Joseph R. Clark

Assistant Professor Marquette University TheClarkLab.com Joseph.R.Clark@Marquette.edu

Education

09/2014 – 01/2018	NIH Ruth Kirschstein Postdoctoral Fellow with Prof. M. Christina White University of Illinois, Urbana-Champaign, IL
09/2009 - 08/2014	Ph.D. in Chemistry with Prof. Steven T. Diver University at Buffalo, Buffalo, NY
09/2004 - 05/2008	B.Sc. in Chemistry Minor in Mathematics St. John Fisher College, Rochester, NY

Research Experience and Training

08/2018 - present	Assistant Professor of Chemistry, Marquette University, Milwaukee, WI
09/2014 – 01/2018	University of Illinois , Urbana-Champaign, IL NIH Ruth Kirschstein Postdoctoral Fellow, advisor: Prof. M. Christina White
09/2009 - 08/2014	University at Buffalo (SUNY) , Buffalo, NY Graduate student, advisor: Prof. Steven T. Diver
06/2007 - 08/2007	University at Buffalo (SUNY) , Buffalo, NY NSF-Research Experiences for Undergraduates, advisor: Prof. Steven T. Diver
09/2004 - 05/2008	St. John Fisher College , Rochester, NY Undergraduate student, advisor: Prof. Daniel E. Piccolo

Teaching Experience

Spring 2023	CHEM 4130/5130 Characterization of Organic Compounds, Marquette Univ.
Spring 2022	CHEM 6102 Organic Reactions, Marquette University
Fall 2021	CHEM 2113 Organic Chemistry I for Majors, Marquette University
Spring 2021	CHEM 4130/5130 Characterization of Organic Compounds, Marquette Univ.
Fall 2020	CHEM 2113 Organic Chemistry I for Majors, Marquette University
Spring 2020	CHEM 6931 Organic Synthesis and Methods, Marquette University
Fall 2019	CHEM 2113 Organic Chemistry I for Majors, Marquette University
Fall 2018	CHEM 2113 Organic Chemistry I for Majors, Marquette University
Spring 2016 and 2017	Organometallics Graduate Class, University of Illinois Taught 2 lectures in Spring 2016 and 5 lectures in Spring 2017
2009 – 2011	Organic Laboratory Graduate Teaching Assistant, University at Buffalo

Peer-Reviewed Publications

- 21. Sloane, S. E.; Vang, Z. P.; Nelson, G.; Qi, L.; Sonstrom, R. E.; Alansari, I. Y.; Behlow, K. T.; Pate, B. H.*; Neufeldt, S. R.*; Clark, J. R.* "Precision Deuteration Using Cu-Catalyzed Transfer Hydrodeuteration to Access Small Molecules Deuterated at the Benzylic Position." *JACS Au*, **2023**, *3*, 1583-1589.
- 20. Vang, Z. P.; Sonstrom, R. E.; Scolati, H. N.; Clark, J. R.*; Pate, B. H.* "Assignment of the Absolute Configuration of Molecules That are Chiral by Virtue of Deuterium Substitution Using Chiral Tag Molecular Rotational Resonance Spectroscopy." *Chirality*, **2023**, *Early View* (Invited Submission for Special Issue)
- Sonstrom, R. E.; Vang, Z. P.; Scolati, H. N.; Neill, J. L.; Pate, B. H.*; Clark, J. R.* "Rapid Enantiomeric Excess Measurements of Enantioisotopomers by Molecular Rotational Resonance Spectroscopy." *Org. Process Res. Dev.* 2023, *27*, 1185-1197. (Invited Submission for Special Issue: Advances and Applications in Catalysis with Earth-Abundant Metals)
- 18. Hintzsche, S. H.; Vang, Z. P.; Rivera Torres, E.; Podoski, M.; Clark, J. R.* "Highly Selective Catalytic Transfer Hydrodeuteration of Cyclic Alkenes." *J. Label. Compd. Radiopharm.* **2023**, *66*, 86-94.
- 17. Mills, M. D.; Sonstrom, R. E.; Vang, Z. P.; Neill, J. L.; Scolati, H. N.; West, C. T.; Pate, B. H.*; Clark, J. R.* "Enantioselective Synthesis of Enantioisotopomers with Quantitative Chiral Analysis by Chiral Tag Rotational Spectroscopy." *Angewandte Chemie International Edition* **2022**, *61*, e202207275 (Received the Very Important Paper VIP designation)
- Reyes, A.; Rivera Torres, E.; Vang, Z. P.; Clark, J. R.* "Highly Regioselective Copper-Catalyzed Transfer Hydrodeuteration of Unactivated Terminal Alkenes." *Chemistry – A European Journal* 2022. 28, e202104340 (Featured in Org. Chem. Highlights)
- 15. Sloane, S. E.; Behlow, K. T.; Mills, M. D.; Clark, J. R.* "Three-Component Coupling Reactions that Generate 1,3-Dienes." *Science of Synthesis Knowledge Updates.* **2022**, 2, 389. DOI: 10.1055/sos-SD-146-00001
- 14. Mills, M. D.; Clark, J. R.* "Conjugated Diene Synthesis by Rearrangement of 1,3-Dienes to 1,3-Dienes." *Science of Synthesis Knowledge Updates.* **2022**, *2*, 441. DOI: 10.1055/sos-SD-146-00034.
- Vang, Z. P.; Reyes, A.; Sonstrom, R. E.; Holdren, M. S.; Sloane, S. E.; Alansari, I. Y.; Neill, J. L.; Pate, B. H.; Clark, J. R.* "Copper-Catalyzed Transfer Hydrodeuteration of Aryl Alkenes with Quantitative Isotopomer Purity Analysis by Molecular Rotational Resonance Spectroscopy." *Journal of the American Chemical Society* 2021, 143, 7707-7718.
- Vang, Z. P.; Hintzsche, S. J.; Clark, J. R.* "Catalytic Transfer Deuteration and Hydrodeuteration: Emerging Techniques to Selectively Transform Alkenes and Alkynes to Deuterated Alkanes." *Chemistry – A European Journal* 2021, 27, 9988-10000. (Selected by the editors as an outstanding review-type article)
- 11. Sloane, S. E.; Reyes, A.; Vang, Z. P.; Li, L.; Behlow, K. T.; Clark, J. R.* "Copper-Catalyzed Formal Transfer Hydrogenation/Deuteration of Aryl Alkynes" *Organic Letters* **2020**, *22*, 9139-9144.
- 10. Clark, J. R.* "Challenges Facing Young Scientists in Academia and Industry in the United States from the Lens of a Millennial Academic" *Chemistry A European Journal* **2020**, *26*, 15759-15762.

*Denotes corresponding author

Publications from Postdoctoral, Graduate and Undergraduate Research

- Ide, T.; Feng, K.; Dixon, C.F.; Teng, D.; Clark, J.R.; Han, W.; Wendell, C.I.; Koch, V.; White, M.C. "Late-Stage Intermolecular Allylic C-H Amination. *Journal of the American Chemical Society* 2021, 143, 14969-14975.
- 8. Clark, J. R.; Feng, K.; Sookezian, A.; White, M. C. "Manganese-Catalyzed Benzylic C(sp³)—H Amination for

Late-Stage Functionalization." *Nature Chemistry* **2018**, *10*, 583-591 (Featured on the cover of Nature Chemistry. Also featured in *Chemical and Engineering News* May 7, 2018 p 11).

- 7. Howell, J. M.; Feng, K.; Clark, J. R.; Trzepkowski, L. J.; White, M. C. "Remote Oxidation of Aliphatic C—H Bonds in Nitrogen-Containing Molecules." *J. Am. Chem. Soc.* **2015**, *137*, 14590-14593.
- 6. Diver, S. T.; Clark, J. R. "Ene-Yne Metathesis." Comp. Org. Synth II. 2014, 5, 1302-1356.
- 5. Clark, J. R.; Griffith, J. R.; Diver, S. T. "Ruthenium Hydride Promoted Dienyl Isomerization: Access to Highly Substituted 1,3 Dienes." *J. Am. Chem. Soc.* **2013**, *135*, 3327-3330.
- 4. Clark, J. R.; French, J. M.; Jecs, E.; Diver, S. T. "Geminal Alkene-Alkyne Cross Metathesis Using a Relay Strategy." *Org. Lett.* **2012**, *14*, 4178-4181.
- 3. Clark, J. R.; French, J. M.; Diver, S. T. "Alkene Metathesis Approach to β-Unsubstituted Anti-Allylic Alcohols and Their Use in Ene-Yne Metathesis." *J. Org. Chem.* **2012**, 77, 1599-1604.
- 2. Clark, J. R.; Diver, S. T. "Atom Economy in the Metathesis Cross-Coupling of Alkenes and Alkynes." *Org. Lett.* **2011**, *13*, 2896-2899.
- 1. Clark, D. A.; Clark, J. R.; Diver, S. T. "Alkenol-Alkyne Cross Metathesis." Org. Lett. 2008, 10, 2055-2058.

Ongoing, Completed, and Pending Research Grants

<u>Ongoing</u>

"Reaction Development and Advancing Spectroscopic Analysis for Selective Labeling and Radiolabeling of Small Molecules." NSF CAREER: Awarded \$650,000. 7/01/2023-6/30/2028. Role: Primary PI

"Highly Selective Cu-Catalyzed Reactions for Precision Deuteration and Alkyne Hydrofunctionalization." NIH ESI MIRA 1R35GM147441-01: Awarded \$1,848,854. 7/15/2022-6/30/2027. Role: Primary PI

"Molecular Rotational Resonance Spectroscopy Instrumentation for the Quantification and Characterization of Enantioisotopomers." NIH ESI MIRA Supplement 3R35GM147441-02S1: Awarded \$250,000. 7/01/2023-6/30/2024. Role: Primary PI

"Development of Selective Cu-Catalyzed Alkene and Alkyne Functionalization Reactions." American Chemical Society Petroleum Research Fund 65384-DNI1: Awarded \$110,000. 7/01/2022-8/31/2024. Role: Primary PI

"Implementation of multi-outcome experiments and benchtop NMR across all organic chemistry laboratory sections." Marquette University College of Arts and Sciences Mellon Grant. Awarded \$22,000. 7/01/2022-6/30/2024. Role: Primary PI

"Way Klingler Early Career Award." Marquette University: Awarded a one-semester teaching release and \$2,000 for research expenditures. 4/05/2022-6/30/2023.

<u>Completed</u>

"Regioselective Cu-Catalyzed Transfer Hydrodeuteration of Alkenes and Alkynes." Extreme Science and Engineering Discovery Environment XSEDE: Awarded \$685.36. 3/3/2021-3/2/2022. Role: Primary PI

"New Method Development Towards the Synthesis of Bioactive Myrioneuron Alkaloid Natural Products." Marquette University Regular Research Grant: Awarded \$6,000. 1/01/2020-6/30/2021.

"A General Intermolecular Benzylic C-H Amination Employing an Earth Abundant Metal." NIH F32 Ruth Kirschstein Postdoctoral Fellowship: Awarded \$56,868. 9/16/2016-9/15//2017.

Patents

Clark, J. R.; Vang, Z.P.; Mills, M.; Reyes, A.; Sloane, S. E.; Rivera Torres, E.; "Selective Transition Metal Catalyzed Deuterium Incorporation into Alkyne and Alkene Functionalities." PCT/US2021/057608, *Published May 5, 2022. WO 2022/094420 A1.*

Clark, J. R.; Feng, K.; Sookezian, A.; White, M. C. "Manganese (III) catalyzed C—H aminations." US Patent # 10611786. 04/07/2020.

Honors

April 2022	Way Klingler Early Career Award . Highly competitive award given by Marquette University to promising faculty scholars in their early career. Includes a one semester teaching sabbatical and \$2,000 in research support.
May 2019	Senior Award . Presented by CheMU (Marquette Chemistry). An award given by undergraduate chemistry majors to one professor in recognition of teaching excellence and developmental guidance of future scientists.
February 2018	Poster Award . 11 th CaRLa Winter School. One of three attendees selected by the CaRLa committee for the best verbal and poster presentation at the conference.
November 2017	Dr. T. M. Balthazor Poster Award . Beak-Pines Allerton Conference, UIUC. Awarded to the individual with an outstanding poster presentation.
October 2017	C. S. Marvel Postdoctoral Travel Award, UIUC A departmental travel award given to exceptional postdoctoral researchers to present their research at an ACS conference or Gordon Research Conference.
Spring - Summer 2013	Silbert Fellowship , University at Buffalo Awarded to one outstanding Chemistry doctoral student in their last year of study and covers full tuition and stipend
Summer - Fall 2012	Speyer Fellowship , University at Buffalo Awarded to exceptional doctoral students for outstanding character and scholarship and covers full tuition and stipend
Fall 2010	Mattern-Tyler Teaching Award , University at Buffalo Awarded for excellence in teaching
Spring 2007	American Chemical Society Analytical Chemistry Student of the Year Awarded for excellence in analytical chemistry at St. John Fisher College

Selected Presentations

Clark, J.R. "Precision Deuteration of Small Molecules" *Heterocyclic Compounds Gordon Research Conference*. June 18-23, 2023. Flash Presentation and Poster Presentation.

Clark, J.R. "Precision Labeling of Small Molecules." *International Isotope Society, European Division* 26th *Workshop on "The Synthesis and Applications of Isotopes and Isotopically Labelled Compounds."* May 12, 2023.

Clark, J.R. "Quantitative Analysis of Precision Deuteration Reaction Products Using Molecular Rotational Resonance (MRR) Spectroscopy." *International Isotope Society, European Division 26th Workshop on "The Synthesis and Applications of Isotopes and Isotopically Labelled Compounds.*" May 11, 2023. This was the keynote talk for the "Analytical Workshop Special." Invited Lecture

Clark, J.R. "Precision Labeling of Small Molecules" *University of Wisconsin, Madison.* April 28, 2023. Invited Departmental Seminar.

Clark, J.R. "Precision Labeling of Small Molecules" *University of Puerto Rico NIH RISE Program Circulo de Quimica*. University of Puerto Rico, Cayey. Cayey, Puerto Rico. November 16, 2022. Invited lecture.

Clark, J.R. "Precision Labeling of Small Molecules" *University at Buffalo SUNY*. November 11, 2022. Invited Departmental Seminar.

Clark, J.R. "Precision Labeling of Small Molecules" *Florida State University.* October 20, 2022. Invited Departmental Seminar.

Clark, J.R. "Precision Labeling of Small Molecules" *University of Wisconsin-Milwaukee*. October 14, 2022. Invited Departmental Seminar.

Clark, J.R. "Cu-Catalyzed Reactions for Precision Deuteration of Small Molecules" *Gordon Research Conference on Stereochemistry.* July 2022. Poster Presentation.

Clark, J.R. "Precision Labeling of Small Molecules" *14th International Symposium on the Synthesis and Applications of Isotopically Labelled Compounds.* June 14, 2022. Invited lecture.

Clark, J.R. "New Transition Metal Catalysis to Expand the Drug Discovery Toolbox" *University of Puerto Rico NIH RISE Program Circulo de Quimica*. University of Puerto Rico Cayey. Cayey, Puerto Rico. February 25, 2022. Invited lecture.

Clark, J.R. "Precision Labeling of Small Molecules" FloHet. March 8, 2022. Oral presentation.

Clark, J.R. "Synthesis and Characterization of Selectively Deuterated Small Molecules." 2021 MRR Symposium and Workshop. March 30, 2021. Invited lecture. http://www.brightspec.com/mrr-symposium-and-workshop/

Clark, J.R. "New Transition Metal Catalysis to Expand the Drug Discovery Toolbox" *University of Puerto Rico NIH RISE Program Circulo de Quimica*. University of Puerto Rico Cayey. Cayey, Puerto Rico. November 24, 2020. Invited lecture.

Clark, J.R. "Research Opportunities at Marquette University." ACCA Collaborative Meeting, Benedictine University, Lisle, IL. February, 29, 2020. Invited lecture.

Clark, J.R. "Research Opportunities at Marquette University." *University of Puerto Rico NIH RISE Program Circulo de Quimica*. University of Puerto Rico Cayey. Cayey, Puerto Rico. November 26, 2019. Invited lecture.

Clark, J.R. "Choosing a Career in Chemistry and Research and New Organic Chemistry Method Development and Synthesis." St. Catherine University. St. Paul, Minnesota. November 8, 2019. Invited lecture.

Clark, J.R. "First-Row Transition Metal Catalysis: Site-Selective Copper-Catalyzed Deuterium Incorporation into Small Molecules." Alfred R. Bader Award Keynote Lecturer. The keynote speaker for the prestigious Bader Award in synthetic organic chemistry at MilliporeSigma located Milwaukee, WI. September 12, 2019. Invited lecture

Clark, J.R. "Exploring Bioactive Molecule Synthesis and Modification to Develop New Medicines." *University of Puerto Rico NIH RISE Program Círculo de Quimica*. University of Puerto Rico Cayey. Cayey, Puerto Rico. November 27, 2018. Invited lecture.

Clark, J. R.; Feng, K.; Sookezian, A.; White, M. C. "Manganese-Catalyzed Benzylic C(sp³)—H Amination for Late-Stage Functionalization." *Natural Products and Bioactive Compounds Gordon Research Conference*. Proctor Academy. Andover, NH, July 29-August 3, 2018. (Poster Presentation) This presentation was selected for a flash presentation on July 30.

Clark, J.R "Exploring Bioactive Molecule Synthesis and Modification to Develop New Medicines." *Future Pharmacists Association*. University of Puerto Rico Cayey, Cayey, Puerto Rico, May 17, 2018. Invited lecture.

Clark, J.R.; Santiago Capeles, L. "How Pursuing an Advanced Degree in Chemistry Can Open the Doors to a Career in Academics or the Pharmaceutical Industry." *University of Puerto Rico NIH RISE Program Circulo de Quimica*. University of Puerto Rico Cayey. Cayey, Puerto Rico, March 20, 2018. Invited lecture.

Clark, J. R.; White, M. C. "Manganese-Catalyzed Benzylic C(sp³)—H Amination for Late-Stage Functionalization." *C.S. Marvel Postdoctoral Travel Award.* University of Illinois Urbana-Champaign, IL, March 1, 2018. Invited lecture to receive the travel award.

Clark, J. R.; Feng, K.; Sookezian, A.; White, M. C. "Manganese-Catalyzed Benzylic C(sp³)—H Amination for Late-Stage Functionalization." *11th CaRLa Winter School*. Heidelberg, Germany, February 18-23, 2018. (Poster Presentation)

Clark, J. R.; Feng, K.; Sookezian, A.; White, M. C. "Manganese-Catalyzed Benzylic C(sp³)—H Amination for Late-Stage Functionalization." Beak-Pines Allerton Conference, University of Illinois Urbana-Champaign, Champaign, IL, November 11, 2017. (Received Award for Best Poster Presentation)

Clark, J. R.; Diver, S. T.; White, M. C. "From Ruthenium Carbenes to Base Metal Oxos and Nitrenes: Using Transition Metal Catalysis to Advance Synthetic Methods." *Invited lecture*. Organic Chemistry Seminar Series, University at Buffalo SUNY, Buffalo, NY, October 10, 2017. (Oral Presentation)

Clark, J. R.; Howell, J. M.; Feng, K.; Trzepkowski, L. J.; White, M. C. "Oxidizing Fishy Compounds." *Invited lecture*. The Burkett Lecture Series, DePauw University, IN, September 2016. (Oral Presentation)

Clark, J. R.; Diver, S. T. "Progress Toward Advancing the Utility of Cross Ene-Yne Metathesis for Broader Use in Complex Molecule Design," *245th ACS National Meeting*, New Orleans, LA, April 2013. (Oral Presentation)

Clark, J. R.; Diver, S. T. "Relay Strategies for Olefin and Ene-yne Metathesis to Access New Compounds" *Invited talk*. St. John Fisher College, February 2013. (Oral Presentation)

Clark, J. R.; Diver, S. T. "Progress Toward Advancing the Utility of Cross Ene-Yne Metathesis for Broader Use in Complex Molecule Design" *UB Graduate Student Symposium (GSS)*, Buffalo, NY. Spring 2012, (Oral Presentation)

Clark, J. R.; Diver, S. T. "Atom Economy in the Metathesis Cross-Coupling of Alkenes and Alkynes." *UB Graduate Student Symposium (GSS)*, Buffalo, NY. Spring 2011, (Oral Presentation)

Clark, J. R.; Diver, S. T. "Achieving True Atom Economy in Ene-Yne Metathesis." *UB Graduate Student Symposium (GSS)*, Buffalo, NY. Spring 2010, (Poster Presentation)

Mentoring Experience

Marquette University, Research Group

- Current Graduate Researchers: Samantha Sloane, Sam Hintzsche, Dana Stambekova, Emanuel Rivera Torres, Lihan Qi, Aniel Rivera Arzola, Erik Hensle, Gabriel Garcia Padin, Moataz Hendi, Nazanin Farmanbordar (joining Fall 2023), Ali Yadegari (joining Fall 2023)
- Current Undergraduate Researchers: Cristian Morales Borges, Katie Smith, Carolina Marcano Santiago, Mykaela Podoski, Olivia Smetana, Isaac Anderson, Jasmine Murray
- Previous Research Associates: Albert Reyes, Emanuel Rivera Torres
- Previous Postdoctoral Researchers: Dr. Lingzi Li
- Previous Undergraduate Researchers: Elisabeth Solis, Chrissy Fox, Maria Velarde Villalaz, Aniel J Rivera Arzola, Nicole Colón Rosa, Emanuel Rivera Torres, Sam Hintzsche, Nick Hansen, Genesis Chase, Jordan McCurdy, Albert Reyes, Priyanka Trivedi, Olivia Flores, Raul Diaz Santiago, Isabella Alansari,

Gustavo Porrata Caraballo, Janiennid Alicea Tirado, Daniel Bohar

- Previous Milwaukee High School Researchers: Olivia Starich
- Previously Mentored Graduated Students: Zoua Pa Vang PhD (2023), Mitchell M. Mills MS (2022), Kiera Behlow MS (2021)

University of Illinois Urbana-Champaign, White Research Group

• PhD Students Mentored (6): Kaibo Feng, Chloe Wendell, Rachel Chambers, Jon Young, Vanessa Koch, Tyler Smolczyk

University at Buffalo, Diver Research Group

- PhD Students Mentored (2): Justin R. Griffiths, Synthia Gratia
- Undergraduate Students (4): Victoria Jaynes, Almedina Redzematovic, Nellieane Figueroa, Enzo Benfanti.

University at Buffalo, Department of Chemistry

• Research Experience for Undergraduates (NSF-REU) Coordinator (Summer 2014)

Service

Marquette Chemistry NMR Facility Co-Director: March 2022 - September 2022

Undergraduate Committee: July 2020 - July 2021

NMR oversight committee: July 2020 – Present

Faculty Search Committee (Department of Chemistry): Fall 2019, Spring 2021, Spring 2022 (2x), Fall 2023

Chemistry Undergraduate Advisor: July 2019 - Present

Graduate Recruiting Committee (GRAC): July 2018 - July 2021, July 2022 - present

CheMU Advisor: Fall 2018 - Fall 2019, July 2021 - present

Volunteer for abstract review for the Annual Biomedical Research Conference for Minority Students (ABRCMS) 2020

Chemistry demonstration for elementary school students in the city of Milwaukee school district. September 25, 2019 and October 3, 2018

External Reviewing

Funding Agencies: ACS PRF ad hoc reviewer

Journals: AAAS, Science AAAS, Science Advances Wiley-VCH, Angewandte Chemie International Edition (top 10% of reviewers in 2022) Wiley-VCH, Journal of Labelled Compounds and Radiopharmaceuticals Wiley-VCH, Chemistry a European Journal Wiley-VCH, Chemistry a European Journal Wiley-VCH, Asian Journal of Organic Chemistry Wiley-VCH, European Journal of Organic Chemistry Wiley-VCH, ChemistrySelect American Chemical Society, Journal of the American Chemical Society American Chemical Society, JACS Au American Chemical Society, Organic Letters

American Chemical Society, *ACS Catalysis* American Chemical Society, *Organometallics* Royal Society of Chemistry, *RSC Advances* Thieme, *Synlett* MDPI, *Catalysts*

Languages

English: Native speaker Spanish: fluent in conversation