Christopher B. Kelly, Ph.D.

Department of Chemistry, Virginia Commonwealth University
Biotech 8 737 North 5th Street Richmond, Virginia 23220
Phone: Coming Soon!; Email: Coming Soon!
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Education

National Institutes of Health NRSA Postdoctoral Fellow (2015 – Present)
University of Pennsylvania, Philadelphia, PA
Advisor: Prof. Gary A. Molander
Research Focus: Ni/Photoredox Dual Catalysis, Radical Alkylation
NRSA Award No.: F32GM117634-01

Ph. D. in Organic Chemistry (2010 − 2015)
University of Connecticut, Storrs, CT
Advisor: Prof. Nicholas E. Leadbeater
Research Focus: Organofluorine, Oxoammonium Salt Chemistry, and Continuous-Flow Processing
GPA: 4.075 overall

B.S. in Biochemistry (2006 − 2010)
Stonehill College, North Easton, MA
Advisor: Prof. Leon J. Tilley
Concentration: Organic Chemistry and Chemical Biology
GPA: 3.97 Overall, 3.98 Science
Graduated Valedictorian, *Summa Cum Laude*

Awards and Honors

- Selected for SCI-MIX at ACS 254th National Meeting (UPenn, 2017)
- Selected for ACS Postdoc-to-Faculty Workshop at ACS 254th National Meeting (UPenn, 2017)
- National Institutes of Health National Research Service Award Postdoctoral Fellowship (UPenn, 2016)
- Mentorship Excellence Award (UCONN, 2015)
- Connecticut Chemistry Research Award (UCONN, 2015)
- Doctoral Dissertation Fellowship (UCONN, 2014)
- College of Liberal Arts and Sciences Fellowship (UCONN, 2014)
- Internship in Chemical Development at Boehringer Ingelheim Pharmaceuticals (Summer 2013)
- Charles E. Waring Memorial Scholarship for Highest Performance in First Year of Graduate School (UCONN, 2011)
- Only recipient of the Office of Sponsored Programs Fellowship in Chemistry (UCONN, 2010)
- Honorable Mention, NSF Graduate Fellowship (Stonehill College, 2010)
- Valedictorian of Stonehill College Class of 2010
- William C. LaPlante Memorial Scholarship (Stonehill, 2010)
- Barry M. Goldwater Scholarship (Stonehill College, 2009−2010)
- Columbia University NSF REU Fellow (2009)
- *Phi Lambda Upsilon* membership, Stonehill College's Honor Society (2009−2010)
- Research Assistant for the Office of Naval Research (Stonehill College, 2008−2010)
- PolyEd Award for Highest Performance in Organic Chemistry I/II (Stonehill College, 2008)
- Merck Index Award for Highest Performance in General Chemistry II (Stonehill College 2008)
- CRC Handbook Award for Highest Performance in Freshman Year Chemistry (Stonehill College, 2007)

Peer−Reviewed Publications (In Chronological Order)

38. *Rapid Access to Diverse Trifluoromethyl-Substituted Alkenes Using Complementary Strategies* Wiles, R. W.; Phelan, J. P.; Lang, S. B.; **Kelly, C. B.**; Molander, G. A. *Chem. Sci.* **2018**, *Accepted Manuscript*.

37. *Engaging Sulfinate Salts via Ni/Photoredox Dual Catalysis Enables Facile C_{sp^2}–SO_2R Coupling* Cabrera Afonso, M. J.; Lu, Z.; **Kelly, C. B.**; Lang, S. B.; Dykstra, R.; Gutierrez, O.; Molander, G. A. *Chem. Sci.* **2018**, *Accepted Manuscript*.

36. *Photoredox Generation of Carbon-Centered Radicals Enables the Construction of 1,1-Difluoroalkene Carbonyl Mimics* Lang, S. B.; Wiles, R. W.; **Kelly, C. B.**; Molander, G. A. *Angew. Chem., Int. Ed.* **2017**, *56*, 15073.

- *Highlighted in ChemistryViews (Nov 4th 2017).*

35. *Oxidative Functionalisation of Alcohols and Aldehydes via the Merger of Oxoammonium Cations and Photoredox Catalysis* Nandi, J.; Ovian, J. M.; **Kelly, C. B.**; Leadbeater, N. E. *Org. Biomol. Chem.* **2017**, *15*, 8295**.**

34. *Aminomethylation of Aryl Halides via Ni/Photoredox Dual Catalysis* Remeur, C.; **Kelly, C. B.**; Patel, N. R.; Molander, G. A. *ACS Catal.* **2017**, *7*, 6065.

- *One of the top most read papers of August 2017 in ACS Catalysis.*

33. *Haloselective Cross-Coupling via Ni/Photoredox Dual Catalysis* Lin, K.; Wiles, R. J.; **Kelly, C. B.**; Davies, G. H. M.; Molander, G. A. *ACS Catal.* **2017,** *7*, 5129.

- *One of the top most read papers of July 2017 in ACS Catalysis.*
- *Highlighted in SYNFACTS (Synfacts* **2017** *13*, 1072).

32. *Azaborininones: Synthesis and Structural Analysis of a Class of Azaborines* Davies, G. H. M.; Mukhtar, A.; Saeednia, B.; Sherafat, F.; **Kelly, C. B.**; Molander, G. A. *J. Org. Chem.* **2017**, *82*, 5380.

31. *Accessing N-Acyl Azoles via Oxoammonium Salt-Mediated Oxidative Amidation* Ovian, J. M.; **Kelly, C. B.**; Pistritto, V. A.; Leadbeater, N. E. *Org. Lett.* **2017**, *19*, 1286.

30. *Mild, Redox-Neutral Alkylation of Imines Enabled by an Organic Photocatalyst* Patel, N. R.; **Kelly, C. B.**; Siegenfeld, A. P.; Molander, G. A. *ACS Catal.* **2017**, *7*, 1766.

- *One of the top most read papers of February 2017 in ACS Catalysis*.
- *Highlighted in SYNFACTS (Synfacts* **2017** *13*, 0404).

29. *Preparation of visible-light-activated metal complexes and their use in photoredox/nickel dual catalysis* **Kelly, C. B.**; Patel, N. R.; Primer, D. N.; Jouffroy, M.; Tellis, J. C.; Molander, G. A. *Nat. Protoc.* **2017**, *12*, 472.

28. *Preparation of diisopropylammonium bis(catecholato)cyclohexylsilicate* Lin, K.; **Kelly, C. B.**; Jouffroy, M.; Molander, G. A. *Org. Synth.* **2017**, *94*, 16.

27. *Oxidative Cleavage of Silyl Ethers by an Oxoammonium Salt* Loman, J. J.; Pistritto, V. A.; **Kelly, C. B.**; Leadbeater, N. E. *Synlett* **2016**, *27*, 2372.

26. *Single-Electron Transmetalation via Photoredox/Nickel Dual Catalysis: Unlocking a New Paradigm for sp^3–sp^2 Cross-Coupling* Tellis, J. C.; **Kelly, C. B.**; Primer, D. N.; Jouffroy, M.; Patel, N. R.; Molander, G. A. *Acc. Chem. Res.* **2016**, *49*, 1429.

- *Published as part of the Accounts of Chemical Research special issue "Photoredox Catalysis in Organic Chemistry".*
- *The top most read paper of August 2016 in Accounts of Chemical Research*.
- *One of the top five most read papers in Accounts of Chemical Research (2016–2017).*

25. *A combined computational and experimental investigation of the oxidative ring-opening of cyclic ethers by oxoammonium cations* Loman, J. J.; Carnaghan, E. R.; Hamlin, T. A.; Ovian, J. M.; **Kelly, C. B.**; Mercadante, M. A.; Leadbeater, N. E. *Org. Biomol. Chem.* **2016**, *14*, 3883.

24. *Thioetherification via Photoredox/Nickel Dual Catalysis* Jouffroy, M.; **Kelly, C. B.**; Molander, G. A. *Org. Lett.* **2016**, *18*, 876.

23. *Engaging Alkenyl Halides with Alkylsilicates via Photoredox Dual Catalysis* Patel, N. R.; **Kelly, C. B.**; Jouffroy, M.; Molander, G. A. *Org. Lett.* **2016**, *18*, 764.

22. *Toward a Unified Mechanism for Oxoammonium Salt-Mediated Oxidation Reactions: A Theoretical and Experimental Study Using a Hydride Transfer Model* Hamlin, T. A.; **Kelly, C. B.**; Ovian, J. M.; Wiles, R. J.; Tilley, L. J.; Leadbeater, N. E., *J. Org. Chem.* **2015**, *80*, 8150.

21. *Synthesis of Perfluoroalkyl-Substituted Vinylcyclopropanes by Way of Enhanced Neighboring Group Participation* **Kelly, C. B.**; Mercadante, M. A.; Carnaghan, E. R.; Doherty, M. J.; Fager, D. C.; Hauck, J. J.; MacInnis, A. E.; Tilley, L. J.; Leadbeater, N. E. *Eur. J. Org. Chem.* **2015**, 4071.

20. *Oxidative Cleavage of Allyl Ethers by an Oxoammonium Salt* **Kelly**, **C. B.**; Ovian, J. M.; Cywar, R. M.; Gossland, T. R.; Wiles, R. J.; Leadbeater, N. E. *Org. Biomol. Chem.* **2015**, *13*, 4255.

19. *Access to Nitriles from Aldehydes Mediated by an Oxoammonium Salt* **Kelly, C. B.**; Lambert, K. M.; Mercadante, M. A.; Ovian, J. M.; Bailey, W. F.; Leadbeater, N. E. *Angew. Chem., Int. Ed.* **2015**, *54*, 4241.

- *Highlighted in "Some Items of Interest to Process R&D Chemists and Engineers" Org. Process Res. Dev.* **2015**, *19*, 596.

18. *A Continuous-Flow Approach to 3,3,3-Trifluoromethylpropenes: Bringing Together Grignard Addition, Peterson Elimination, Inline Extraction, and Solvent Switching*. Hamlin, T. A.; Lazarus, G. M. L.; **Kelly, C. B.**; Leadbeater, N. E. *Org. Process Res. Dev.* **2014**, *18*, 1253.

17. *1,3-γ-Silyl-elimination in electron-deficient cationic systems* Mercadante, M. A.; **Kelly, C. B.**; Leadbeater, N. E.; Tilley L. J et al. *Chem. Sci.* **2014**, *5*, 3983.

16. *A Scalable and Regioselective Synthesis of 2-Difluoromethyl Pyridines from Commodity Chemicals* Desrosiers, J.-N.; **Kelly, C. B.**; Fandrick, D.; Song, J.; Senanayake, C. et al. *Org. Lett.* **2014,** *16*, 1724.

15. *Methylenation of Perfluoroalkyl Ketones using a Peterson Olefination Approach* Hamlin, T. A.; **Kelly, C. B.**; Cywar, R. M.; Leadbeater, N. E. *J. Org. Chem.* **2014**, *79*, 1145.

14. *Oxoammonium Salt Oxidations of Alcohols in the Presence of Pyridine Bases* Bobbitt, J. M.; Bartelson, A. L.; Bailey, W. F.; Hamlin, T. A.; **Kelly, C. B.** *J. Org. Chem.* **2014**, *79*, 1055.

13. *Trifluoromethyl ketones: properties, preparation, and application* **Kelly, C. B.**; Mercadante, M. A.; Leadbeater, N. E. *Chem. Commun.* **2013**, *49*, 11133.

12. *Oxidative Esterification of Aldehydes via an Oxoammonium Salt* **Kelly, C. B.**; Mercadante, M. A.; Wiles, R. J.; Leadbeater, N. E. *Org. Lett.* **2013**, *15*, 2222.

11. *Dehydrogenation of Perfluoroalkyl Ketones Using a Recyclable Oxoammonium Salt* Hamlin, T. A.; **Kelly, C. B.**; Leadbeater, N. E. *Eur. J. Org. Chem.* **2013**, 3658.

10. *Synthesis of 4-acetamido-2,2,6,6-tetramethylpiperidine-1-oxoammonium tetrafluoroborate and 4-acetamido-(2,2,6,6-tetramethyl-piperidin-1-yl)oxyl and their use in oxidative reactions* Mercadante, M. A.; **Kelly, C. B.**; Bobbitt, J. M.; Tilley, L. J.; Leadbeater, N. E. *Nat. Protoc.* **2013**, *8*, 666.

9. *2,2,6,6-Tetramethylpiperidine-Based Oxoammonium Salts* **Kelly, C.B.** *Synlett Spotlight No. 423, Synlett* **2013**, *24*, 527.

8. *Oxidation of α-Trifluoromethyl Alcohols Using a Recyclable Oxoammonium Salt* **Kelly, C. B.**; Mercadante, M. A.; Hamlin, T. A.; Fletcher, M. H.; Leadbeater, N. E. *J. Org. Chem*. **2012**, *77*, 8131.

7. *A Weinreb amide approach to the synthesis of trifluoromethylketones* Rudzinski, D. M.; **Kelly C. B.**; Leadbeater, N. E. *Chem. Commun.* **2012**, *48*, 9610.

   - *Highlighted in "Some Items of Interest to Process R&D Chemists and Engineers" Org. Process Res. Dev.* **2012**, *16*, 1878.

6. *Continuous Flow Hydrogenation Using an On-Demand Gas Delivery Reactor* Mercadante, M. A.; **Kelly, C. B.**; Lee, C.; Leadbeater, N. E. *Org. Process Res. Dev*. **2012**, *16*, 1064.

5. *Access to Dienophilic Ene-Triketone Synthons by Oxidation of Diketones with an Oxoammonium Salt* Eddy, N. A.; **Kelly, C.B.**; Mercadante, M. A.; Leadbeater, N. E.; Fenteany, G. *Org. Lett.* **2012**, *14*, 498.

4. *Copper-catalyzed direct preparation of diaryl sulfides from aryl iodides using potassium thiocyanate as a sulfur transfer reagent* **Kelly, C. B.**; Lee, C.; Leadbeater, N. E. *Tetrahedron Lett*. **2011**, *52*, 4587.

3. *A Continuous-Flow Approach to Palladium-Catalyzed Alkoxycarbonylation Reactions* **Kelly, C. B.**; Lee, C.; Mercadante, M. A.; Leadbeater, N. E. *Org. Process Res. Dev*. **2011**, *15*, 717.

2. *Enabling the Synthesis of Perfluoroalkyl Bicyclobutanes via 1,3 γ-Silyl Elimination* **Kelly, C. B.**; Tilley, L. J. *et al. Org. Lett*. **2011**, *13*, 1646.

1. *An approach for continuous-flow processing of reactions that involve the in situ formation of organic products* **Kelly, C. B.**; Lee, C.; Leadbeater N. E. *Tetrahedron Lett.* **2010**, *52*, 263.

Presentations

10. *Accessing Uncharted Chemical Space via Photoredox Catalysis* **Kelly, C. B.**; Molander, G. A. *et al.* Presented at the 254th ACS National Meeting, Washington D.C. August 20th–24th, 2017, Oral Presentation. ORGN 643.

9. *Advancements using Alkylsilicates for C-C Bond Construction* **Kelly, C. B.**; Molander, G. A. *et al.* Presented at the 254th ACS National Meeting, Washington D.C. August 20th–24th, 2017, Oral Presentation. ORGN 325.

8. *Accessing Uncharted Chemical Space via Photoredox Catalysis* **Kelly, C. B.**; Molander, G. A. *et al.* Presented at the Gordon Research Conference: Organic Reactions and Processes, Easton, MA. July 23th-28nd 2017. Poster Presentation.

7. Alkylsilicates as Versatile Radical Precursors in Photoredox Catalysis **Kelly, C. B.**; Molander, G. A. *et al.* Presented at the 252nd ACS National Meeting, Philadelphia, PA. August 21st–25th, 2016, Poster Presentation. ORGN 712.

6. *Alkylsilicates as Versatile Radical Precursors in Photoredox Catalysis* **Kelly, C. B.**; Molander, G. A. *et al.* Presented at the Gordon Research Conference: Organic Reactions and Processes, Easton, MA. July 17th-22nd 2016. Poster Presentation.

5. *New Frontiers in Oxoammonium Cation-Mediated Oxidations* **Kelly, C. B.**; Tilley, L. J.; Leadbeater, N. E. *et al.* Presented at the Gordon Research Conference: Organic Reactions and Processes, Smithfield, RI. July 13th–18th 2014. Poster Presentation.

4. *Oxidative Transforms of α-CF_3 Carbinols and Trifluoromethyl Ketones (TFMKs) by a Simple, Recyclable Oxoammonium Salt* **Kelly, C. B.**; Leadbeater, N. E. *et al.* Presented at the ACS Northeast Regional Meeting, New Haven, CT. October 23rd–26th, 2013. Oral Presentation, Abstract ID: NERM1408.

3. *Access to Trifluoromethylcyclopropanes via Electron-Deficient Cationic Directed 1,3 γ-Silyl Elimination* **Kelly, C. B.**; Leadbeater, N. E.; Tilley, L. J. *et al.* Presented at the 244th ACS National Meeting, Philadelphia, PA. August 19th–23rd, 2012, Oral Presentation ORGN 364.

2. *Access to Trifluoromethylcyclopropanes via Electron-Deficient Cationic Directed 1,3 γ-Silyl Elimination* **Kelly, C. B.**; Leadbeater, N. E.; Tilley, L. J. *et al.* Presented at the 30th Annual Graduate Student Symposium, Buffalo, NY. May 16th–18th, 2012, Oral Presentation T21.

1. *Utilization of the Gamma-Silyl Effect for the Synthesis of Strained Hydrocarbon Systems: A Potential Route to Tetrahedranes?* **Kelly, C. B.**; Tilley, L. J. *et al.* Presented at the 238th ACS National Meeting, Washington, DC, August 16th–20th, 2009; Poster CHED 297.

Teaching Experience

University of Pennsylvania

Guest Lecturer

• *CHEM 241: Organic Chemistry I*, Fall 2016 & 2017

Description: Lecturer for Professor Gary Molander's organic chemistry course; Covered various topics for several lectures per semester.

University of Connecticut

Visiting Professor (UCONN Hartford Campus)

• *CHEM 2443: Organic Chemistry I*, June 2014 − July 2014

Description: Lecturer for summer organic chemistry course. Wrote exams, course handbooks, assignments and lectures for the entire course.

Developments in Chemical Education (UCONN Storrs Campus):

• *Advanced Organic Chemistry Laboratory:*

Description: Developed and implemented a new laboratory curriculum. Designed experiments suitable for undergraduates that ranged from organocatalysis and organofluorine chemistry to transition metal-catalyzed coupling reactions. Devised a multistep synthesis of Ibuprofen as a final project for the class. Provided sets of required questions to be answered by students as part of laboratory reports.

• *Undergraduate Flow Chemistry:*

Description: Developed ten experiments for a laboratory manual on continuous-flow chemistry targeted for undergraduate institutions worldwide (published by Vapourtec Ltd). Drafted protocols for each experiment in the manual.

Teaching assistant for the following courses (UCONN Storrs Campus):

• *General Chemistry I Laboratory,* Fall 2010

Description: Responsible for holding weekly discussion and laboratory sessions. Administered quizzes, graded lab reports/homework, and assisted in grading exams.

• *Organic Chemistry Laboratory for Engineers,* Spring 2011

Description: Responsible for holding laboratory sessions for the one semester organic chemistry laboratory designed for engineering students. Administered quizzes and graded lab reports.

• *Honors Organic Chemistry,* I/II Fall 2011 – Fall 2014

Description: Responsible for holding weekly discussion sessions. Assisted in grading exams.

• *MCAT DAT Test Review Course,* Spring 2013 – Spring 2015

Description: Instructor for the organic chemistry module of the course, reviewed test topics and strategies

• *Other*: Private tutor for several courses, including those mentioned above. Met regularly with students to ensure they had a full grasp of course material. Sessions could last up to 2 hours.

Stonehill College

Teaching assistant for the following courses:

• *General Chemistry I/II*, Fall 2007 and Spring 2009

Description: Responsible for holding weekly problem solving sessions

• *Organic Chemistry I/II*, Spring 2008, Fall 2008, Fall 2009, and Spring 2010

Description: Responsible for holding weekly problem solving sessions as well as test review sessions

• *Chemistry Tutor,* Fall 2009 and Spring 2010

Description: Assisted students in organic and general chemistry at a helpdesk in Shield's Science Building

Research Experience

Academic

• *Stonehill College* (May 2007 − May 2010)

Title: Undergraduate Researcher
Advisor: Prof. Leon J. Tilley, Funded by the Office of Naval Research

• *Columbia University* (June 2009 − August 2009):

Title: REU Scholar/Fellow
Advisor: Prof. Dalibor Sames, Funded by the National Science Foundation

• *University of Connecticut* (July 2010 − May 2015)

Title: Graduate Assistant
Advisor: Prof. Nicholas E. Leadbeater, Funded by the National Science Foundation

• *University of Pennsylvania* (June 2015 − Present)

Title: NIH NRSA Postdoctoral Researcher
Advisor: Prof. Gary A. Molander, Funded by the National Institutes of Health

Industrial

• *Boehringer Ingelheim Pharmaceuticals* (June 2013 − August 2013)

Title: Intern in Chemical Development
Advisor: Dr. Jean-Nicolas Desrosiers *Departmental Supervisor*: Dr. Chris Senanayake