Stanford | Chemistry

Noah Z. Burns, Ph.D.

Curriculum Vitae

Stanford University
Department of Chemistry
337 Campus Drive
Stanford, CA 94305

office: 335 Lokey
phone: (650) 723-2961
nburns@stanford.edu
burnschemistry.com

APPOINTMENTS

Associate Professor — 2019–
Stanford University, Stanford CA

Assistant Professor — 2012–2019
Stanford University, Stanford CA

EDUCATION AND TRAINING

Postdoctoral Fellow (NIH) — 2009–2012
Harvard University, Cambridge MA
Advisor: Eric N. Jacobsen

Doctor of Philosophy — 2004–2009
The Scripps Research Institute, La Jolla CA
Advisor: Phil S. Baran
Thesis: *Total Syntheses of Haouamine A*

Bachelor of Arts, Chemistry — 2000–2004
Columbia University, New York NY
Summa Cum Laude
Advisor: James Leighton

AWARDS AND HONORS

2020: Hirata Award

2019: Eli Lilly Young Investigator Award

2019: NSF CAREER Award

2018: Kavli Fellow

2017: Dean's Award for First Years of Teaching at Stanford

2017: Amgen Young Investigator Award

2013–2017: Stanford Terman Fellow

2012: Thieme Chemistry Journal Award

2009–2012: NIH NRSA Postdoctoral Fellow

2006–2008: ARCS Foundation Scholarship

2006: Roche Excellence in Chemistry Award

2005–2006: TSRI Dean's Fellow

2004: Graduated *Summa Cum Laude*, Columbia University

2004: Phi Beta Kappa

2003: Barry M. Goldwater Scholarship

2002: NSF Summer Undergraduate Research Fellowship

PROFESSIONAL ACTIVITIES

Director of Undergraduate Studies, Department of Chemistry, Stanford University 2022–

Editorial Advisory Board, *Accounts of Chemical Research*, 2019–

Academic Co-chair, 1st Bay Area Chemistry Symposium, November 2019

PUBLICATIONS

Ahanjit Bhattacharya, Isaac D. Falk, Frank R. Moss III, Thomas M. Weiss, Khoi N. Tran, Noah Z. Burns, Steven G. Boxer "Structure–Function Relationships in Pure Archaeal Bipolar Tetraether Lipids" *Chem. Sci*. **2024**, *15*, 14273–14286.

Yanan Li, Ting Yu, Xi Feng, Bo Zhao, Huahui Chen, Huan Yang, Xing Chen, Xiao-Hua Zhang, Hayden R. Anderson, Noah Z. Burns, Fuxing Zeng, Lizhi Tao, Zhirui Zeng, "Biosynthesis of GMGT Lipids by a Radical SAM Enzyme Associated with Anaerobic Archaea and Oxygen-deficient Environments" *Nat. Commun*. **2024**, *15*, 5256.

Boswell, B. R.; Burns, N. Z. "2,3-Diethyl 2,3-diazabicyclo[2.2.0]hex-5-ene-2,3-dicarboxylate," *Encyclopedia of Reagents for Organic Synthesis (EROS)*, **2024** https://doi.org/10.1002/047084289X.rn02555.

Derstine, B. C.; Cook, A. J.; Collings, J. D.; Gair, J.; Saurí, J.; Kwan, E. E.; Burns, B. Z. "Total Synthesis of (+)-Discorhabdin V," *Angew. Chem. Int. Ed.* **2024**, *63*, e202315284.

Boswell, B. R.; Mansson, C. M. F.; Cabrera, G. E.; Hansen, C. R.; Oliver, A. G.; Burns, N. Z. "A Metal-Free Cyclobutadiene Reagent for Intermolecular [4 + 2] Cycloadditions," *J. Am. Chem. Soc.* **2023**, *145*, 5631–5636.

Mansson, C. M. F.; Burns, N. Z. "Aqueous Amine-Tolerant [2+2] Photocycloadditions of Unactivated Olefins," *J. Am. Chem. Soc.* **2022**, *144*, 19689–19694.

Patel, S. C.; Burns, N. Z. "Conversion of Aryl Azides to Aminopyridines," *J. Am. Chem. Soc.* **2022**, *144*, 17797–17802.

Cabrera, G. E.; Reid, T. A.; Johnson, E. C.; Orlicki, J. A.; Burns, N. Z.; Sabaitini, J. J. “Synthesis and Characterization of the Potential Energetic Propellant Plasticizer 3-Nitratoethyl-N -nitramino-5-nitratomethyl Isoxazole,” *ChemPlusChem* **2022**, 87, e202200096.

Wei, T. *et al.* “Cannabinoid Receptor 1 Antagonist Genistein Attenuates Marijuana-Induced Vascular Inflammation,” *Cell* **2022**, *185*, 1676–1693.

Patel, S. C.; Smith, M. W.; Mercer, J. A. M.; Suzuki, K.; Burns, N. Z. “Enantioselective Cyclobutenylation of Olefins Using N-Sulfonyl-1,2,3-Triazoles as Vicinal Dicarbene Equivalents,” *Org. Lett.* **2021**, 23, 6530–6535.

Falk, I. D.; Gál, B.; Bhattacharya, A.; Wei, J. H.; Welander, P. V.; Boxer, S. G.; Burns, N. Z. “Enantioselective Total Synthesis of the Archaeal Lipid Parallel GDGT-0 (Isocaldarchaeol),” *Angew. Chem. Int. Ed.* **2021***, 60,* 17492–17496.

Li, J.; Reiser, P.; Boswell, B. R.; Eberhard, A.; Burns, N. Z.; Friederich, P.; Lopez, S. A. “Automatic discovery of photoisomerization mechanisms with nanosecond machine learning photodynamics simulations,” *Chem. Sci.* **2021**, *12*, 5302–5314.

Boswell, B. R.; Mansson, C. M. F.; Cox, J. M.; Jin, Z.; Romaniuk, J. A. H.; Lindquist, K. P.; Cegelski, L.; Xia, Y.; Lopez, S. A.; Burns, N. Z. “Mechanochemical Synthesis of Elusive Fluorinated Polyacetylene,” *Nature Chemistry* **2021**, *13*, 41–46.

Moss, F. R.; Cabrera, G. E.; McKenna, G. M.; Salerno, G. J.; Shuken, S. R.; Landry, M. L.; Weiss, T. M.; Burns, N. Z.; Boxer, S. G. “Halogenation-Dependent Effects of the Chlorosulfolipids of Ochromonas danica on Lipid Bilayers,” *ACS Chem. Bio.* **2020**, *15*, 2986–2995.

Yang, J.; Horst, M.; Werby, S. H.; Cegelski, L.; Burns, N. Z.; Xia, Y. “Bicyclohexene-*peri*-naphthalenes: Scalable Synthesis, Diverse Functionalization, Efficient Polymerization, and Facile Mechanoactivation of Their Polymers,” *J. Am. Chem. Soc*. **2020**, *142*, 14619–14626.

Chen, Z.; Zhu, X.; Yang, J.; Mercer, J. A. M.; Burns, N. Z.; Martinez, T. J.; Xia, Y. “The Cascade Unzipping of Ladderane Reveals Dynamic Effects in Mechanochemistry,” *Nature Chemistry* **2020**, *12*, 302–309.

Smith, M. W.; Falk, I. D.; Ikemoto, H.; Burns, N. Z. “A Convenient C–H Functionalization Platform for Pyrroloiminoquinone Alkaloid Synthesis,” *Tetrahedron* **2019**, *75*, 3366–3370. [Invited contribution in honor of Professor Ryan Shenvi, recipient of the 2019 Tetrahedron Young Investigator Award.]

Landry, M. L.; McKenna, G. M.; Burns, N. Z. “Enantioselective Synthesis of Azamerone,” *J. Am. Chem. Soc.* **2019**, *141*, 2867–2871.

Kearney, S. E. *et al.* “Canvass: A Crowd-Sourced, Natural-Product Screening Library for Exploring Biological Space,” *ACS Central Science* **2018**, *4*, 1727–1741.

Seidl, F. J.; Min, C.; Lopez, J. A.; Burns, N. Z. “Catalytic Regio- and Enantioselective Haloazidation of Allylic Alcohols,” *J. Am. Chem. Soc.* **2018**, *140*, 15646–15650.

Su, J.; Feist, J. D.; Yang, J.; Mercer, J. A. M.; Romaniuk, J. A. H.; Chen, Z.; Cegelski, L.; Burns, N. Z.; Xia, Y. “Title: Synthesis and Mechanochemical Activation of Ladderene-Norbornene Block Copolymers,” *J. Am. Chem. Soc.* **2018**, *140*, 12388–12391.

Moss, F. R.; Shuken, S. R.; Mercer, J. A. M.; Cohen, C. M.; Weiss, T. M.; Boxer, S. G.; Burns, N. Z. “Ladderane phospholipids form a densely packed membrane with normal hydrazine permeability and anomalously low proton/hydroxide permeability,” *Proc. Natl. Acad. Sci.* **2018**, *115*, 9098–9103.

Landry, M. L.; Burns, N. Z. “Catalytic Enantioselective Dihalogenation in Total Synthesis,” *Acc. Chem. Res.* **2018**, *51*, 1260–1271.

Sathyamoorthi, S.; Banerjee, S.; Du Bois, J.; Burns, N. Z.; Zared, R. N. "Site-selective bromination of sp^3 C–H bonds," *Chem. Sci.* **2018**, *9*, 100–104.

Burckle, A. J.; Gál, B.; Seidl, F. J.; Vasilev, V. H.; Burns, N. Z. “Enantiospecific Solvolytic Functionalization of Bromochlorides,” *J. Am. Chem. Soc.* **2017**, *139*, 13562–13569.

Chen, Z.; Mercer, J. A. M.; Zhu, X.; Romaniuk, J. A. H.; Pfattner, R.; Cegelski, L.; Martinez, T. J.; Burns, N. Z.; Xia, Y. "Mechanochemical unzipping of insulating polyladderene to semiconducting polyacetylene" *Science*, **2017**, *357*, 475–479.

Mercer, J. A. M.; Cohen, C. M.; Shuken, S. R.; Moss, F. R.; Wagner, A. M.; Smith, M. W.; Smith, M. D.; Vahala, R.; Gonzalez-Martinez, A.; Boxer, S. G.; Burns, N. Z. “Chemical Synthesis and Self-Assembly of Ladderane Phospholipids,” *J. Am. Chem. Soc.* **2016***, 138*, 15845–15848.

Gál, B.; Bucher, C.; Burns, N. Z. "Chiral Alkyl Halides: Underexplored Motifs in Medicine” *Mar. Drugs* **2016**, *14*, 206. [Invited contribution for Special Issue on Marine Organohalides]

Burckle, A. J.; Vasilev, V.; Burns, N. Z. “A Unified Approach for the Enantioselective Synthesis of the Brominated Chamigrene Sesquiterpenes,” *Angew. Chem. Int. Ed.* **2016***, 55,* 11476–11479.

Seidl, F. J.; Burns, N. Z. “Selective Bromochlorination of a Homoallylic Alcohol for the Total Synthesis of (–)-Anverene,” *Beilstein J. Org. Chem.* **2016,** *12,* 1361–1365. [Invited contribution: Special Themed Issue on Strategies in Asymmetric Catalysis]

Landry, M. L.; Hu, D. X.; McKenna, G. M.; Burns, N. Z. “Catalytic Enantioselective Dihalogenation and the Selective Synthesis of (−)-Deschloromytilipin A and (−)-Danicalipin A,” *J. Am. Chem. Soc.* **2016**, *138*, 5150–5158.

Mercer, J. A. M.; Burns, N. Z. “Natural products: Emulation Illuminates Biosynthesis,” *Nature Chem.* **2015**, *7*, 860–861.

Bucher, C.; Deans, R. M.; Burns, N. Z. “Highly Selective Synthesis of Halomon, Plocamenone, and Isoplocamenone,” *J. Am. Chem. Soc.* **2015**, *137*, 12784–12787.

Hu, D. X.; Seidl, F. J.; Bucher, C.; Burns, N. Z. “Catalytic Chemo-, Regio-, and Enantioselective Bromochlorination of Allylic Alcohols,” *J. Am. Chem. Soc.* **2015**, *137*, 3795–3798.

Hu, D. X.; Shibuya, G. M.; Burns, N. Z. “Catalytic Enantioselective Dibromination of Allylic Alcohols,” *J. Am. Chem. Soc.* **2013**, *135*, 12960–12963.

POSTDOCTORAL

Burns, N. Z.; Jacobsen, E. N. "Catalysis in Tight Spaces," *Nature*, **2012**, *483*, 278–279.

Burns, N. Z.; Witten, M. W.; Jacobsen, E. N. "Dual Catalysis in Enantioselective Oxidopyrylium-Based [5 + 2] Cycloadditions," *J. Am. Chem. Soc.* **2011**, *133*, 14578–14581.

Burns, N. Z.; Jacobsen, E. N. "Mannich Reaction," in *Science of Synthesis, Stereoselective Synthesis*, Vol. 2, De Vries, J. G.; Molander, G. A.; Evans, P. A., Eds.; Georg Thieme Verlag: Stuttgart, Germany, **2011**; 785–834.

GRADUATE

Sella, E.; Weinstain, R.; Erez, R.; Burns, N. Z.; Baran, P. S.; Shabat, D "Sulfhydryl-Based Dendritic Chain Reaction," *Chem. Commun.* **2010**, *46*, 6575–6577.

Burns, N. Z.; Krylova, I. N.; Hannoush, R. N.; Baran, P. S. "Scalable Total Synthesis and Biological Evaluation of Haouamine A and Its Atropisomer," *J. Am. Chem. Soc.* **2009**, *131*, 9172–9173.

Burns, N. Z.; Baran, P. S.; Hoffmann, R. W. "Redox Economy in Organic Synthesis," *Angew. Chem., Int. Ed.* **2009**, *48*, 2854–2867.

Burns, N. Z.; Jessing, M.; Baran, P. S. "Total synthesis of Haouamine A: the Indeno-Tetrahydropyridine Core," *Tetrahedron*, **2009**, *65*, 6600–6610.

Burns, N. Z.; Baran, P. S. "On the Origin of the Haouamine Alkaloids," *Angew. Chem., Int. Ed.* **2008**, *47*, 205–208.

Baran, P. S.; Burns, N. Z. "Total Synthesis of (±)-Haouamine A," *J. Am. Chem. Soc.*, **2006**, *128*, 3908–3909.

UNDERGRADUATE

Burns, N. Z.; Hackman, B. H.; Ng, P. Y.; Powelson, I. A.; Leighton, J. L. "The Enantioselective Allylation and Crotylation of Sterically Hindered and Functionalized Aryl Ketones: Convenient Access to Unusual Tertiary Carbinol Structures," *Angew. Chem., Int. Ed.* **2006**, *45*, 3811–3813.

PATENT APPLICATIONS

Mansson, C. M. F.; Burns, N. Z. “Method for the Construction of Aminocyclobutanes from Copper-Catalyzed Aqueous [2+2] Cycloadditions of Un-Activated Olefins,” US Patent App. 63/417,851 (2023)

Shuken, S. R.; Burns, N. Z. “Fluorogenic Water Soluble Hydrazine Sensors,” US Patent App. 16/046,772 (2018)

Shuken, S. R.; Mercer, J. A. M.; Cohen, C. M.; Burns, N. Z. “Ladderane Lipid Compounds and Liposomes and Methods of Preparing and Using the Same,” US Patent App. 16/046,772; Intl. Patent App. PCT/US2017/049479 (2018)

TEACHING

CHEM 111: Exploring Chemical Research

CHEM 33: Structure and Reactivity of Organic Molecules

CHEM 35: Synthetic and Physical Organic Chemistry

CHEM 121: Understanding the Natural and Unnatural World through Chemistry

CHEM 126: Synthesis Laboratory

CHEM 132: Synthesis Laboratory

CHEM 221: Advanced Organic Chemistry II	Autumn 2021, 2022
CHEM 223: Advanced Organic Chemistry II	Winter 2020, 2022
CHEM 225: Advanced Organic Chemistry III	Winter 2019
	Winter 2014
	Autumn 2019
	Winter 2024
	Winter 2013, 2014, 2015, 2016, 2018, 2021
	Autumn 2013, 2014, 2015 & 2016
	Spring 2019, 2022, 2023, 2024

EXTERNAL GRANT FUNDING

NSF CAREER CHE- 1846512	May 2019 – May 2024
DARPA-SN-18-47	July 2018 – December 2019
DOD MURI N00014-17-S-F006	July 2018 – June 2023
NIH R01 GM114061-01	September 2015 – June 2020
ACS PRF 56372-DNI1	July 2016 – September 2017

INVITED LECTURES

1. Columbia University, Jim Leighton 50th Birthday Symposium, New York, NY (February 2014)
2. Portland State University, Department of Chemistry, Portland, OR (March 2015)
3. ACS Meeting, Creative Invention Award in Honor of Jotham Coe, Denver, CO (March 2015)
4. International Symposium on Chirality, Boston, MA (June 2015)
5. 2nd EOC Symposium, Department of Chemistry, Nankai University, Tianjin, China (July 2015)
6. Peking University, Department of Chemistry, Beijing, China (July 2015)
7. Shanghai Institute of Organic Chemistry, Shanghai, China (July 2015)
8. Gordon Research Conference on Natural Products, Andover, NH (July 2015)
9. Biogen, Cambridge, MA (October 2015)
10. University of Arizona, College of Pharmacy, Tucson, AZ (October 2015)
11. ACS Meeting, E. J. Corey Young Investigator Award Symposium, San Diego, CA (March 2016)
12. Bristol-Myers Squibb Process Chemistry, New Brunswick, NJ (March 2016)
13. University of California, Santa Barbara, Department of Chemistry, Santa Barbara, CA (April 2016)

14. University of Alberta, Student Invited Speaker, Department of Chemistry, Edmonton, AB (May 2016)

15. South University of Science and Technology of China, Shenzhen, China (May 2016)

16. Lanzhou University, Lanzhou, China (May 2016)

17. Shaanxi Normal University, Xi'an, China (May 2016)

18. Shanghai Institute of Organic Chemistry, Shanghai, China (May 2016)

19. Gordon Research Conference on Stereochemistry, Newport, RI (July 2016)

20. AbbVie, Process R&D, North Chicago, IL (August 2016)

21. Dow AgroSciences LLC, Indianapolis, IN (September 2016)

22. Eli Lilly & Co., Discovery Chemistry, Indianapolis, IN (September 2016)

23. Indiana University – Purdue University Indianapolis, Indianapolis, IN (September 2016)

24. Tel Aviv University, Department of Chemistry, Tel Aviv-Yafo, Israel (December 2016)

25. First ADAMA-BGU Symposium, Ben-Gurion University, Be'er Sheva, Israel (December 2016)

26. Emory University, Department of Chemistry, Atlanta, GA (March 2017)

27. University of California at Riverside, Department of Chemistry, Riverside, CA (April 2017)

28. Princeton University, BMS Lectureship in Synthetic Chemistry, Princeton, NJ (May 2017)

29. Gordon Research Conference on Organic Reactions & Processes, Easton, MA (July 2017)

30. Bristol-Myers Squibb R&D Medicinal Chemistry, Lawrenceville, NJ (August 2017)

31. Bristol-Myers Squibb R&D Discovery Chemistry, Wallingford, CT (August 2017)

32. Indiana University, Department of Chemistry, Bloomington, IN (September 2017)

33. California Institute of Technology, Amgen Young Investigator Symposium, Pasadena, CA (October 2017)

34. University of Chicago, Department of Chemistry, Chicago, IL (October 2017)

35. Claremont McKenna College, Keck Science Department, Claremont, CA (October 2017)

36. The Scripps Research Institute, Department of Chemistry, La Jolla, CA (November 2017)

37. University of California, San Francisco, Department of Pharmaceutical Chemistry, San Francisco, CA (November 2017)

38. North Jersey American Chemical Society Early Career Symposium, Somerset, NJ (November 2017)

39. Albert Padwa Lecture, Columbia University, Department of Chemistry, New York, NY (January 2018)

40. Oregon State University, Department of Chemistry, Corvallis, OR (January 2018)

41. University of Oregon, Department of Chemistry, Eugene, OR (January 2018)

42. Gilead Sciences, Medicinal Chemistry, Foster City, CA (February 2018)

43. Boston University, Department of Chemistry, Boston, MA (March 2018)

44. Merck Boston, Boston, MA (April 2018)

45. Massachusetts Institute of Technology, Student Invited Speaker, Department of Chemistry, Cambridge, MA (April 2018)

46. University of Pennsylvania, Department of Chemistry, Philadelphia, PN (April 2018)

47. New York University, Department of Chemistry, New York, NY (May 2018)

48. University of Wisconsin–Madison, Department of Chemistry, Madison, WI (May 2018)

48. UT Southwestern Medical Center, Department of Biochemistry, Dallas, TX (May 2018)

49. University of California, Irvine, Department of Chemistry, Irvine, CA (May 2018)

50. 17th French–American Chemical Society Symposium, Orléans, France (June 2018)

51. Institut Català d'Investigació Química, Tarragona, Spain (June 2018)

52. Technical University of Munich, Department of Chemistry, Garching, Germany (June 2018)

53. Max-Planck-Institut für Kohlenforschung, Mülheim an der Ruhr, Germany (June 2018)

54. Pfizer Groton, Groton, CT (August 2018)

55. Merck Rahway, Rahway, NJ (August 2018)

56. The 1st International Symposium on Middle Molecular Strategy for Young Scientists (Plenary Lecturer) Seapal Suma, Kobe, Japan (August 2018)

57. Osaka University, Osaka, Japan (August 2018)

58. Kyoto University, Kyoto, Japan (August 2018)

59. Nagoya University, Nagoya, Japan (August 2018)

60. Waseda University, Tokyo, Japan (August 2018)

61. University of Tokyo, Tokyo, Japan (August 2018)

62. Chemistry Summer School (Keynote Lecturer), Tohoku University, Sendai, Japan (August 2018)

63. University of Utah, Department of Chemistry, Salt Lake City, UT (September 2018)

64. 2018 Annual CMAD Symposium, Stanford University, Department of Chemistry, Stanford, CA (September 2018)

65. Boston College, Department of Chemistry, Boston, MA (September 2018)

66. University of California, Berkeley, Department of Chemistry, Berkeley, CA (September 2018)

67. University of North Carolina, Chapel Hill, Department of Chemistry, Chapel Hill, NC (September 2018)

68. 2018 Organic Reactions Symposium, University of Michigan, Department of Chemistry, Ann Arbor, MI (October 2018)

69. 2018 Chinese-American Kavli Frontiers of Science Symposium, Nanjing, China (October 2018)

70. Rice University, Department of Chemistry, Houston, TX (October 2018)

71. University of Illinois, Urbana-Champaign, Department of Chemistry, Urbana-Champaign, IL (November 2018)

72. Sigma-Aldrich Lecturer, Yale University, Department of Chemistry, New Haven, CT (November 2018)

73. Sigma-Aldrich Lecturer, University of Minnesota, Department of Chemistry, Minneapolis, MN (November 2018)

74. Bristol-Myers Squibb Organic Lecturer, Harvard University, Department of Chemistry and Chemical Biology, Cambridge, MA (November 2018)

75. Stanford University, Department of Chemistry, Stanford, CA (January 2019)

76. 20th Tetrahedron Symposium, Bangkok, Thailand (June 2019)

77. University of California, San Diego, Department of Chemistry and Biochemistry, San Diego, CA (October 2019)

78. Harvard University, Eric Jacobsen 60th Birthday Symposium, Cambridge, MA (February 2020)

79. GlaxoSmithKline, Virtual Seminar (June 2020)

80. Memorial Sloan Kettering Cancer Center, Molecular Pharmacology & Chemical Biology Programs, Virtual Seminar (January 2021)

81. Hirata Award Lecture, Virtual Seminar (February 2022)

82. Gilead Sciences, Process Chemistry, Virtual Seminar (June 2022)

83. University of Pittsburg, Department of Chemistry, Pittsburg, PA (September 2022)

84. AbbVie, Virtual Seminar (June 2023)

85. McGill University, Department of Chemistry, Montreal, Québec (October 2023)

86. University of Montreal, Department of Chemistry, Montreal, Québec (October 2023)

87. Bay Area Chemistry Symposium, (Keynote speaker), San Francisco, CA (October 2024)