

Jacob Preston Troutman, Ph.D.

Assistant Professor
Department of Chemistry
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EDUCATION

University of Texas at Austin, Austin, Texas December 2022
Ph.D. in Civil Engineering
“Molecular tailoring of noble metal catalysts for hydrogenation of aqueous oxyanion contaminants.”
Advisor: Charles J. Werth
Graduate Portfolio in Food-Energy-Water Systems
Graduate Portfolio in Science & Technology Professional Development

University of Texas at Austin, Austin, Texas June 2018
M.S.E. in Civil Engineering

Wingate University, Wingate, North Carolina June 2017
B.S. in Chemistry, *summa cum laude*
B.S. in Mathematics, *summa cum laude*

PROFESSIONAL EXPERIENCE

Assistant Professor, August 2023 – Present
Department of Chemistry, Augsburg University, Minneapolis, MN

Post-doctoral Research Associate, January 2023 – June 2023
Department of Civil, Architectural, and Environmental Engineering & Department of Chemistry,
University of Texas at Austin, Austin, TX

Adjunct Professor, September 2021 – December 2021
Experiential Engineering Education, Rowan University, Glassboro, NJ

Graduate Research Assistant, August 2017 – December 2022
Department of Civil, Architectural, and Environmental Engineering, University of Texas at Austin,
Austin, TX

Laboratory Assistant, August 2015 – May 2017
Department of Chemistry, Wingate University, Wingate, NC

MENTORSHIP

7. Bjorn Solberg, August 2023 – Present, B.S. Physics and Mathematics
Undergraduate at Augsburg University
6. Jingwen Xu, August 2022 – June 2023, B.S. Environmental Engineering
Undergraduate at the University of Texas at Austin

5. Morgan Marinelli, September 2022 – December 2022, B.S. Chemical Engineering Undergraduate at the University of Texas at Austin
4. Kiet Luan, May 2020 – August 2021, B.S. Physics and Mathematics Undergraduate at the University of Texas at Austin
3. Alison Hadix, May 2019 – May 2020, M. S. Environmental and Water Resources Engineering Master's student at the University of Texas at Austin
2. Benjamin Kienzle, September 2018 – December 2018, B.S. Civil Engineering Undergraduate at the University of Texas at Austin
1. Bridget Anger, June 2018 – August 2018, B.S. Chemical Engineering Environmental Science Institute REU participant at the University of Texas at Austin

PUBLICATIONS – <https://orcid.org/0000-0002-2026-8886>

Google scholar: <https://scholar.google.com/citations?user=2pfGb20AAAAAJ&hl=en&oi=ao>

* denotes student mentored by me

† denotes equal authorship

‡ denotes presenter

Peer-reviewed Articles

- J6. †**Troutman, J. P.**; †Restivo, J.; Ha, H.; Bajalan, Z.; Brady, C. E.; Vigil-Hernandez, C.; Costa, J. M. B.; Barbosa, J. R.; Orge, C. A.; Pereira, M. F. R.; Humphrey, S. M.; Henkelman, G.; Werth, C. J.; Soares, O. S. G. P. Design of nanostructured bimetallic catalysts for the cost-efficient reduction of bromate in drinking water. *Appl. Catal. A Gen.*, **2024**, *676*, 119654. DOI: 10.1016/j.apcata.2024.119654.
- J5. †**Troutman, J. P.**; †Jagganath, S. P. M.; Li, H.; Henkelman, G.; Humphrey, S. M.; Werth, C. J. Tuning the selectivity of nitrate reduction via fine composition control of RuPdNP catalysts. *Small*, **2024**, *accepted*. DOI: 10.1002/smll.202308593.
- J4. †Cooper, C. M.; †**Troutman, J. P.**; Awal, R.; Habibi, H.; Fares, A. Climate change-induced variations in blue and green water usage in U.S. urban agriculture. *J. Clean. Prod.*, **2022**, *348*, 131326. DOI: 10.1016/j.jclepro.2022.131326.
- J3. Werth, C. J.; Yan, C.; **Troutman, J. P.** Factors Impeding Replacement of Ion Exchange with (Electro)Catalytic Treatment for Nitrate Removal from Drinking Water. *ACS ES&T Eng.*, **2021**, *1(1)*, 6–20. DOI: 10.1021/acsestengg.0c00076. (*Selected as one of the winners for the 2021 ACS ES&T Engineering Best Paper Award.*)
- J2. †**Troutman, J. P.**; †Li, H.; *Haddix, A. M.; *Kienzle, B. A.; Henkelman, G.; Humphrey, S. M.; Werth, C. J. PdAg Alloy Nanocatalysts: Toward Economically Viable Nitrite Reduction in Drinking Water. *ACS Catal.* **2020**, *10(14)*, 7979–7989. DOI: 10.1021/acscatal.0c01538.
- J1. Dong, Y.; Mosquera-Giraldo, L. I.; **Troutman, J. P.**; Skogstad, B.; Taylor, L. S.; Edgar, K. J. Amphiphilic hydroxyalkyl cellulose derivatives for amorphous solid dispersion prepared by olefin cross-metathesis. *Polym. Chem.*, **2016**, *7(30)*, 4953–4963. DOI: 10.1039/C6PY00960C.

Peer-reviewed Conference Proceedings

- C1. ‡**Troutman, J. P.**; ‡Riley, D. R.; Mallouk, K. E. (2022, June), *Visualizing Stress and Relief: How stressors and coping mechanisms interact in engineering graduate student experiences* Paper presented at 2022 ASEE Annual Conference & Exposition, Minneapolis, MN.

Presentations

- P9. ‡**Troutman, J. P.**; Cooper, C. M.; Awal, R.; Habibi, H.; Fares, A. “Climate change-induced variations in blue and green water usage in U.S. urban agriculture.” Planet Texas 2050 Research Symposium in Austin, TX. April 2022. Poster Presentation.
- P8. ‡**Troutman, J. P.**; Mantha, J.; Henkelman, G.; Humphrey, S. M.; Werth, C. J. “Alloyed ruthenium nanoparticle catalysts for tunable selectivity during nitrate reduction.” ACS Spring 2022 National Meeting and Exposition in San Diego, CA. March 2022. Oral Presentation.
- P7. ‡Brady, C. E.; **Troutman, J. P.**; Vigil Hernandez, C.; Humphrey, S. M.; Werth, C. J. “Reduction and removal of water contaminants through the use of mono-metallic and bi-metallic nanoparticles via catalytic hydrogenation.” ACS Spring 2022 National Meeting and Exposition in San Diego, CA. March 2022. Poster Presentation.
- P6. ‡Cooper, C.; ‡**Troutman, J. P.**; Klopfenstein, L. A.; Werth, C. J. “INFEWS Scholar Program: A National Science Foundation Research Traineeship Program.” 2019 NSF Research Traineeship (NRT) Annual Meeting in Evanston, IL. September 2019. Poster Presentation.
- P5. ‡**Troutman, J. P.**; Humphrey, S. M.; Werth, C. J. “Bimetallic PdAg nanoparticles for sustainable nitrite reduction in drinking water.” ACS Fall 2019 National Meeting and Exposition in San Diego, CA. August 2019. Oral Presentation.
- P4. Kunal, P.; Roberts, E.; Riche, C.; Li, H.; Yan, C.; **Troutman, J. P.**; Guo, H.; Duncan, M.; Malmstadt, N.; Brutchey, R.; Werth, C.; Henkelman, G.; ‡Humphrey, S. “Synthesis and catalytic applications of Rh multipod nanoparticles using flow methods and CuM, (M= Rh, Pd) bimetallic nanoparticles in batch reactors under microwave heating.” ACS Fall 2018 National Meeting and Exposition in Boston, MA. August 2018. Oral Presentation.
- P3. ‡Free, D.; **Troutman, J. P.**; Dahm, C. “Development of an inexpensive emission spectrometer for the detection of easily ionizable elements.” 68th Annual Southeastern Meeting of the ACS in Columbia, SC. October 2016. Poster Presentation.
- P2. ‡**Troutman, J. P.**; Dong, Y.; Edgar, K. J. “Creating functional variety in hydroxypropyl cellulose using olefin cross-metathesis.” 2015 Polymers in Medicine and Biology Workshop in Santa Rosa, CA. September 2015. Poster Presentation.
- P1. ‡**Troutman, J. P.**; Griffin, M.; Thompson, G. D.; Dahm, C. E. “Inexpensive emission spectroscopy.” 66th Annual Southeastern Meeting of the ACS in Nashville, TN. October 2014. Poster Presentation.

GRANTS AND FUNDING PROPOSALS

- G1. NSF-CBET, SusChem: Non-precious metal substitution into hydrogenation metal alloy catalysts deposited onto redox active supports for facile nitrate destruction in drinking water, 2019–2022 (PI: Werth, Co-PI: Humphrey, Co-PI: Henkelman), \$343,000. Funded. *Assisted in literature review for various research aspects of proposal, and in expanding/editing different sections.*

RESEARCH PROJECTS

University of Texas at Austin

Supported RuPdNPs for Selective NO₃⁻ Reduction

May 2020 – June 2023

Funded by NSF CHE-1807847 and NSF CBET-1922504.

I explored how the composition of Ru_xPd_{100-x}NPs affects selectivity towards ammonium (NH₄⁺) versus N₂ during nitrate (NO₃⁻) reduction. Typical catalysts for NO₃⁻ reduction utilize palladium (Pd) in tandem with a promoter metal to form N₂. Ruthenium (Ru), however, is able to directly reduce NO₃⁻ without the use of a promoter metal; Ru also displays complete selectivity for NH₄⁺. We are exploring if the selectivity of these two metals can be tuned by finely controlling the composition, allowing researchers to target one end-product versus another.

Mechanisms for Catalytic Enhancement during BrO₃⁻ Reduction via PdCu and PdAg Catalysts

January 2021 – December 2023

Funded by ...

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Alloyed PdAg Nanoparticles for NO₂⁻ Removal

August 2017 – May 2020

Funded by NSF CHE-1807847 and NSF CBET-1922504.

I investigated the use of novel nanomaterials for water treatment. I synthesized bimetallic alloyed nanoparticles consisting of palladium, Pd, and silver, Ag, which were then tested as catalysts to reduce the aqueous pollutant nitrite (NO₂⁻) for drinking water treatment. I investigated the use of microwave heating as a quick, efficient method for nanoparticle growth in order to study the effects of nanoparticle composition and size on reaction kinetics within the treatment process. Additionally, I conducted preliminary studies on how support effects combine with alloy effects to improve NO₂⁻ reduction. This work resulted in a published manuscript (DOI: 10.1021/acscatal.0c01538).

Wingate University

An Inexpensive Emission Spectrometer

August 2014 – August 2017

An inexpensive emission spectrometer was developed and built by faculty in the Chemistry Department at Wingate University. I performed preliminary studies of the capabilities of the instrument in atomic emission spectroscopy, as well as phosphorescence and chemiluminescence. After preliminary experiments, I conducted more in-depth analysis of the device's limits using chemiluminescent kinetic studies.

Macromolecules and Interfaces Institute, Virginia Tech University

Functional Derivatives of Cellulose

May 2015 – August 2015

As part of an NSF-funded summer research experience for undergraduates (REU), I worked with Yifan Dong and Dr. Kevin Edgar to investigate the use of olefin cross-metathesis as a means of creating functional derivatives of hydroxypropyl cellulose. I participated in the laboratory, performing synthesis reactions and characterizing products. These polymers were then tested as potential drug delivery material for a method known as amorphous solid dispersion (ASD). This work helped contribute to a published manuscript (DOI: 10.1039/C6PY00960C).

PROFESSIONAL MEMBERSHIP & DEVELOPMENT

Active Participation in the following professional organizations:

3. American Society for Engineering Education (ASEE), 2021 – Present
2. National Center for Faculty Development & Diversity, 2021 – Present
1. American Chemical Society (ACS), 2016 – Present

Participated in the following courses and workshops:

4. Teaching for Disability Accommodations. *A workshop sponsored by the Civil, Architectural, and Environmental Engineering Graduate Student Advisory Board designed to bring focus to the challenges and solutions for providing disability accommodations.* Completed September 2022.
3. Inclusive Mentoring of Undergraduate Researchers in STEM Workshop. *A workshop led by members of the NSF HRD-sponsored Louis Stokes IM STEM Center of Excellence designed to help mentors of undergraduate researchers adopt more inclusive practices.* Completed June 2022.
2. Mental Health First Aid Training. Completed December 2021.
1. The Inclusive STEM Teaching Project. *An NSF DUE-sponsored online course designed to advance ability and awareness for cultivating inclusive STEM learning environments.* Completed December 2021.

LEADERSHIP & SERVICE

Leadership

Graduate Student Advisory Board, Department of Civil, Architectural, and Environmental Engineering, University of Texas at Austin
Board Member, May 2020 – Aug 2021

Environmental and Water Resources Engineering Seminar, Department of Civil, Architectural, and Environmental Engineering, University of Texas at Austin
Committee Member, Aug 2019 – May 2020

Student-Athlete Advisory Committee, Wingate University
Men's Cross Country Representative, Aug 2015 – May 2017

Service

CAEE GsAB Mentorship Program, Civil, Architectural, and Environmental Engineering, University of Texas at Austin
Aug 2021 – Present

Explore UT, University of Texas at Austin
March 2019

Xcel 2 Fitness: The Big Event, Indian Trail, Union County, NC
Nov 2015 & Nov 2016

United Way Day of Caring, Wingate, Union County, NC
Aug 2015, Aug 2016

AWARDS & HONORS

Academic

- 2021 ACS ES&T Engineering Best Paper Award** September 2022
Factors Impeding Replacement of Ion Exchange with (Electro)Catalytic Treatment for Nitrate Removal from Drinking Water (J3)
- Schmidt Science Fellowship Post Doctoral Fellowship Nominee** May 2022
The University of Texas at Austin
- Graduate School Professional Development Award** April 2022
The University of Texas at Austin
- National Science Foundation INFEWS Scholar Program** Aug 2019 – Aug 2021
The University of Texas at Austin
- Thrust 2000 Graduate Fellowships in Engineering** Aug 2017 – Aug 2021
The University of Texas at Austin
- Senior Chemistry Award** April 2017
Wingate University
- Senior Mathematics Award** April 2017
Wingate University
- Phi Eta Sigma National Honor Society** Inducted Fall 2014
Wingate University

Athletic

- Academic All-America Team** May 2017
College Sports Information Directors of America
- Track and Field Elite 18 Award** May 2017
South Atlantic Conference of the NCAA Division II
- Men's Track and Field Scholar Athlete of the Year** May 2017
South Atlantic Conference of the NCAA Division II
- Academic All-District III** May 2017, May 2016, May 2015
College Sports Information Directors of America
- All-Academic Individual Award** November 2015
US Track and Field and Cross Country Coaches Association