Jacob Preston Troutman

The University of Texas at Austin
Department of Civil, Architectural, and Environmental Engineering
ECJ 9.222, 301 E. Dean Keeton St, Stop C1700, Austin, TX 78712

ja.troutman@utexas.edu
www.troutmanja.com
Phone: +1 (910) 315-6572

EDUCATION

University of Texas at Austin, Austin, Texas — 2019 – Present
Ph.D. in Civil Engineering, Anticipated May 2023
GPA: 3.918/4.000

University of Texas at Austin, Austin, Texas — 2017 – 2019
M.S.E. in Civil Engineering, May 2019

Wingate University, Wingate, North Carolina — 2013 – 2017
B.S. in Chemistry, *summa cum laude*, May 2017
B.S. in Mathematics, *summa cum laude*, May 2017

TEACHING & ADVISING EXPERIENCE

Teaching

5. *Adjunct Professor*, Experiential Engineering Education, Rowan University, Glassboro, NJ
   First-Year Engineering Clinic I, Fall 2021
4. *Guest Lecturer*, Civil, Architectural, and Environmental Engineering, University of Texas at Austin, Austin, TX
   Hazardous Waste Management, Fall 2020
3. *Teaching Assistant*, Chemistry, University of Texas at Austin, Austin, TX
   Introduction to Chemical Practice, Spring 2019
2. *Teaching Assistant*, Civil, Architectural, and Environmental Engineering, University of Texas at Austin, Austin, TX
   First-Year Seminar in Environmental Engineering, Fall 2018
1. *Laboratory Assistant*, Chemistry, Wingate University, Wingate, NC
   General Chemistry, Fall 2015 – Spring 2017

Mentoring

4. *Kiet Luan*, Undergraduate Research, University of Texas at Austin, Austin, TX
   May 2020 – August 2021
3. *Alison Haddix*, Master's Thesis, University of Texas at Austin, Austin, TX
   May 2019 – May 2020
2. *Benjamin Kienzle*, Undergraduate Research, University of Texas at Austin, Austin, TX
   Sep 2018 – Dec 2018
1. *Bridget Anger*, Environmental Science Institute REU, University of Texas at Austin, Austin, TX
   June 2018 – August 2018

SCHOLARSHIP

Funded Grants

1. 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.*

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

Google scholar: https://scholar.google.com/citations?user=2pfGb20AAAAJ&hl=en&oi=ao
* denotes student mentored by me
† denotes equal authorship
‡ denotes presenter

Peer-reviewed Articles

4. †Cooper, C. M.; †**Troutman, J. P.**; Awal, R.; Habibi, H.; Fares, A. Climate Change-Induced Blue and Green Water Usage Variations in Urban Agriculture. *J. Clean. Prod.*, **2022**, *348*, 131326. DOI: 10.1016/j.jclepro.2022.131326.
3. 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¡/a¿.
2. †**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.
1. 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

1. **Troutman, J. P.**; Riley, D. R.; Mallouk, K. E. Visualizing Stress and Relief: How stressors and coping mechanisms interact in engineering graduate student experiences. Accepted for *ASEE 2022 Annual Conference* in Minneapolis, MN. June 2022.

Presentations

9. ‡**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.
8. ‡**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.
7. ‡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.
6. ‡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.

5. ‡**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.
4. 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.
3. ‡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.
2. ‡**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.
1. ‡**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.

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:

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

RESEARCH PROJECTS

Environmental and Water Resources Engineering, University of Texas at Austin

Graduate Research Assistant – Supported PdAuNPs and PdAgNPs for NO_3^- Destruction
May 2021 – Present
Funded by NSF CHE-1807847 and NSF CBET-1922504.
I am investigating how the material design of catalysts (*e.g.*, loading rates, alloy composition, support material) impacts the reduction of NO_3^- by supported alloy Pd nanoparticles. It has recently been shown that alloying palladium (Pd) with either gold (Au) or silver (Ag) as nanoparticles can promote the reduction of aqueous NO_2^-. However, it is unknown how such materials will behave in tandem with oxophilic promoter metals (PM) for NO_3^- reduction. The rate of oxygen abstraction by the PM and the rate of re-reduction by spillover hydrogen could both potentially limit the overall rate of NO_3^- reduction.

Graduate Research Assistant – Supported RuPdNPs for Selective NO_3^- Reduction
May 2020 – Present
Funded by NSF CHE-1807847 and NSF CBET-1922504.
I am exploring how the composition of $Ru_xPd_{100\text{-}x}$NPs affects selectivity towards ammonium (NH_4^+) versus N_2 during nitrate (NO_3^-) reduction. Typical catalysts for NO_3^- reduction utilize palladium (Pd) in tandem with a promoter metal to form N_2. Ruthenium (Ru), however, is able to directly reduce NO_3^- without the use of a promoter metal; Ru also displays complete selective for NH_4^+. 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.

Graduate Research Assistant – Alloyed PdAg Nanoparticles for NO_2^- 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 (NO_2^-) 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 NO_2^- reduction. This work resulted in a published manuscript (DOI: 10.1021/acscatal.0c01538).

Department of Chemistry, Wingate University

Undergraduate Researcher – An Inexpensive Emission Spectrometer
August 2014 – May 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

Undergraduate Research Assistant – 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).

AWARDS & HONORS

Academic

Graduate School Professional Development Award, The University of Texas at Austin — April 2022
National Science Foundation INFEWS Scholar Program, The University of Texas at Austin — Aug 2019 – Aug 2021
Thrust 2000 Graduate Fellowships in Engineering, The University of Texas at Austin — Aug 2017 – Aug 2021
Senior Chemistry Award, Wingate University — April 2017
Senior Mathematics Award, Wingate University — April 2017
Phi Eta Sigma National Honor Society, Wingate University — Inducted Fall 2014

Athletic

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