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PROFESSIONAL POSITIONS

Duke University
Professor of Chemistry (2023-)
Robert R. and Katherine B. Penn Associate Professor of Chemistry (2018-2023)
Assistant Professor of Chemistry (2011-2018)

EDUCATION

Broad Institute of Harvard and MIT (2007-2011)
Postdoctoral Researcher
Advisor: Professor Stuart L. Schreiber
Harvard University (2005-2007)
Postdoctoral Researcher
Advisor: Professor Andrew G. Myers
Emory University (2001-2005)
Ph.D. Organic Chemistry
Advisor: Professor Albert Padwa
Wuhan University, P. R. China (1995-1999)
B.S. Environmental Chemistry

HONORS AND AWARDS

CAPA Distinguished Faculty Award (US)	2021
Bass Fellow, Duke University	2018
Camille Dreyfus Teacher-Scholar Award	2016
Alfred P. Sloan Research Fellow	2016
NSF CAREER Award	2015
Thieme Chemistry Journal Award	2015
ACS PRF Doctoral New Investigator Award	2013
Osborne R. Quayle Award for Outstanding Graduate Research	2004
Boehringer-Ingelheim Graduate Student Scholarship	2003
Excellent Undergraduate Student Scholarship	1996-1999

PUBLICATIONS

RESEARCH ARTICLES – INDEPENDENT CAREER

(Undergraduate co-author, *indicates corresponding author)

- 47 Feng, G.; Ku, C. K.; Zhao, J.; **Wang, Q.*** Copper-Catalyzed Regioselective Aminofluorination of Alkenes and 1,3-Dienes: Direct Entry to Diverse β -Fluoroamines. *J. Am. Chem. Soc.*, **2022**, *144*, 20463–20471.
- Top 20 Most Read Articles, Nov 2022.
- 46 Park, H.;[#] Jun Chen,[#] J.; Dimitrov, I. E.; Park J. M.;* **Wang, Q.*** Design and characterizations of hyperpolarized ^{15}N -BBCP as a H_2O_2 sensing probe. *ACS Sensors*, **2022**, *7*, 2928–2933.
- 45 Park, H.;[#] Eriksson, S.,[#] Warren, S. W.;* **Wang, Q.*** Design, Synthesis and Evaluation of ^{15}N - and ^{13}C -Labeled Molecular Probes as Hyperpolarized Nitric Oxide Sensors. *Bioorg. Med. Chem.* **2022**, *72*, 116969.
- Special issue in honor of Yimon Aye's 2022 Tetrahedron Young Investigator Award.
- 44 Kwon, Y.; **Wang, Q.*** Recent Advances in 1,2-Amino(hetero)arylation of Alkenes. *Chemistry - An Asian Journal*. **2022**, *17*, e202200215.
- Special issue for Women in Chemistry.
- 43 Park, H.; **Wang, Q.*** State-of-the-Art Accounts of Hyperpolarized ^{15}N -Labeled Molecular Imaging Probes for Magnetic Resonance Spectroscopy and Imaging. *Chem. Sci.* **2022**, *13*, 7378–7391.
- 42 Cho, S.; McLaren, E.J.; **Wang, Q.*** Three-Component Difunctionalization of Cyclohexenyl Triflates Direct Access to Versatile Cyclohexenes via Cyclohexynes. *Angew. Chem. Int. Ed.*, **2021**, *60*, 26332–26336.
- Featured at Hot Paper.
- 41 Bae, J.;[#] Zhang, G.;[#] Park, H.; Warren, S. W.;* **Wang, Q.*** ^{15}N -Azides as Practical and Effective Tags for Developing Long- Lived Hyperpolarized Agents. *Chem. Sci.* **2021**, *12*, 14309–14315.
- 40 Kwon, Y.;[#] Zhang, W.;[#] **Wang, Q.*** “Copper-Catalyzed Aminoheteroarylation of Unactivated Alkenes through Distal Heteroaryl Migration” *ACS Catal.* **2021**, *11*, 8807–8817. ([#]equal contribution)
- Top 10 Most Read Articles, July 2021
- 39 Wang, L.; Wang, H.; Shen, K.; Park, H.; Zhang, T.; Wu, X.; Hu, M.; Yuan, H.; Yue Chen, Y.; Wu, Z.*; **Wang, Q.***, Li, Z. Development of novel ^{18}F -PET agents for tumor hypoxia imaging” *J. Med. Chem.* **2021**, *64*, 5593–5602.
- 38 Zhang, W.;[#] Wang, C.;[#] **Wang, Q.*** "Copper-Catalyzed Decarboxylative Functionalization of Conjugated β,γ -Unsaturated Carboxylic Acids" *ACS Catal.* **2020**, *10*, 13179–13185. ([#]equal contribution)
- 37 Kwon, Y.; **Wang, Q.*** “Copper-Catalyzed 1,2-Aminocyanation of Unactivated Alkenes via Cyano Migration” *Org. Lett.* **2020**, *11*, 4141–4145.
- 36 Park, H.;[#] Urs, A. N.;[#] Zimmerman, J.; Liu, C.; **Wang, Q.*** Urs, N.M.* Structure–Functional–Selectivity Relationship Studies of Novel Apomorphine Analogs to Develop $\text{D}_1\text{R}/\text{D}_2\text{R}$ Biased Ligands. *ACS Med. Chem. Lett.* **2020**, *11*, 385–392. ([#]equal contribution)
- Special Issue Women in Medicinal Chemistry.

- 35 Park, H.;[#] Zhang, G.;[#] Bae, J.;[#] Theis, T.; Warren, S. W.;* **Wang, Q.*** Application of ¹⁵N₂-Diazirines as a Versatile Platform for Hyperpolarization of Biological Molecules by d-DNP. *Bioconjugate Chem.* **2020**, *31*, 537–541. ([#]equal contribution)
- 34 Cho, S.; **Wang, Q.*** 1,2-Difunctionalization of Aryl Triflates: A Direct and Modular Access to Diversely Functionalized Anilines. *Org. Lett.* **2020**, *4*, 1670–1674.
- 33 Hemric, B. N.; Chen, A. W.; **Wang, Q.*** Copper-Catalyzed 1,2-Amino Oxygenation of 1,3-Dienes: A Chemo-, Regio-, and Site-Selective Three-Component Reaction with *O*-Acyloxyhydroxylamines and Carboxylic Acids. *ACS Catal.* **2019**, *11*, 10070–10076.
- 32 Hemric, B. N.; Chen, A. W.; **Wang, Q.*** Copper-Catalyzed Modular Amino Oxygenation of Alkenes: Access to Diverse 1,2-Amino Oxygen-Containing Skeletons. *J. Org. Chem.* **2019**, *74*, 1468–1488.
- Top 20 Most Read Articles, Feb 2019
- 31 Cho, S.; **Wang, Q.*** *ortho*-Difunctionalization of Arynes via LiZnEt₂(TMP)-Mediated Deprotonative Zincation/Elimination of Aryl Triflates. *Tetrahedron*, **2018**, *74* (26), 3325–3328.
- Special issue in honor of Seth Herzon’s Tetrahedron Young Investigator Award
- 30 Liu, C.; **Wang, Q.*** Alkenylation of *sp*³ C–H Bonds by Zincation/Copper-Catalyzed Cross-Coupling with Iodonium Salts. *Angew. Chem. Int. Ed.* **2018**, *57*, 4727–4731.
- 29 Bae, J.;[#] Zhou, Z.;[#] Theis, T.;* Warren, W. S.; **Wang, Q.*** ¹⁵N₄-1,2,4,5-Tetrazines as Potential Molecular Tags: Integrating Bioorthogonal Chemistry with Hyperpolarization and Unearthing *para*-N₂. *Sci. Adv.* **2018**, *4*, eaar2978. ([#]equal contribution)
- Featured at “Duke Research Blog”
- 28 Ortiz, Jr. G. X.,[#] Chansaenpak, K.[#] Wang, M.; Ma, X.; Wang, H.; Li, Z.* Wang, Q.* A Novel ¹⁸F-Labeling Method for the Synthesis of [¹⁸F]-Piperidine-Containing Ligands as Potential PET Radiotracers for Sigma Receptors. *Synlett*, **2018**, *28*, 410–414.
- Contribution to the Cluster *Alkene Halofunctionalization*.
- 27 Shen, K.; **Wang, Q.*** Copper-Catalyzed Aminoalkynylation of Alkenes with Hypervalent Iodine Reagents. *Chem. Sci.* **2017**, *8*, 8265–8270.
- 26 Shen, K.; **Wang, Q.*** Copper-Catalyzed Alkene Aminoazidation as a Rapid Entry to 1,2-Diamines and Installation of an Azide Reporter onto Azaheterocycles. *J. Am. Chem. Soc.* **2017**, *139*, 13110–13116.
- Top 20 Most Read Articles, Sept–Oct 2017
- 25 Hendrick, C. E.; Bitting, K. J. Cho, S. **Wang, Q.*** Site-Selective Copper-Catalyzed Amination and Azidation of Arenes and Heteroarenes via Deprotonative Zincation. *J. Am. Chem. Soc.* **2017**, *139*, 11622–11628.
- 24 Shen, K.;[#] Logan, A.;[#] Colell, J. F. P.;[#] Bae, J.; Ortiz, Jr. G. X.; Theis, T.; Warren, W. S.;* Malcolmson, S.;* **Wang, Q.*** Diazirines as Potential Molecular Imaging Tags: Probing the Requirements for Efficient and Long-Lived SABRE-Induced Hyperpolarization. *Angew. Chem. Int. Ed.* **2017**, *56*, 12112–12116. ([#]equal contribution)
- Selected as Very Important Paper and Featured on the Front Cover.
- 23 Colell, J. F. P. J.; Emondts, M.; Logan, A. W. J.; Shen, K.; Bae, J.; Shchepin, R.; Ortiz, G. X. Jr.; Spanning, P.; **Wang, Q.**; Malcolmson, S.; Chekmenev, E. Y.; Feiters, M.; Rutjes, F.; Bluemich, B.; Theis, T.; * Warren, W. S.* Direct Hyperpolarization of Nitrogen-15 in Aqueous Media with Parahydrogen in Reversible Exchange *J. Am. Chem. Soc.* **2017**, *139*, 7761–7767.

- 22 Ortiz, Jr. G. X.; Hemric, B. N.; **Wang, Q.*** Direct and Selective 3-Amidation of Indoles Using Electrophilic *N*-Benzenesulfonyloxyamides. *Org. Lett.*, **2017**, *19*, 1314–1317.
- Top 20 Most Read Articles, April 2017, Highlighted in *SYNFACTS & Org. Process Res. Dev.*
- 21 Colell, J. F. P. J.; Logan, A. W. J.; Bae, Zhou, Z.; Shchepin, R. V.; Barskiy, D.A.; Ortiz, G. X. Jr.; **Wang, Q.**; Malcolmson, S. J.; Chekmenev, E. Y.; Warren, W. S.; * Theis, T. * Generalizing, Extending, and Maximizing Nitrogen-15 Hyperpolarization induced by Parahydrogen in Reversible Exchange. *J. Phy. Chem. C*, **2017**, *121*, 6626–6634.
- Featured as “Front Cover”, March 30, 2017
- 20 Hendrick, C. E.; **Wang, Q.*** Emerging Developments Using Nitrogen–Heteroatom Bonds as Amination Reagents in the Synthesis of Aminoarenes. *J. Org. Chem.* **2017**, *82*, 839–847.
- Top 20 Most Read Articles, Feb 2017
- 19 Liu, C.; **Wang, Q.*** Arylation, Vinylation and Alkynylation of Electron-deficient (Hetero)arenes with Iodonium Salts. *Org. Lett.* **2016**, *18*, 5118–5121.
- Highlighted in *SYNFACTS*
- 18 Hemric, B. N.; Shen, K.; **Wang, Q.*** Copper-Catalyzed Amino Lactonization and Amino Oxygenation of Alkenes Using *O*-Benzoylhydroxylamines. *J. Am. Chem. Soc.* **2016**, *138*, 5813–5816.
- Top 10 Most Read Articles, May–June 2016, Highlighted in *SYNFACTS*
- 17 Theis, T.; #* Ortiz Jr., G. X.; # Logan, A.; Claytor, K.; Feng, Y.; Kuhn, W.; Blum, V.; Malcolmson, S.; Chekmenev, E. Y.; **Wang, Q.**;* Warren, W. S.* Direct and Cost-efficient Hyperpolarization of Long-lived Nuclear Spin States on Universal ¹⁵N Molecular Tags. *Sci. Adv.* **2016**, *2*, e1501438. (#equal contribution)
- Featured as “Top story” on the NSF Science 360 News, Media report at “Duke Today”
- 16 Hemric, B. N.; **Wang, Q.*** Copper-Catalyzed Intermolecular Oxyamination of Olefins Using Carboxylic Acids and *O*-Benzoylhydroxylamines. *Beilstein J. Org. Chem.* **2016**, *12*, 22–28.
- Contribution to the themed issue “Copper Catalysis in Organic Synthesis”
- 15 Shen, K.; **Wang, Q.*** Copper-Catalyzed Aminotrifluoromethylation of Alkenes: A Facile Synthesis of CF₃-Containing Lactams. *Org. Chem. Front.* **2016**, *3*, 222–226.
- The Inaugural Emerging Investigators Themed Collection
- 14 Chen, Z.; **Wang, Q.*** Synthesis of *o*-Aminophenols via a Formal Insertion Reaction of Arynes into Hydroxyindolinones. *Org. Lett.* **2015**, *17*, 6130–6133.
- 13 McDonald, S. L.; Hendrick, C. E.; Bitting, K. J. **Wang, Q.*** Copper-Catalyzed Electrophilic Amination of Heteroaromatic and Aromatic C–H Bonds via tmpZnCl•LiCl Mediated Metalation. *Org. Synth.* **2015**, *92*, 356–372.
- 12 Shen, K.; **Wang, Q.*** Copper-Catalyzed Diamination of Unactivated Alkenes with Hydroxylamines. *Chem. Sci.* **2015**, *6*, 4279–4283.
- 11 Hendrick, C. E.; **Wang, Q.*** Insertion of Arynes into Nitrogen-Halo Bonds: A Rapid Approach to Novel Antipsychotic *ortho*-Haloaminoarenes. *J. Org. Chem.* **2015**, *80*, 1059–1069.
- 10 McDonald, S. L.; Hendrick, C. E.; **Wang, Q.*** Copper-Catalyzed Electrophilic Amination of Heteroarenes and Arenes by C–H Zincation. *Angew. Chem. Int. Ed.* **2014**, *53*, 4667–4670.
- Highlighted as *SYNFACT of the Month*

- 9 Feng, Y.; Sokol, E.; Del Vecchio, C.; Sanduja, S.; Claessen, J.; Proia, T.; Jin, D.; Reinhardt, F.; Ploegh, H. L.; **Wang, Q.**; Gupta, P.* Epithelial-to-Mesenchymal Transition Activates PERK-eIF2 α and Sensitizes Cells to Endoplasmic Reticulum Stress. *Cancer Discov.* **2014**, *4*, 702–715.
- 8 Wang, B.; Rao, Y.-H.; Inoue, M.; Hao, R.; Lai, C.-H.; McDonald, S. L.; Choi, M.-C.; **Wang, Q.**; Mari Shinohara, M.; Yao, T.-P.* Microtubule Acetylation Amplifies p38 Kinase Signaling and Anti-inflammatory IL-10 Production. *Nat. Commun.* **2014**, *5*, 3479.
- 7 McDonald, S. L.; **Wang, Q.*** α -Amination of Phosphonates: A Direct Synthesis of α -Amino Phosphonic Acids and Derivatives. *Synlett* **2014**, *25*, 2233–2238. (Invited highlight)
- 6 McDonald, S. L.; **Wang, Q.*** Selective α -Amination and α -Acylation of Esters and Amides via Dual Reactivity of *O*-Acylhydroxylamines toward Zinc Enolates. *Chem. Comm.* **2014**, *50*, 2535–2538.
- 5 McDonald, S. L.; **Wang, Q.*** Copper-Catalyzed α -Amination of Phosphonates and Phosphine Oxides: A Direct Approach to α -Amino Phosphonic Acids and Derivatives. *Angew. Chem. Int. Ed.* **2014**, *53*, 1867–1871.
- 4 Ortiz, Jr. G. X.; **Kang, B.**; **Wang, Q.*** One-Pot Synthesis of 3-Azido- and 3-Aminopiperidines by Intramolecular Cyclization of Unsaturated Amines. *J. Org. Chem.* **2014**, *79*, 571–581.
- 3 Feng, Y.; Theis, T.; Liang, X.; Davis, R. M.; **Wang, Q.**; Zhou, P.; Warren, W. S.* Storage of Hydrogen Spin Polarization in Long-Lived $^{13}\text{C}_2$ Singlet Order and Implications for Hyperpolarized Magnetic Resonance Imaging. *J. Am. Chem. Soc.* **2013**, *135*, 9632–9635.
- 2 Hendrick, C. E.; McDonald, S. L.; **Wang, Q.*** Insertion of Arynes into *N*-Halo Bonds: A Direct Approach to *o*-Haloaminoarenes. *Org. Lett.* **2013**, *15*, 3444–3447.
- 1 **Huang, H.-T.**; **Lacy, T. L.**; **Blachut, B.**; Ortiz Jr., G. X.; **Wang, Q.*** An Efficient Synthesis of Fluorinated Azaheterocycles by Aminocyclization of Alkenes. *Org. Lett.* **2013**, *15*, 1818–1821.

RESEARCH REVIEW AND BOOK CHAPTER – INDEPENDENT CAREER

- 4 Cho, S.; Bitting, K. J. **Wang, Q.*** Deprotonative C–H Zincation for Carbon–Carbon Bond Formation. *Handbook of C–H-Functionalization*, Wiley-VCH: 2023.
- 3 Hemric, B. N.; Ku, C.; **Wang, Q.*** (2020) *O*-Benzoyl-*N*-Hydroxylmorpholine. In *Encyclopedia of Reagents for Organic Synthesis*.
- 2 Hill, N.; Du, L.; **Wang, Q.*** DOS-Derived Small-Molecule Probes in Chemical Biology. pp575–617, In *Diversity-Oriented Synthesis: Basics and Applications in Organic Synthesis, Drug Discovery, and Chemical Biology*, Trabocchi, A., Ed. Wiley-VCH: 2013.
- 1 Dass, F. M.; Kemp, M.; Schroeder, F. A.; Wagner, F. F.; **Wang, Q.**; Holson, E. B.* Histone Acetylation and Deacetylation. In *Epigenetic Regulation and Epigenomics*, Editor, Meyers, R. A., Meyers, R. A., Ed. Wiley-VCH: Weinheim, Germany, 2012.

FROM POSTDOCTORAL AND GRADUATE WORK

- 14 Yuan, Y.; Tang, A. J.; Castoreno, A. B.; Kuo, S.-Y.; **Wang, Q.**; Kuballa, P.; Xavier, R.; Shamji, A.; Schreiber, S. L.; Wagner, B. K. Gossypol and an HMT G9a Inhibitor Act in Synergy to Induce Cell Death in Pancreatic Cancer Cells. *Cell Death Dis.* **2013**, *4*, e690.
- 13 Yuan, Y.; [#] **Wang, Q.**; [#] Paulk, J.; Kubicek, S.; Kemp, M.; Adams, D.; Shamji, A.; Wagner, B. K.; Schreiber, S. L. A Small-Molecule Probe of the Histone Methyltransferase G9a Induces Cellular Senescence in Pancreatic Adenocarcinoma. *ACS Chem. Bio.* **2012**, *7*, 1152–1157. ([#]equal contribution, Top 20 Most Read *ACS Chem. Bio.* Articles, May 2012 – May 2013)

- 12 Kemp, M; **Wang, Q.**; Fuller, F. H.; West, N.; Martinez, N. M.; Morsea, El. M.; Weiwera, M.; Schreiber, S. L.; Bradner, J. E.; Koehler, A. K. A Novel HDAC Inhibitor with a Hydroxy-Pyrimidine Scaffold. *Bioorg. Med. Chem. Lett.* **2011**, *21*, 4164–4169.
- 11 **Wang, Q.**; Schreiber, S. L. Copper-Mediated Amidation of Heterocyclic and Aromatic C–H Bonds. *Org. Lett.* **2009**, *11*, 5178–5180. (Top 20 Most Read *Org. Lett.* Articles in Nov – Dec 2009, Highlighted in *Angew. Chem. Int. Ed.* **2010**, *49*, 2282–2285)
- 10 Sun, C.; **Wang, Q.**; Brubaker, J. D.; Wright, P. M.; Lerner, C. D.; Noson, K.; Charest, M.; Siegel, D. R.; Wang, Y.-M.; Myers, A. G. A Robust Platform for the Synthesis of New Tetracycline Antibiotics. *J. Am. Chem. Soc.* **2008**, *130*, 17913–17927.
- 9 Padwa, A.; **Wang, Q.** Synthesis of the Tetracyclic Framework of the Erythrina Alkaloids Using a [4 + 2]-Cycloaddition/Rh(I)-Catalyzed Cascade of 2-Imidofurans. *J. Org. Chem.* **2006**, *71*, 7391–7402.
- 8 Padwa, A.; **Wang, Q.** Rhodium(I)-Catalyzed Nucleophilic Ring-Opening Reactions of Oxabicyclo Adducts Derived from the [4 + 2]-Cycloaddition of 2-Imido-Substituted Furans. *J. Org. Chem.* **2006**, *71*, 3210–3220.
- 7 Padwa, A.; Nara, S.; **Wang, Q.** Additive Pummerer Reaction of Heteroaromatic Sulfilimines with Carbon Nucleophiles. *Tetrahedron Lett.* **2006**, *47*, 595–597.
- 6 Wang, Q.; Padwa, A. Synthesis of Erythrina Alkaloids 3-Demethoxyerythratidinone. Novel Acid-Induced Rearrangements of Its Precursors. *Org. Lett.* **2006**, *8*, 601–604.
- 5 Padwa, A.; Nara, S.; **Wang, Q.** Dichloroketene-Induced Cyclizations of Vinyl Sulfilimines: Application of the Method in the Synthesis of (±)-Desoxyseroline. *J. Org. Chem.* **2005**, *70*, 8538–8549.
- 4 **Wang, Q.**; Nara, S.; Padwa, A. A New Synthesis of γ -Lactams Based on the Reaction of Vinyl Sulfilimines with Dichloroketene. *Org. Lett.* **2005**, *7*, 839–841.
- 3 **Wang, Q.**; Padwa, A. Rh(I)-Catalyzed Ring Opening of an IMDAF-Derived Oxabicyclo cycloadduct as the Key Step in the Synthesis of (±)-*epi*-Zephyranthine. *Org. Lett.* **2004**, *6*, 2189–2192.
- 2 Padwa, A.; Brodney, M. A.; Lynch, S. M.; Rashatasakhon, R.; **Wang, Q.**; Zhang, H. A New Strategy toward Indole Alkaloids Involving an Intramolecular Cycloaddition/Rearrangement Cascade. *J. Org. Chem.* **2004**, *69*, 3735–3745.
- 1 Padwa, A.; Heidelbaugh, T. M.; Kuethe, J. T.; McClure, M. S.; **Wang, Q.** Tandem Pummerer/Mannich Cyclization Cascade of α -Sulfinylamides as a Method to Prepare Aza-Heterocycles. *J. Org. Chem.* **2002**, *67*, 5928–5937.

PATENTS

- 3 Wang, Q.; Park, H. COMPOSITIONS COMPRISING HYPERPOLARIZED PROBES FOR H₂O₂ SENSING AND METHODS OF USING SAME.
- 2 Wang, Q. Compositions as Molecular Tags for Hyperpolarization NMR and Magnetic Resonance and Methods of Making and Using Same.
- 1 Myers, A. G.; Brubaker, J. D.; Sun, C.; Wang, Q. Synthesis of Tetracyclines and Analogues Thereof. (WO/2007/117639).