

Andrew J. Wilson

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CURRENT POSITION

Associate Professor

July 2026 – present

Department of Chemistry
University of Louisville, Louisville, KY

EDUCATION

- **The University of Texas at Austin.** Austin, TX
Ph.D., Physical Chemistry
Certification in Nanoscience and Nanotechnology
December 2015
- **The University of Iowa.** Iowa City, IA
B.S., Chemistry
May 2010

PROFESSIONAL EXPERIENCE

- **Assistant Professor** 2020–2026
Department of Chemistry, University of Louisville, Louisville, KY
- **Postdoctoral Research Fellow** 2016–2020
Springborn Postdoctoral Fellow 2016-2018
Department of Chemistry, University of Illinois at Urbana-Champaign
Urbana, IL
Advisor: Professor Prashant K. Jain
- **Postdoctoral Research Fellow** 2015–2016
Department of Chemistry, Temple University
Philadelphia, PA
Advisor: Professor Katherine A. Willets
- **Graduate Research Fellow** 2010–2015
Department of Chemistry, The University of Texas at Austin
Austin, TX
Advisor: Professor Katherine A. Willets
Dissertation Title: Optical Readouts of Electrochemistry on Plasmonic Nanoparticle Electrodes
- **Undergraduate Research Assistant** 2009–2010
Department of Chemistry, The University of Iowa
Iowa City, IA
Advisor: Professor Johna Leddy

AWARDS

- National Science Foundation CAREER Award, 2024
- Ralph E. Powe Junior Faculty Enhancement Award, Oak Ridge Associated Universities, 2022
- Student Champion, University of Louisville, 2021-2022, 2023-2024, 2024-2025
- Springborn Postdoctoral Fellowship, University of Illinois at Urbana-Champaign, 2016-2018
- Fall 2015 Nano Portfolio Program Student Presentations Best Presentation Award, The University of Texas at Austin, 2015
- Professional Development Award/Travel Award, The University of Texas at Austin, 2014
- Jeff Byers Memorial Graduate Award in Chemistry and Chemical Engineering, The University of Texas at Austin, 2013-2014
- Faraday Teaching Award, The University of Texas at Austin, 2010-2011
- Analytical Chemistry Award, The University of Iowa, 2009

PUBLICATIONS

‡undergraduate author, †contributed equally, *corresponding author

45. A. Borden[‡], E. Glasser[‡], **A.J. Wilson**, M. Balabanoff*. “Catalyzing Future Chemists: The Design and Impact of a Novel G-IBL Laboratory Course,” **2026, submitted**
44. W.I. Khan, C.A. Grapperhaus, J. Hemmer, **A.J. Wilson**, G. Sumanasekera, R.M. Buchanan, G. Gupta. “Spectro-Electrochemical Mapping of Buried Metal-Aqueous Interfaces by Electrophoretic Interface Expansion,” **2026, submitted**
43. J.V. Hemmer[‡], M. Al-Amin[‡], **A.J. Wilson***. “Optical field-induced mass transfer in plasmonic electrochemistry,” *Chem. Commun.* **2026**, 62, 2908-2912
 - Designated as HOT article
42. M. Al-Amin[‡], J.V. Hemmer[‡], **A.J. Wilson***. “Effect of temperature gradients on the selectivity of the electrocatalytic CO₂ reduction reaction,” *ACS Appl. Mater. Interfaces* **2025**, 17, 54816-54825
41. N. Karki and **A.J. Wilson***. “Modulation of selectivity in electrocatalytic CO₂ reduction with a magnetic field and imidazolium ionic liquids,” *J. Phys. Chem. C* **2025**, 129, 14356-14365
40. M. Rahman, M. Al-Amin, A. Kaur, S. Jahan, **A.J. Wilson**, N. Ahamad. “Optimizing shell thickness of Ag@TiO₂ nanostructures by a simple top-down method to engineer effective SERS substrates and photocatalysts,” *ACS Omega* **2025**, 10, 14940-14948
39. N. Karki, F.L. Mufoyongo, **A.J. Wilson***. “Utilizing the magnetic properties of electrodes and magnetic fields in electrocatalysis,” *Inorg. Chem. Front.* **2024**, 11, 5414-5434
 - Invited review

38. N. Karki, I.G. Marquina, J.V. Hemmer, Y. Yu*, **A.J. Wilson***. “Suppressing competing solvent reduction in CO₂ electroreduction with a magnetic field,” *J. Phys. Chem. Lett.* **2024**, *15*, 7045-7054
37. M. Al-Amin, J.V. Hemmer, P.B. Joshi, K. Fogelman, **A.J. Wilson***. “Quantification and description of photothermal heating effects in plasmon-assisted electrochemistry,” *Commun. Chem.* **2024**, *7*, 70
▪ Invited article: Collection on Plasmon-mediated Chemistry
▪ 2024 Editor’s Highlights Collection
36. J.V. Hemmer, P.B. Joshi, A. Kaur, **A.J. Wilson***. “Reducing ensemble averaging for mechanistic understanding of electrocatalysis in energy conversion reactions,” *J. Phys. Chem. C* **2024**, *128*, 697-709
▪ Invited Perspective
35. C.L. Brosseau*, A. Colina*, J.V. Perales-Rondón, **A.J. Wilson***, P.B. Joshi, B. Ren*, X. Wang*. “Electrochemical Surface-Enhanced Raman Spectroscopy,” *Nat Rev Methods Primers* **2023**, *3*, 79
34. J.F. Adkins[‡], A. Kaur, M.S. Alom, H. Chandran, F. Ramezanipour, **A.J. Wilson***. “Directing the size and dispersity of Ag nanoparticles with kudzu leaf extracts,” *RSC Adv.* **2023**, *13*, 25360-25368
33. P.B. Joshi and **A.J. Wilson***. “Potential-dependent temporal dynamics of CO surface concentration in electrocatalytic CO₂ reduction,” *J. Phys. Chem. Lett.* **2023**, *14*, 5754-5759
32. J.V. Hemmer[†], P.B. Joshi[†], **A.J. Wilson***. “Tracking electrochemistry at single nanoparticles with surface-enhanced Raman scattering spectroscopy and microscopy,” *J. Vis. Exp.* **2023**, *195*, e65486
▪ Invited article: Emerging Methods for Nanoscale Electrochemistry
31. J. Lee, P.B. Joshi, **A.J. Wilson***, Y. Kim*. “Plasmon-Driven Near-Field Photopolymerization in a Gold Nanoparticle Colloid,” *J. Phys. Chem. C* **2023**, *127*, 8096-8103
30. P.B. Joshi and **A.J. Wilson***. “Understanding Electrocatalysis at Nanoscale Electrodes and Single Atoms with Operando Vibrational Spectroscopy,” *Curr. Opin. Green Sustain. Chem.* **2022**, *38*, 100682
▪ Invited review for the Special Issue on Nanocatalysis
29. P.B. Joshi and **A.J. Wilson***. “Plasmonically enhanced electrochemistry boosted by nonaqueous solvent,” *J. Chem. Phys.* **2022**, *156*, 241101
▪ Invited article for the JCP Special Topic on Plasmon-Driven Energy Conversion
28. D. Ogulu, P.P. Bora, M. Bihani, S. Sharma, T.N. Ansari, **A.J. Wilson**, J.B. Jasinski, F. Gallou, S. Handa. “Phosphine ligand-free bimetallic Ni(0)Pd(0) nanoparticles as catalyst for facile, general, sustainable, and highly selective 1,4-reductions in aqueous micelles,” *ACS Appl. Mater. Interfaces* **2022**, *14*, 6754-6761

27. P.B. Joshi, N. Karki, **A.J. Wilson***. “Electrocatalytic CO₂ reduction in acetonitrile enhanced by the local environment and mass transport of H₂O,” *ACS Energy Lett.* **2022**, 7, 602-609
26. T.N. Ansari, S. Sharma, S. Harza, J.B. Jasinski, **A.J. Wilson**, F. Hicks, D.K. Leahy, S. Handa. “Shielding effect of nanomicelles: Stable and catalytically active oxidizable Pd(0) nanoparticle catalyst compatible for cross-couplings of water-sensitive acid chlorides in water,” *JACS Au* **2021**, 1, 1506-1513
25. D. Devasia, **A.J. Wilson**, J. Heo, V. Mohan, P.K. Jain. “A rich catalog of C–C bonded species formed in CO₂ reduction on a plasmonic photocatalyst,” *Nat. Commun.* **2021**, 12, 2612
▪ Editors’ Highlight in Catalysis
24. **A.J. Wilson** and P.K. Jain. “Light-induced voltages in catalysis by plasmonic nanostructures,” *Acc. Chem. Res.* **2020**, 53, 1773-1781
▪ Among most read articles, September 2020 list
23. J. Wang, J. Heo, C. Chen, **A.J. Wilson**, P.K. Jain. “Ammonia oxidation enhanced by photopotential generated by plasmonic excitation of a bimetallic electrocatalyst,” *Angew. Chem. Int. Ed.* **2020**, 59, 18430-18434
▪ Designated as “Hot Paper”
22. **A.J. Wilson**, D. Devasia, P.K. Jain. “Nanoscale optical imaging in chemistry,” *Chem. Soc. Rev.* **2020**, 49, 6087-6112
21. **A.J. Wilson**, V. Mohan, P.K. Jain. “Mechanistic understanding of plasmon-enhanced electrochemistry,” *J. Phys. Chem. C* **2019**, 123, 29360-29369
20. **A.J. Wilson** and P.K. Jain. “Structural dynamics of the oxygen evolving complex of Photosystem II in water-splitting action,” *J. Am. Chem. Soc.* **2018**, 140, 5853-5859
19. S. Yu, **A.J. Wilson**, J. Heo, P.K. Jain. “Plasmonic control of multi-electron transfer and C-C coupling in visible-light-driven CO₂ reduction on Au nanoparticles,” *Nano Lett.* **2018**, 18, 2189-2194
▪ Featured on the April issue front cover
▪ Among most read articles, March and May 2018 list
▪ Featured in Chemistry World article “Forcing reactions with plasmons”
▪ Thomson Reuters Highly Cited (top 1%)
18. S. Yu, **A.J. Wilson**, G. Kumari, X. Zhang, P.K. Jain. “Opportunities and challenges of solar-energy-driven carbon dioxide to fuel conversion with plasmonic catalysts,” *ACS Energy Lett.* **2017**, 2, 2058-2070
▪ Among most read articles, September 2017 list
▪ Featured in virtual issue “Plasmons for Energy Conversion”, *ACS Energy Lett.*, **2018**, 3, 1467–1469

17. Z. Zhang, P. Li, Y. Tang, **A.J. Wilson**, K.A. Willets, M. Wuttig, R. Xiong, S. Ren. "Tunable electroresistance and electro-optic effects of transparent molecular ferroelectrics," *Sci. Adv.* **2017**, 3 (8), e1701008
▪ News Spotlight, Nanowerk: Advancing molecular ferroelectric thin-film technologies.
<http://www.nanowerk.com/spotlight/spotid=47909.php>
16. Y. Kim, **A.J. Wilson**, P.K. Jain. "The nature of plasmonically assisted hot electron transfer in a donor-bridge-acceptor complex," *ACS Catal.* **2017**, 7, 4360-4365
15. P.B. Joshi, T.P. Anthony, **A.J. Wilson**, K.A. Willets. "Imaging out-of-plane polarized emission patterns on gap mode SERS substrates: from high molecular coverage to the single molecule regime," *Faraday Discuss.* **2017**, 205, 245-259
14. V. Sundaresan, K. Marchuk, Y. Yu, E.J. Titus, **A.J. Wilson**, C. Armstrong, B. Zhang, K.A. Willets. "Visualizing and Calculating Tip-Substrate Distance in Nanoscale Scanning Electrochemical Microscopy Using 3-Dimensional Super-Resolution Optical Imaging," *Anal. Chem.* **2017**, 89, 922-928
13. K.A. Willets, **A.J. Wilson**, V. Sundaresan, P.B. Joshi. "Super-resolution imaging and plasmonics," *Chem. Rev.* **2017**, 117, 7538-7582
12. S. Zaleski, M.F. Cardinal, D.V. Chulhai, **A.J. Wilson**, K.A. Willets, L. Jensen, R.P. Van Duyne. "Towards Monitoring Electrochemical Reactions with Dual-Wavelength SERS: Characterization of Rhodamine 6G (R6G) Neutral Radical Species and Covalent Tethering of R6G to Silver Nanoparticles," *J. Phys. Chem. C* **2016**, 120, 24982-24991
11. S. Zaleski, **A.J. Wilson**, M. Mattei, X. Chen, G. Goubert, M.F. Cardin, K.A. Willets, R.P. Van Duyne. "Investigating nanoscale electrochemistry with surface- and tip-enhanced Raman spectroscopy," *Acc. Chem. Res.* **2016**, 49, 2023-2030
10. **A.J. Wilson** and K.A. Willets. "Unforeseen distance-dependent SERS spectroelectrochemistry from surface-tethered Nile Blue: the role of molecular orientation," *Analyst* **2016**, 141, 5144-5151
9. **A.J. Wilson**, N.Y. Molina, K.A. Willets. "Modification of the electrochemical properties of Nile Blue through covalent attachment to gold as revealed by electrochemistry and SERS," *J. Phys. Chem. C* **2016**, 120, 21091-21098
8. **A.J. Wilson** and K.A. Willets. "Molecular Plasmonics," *Annu. Rev. Anal. Chem.* **2016**, 9, 27-43
7. B. Xu, Z. Luo, **A.J. Wilson**, K. Chen, H.D. Chopra, X. Chen, K.A. Willets, Z. Dauter, S. Ren. "Multifunctional charge-transfer single crystals through supramolecular assembly," *Adv. Mater.* **2016**, 28, 5322-5329
6. B. Xu, Hu. Li, Ha. Li, **A.J. Wilson**, L. Zhang, K. Chen, K.A. Willets, F. Ren, J.C. Grossman, S. Ren. "Chemically driven interfacial coupling in charge-transfer mediated functional superstructures," *Nano. Lett.* **2016**, 16, 2851-2859

5. B. Xu, Z. Luo, W. Gao, **A.J. Wilson**, C. He, X. Chen, G. Yuan, H-L Dai, Y. Rao, K.A. Willets, Z. Dauter, S. Ren. "Solution-processed molecular opto-ferroic crystals" *Chem. Mater.* **2016**, 28, 2441-2448
4. **A.J. Wilson**, K. Marchuk, K.A. Willets. "Imaging electrogenerated chemiluminescence at single gold nanowire electrodes," *Nano Lett.* **2015**, 15, 6100-6115
3. M.L. Weber, **A.J. Wilson**, K.A. Willets. "Characterizing the spatial dependence of redox chemistry on plasmonic nanoparticle electrodes using correlated super-resolution SERS imaging and electron microscopy," *J. Phys. Chem. C* **2015**, 119, 18591-18601
2. **A.J. Wilson** and K.A. Willets. "Visualizing site-specific redox potentials on the surface of plasmonic nanoparticles with super-localization SERS microscopy," *Nano Lett.* **2014**, 14, 939-945
1. **A.J. Wilson** and K.A. Willets. "Surface-enhanced Raman scattering (SERS) imaging using noble metal nanoparticles," *WIREs Nanomedicine and Nanobiotechnology* **2013**, 5, 180-189

PRESENTATIONS

INVITED SEMINARS

20. *Modulating the microenvironment at electrode–electrolyte interfaces with external fields*, Washington University in St. Louis, Department of Chemistry, invited seminar, St. Louis, MO, April 24, 2025
19. *Modulating the microenvironment at electrode–electrolyte interfaces with external fields*, University of Kentucky, Department of Chemistry, invited seminar, Lexington, KY, April 18, 2025
18. *Plasmons and magnetic fields in electrochemistry*, University of Louisville, Department of Chemistry, invited seminar, Louisville, KY, September 13, 2024
17. *Controlling concentration gradients in electrochemistry with plasmons and magnetic fields*, Temple University, Department of Chemistry, invited seminar, Philadelphia, PA, April 11, 2024
16. *Formation and dynamics of CO in CO₂ electroreduction in acetonitrile*, University of Iowa, Department of Chemistry, invited seminar, Iowa City, IA, September 28, 2023
15. *Reducing ensemble averaging for mechanistic insight in electrocatalysis*, Indiana State University, Department of Chemistry and Physics, invited seminar, Terre Haute, IN, September 5, 2023
14. *Tracking reaction intermediates in electrocatalysis with SERS microscopy*, University of Mississippi, Department of Chemistry, invited seminar, Oxford, MS, February 9, 2023
13. *Plasmons in electrocatalysis*, University of Notre Dame, Electrochemical Society Student Chapter, invited seminar, Notre Dame, IN, October 12, 2022

12. *Using plasmonics to measure and enhance electrocatalysis*, University of Iowa, Department of Chemistry, invited seminar, Iowa City, IA, March 31, 2022
11. *Using light to study and enhance electrochemistry*, University of Louisville, Society of Undergraduate Chemistry Students, invited seminar, Louisville, KY, March 7, 2022
10. *Vibrational microscopy*, Southwestern University, Department of Chemistry, invited seminar, Georgetown, TX, March 23, 2021
9. *Energy conversion and storage at the nanoscale*, University of Louisville, Society of Undergraduate Chemistry Students, invited seminar, Louisville, KY, March 15, 2021
8. *Photovoltages in plasmonic electrocatalysis*, Eastern Kentucky University, Department of Chemistry, invited seminar, Richmond, KY, February 12, 2021
7. *Accelerating electrocatalysis with plasmons*, Western Kentucky University, Department of Chemistry, invited seminar, Bowling Green, KY, September 18, 2020
6. *Synergy between nanoplasmonics and electrochemistry*, Brandeis University, Department of Chemistry, invited seminar, Waltham, MA, December 9, 2019
5. *Synergy between nanoplasmonics and electrochemistry*, University of Louisville, Department of Chemistry, invited seminar, Louisville, KY, November 21, 2019
4. *Synergy between nanoplasmonics and electrochemistry*, Oak Ridge National Laboratory, invited seminar, Oak Ridge, TN, November 18, 2019
3. *Watching chemistry at the nanoscale with in situ SERS microscopy*, Sandia National Laboratories, invited seminar, Albuquerque, NM, April 15, 2019
2. *Watching chemistry at the nanoscale with SERS microscopy*, Marquette University, Department of Chemistry, invited seminar, Milwaukee, WI, January 14, 2019
1. *Watching chemistry at the nanoscale with SERS microscopy*, Mississippi State University, Department of Chemistry, invited seminar, Mississippi State, MS, November 29, 2018

INVITED CONFERENCE PRESENTATIONS

12. *Plasmonic enhancement of electrochemical oxygen reduction in aprotic solvents*, ACS Southeastern Regional Meeting, invited talk, Memphis, TN, November, 2026
11. *Temperature and Electromagnetic Fields Gradients in Plasmon-assisted Electrocatalysis*, ACS National Meeting, invited talk, Atlanta, GA, March 23, 2026
10. *Impact of temperature gradients in plasmon-assisted electrochemistry*, ECS National Meeting, invited talk, Chicago, IL, October 14, 2025
9. *Measuring concentration changes of surface intermediates in electrocatalysis with microsecond time-resolved Raman spectroscopy*, SciX Conference, invited talk, Covington, KY, October 6, 2025

8. *Electrode surface heating in plasmon-assisted electrochemistry*, ACS National Meeting, invited talk, San Diego, CA, March 26, 2025
7. *Time-resolved spectroelectrochemistry on noble metal nanostructures*, Gordon Research Seminar, Noble Metal Nanoparticles, invited keynote address, South Hadley, MA, June 15, 2024
6. *Local heating, hot charge carrier, and solvent effects in plasmon-assisted electrochemistry*, Gordon Research Conference, Electrochemistry, invited talk, Ventura, CA, January 8, 2024
5. *Measuring the temporal evolution of surface intermediates in electrocatalysis*, ECS National Meeting, invited talk, Boston, MA, May 31, 2023
4. *Tracking surface intermediates in electrocatalysis with time-resolved electrochemical SERS microscopy*, ACS National Meeting, invited talk, Indianapolis, IN, March 28, 2023
3. *Plasmon-enhanced electrochemistry in nonaqueous solvent*, SciX Conference, Surface Plasmon Resonance (Plasmonics), invited talk, Covington, KY, October 3, 2022
2. *Tracking reaction intermediates in electrocatalysis with high spatiotemporal resolution*, ACS National Meeting, invited talk, Chicago, IL, August 24, 2022
1. *Boosting electrocatalytic activity with plasmonic electrodes*, BK 21 Four International Symposium: Materials for Solar Energy Harvesting & Utilization, Yeungnam University, invited virtual oral presentation, Gyeongsan, South Korea, January 21, 2021

CONTRIBUTED PRESENTATIONS

16. *Plasmon-enhanced electrochemistry in nonaqueous solvents*, Gordon Research Conference, Noble Metal Nanoparticles, poster, South Hadley, MA, June 16-21, 2024
15. *Probing local environments and the dynamics of electrocatalytic CO₂ reduction in acetonitrile with spatiotemporally-resolved SERS spectroscopy*, Gordon Research Conference, Electrochemistry, poster, Ventura, CA, September 11-16, 2022
14. *CO₂ Reduction in Acetonitrile Enhanced by Electrolyte-assisted Mass Transport of Water*, ACS Southeastern Regional Meeting, oral presentation, Birmingham, AL, November 10, 2021
13. *Enhancing laboratory preparation with Perusall*, University of Louisville, Seminar on Teaching for New Faculty, poster, Louisville, KY, April 7, 2021
12. *Photosynthesis in Photosystem II-Plasmonic Hybrid Photocatalysts*, Gordon Research Conference, Renewable Energy: Solar Fuels, poster, Ventura, CA, January 28-February 2, 2017
11. *Structural Analysis of the Oxygen Evolving Complex Using Low Frequency SERS*, International Symposium on Molecular Spectroscopy, oral presentation, Champaign-Urbana, IL, June 21, 2017

10. *Probing Nanoelectrochemistry with Optical Microscopy*, ACS National Meeting, oral presentation, Philadelphia, PA, August 23, 2016
9. *Optical Readouts of Nanoelectrochemistry on Plasmonic Electrodes*, Philadelphia Electrochemical Society Symposium, poster, Drexel University, Philadelphia, PA, April 28, 2016
8. *Spectroelectrochemical Microscopy on Plasmonic Nanoparticle Electrodes*, MRS Spring Meeting, poster, Phoenix, AZ, March 28-April 1, 2016
7. *Plasmon-assisted Electrochemistry*, Temple Materials Institute Inaugural Meeting, poster, Philadelphia, PA, March 1, 2016
6. *Optical Readouts of Electrochemistry on Plasmonic Nanoparticle Electrodes*, Nano Portfolio Program, oral presentation, The University of Texas at Austin, Austin, TX, December 2015
 - Won oral presentation competition
5. *Electrochemistry on Plasmonic Nanoparticle Electrodes*, ACS National Meeting, oral presentation, Denver, CO, March 22-26, 2015
4. *Plasmon-mediated electrochemical reactions*, Gordon Research Conference: Plasmonics, poster, Newry, ME, July 6-11, 2014
3. *Visualizing Site-Specific Redox Potentials on the Surface of Plasmonic Nanoparticles*, Nano Night annual poster session, Center for Nano- and Molecular Science, The University of Texas at Austin, Austin, TX, March 26, 2014
2. *Visualizing Site-Specific Redox Potentials on the Surface of Plasmonic Nanoparticles*, 2014 CEC Annual Workshop on Electrochemistry, poster, Austin, TX, February 8-9, 2014
1. *Electron transfer rates of Cobalt (III) tris(1,10-phenanthroline)*, Analytical Chemistry Award, poster, Iowa City, IA, May 2009

CO-AUTHORED PRESENTATIONS

31. E. Glasser, A. Borden, A.J. Wilson, M. Balabanoff. “*Catalyzing Future Chemists! Design and Impact of a Novel G-IBL Laboratory*,” Biennial Conference on Chemical Education, oral presentation, Madison, WI, July 26-30, 2026
30. A. Kaur, A. Jain, A.J. Wilson. “*Mechanistic investigation of CO₂ electroreduction on silver in non-aqueous media: the role of cations and water*,” Next Generation Electrochemistry (NGenE) Workshop, Argonne National Laboratory, Lemont, IL, July 6-10, 2026
29. J.V. Hemmer, M. Al-Amin, A.J. Wilson. “*Optical-field-induced mass transfer in plasmonic electrochemistry*,” ECS National Meeting, Seattle, WA, May 24, 2026

28. A. Jain, A. Kaur, A.J. Wilson. “*Role of cation and water concentration in electrocatalytic CO₂ reduction in non-aqueous solvents*,” Kentucky Academy of Science Annual Meeting, Louisville, KY, November 22, 2025
27. A. Borden, E. Glasser, A.J. Wilson, M. Balabanoff. “*The Design and Impact of a Novel Guided Inquiry Lab in Upper-Level Analytical Chemistry*,” Kentucky Academy of Science Annual Meeting, Louisville, KY, November 21, 2025
26. J.V. Hemmer, M. Al-Amin, A.J. Wilson. “*Effect of temperature gradients on the selectivity of the CO₂ electroreduction reaction*,” Tristate Catalysis Society Annual Symposium, oral presentation, Convington, KY, September 11, 2025
25. N. Karki and A.J. Wilson. “*Magnetic field effects in electrocatalytic CO₂ reduction*,” ACS National Meeting, oral presentation, Washington, DC, August 20, 2025
24. A. Loiacono, N. Karki, E. Franceschini, E. Pastor, A.J. Wilson. “*Magnetic field effect on Ni-Cu alloys and Ni as electrocatalysts for CO₂ reduction*,” 45th Meeting of the Electrochemistry Group of the Royal Spanish Society of Chemistry, oral presentation, Tenerife, Canary Islands, Spain, July 16, 2025
23. N. Karki and A.J. Wilson. “*Enhancing the mass transport of CO₂ complexed with imidazolium-based ionic liquids in electrocatalytic CO₂ reduction in the presence of an external magnetic field*,” CARD Talk, oral presentation, Louisville, KY, March 27, 2025
22. N. Karki and A.J. Wilson. “*Magnetic field effects in electrocatalytic CO₂ reduction with imidazolium-based ionic liquids complexed with CO₂*,” PittCon, poster, Boston, MA, March 4, 2025
21. N. Karki and A.J. Wilson. “*Enhancing electrocatalytic CO₂ reduction using imidazolium-based ionic liquids in the presence of an external magnetic field*,” ACS Central Regional Meeting, oral presentation, Pittsburgh, PA, November 6, 2024
20. A. Kaur and A.J. Wilson. “*Investigating the role of electrolyte cations on CO intermediate formation in electrocatalytic CO₂ reduction*,” Graduate Student Regional Research Conference, poster, Louisville, KY, March 28, 2024
 - Best Poster Presentation Award
19. A. Kaur and A.J. Wilson. “*Investigating the role of electrolyte cations on CO intermediate formation in electrocatalytic CO₂ reduction*,” Graduate Student Regional Research Conference, oral presentation, Louisville, KY, March 28, 2024
18. F. Mufoyongo and A.J. Wilson. “*Enhancing ammonium synthesis from nitrate with electrocatalysis in a magnetic field*,” Graduate Student Regional Research Conference, poster, Louisville, KY, March 28, 2024
17. F. Mufoyongo and A.J. Wilson. “*Enhancing ammonium synthesis from nitrate with electrocatalysis in a magnetic field*,” Graduate Student Regional Research Conference, oral presentation, Louisville, KY, March 28, 2024

16. M. Al-Amin, J.V. Hemmer, P.B. Joshi, K. Fogelman, A.J. Wilson. “*Understanding the origin and effect of local heating in plasmon-assisted electrochemistry,*” ACS National Meeting, oral presentation, New Orleans, LA, March 20, 2024
15. N. Karki and A.J. Wilson. “*Enhancing CO:H₂ selectivity in CO₂ electroreduction with an external magnetic field,*” ACS National Meeting, oral presentation, New Orleans, LA, March 20, 2024
14. N. Karki and A.J. Wilson. “*Enhancing CO:H₂ selectivity in CO₂ electroreduction with an external magnetic field,*” Sci-Mix, ACS National Meeting, poster, New Orleans, LA, March 18, 2024
13. N. Karki and A.J. Wilson. “*Magnetic field-induced modulation of the ratio of CO:H₂ in electrocatalytic CO₂ reduction,*” ACS Southeastern Regional Meeting, oral presentation, Durham, NC, October 26, 2023
12. J. Adkins[‡] and A.J. Wilson. “*Directing the size and dispersity of silver nanoparticles with kudzu extracts,*” Undergraduate Arts & Research Showcase, poster, Louisville, KY, April 21, 2023
11. N. Karki and A.J. Wilson. “*Tuning the selectivity of electrocatalytic CO₂ reduction with an external magnetic field,*” ACS Energy and Fuels Student Travel Award competition, poster, Indianapolis, IN, March 28, 2023
10. N. Karki and A.J. Wilson. “*Tuning the selectivity of electrocatalytic CO₂ reduction with an external magnetic field,*” ACS National Meeting, oral presentation, Indianapolis, IN, March 27, 2023
9. P.B. Joshi and A.J. Wilson. “*Improving plasmonic enhancement in electrochemistry using nonaqueous solvents,*” ACS National Meeting, poster, Indianapolis, IN, March 27, 2023
8. J. Adkins[‡] and A.J. Wilson. “*Synthesis of silver nanoparticles using kudzu extract,*” ACC Meeting of the Minds Undergraduate Research Conference, oral presentation, Blacksburg, VA, March 25, 2023
7. N. Karki and A.J. Wilson. “*Effects of an external magnetic field in electrocatalytic CO₂ reduction,*” Graduate Student Regional Research Conference, poster, Louisville, KY, March 23, 2023
6. J.V. Hemmer, P.B. Joshi, A.J. Wilson. “*Measuring intermediates of electrochemical CO₂ reduction with spatially and temporally resolved SERS spectroscopy,*” Graduate Student Regional Research Conference, poster, Louisville, KY, March 23, 2023
5. M. Al-Amin and A.J. Wilson. “*Isolation and quantification of photothermal heating in plasmon-enhanced electrochemistry,*” Graduate Student Regional Research Conference, poster, Louisville, KY, March 23, 2023

4. N. Karki and A.J. Wilson. “*Effects of an external magnetic field in electrocatalytic CO₂ reduction*,” Graduate Student Regional Research Conference, oral presentation, Louisville, KY, March 22, 2023
3. P.B. Joshi and A.J. Wilson. “*Plasmonics for understanding and enhancing electrochemistry in nonaqueous solvent*,” Midwest Universities Analytical Chemistry Conference, poster, Cincinnati, OH, October 28, 2022
▪ Best Poster Award
2. P.B. Joshi and A.J. Wilson. “*Engineering the local environment and mass transport of proton donors to enhance proton-coupled electrochemical reactions*,” ACS National Meeting, oral presentation, Chicago, IL, August 24, 2022
1. J. Adkins[‡] and A.J. Wilson. “*Synthesis of silver nanoparticles using plant-based extract*,” Summer Research Showcase, poster, Louisville, KY, August 5, 2022

FUNDING

AWARDED GRANTS

TOTAL: \$691,882

4. co-PI (with Morgan Balabanoff), Kentucky Academy of Sciences, “Exploring Nanotechnology: Kentucky High School Outreach Program,” \$2,500.00 (2025)
3. PI, National Science Foundation, Division of Chemistry, Chemical Catalysis Program, “CAREER: Plasmonic enhancement of electrocatalytic oxygen reduction in nonaqueous solvents,” \$674,734.00 (2025-2030)
2. PI, Louisville Research Core Voucher Program, “Correlative mapping of reaction intermediates and catalyst structure in electrochemical CO₂ reduction,” \$4,648.00 (2024)
1. PI, Oak Ridge Associated Universities. Ralph E. Powe Junior Faculty Enhancement Award, “Uncovering intermediates in electrochemical transformations,” \$10,000.00 (2022-2023)

STUDENT GRANTS

TOTAL: \$9,875

9. ECS Physical and Analytical Electrochemistry Division Travel Grant, Student: Johann Hemmer, Spring 2026, \$500
8. Graduate Student Council Travel Award, University of Louisville, Student: Johann Hemmer, Spring 2026, \$350
7. 2025 Undergraduate Mentored Research Award, University of Louisville, Students: Johann Hemmer and Colin Ackerman, Spring 2025, \$1500.00
6. ACS Energy and Fuels Division, Student: Nawaraj Karki, Spring 2024, \$2000.00

5. Graduate Student Council Travel Award, University of Louisville, Student: Md. Al-Amin, Spring 2024, \$350.00
4. Graduate Student Council Travel Award, University of Louisville, Student: Nawaraj Karki, Fall 2023, \$350.00
3. Graduate Student Council Travel Award, University of Louisville, Student: Nawaraj Karki, Spring 2023, \$350.00
2. 2022 Summer Research Opportunity Program, Office of Undergraduate Research and Creative Activity, Student: Jaley Adkins, \$500.00 (\$3,500.00 to student)
1. EVPRI's Undergraduate Research Scholar Grant, "Light-guided synthesis of chiral metal nanostructures." Student: Hoang Gia An Tran, 2021 – 2022, \$475.00

TEACHING EXPERIENCE

University of Louisville

- **Chem 201**, General Chemistry I S26
- **Chem 220**, Introduction to Scientific Research F26
- **Chem 391/392/491/492**, Undergraduate Research – CUE S21–S26
- **Chem 426**, Instrumental and Statistical Analysis Laboratory – WR F22–F25
- **Chem 527**, Introduction to Separations and Spectroscopy – WR F20, F21
- **Chem 620**, Optical Spectrochemical Methods of Analysis S22, F24, F26
- **Chem 625**, Advanced Analytical Chemistry F22, S24
- **Chem 691/692**, Research S21–F26

Temple University

- **Chem 8300**, Optical Spectroscopy and Microscopy S16

University of Texas at Austin

- **Chemistry 302**, Principles of Chemistry II Su12
- **Chemistry 376K**, Advanced Analytical Chemistry S11
- **Chemistry 455**, Fundamentals of Analytical Chemistry S13, S12
- **Chemistry 456**, Analytical Chemistry F11, S12, F12
- **Chemistry 456**, Analytical Chemistry Laboratory F10

RESEARCH MENTORING

Current

Graduate students

- Johann Hemmer, December 2022 – present
 - Most Auspicious First Year Award, UofL Chemistry Department, 2023
 - Chemistry Graduate Students Association, Vice President, 2023-2024
 - Best Laboratory Graduate Teaching Assistant Award, 2024
 - Undergraduate Mentored Research Award, 2025
 - Leadership Award, UofL Chemistry Department, 2026
- Amandeep Kaur, May 2023 – present
 - 2024 GSRRC best poster presentation award
 - Chemistry Graduate Students Association, President, 2024-2025

- Award for Character and Endeavor, 2025
- Best Laboratory Graduate Teaching Assistant Award, 2026
- Fredrick Mufoyongo, May 2023 – present
- Chemistry Graduate Students Association, Treasurer, 2024-2025
- Best Laboratory Graduate Teaching Assistant Award, 2026
- Amanda Borden, January 2024 – present
- Astha Jain, November 2024 – present
- Chemistry Graduate Students Association, Secretary, 2025-2026
- Augustine Onakpa, November 2025 – present
- Chemistry Graduate Students Association, Secretary, 2026-2027

Undergraduate students

- Louai Sarakbi, January 2026 – present
- Jonathan Hermosillo, January 2026 – present
- Shreya Patel, January 2026 – present

High school students

- Keerthi Sriram, June 2026 – present

Alumni**Postdoctoral scholar**

- Dr. Padmanabh B. Joshi, May 2021 – July 2023
- 2022 Midwest Universities Analytical Chemistry Conference best poster award

Graduate students

- Antonella Loiacono, February 2025 – May 2025 (visiting scholar)
- Dr. Nawaraj Karki, January 2021 – December 2025
- Graduate Student Council Travel Award, S23 & F23
- Outstanding Chemistry Student Award, Louisville ACS Local Section, 2023
- Chemistry Graduate Students Association, President, 2023-2024
- ACS, Energy and Fuels Division Travel Award, S24
- Dorothy Gibson Memorial Fellowship, 2024-2025
- ACS Bridge Career Conference, November 2025
- Dr. Md. Al Amin, November 2020 – December 2025
- Graduate Student Council Travel Award, S24

Undergraduate students

- Kyle Barnett, January 2021 – April 2021
- Virginia Noe, August 2021 – December 2021
- 2022 Summer Research Opportunity Program (declined)
- Hoang Gia An Tran, June 2021 – April 2022
- Awarded an EVPRI Undergraduate Research Scholar Grant, 8/9/2021-8/10/2022
- University Fellow, University of Louisville Graduate School, 2022
- Jaley Adkins, January 2022 – May 2023
- 2022 Summer Research Opportunity Program
- 2023 ACC Meeting of the Minds Conference
- Ayan Abdi, January 2023 – December 2023
- 2023 Summer Research Opportunity Program (declined)
- Jacob Long, January 2024 – April 2024
- Sam Shircliff, January 2024 – April 2024

- Colin Ackerman, January 2024 – April 2025
 - Undergraduate Mentored Research Award, 2025
- Eliana Purcell, January 2025 – December 2025

High school students

- Luna Asbell, May 2024 – August 2024
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SERVICE

16. Mentor, NSF CAREER Workshop, Alexandria, VA, June 2026
 15. Chair, Instrument Specialist Search Committee, Department of Chemistry, University of Louisville, August 2025
 14. Director of Undergraduate Studies, Department of Chemistry, University of Louisville, July 2025 – present
 13. Member, Assistant Professor - Term Search Committee, Department of Chemistry, University of Louisville, July 2025
 12. International Editorial Board, *Advances in Industrial and Engineering Chemistry*, Fall 2024 – present
 11. Director, Graduate Admissions, Recruitment, and Appeals, Department of Chemistry, University of Louisville, Fall 2024 – Fall 2025
 10. Past Chair, Electrochemical Society Mid-America Section, 2023 – 2025
 9. Chair, Electrochemical Society Mid-America Section, 2021 – 2023
 8. Member, Lab Fees Committee, Department of Chemistry, University of Louisville, Fall 2021 – 2024
 7. Chemistry Representative, Department Teaching Evaluation Program, College of Arts & Sciences, University of Louisville, AY21-22
 6. Director, Undergraduate Research, Department of Chemistry, University of Louisville, Spring 2021 – Spring 2024
 5. Member, Graduate Admissions Committee, Department of Chemistry, University of Louisville, Fall 2020 – Fall 2025
 4. Member, Stockroom Manager Search Committee, Department of Chemistry, University of Louisville, Fall 2020
 3. Committee member of 33 Ph.D./M.S. students, 2020 – present
 2. Reviewer Board, *Nanomaterials*, 2020 – 2024
 1. Invited peer reviewer: *National Science Foundation*, *Department of Energy*, *American Chemical Society Petroleum Research Fund*, *Journal of the American Chemical Society*, *Angewandte Chemie*, *ACS Energy Letters*, *Science Advances*, *ACS Catalysis*, *Journal of Catalysis*, *Nature Communications*, *Nano Letters*, *Nature Reviews Chemistry*, *Advanced*
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Materials, ACS Photonics, ACS Nano, ACS Applied Materials & Interfaces, Journal of Physical Chemistry, Journal of Chemical Physics, Analytical Chemistry, Current Opinion in Electrochemistry, ACS Sustainable Chemistry & Engineering, MRS Communications, Laser & Photonics Reviews, Sensors, Nanomaterials, Catalysts, Leverhulme Trust (UK), Micromachines

PROFESSIONAL SOCIETIES

- Electrochemical Society (ECS)
- American Chemical Society (ACS)
- The Society for Electroanalytical Chemistry (SEAC)
- Kentucky Academy of Sciences (KAS)

OUTREACH

- Outreach experiment coordinator, “Synthesis and optical characterization of Ag nanospheres and nanorods,” Fairdale High School, Louisville, KY, October 30, 2024
- Judge, Science Fair, Fairdale High School, Louisville, KY, May 17, 2024
- Poster session coordinator, Fairdale High School, Louisville, KY, February 2, 2024
- Outreach experiment coordinator, “Synthesis and optical characterization of Ag and Au nanoparticles,” Fairdale High School, Louisville, KY, October 25, 2023
- Judge, Science Fair, Fairdale High School, Louisville, KY, May 23, 2023
- The Cardinal Edge, “Pasta, Pizza, and Profs,” University of Louisville, March 21, 2023
- First-Gen Cards Networking Luncheon, University of Louisville, February 28, 2023
- Invited talk, University of Louisville, Society of Undergraduate Chemistry Students, Louisville, KY, February 6, 2023
- Invited talk, Undergraduate Research Forum, Alpha Epsilon Delta, University of Louisville, December 1, 2022
- Outreach experiment coordinator, “Synthesis and optical characterization of Ag nanoparticles,” Fairdale High School, Louisville, KY, November 17, 2022
- Louis Stokes Alliance for Minority Participation, Speed Networking for Pre-Professional and Graduate Students, University of Louisville, September 27, 2022
- Guest lecturer, “Nanomaterials, microscopy, and chemistry,” Fairdale High School, Louisville, KY, March 25, 2022
- Invited talk, Multicultural Association of Pre-Health Students, University of Louisville, March 21, 2022
- Chemistry representative, Cardinal Preview Day, University of Louisville, October 16, 2021
- Panelist, Undergraduate Research Forum, Alpha Epsilon Delta, University of Louisville, September 16, 2021
- Seminar, “Undergraduate Research in Chemistry,” University of Louisville, August 25, 2021
- Judge, Graduate Student Regional Research Conference, University of Louisville, Louisville, KY, March 11, 2021
- High School STEM Teacher-University Researcher Network, Collaborative initiative between the National Science Teachers Association, the Tri-Services (Army, Navy, Air

Force), and UofL's College of Education and Human Development, October 8, 2020, virtual event

- Parkland Community College research shadow mentor, Younger Chemists Committee, East Central Illinois ACS Local Section, Urbana, IL, July 30, 2018
- Post-doc career panelist, Younger Chemists Committee, East Central Illinois ACS Local Section, Urbana, IL, May 15, 2018
- Committee member, Physical Chemistry Seminars, UIUC, 2017-2018
- Station leader, Women's Chemist Committee Day Camp, "Nanochemistry," Urbana, IL, June 24 & July 8, 2017
- Light/Matter Interactions at the Nano-Bio Interface, workshop participant, University of Illinois at Urbana-Champaign, IL, November 28-29, 2016
- Chemistry After Dark, "Probing Nanoelectrochemistry with Optical Microscopy," Temple University, Philadelphia, PA, August 26, 2016, oral presentation
- Welch Summer Scholar Program, "Metal Nanoparticles and Color", Austin, TX, July 3, 2014, oral presentation
- GirlStart Conference in STEM,
 - "Chemistry in Action", Austin, TX, March 26, 2014
 - "Exploring the Nanoworld: How do we "see" what we cannot see?", Austin, TX, March 26, 2011
- Explore UT volunteer, Superabsorbent polymer demonstration, K-12, Austin, TX, 2011
- Judge
 - East Central Illinois ACS Undergraduate Research Conference, Urbana, IL, October 14, 2017
 - Rao Prize Competition, International Symposium on Molecular Spectroscopy, UIUC, Urbana, IL, 2017
 - Undergraduate Research Symposium, UIUC, Urbana, IL, April 27, 2017
 - Undergraduate Research Symposium, Temple University: College of Science & Technology, Philadelphia, PA, September 16, 2016
 - Undergraduate Research Symposium, Temple University: College of Science & Technology, Philadelphia, PA, September 17, 2015
 - "Safety Madness", UT Austin, 2014