(Invited Lecturer)
30. C. M. Friesen*, **B. J. Jelier, T. J. Burgess, S. J. Boshart, J. M. Burges**, and **J. J. Newton**. “New avenues to form useful mono- and di- functional perfluoropolyalkylethers using anionic ring-opening polymerization methods for fluorinated epoxides or oxetanes.” First South African Fluorine Symposium (SAFS2016), Cape Town, South Africa, February 14-18, 2016.
31. **Mitchell Pfortmueller***, Bruno Ameduri, Vincent Ladmira, **Fraser Parlane**, Chadron M. Friesen “A Path Towards Curing Inoperable Brain Cancers Through MRI Imaging of Fluorine-Tagged Micelles.” 25th Annual Murdock College Science Research Conference, Spokane, Washington, November 4-5, 2016.
32. **Trevor Burgess***, Benson J. Jelier and Chadron M. Friesen “Investigation of Synthetic Methods for the Preparation of Krytox® Perfluoroisopropylene Ether (KPIPE).” 24th Annual Murdock College Science Research Conference, Vancouver, Washington, November 6-7, 2015. (First Place in Organic Division)
33. **Julia Burgess*, Steven Boshart, Benson J. Jelier** and Chadron M. Friesen. “Synthesis of poly(Hexafluoropropylene Oxide) Vinyl Ether from poly(Hexafluoropropylene Oxide) Methylene Alcohol.” 24th Annual Murdock College Science Research Conference, Vancouver, Washington, November 6-7, 2015.
34. **Josiah J. Newton***, Mitchell S. Pfortmueller and Chadron M. Friesen “Synthesis of Difunctional Hydrofluoro Ethers.” 24th Annual Murdock College Science Research Conference, Vancouver, Washington, November 6-7, 2015.
35. **Benson J. Jelier***, Jon L. Howell, Daniel B. Leznoff, Craig D. Montgomery, Chadron M. Friesen, “Towards a More Efficient Anionic Ring-Opening Polymerization of Hexafluoropropylene Oxide.” 21st International Symposium on Fluorine Chemistry & 6th International Symposium on Fluorous Technologies, Como, Italy, August 23-28, 2015.
36. **Jiří Lapčík**, Olinda Gimello, Vincent Ladmira, Chadron Mark Friesen*, and Bruno Ameduri “A new oligo(hexafluoropropylene oxide)-*b*-oligo(ethylene oxide) diblock surfactant

- obtained by radical reactions.” 22nd Winter Fluorine Conference, St. Petersburg, Florida, USA, January 11-16, 2015. (Invited Lecturer)
37. Chadron M. Friesen* and **Benson J. Jelier** “New Methods in Anionic Ring-Opening Polymerization of Fluoro-Epoxides and their Application.” Fluoropolymer 2014, San Diego, USA, October 13-15, 2014. (Invited Lecturer)
 38. **Jiří Lapčík**, Olinda Gimello, Vincent Ladmiral, Chadron Mark Friesen*, and Bruno Ameduri “A new oligo(hexafluoropropylene oxide)-*b*-oligo(ethylene oxide) diblock surfactant obtained by radical reactions.” Fluoropolymer 2014, San Diego, USA, October 13-15, 2014.
 39. Chadron M. Friesen, Craig D. Montgomery, Daniel B. Leznoff, **Benson J. Jelier**, Jon L. Howell “Nonmetal based perfluoroalkoxides: synthesis, properties, and applications.” 248th American Chemical Society National Meeting & Exposition, San Francisco, California, USA, August 11-14, 2014. (Invited Lecturer)
 40. **Benson J. Jelier**, Jon L. Howell, and Chadron M. Friesen* “Moving from metal to nonmetal-based perfluoroalkoxides: *Does it make a difference?*” Polish Chemical Society, Adam Mickiewicz University, Poznań, Poland, May 13, 2014 and Fluor als Schlüsselement, Humboldt Universität zu Berlin and Freie Universität Berlin, Germany, May 16, 2014. (Invited Lecturer)
 41. **Benson J. Jelier**, Jon L. Howell, and Chadron M. Friesen* “Nonmetal based perfluoroalkoxides: synthesis, properties, and applications.” Dipartimento di scienza dei materiali ingegneria chimica, Politecnico di Torino, Torino, Italy, April 15, 2014 and Dipartimento di Chimica, Materiali ed Ingegneria Chimica "G. Natta", Politecnico di Milano, Milan, Italy, April 16, 2014 (Invited Lecturer).
 42. Chadron M. Friesen* “Recycling of metals after catalytic reactions using fluorinated ethers.” Chaire Total de la Fondation Balard lecture series, Montpellier, France, April 24, 2014 (Invited Lecturer)
 43. **Benson J. Jelier**, Jon L. Howell, and Chadron M. Friesen*. “New methods in anionic ring-opening polymerization of fluoro-epoxides.” Chaire Total de la Fondation Balard lecture series, Montpellier, France, April 10, 2014 (Invited Lecturer)
 44. **Benson J. Jelier** and Chadron M. Friesen*. “A Look at perfluoropolyalkylethers for Chronic Pain Theranostics.” Chaire Total de la Fondation Balard lecture series, Montpellier, France, February 28, 2014 (Invited Lecturer)
 45. **Benson J. Jelier**, Jon L. Howell, and Chadron M. Friesen*. “Preparation and Utility of Tetra-alkylammonium Perfluoroalkoxides.” Journee des Polymeristes Languedociens, Montpellier, France, October 3-4, 2013. (Keynote)
 46. **Benson J. Jelier**, Jon L. Howell, and Chadron M. Friesen*. “Innovative Methodology for the Preparation of Quaternary Ammonium Perfluoroalkoxides.” 17th European Symposium on Fluorine Chemistry, Paris, France, July 21- 25, 2013. (Invited Lecturer)
 47. **Benson J. Jelier***, Craig Montgomery, Jon L. Howell, Daniel B. Leznoff and Chadron M. Friesen. “A General Route to Perfluoroalkoxides from Hydrofluoroethers.” 96th Canadian Chemistry Conference and Exhibition, Quebec City, Quebec, Canada, May 26-30, 2013.
 48. Chadron M. Friesen*, **Benson J. Jelier**, Jon L. Howell, and J. Christopher Greever. “Realizing the reactivity of methoxy-based hydrofluoroethers (HFEs).” 21st Winter Fluorine Conference, St. Petersburg, Florida, USA January 13-18, 2013.(Invited Lecturer)
 49. **Benson J. Jelier***, Craig Montgomery, and Chadron M. Friesen. “Utilization of Novel Initiators for the Polymerization of Hexafluoropropylene Oxide.” 21st Winter Fluorine Conference, St. Petersburg, Florida, USA, January 13-18, 2013. (Poster, Award 1st Place Prize)

50. Christopher N. Voth*, **Benson J. Jelier**, and Chadron M. Friesen. "Utilizing poly(hexafluoropropylene oxide) in fluoruous biphase systems." Fluoropolymer 2012, Las Vegas, Nevada, USA, October 14-17, 2012.
51. **Benson J. Jelier***, Christopher N. Voth, Daniel B. Leznoff, Craig D. Montgomery, Chadron M. Friesen. "Utilization of Perfluoropolyalkylethers for Fluorous Biphasic Systems." 95th Canadian Chemistry Conference and Exhibition, Calgary, AB. May 26-30, 2012. BC Inorganic Discussion Week (IDW), Squamish, BC. May 11-13, 2012.
52. Chadron M. Friesen*, **Sebastian A. J. U. Temple**, Craig D. Montgomery, and Jon L. Howell. "Incorporating Poly(hexafluoropropylene oxide) into Wilkinson's Catalyst: A Fluorous Biphase Approach." 94th Canadian Chemistry Conference and Exhibition, Montréal, Quebec, Canada, June 5-9, 2011. 16th European Symposium on Fluorine Chemistry, Ljubljana, Slovenia, July 18-23, 2010.
53. Chadron M. Friesen*, **Sebastian A. J. U. Temple**, Craig D. Montgomery, and Jon L. Howell. "Fluorinated Ethers: A Question of Their Benefit to Catalytic Systems." 20th Winter Fluorine Conference, St. Petersburg, Florida, USA, January 9-14, 2011.
54. **Benson J. Jelier***, **Sebastian Temple**, Chadron M. Friesen, Craig D. Montgomery, Daniel B. Leznoff. "Fluorous Biphase Catalysis: Utilization of Functionalized Perfluoropolyalkylethers." BC Inorganic Discussion Week (IDW), Squamish, BC. May 6-8, 2011.
55. **Andrew Dawn*** and Chadron M. Friesen. "A Clothing Solution." Western Canadian Undergraduate Chemistry Conference, Lethbridge, Alberta, May 6-8th, 2010.
56. **Elizabeth Krieter**, **Sebastian Temple**, **Rose Rogawski**, and Chadron M. Friesen. "Synthesis of Tris(4-Diphenylphosphinyl Polyhexafluoropropylene Oxide Methylene Benzoate) Rhodium Chloride for Use in the Catalytic Hydrogenation of 2-Cyclohexen-1-one." 19th Regional Murdock Charitable Trust Undergraduate Research Conference, Linfield College, McMinnville, Oregon, November 12-13, 2010
57. **A. Rose Rogawski*** and Chadron M. Friesen. "Methodology for Protecting and Deprotecting Triaryl Phosphines." 18th Regional Murdock Charitable Trust Undergraduate Research Conference, Gonzaga University, Spokane, Washington, October 30-31, 2009.
58. Chadron M. Friesen*, J. Christopher Greever, Jon L. Howell, and Justin M. Hoerter "The Use of Perfluorobutyl Methyl Ethers as Methylating Agents for Amines." 19th International Symposium on Fluorine Chemistry, Jackson Hole, Wyoming, USA, August 23-28, 2009. (Invited Lecturer)
59. **Crystal M. Wuthrich*** and Chadron M. Friesen "Synthesis of (4-chlorobenzyl) Diphenyl Phosphine oxide, a Precursor to Fluorous Triarylphosphine Ligand." 17th Regional Murdock Charitable Trust Undergraduate Research Conference, University of Puget Sound, Tacoma, Washington, November 7-8, 2008 and Western Canadian Undergraduate Chemistry Conference, Thompson River University, Kamloops, British Columbia, May 7-9th, 2009.
60. Chadron M. Friesen* and Jon L. Howell "Efforts to Prepare Poly(hexafluoropropylene oxide) perfluorovinyl ether." 15th European Symposium on Fluorine Chemistry, Prague, Czech Republic, July 15-20, 2007.
61. Chadron M. Friesen*, **Ashley**, **Jamieson**, **Daryl Nyvall**, Jon L. Howell. "Understanding Fluorinated Amines Reactions of Poly(hexafluoropropylene oxide) [polyHFPO] Methylene Amine" 18th Winter Fluorine Conference, St. Petersburg, Florida, USA January 14-19, 2007.
62. Chadron M. Friesen*, **Ashley**, **Jamieson**, **Daryl Nyvall**, Jon L. Howell. "The development of ethyl and propyl alcohols from Radical reactions with poly(hexafluoropropylene oxide) primary iodides" 17th Winter Fluorine Conference, St. Petersburg, Florida, USA January 9-14, 2005.

63. Chadron M. Friesen* “Poly(hexafluoropropylene oxide): From the Manufacturing Process to Utilization in Fluorous Biphasic Systems” Simon Fraser University, Burnaby, British Columbia, Canada. October 12, 2004.
64. Joseph S. Thrasher*, Alfred Waterfeld, Yangliu Zhou, Erik W. Perez, Ireneusz Novak, Michael A. P. Beukama, Kevin A. Hay, Chadron M. Friesen, Jon L. Howell. “Syntheses and application of poly-hexafluoropropylene oxide primary and secondary bromides and iodides” Fluoropolymer 2004, Savannah, Georgia, October 7-9, 2004.
65. Jon L. Howell*, **Krista L. Laugesen, Alice E. Van der Ende**, and Chadron M. Friesen. “Reactions of Perfluorinated Ketones with Amines” 14th European Symposium on Fluorine Chemistry, Poznań, Poland, July 11-16, 2004.
66. Chadron M. Friesen*, **Michael A. P. Beukama, Kevin A. Hay**, and Jon L. Howell. “The development of ethyl and propyl alcohols from Radical reactions with poly(hexafluoropropylene oxide) primary iodides” 14th European Symposium on Fluorine Chemistry, Poznań, Poland, July 11-16, 2004.
67. **Michael A.P. Beukema*** and Chadron M. Friesen. “Synthesis of poly-hexafluoropropylene oxide (poly-HFPO) propyl alcohol: A precursor to insulated triarylphosphines” 17th Annual Western Canadian Undergraduate Chemistry Conference, Regina, Saskatchewan, Canada May 1-4, 2003.
68. Chadron M. Friesen*, **Krista L. Laugesen**, Jon L. Howell, Joseph S. Thrasher, Yangliu Zhou, Alfred Waterfeld. “Synthesis of a novel fluororous triarylphosphine-containing poly-hexafluoropropylene oxide (poly-HFPO)” 16th Winter Fluorine Conference, St. Petersburg, Florida, USA January 12-17, 2003.
69. Jon L. Howell*, Alexander B. Shtarov, Joseph S. Thrasher, Alfred Waterfeld, Koichi Murata, Erik W. Pérez, Alexey M. Siyagin, and Chadron M. Friesen. “Synthesis of New Perfluoroalkyl Polyethers Starting from Glycols and Tetrafluoroethylene” 13th European Symposium on Fluorine Chemistry, Bordeaux, France, July 15-20, 2001.
70. Chadron M. Friesen*, Erik W. Pérez*, Jon L. Howell, Joseph S. Thrasher, Alfred Waterfeld, Irik Nowak, Andy N. Wood, and Jonathan F. Sullivan. “Fluorous Biphasic Chemistry Utilizing Perfluoropolyalkylethers.” 219th American Chemical Society National Meeting & Exposition, San Francisco, California, USA March 26-30, 2000. & 16th International Symposium on Fluorine Chemistry, Durham, UK, July 16-21, 2000.
71. Jon L. Howell*, Joseph S. Thrasher, Alfred Waterfeld, Koichi Murata, Erik W. Pérez, Chadron M. Friesen “Degradation of Hexafluoropropylene Oxide (HFPO) Polymers Containing Various End Groups in the Presence of Aluminium Fluoride.” 16th International Symposium on Fluorine Chemistry, Durham, UK, July 16-21, 2000.
72. Joseph S. Thrasher*; Alfred Waterfeld, Alexey M. Sipygin, Chadron M. Friesen, Jon L. Howell, and Michael A. Hofmann. “The use of carbon-13 NMR spectroscopy to determine the end groups in perfluoropolyethers (PFPEs).” 216th ACS National Meeting, Boston, USA August 23-27, 1998.

INVITED FLUORINE RESEARCH INSTRUCTOR:

Adam Mickiewicz University, Faculty of Chemistry, Poznań (Poland)

1. Chadron M. Friesen Short Course in “Fluorine Chemistry-Pharmaceuticals and Perfluoropolyalkylethers (PFPAEs).” June 17-21, 2019.

Ecole Nationale Supérieure de Chimie de Montpellier, Montpellier Cedex (France)

2. Chadron M. Friesen. “Perfluoropolyalkylethers (PFPAEs) Part I: Why should one care?” Lecture for 3A, November 18, 2014.
3. Chadron M. Friesen. “Perfluoropolyalkylethers (PFPAEs) Part II: Applications.” Lecture for 3A, December 4, 2014.
4. Chadron M. Friesen. “Perfluoropolyalkylethers (PFPAEs) Part III: Applications continued & Better Initiators.” Lecture for 3A, December 9, 2014.
5. Chadron M. Friesen. “Industrial History & Application Towards Building Functionalized Perfluoropolyalkylethers (PFPAEs) Part I?” Lecture for 2A, Montpellier, France, February 28, 2014.
6. Chadron M. Friesen. “Perfluoropolyalkylethers (PFPAEs) Part II: Why should one care?” Lecture for 2A, Montpellier, France, March 26, 2014.
7. Chadron M. Friesen. “Perfluoropolyalkylethers (PFPAEs) Part III: Better Initiators.” Lecture for 2A, Montpellier, France, April 8, 2014.

Fluor als Schlüsselement, Freie Universität, Berlin (Germany)

8. Chadron M. Friesen “Designing perfluoropolyalkylethers (PFPAEs) for tribological applications: filling voids in the industrial market.”, Berlin, Germany, May 15, 2014.

Politecnico di Torino, Torino (Italy)

9. Chadron M. Friesen “**Buongiorno Fluorine (Fluoro).**” Turin, Italy May 28, 2018.

PROFESSIONAL SOCIETIES:

- ❖ Member of American Chemical Society, Division of Fluorine Chemistry (1996-present)
- ❖ Eagle Scout (1987), Boy Scouts of America.