Department of Chemistry and Biochemistry
University of South Carolina
Columbia, SC 29208
vannucci@mailbox.sc.edu
803-576-6071

Aaron K. Vannucci, Ph.D.

EXPERIENCE

Associate Professor (June 2021 – present) University of South Carolina

Assistant Professor (Aug. 2014 – June 2021) University of South Carolina

Postdoctoral Research Fellow (Sept. 2010 – Aug. 2014) UNC Chapel Hill under Prof. Thomas J. Meyer

EDUCATION

The University of Arizona Tucson, Arizona
- Ph.D. in chemistry May 2009.
- Advisor: Prof. Dennis L. Lichtenberger
- Dissertation Title: Computational, Spectroscopic, and Electrochemical Studies of Molybdoenzyme and Hydrogenase Active Site Inspired Complexes

The College of Wooster Wooster, Ohio
- B.A. in chemistry May 2004
- American Chemical Society certified degree

AWARDS

- Distinguished Undergraduate Research Mentor Award, University of South Carolina (2024)
- University of South Carolina Breakthrough Star Award (2021)
- Ada B. Thomas Outstanding Faculty Advisor Award, University of South Carolina (2020)
- ACS Green Chemistry Institute Ignition Award (2019)

FUNDING

- New Hybrid Catalysts for Sustainable Cross-Coupling Reactions: Using Atomic Layer Deposition to Immobilize and Enhance Molecular Catalysts (PI) – NSF Grant No. 1954850 – 7/20 - 12/23 – $308,669.
- A New Approach to Catalyst Immobilization Research: Designing Molecular Catalysts for Heterogeneous Catalysis (PI) – ACS Green Chemistry Institute – 9/19 - 3/20 – $25,000.
- Industrial Funding (PI) – PBI Performance Products Inc. – 5/19 - 12/24 – $284,743.
- Development of Electrolysis Processes to Electrochemically Reduce Lignin Samples to Produce a Color Stable Lignin Product (PI) – Ingevity Corp. – 1/17 - 6/17 – $10,000.
- Catalytic Carbon-Carbon Cross Coupling from a Heterogeneous Catalytic System Based on a Homogeneous Molecular Catalyst (co-PI) – NSF Industry/University CRC Grant No. 1464630 – 6/16 - 5/17 – $54,000.
- Development of a Photocatalytic System for the Renewable Production of Hydrogen Fuel (PI) – University of South Carolina Office of the VP of Research – 8/16 – 8/17 - $15,000.
- Catalysis for Renewables: Applications, Fundamentals and Technologies (CRAFT) (funded collaborator) – NSF EPSCoR RII Track-2 Grant No. 1539105 – 8/15 - 8/19 – $4,000,000 (12.5%).

PUBLICATIONS AND PATENTS

During Independent Career at the University of South Carolina
****indicates corresponding author***

38. Yom. T.; Kuchta III, J. J.; Tian, M.; *Vannucci, A. K.; Losego, M. D. "Modifyin the Zeta Potential of Silica Particles via Atomic Layer Deposition of Nanoscale Oxide Coatings" *Langmuir*, **2025**, *under review*.
37. Kuchta III, J. J.; Mood, S. M.; Bradbury, A. M.; Dissanayake, D. M. S. C.; Balijepalli, S. K.; Regalbuto, J. R.; *Vannucci, A. K. "Uniform High Density of Single-Stie Catalysts with Tunable Reactivity on Metal Oxide Supports" *J. Am. Chem. Soc.* **2025**, *under review*
36. Dissanayake, D. M. S. C.; Dinh, M. H.; Kuchta III, J. J.; *Vannucci, A. K. Ferrocene-Mediated Photochemical Reduction of Naphthol to Generate Hydrogen" *Chem. Eur. J.* **2025**, *31*, e01540-e01544. DOI:10.1002/chem.202501540
35. Tillou, J. G.; Kuchta, J. J.; Thornburg, N.; Balijepalli, S. K.; *Vannucci, A. K. "Selective Hydrodeoxygenation of Oxygenated Aromatic Molecules Using a Molecular Palladium Catalyst Covalently Bound to a Solid SiO_2 Support" *RSC Sustain.* **2024**, *2*, 2549-2558. DOI:10.1039/D4SU00333K
34. Alam. M.; Sitter, J. D.; Vannucci, A. K.; Webster, J. P.; Matiasek, S. J.; Aplers, C. N.; Baalousha, M. "Environmentally persistent free radicals and other paragagnetic species in wildland-urban interface fire ashes" *Chemosphere*, **2024**, *363*, 142950-142960. DOI:10.1016/j.chemosphere.2024.142950
33. Losego, M. D.; *Vannucci, A. K. "Immobilization of Molecular Catalysts on Solid Powders via Vapor Deposition of Encapsulating Nano-Layers for Use as Heterogeneous Chemical Catalysts" **2024** US Patent US20240149262A1.
32. Yao, W.; Buell, C. A.; Kuppravalli, A.; Vannucci, A. K.; Papish, E. T. "Iridium Dihydroxybipyridine Complexes are Effective Catalysts for Hydrodeoxygenation of Vanillyl Alcohol in Water" *Organometallics*, **2023**, *42*, 2806-2812. DOI: 10.1021/acs.organomet.3c00273
31. Vannucci, A. K.; Papish, E. T. "Selective Hydrogenation of Aromatic Compounds" **2023** US Patent US11773040B2
30. Tillou, J. G.; Ezeorah, C. J.; Kuchta, J. J.; Dissanayake Mudiyanselage, S. C. D.; Sitter, J. D.; *Vannucci, A. K. "A Review on Recent Trends in Selective Hydrodeoxygenation of Lignin Derived Molecules" *RSC Sustainability* **2023**, *1*, 1608-1633. DOI: 10.1039/D3SU00232B
29. Siter, J. D.; Lemus-Rivera, E. E.; *Vannucci, A. K. "Insights into Reactivity Trends for Electrochemical C-N Bond Formations" *Org. Biomol. Chem.* **2023**, *21*, 4290-4296. DOI: 10.1039/D3OB00236E
28. Ayare, P. J.; Watson, N.; Helton, M. R.; Warner, M. J.; Dilbeck, T.; Hanson, K.; *Vannucci, A. K. "Molecular Z-scheme for solar fuel production via dual photocatalytic cycles" *J. Am. Chem. Soc.* **2022**, *144*, 21568-21575. DOI: 10.1021/jacs.2c08462
27. Martin, C. R.; Park, K. C.; Leith, G. A.; Yu, J.; Mathur, A.; Wilson, G. R.; Gange, G. B.; Barth, E. L.; Ly, R. T.; Manley, O. M.; Forrester, K. L.; Karakalos, S. G.; Smith, M. D.; Makris, T. M.; Vannucci, A. K.; Peryshkov, D. V.; Shustova, N. B. "Stimuli-Modulated Metal Oxidation States in Photochromic MOFs" *J. Am. Chem. Soc.* **2022**, 144, 4457-4468. DOI: 10.1021/jacs.1c11984
26. Dickerson, S. D.; Ayare, P. J.; Vannucci, A. K.; Wiskur, S. L. "Exploration of silicon phthalocyanines as viable photocatalysts for organic transformations" *J. Photochem. Photobiol. A*, **2022**, *422*, 113547-113553. DOI: 10.1016/j.jphotochem.2021.113547
25. Ayare, P. J.; Gregory, S. A.; Key, R. J.; Short, A. E.; Tillou, J. G.; Sitter, J. D.; Yom, T.; Goodlett, D. W.; Lee, D.-C.; Alamgir, F. M.; Losego, M. D.; *Vannucci, A. K. "Immobilization of Molecular Catalysts on Solid Supports via Atomic Layer Deposition for Chemical Synthesis in Green Solvents" *Green Chem.* **2021**, *13*, 9523-9533. DOI: 10.1039/d1gc02024b
24. Islam, M. F.; Sindt, A. J.; Hossain, M. S.; Ayare, P. J.; Smith, M. D.; Vannucci, A. K.; Garashchuk, S.; Shimizu, L. S. "Assembled triphenylamine bis-urea macrocycles: Exploring photodriven electron transfer from host to guests" *Phys. Chem. Chem. Phys.* **2021**, 23953-23960. DOI: 10.1039/D1CP03000K
23. Bobo, M. V.; Kuchta III, J. J.; *Vannucci, A. K. "Recent Advancements in the Development of Molecular Organic Photocatalysts" *Org. Biomol. Chem.* **2021**, *19*, 4816-4834. DOI:10.1039/D1OB00396H
22. Tillou, J. D.; *Vannucci, A. K. "Determining the Active Catalytic Palladium Species Under Hydrodeoxygenation Conditions" *J. Organomet. Chem.* **2021**, *944*, 121848-121853. DOI: 10.1016/j.jorganchem.2021.121848

21. Leith, G. A.; Rice, A. M.; Yarbrough, B. J.; Kittikhunnatham, P.; Mathur, A.; Morris, N. A.; Francis, M. J.; Berseneva, A. A.; Dhull, P.; Adams, R. D.; Bobo, M. V.; Vannucci, A. K.; Smith, M. D.; Garashchuk, S.; Shustova, N. B. "Broken-hearted Carbon Bowl via Electron Shuttle Reaction: Energetics and Electron Coupling" *Chem. Sci.* **2021**, *12*, 6600-6606. DOI: 10.1039/D0SC06755E

20. Sitter, J. D.; *Vannucci, A. K. "Photocatalytic Oxidative Coupling of Arylamines for the Synthesis of Azoaromatics and the Role of O2 in the Mechanism" *J. Am. Chem. Soc.* **2021**, *143*, 2938-2943. DOI: 10.1021/jacs.0c13101

19. Bobo, M. V.; Arcidiacono, A. M.; Ayare, P. J.; Reed, J. C.; Helton, M. R.; Ngo, T.; Hanson, K.; *Vannucci, A. K. "A Series of Green Light Absorbing Organic Photosensitizers Capable of Oxidative Quenching Photocatalysis" *ChemPhotoChem*, **2021**, *5,* 51-57. DOI: 10.1002/cptc.202000153

18. Bobo, M. V.; Paul, A.; Reed, J.; Ngo, T.; Arcidiacono, A. M.; Smith, M. D.; Hanson, K.; *Vannucci, A. K. "Synthesis and Characterization of bis-Cyclometalated Iridium Complexes Containing (4,4'-bis(phosphonomethyl)-2,2'-bipyridine) Ligands" *Inorg. Chem.* **2020**, *59*, 6351-6358. DOI: 10.1021/acs/inorgchem.0c00456

17. Yao, W.; Das, S.; DeLucia, N. A.; Boudreaux, C. M.; Qu. F.; *Vannucci, A. K.; *Papish, E. T. "Determining the Catalyst Properties that Lead to High Activity and Selectivity for Catalytic Hydrodeoxygenation with Ruthenium Pincer Complexes" *Organometallics*, **2020**, *39,* 662-669. DOI: 10.1021/acs.organomet.9b00816

16. Leith, G. A.; Rice, A. M.; Yarbrough, B. J.; Berseneva, A. A.; Ly, R. T.; Buck III, C. N.; Chusov, D.; Brandt, A. J.; Chen, D. A.; Lamm, B. W.; Stefik, M.; Stephenson, K. S.; Smith, M. D.; Vannucci, A. K.; Pellechia, P. J.; Garashchuk, S.; Shustova, N. B. "A Dual Threat: Redox Activity and Electronic Structures of Well-Defined Donor-Acceptor Fulleretic Covalent-Organic Materials" *Angew. Chem. Int. Ed.* **2020**, *59*, 2-9. DOI: 10.1002/anie.201914233

15. Zhu, T.; Sha,Y.; Firouzjaie, H. A.; Peng, X.; Cha, Y. Dissanayake, D. M. M. M.; Smith, M. D.; Vannucci, A. K.; Mustain, W. E.; Tang, C. "Rational Synthesis of Metallo-Cations Toward Redox- and Alkaline-Stable Metallo-Polyelectrolytes" *J. Am. Chem. Soc.* **2020**, *142*, 1083-1089 DOI: 10.1021/jacs.9b12051

14. Sindt, Ammon J.; DeHaven, B. A.; Goodlett, D. W.; Hartel, J. O.; Ayare, P. J.; Du, Y.; Smith, M. D.; Mehta, A. K., Brugh, A. M.; Forbes, M. D. E.; Bowers, C. R.; Vannucci, A. K.; Shimizu, L. S. "Guest Inclusion Modulates Concentration and Persistence of Photogenerated Radicals in Assembled Triphenylamine Macrocycles" *J. Am. Chem. Soc.* **2020**, *142*, 502-511. DOI: 10.1021/jacs.9b1151

13. DeLucia, N. A.; Jystad, A.; Vander Laan, K.; Tengco, J. M. M.; Caricato, M.; *Vannucci, A. K. "Silica Supported Molecular Palladium Catalyst for Selective Hydrodeoxygenation of Aromatic Compounds under Mild Conditions" *ACS Catal.* **2019**, *9*, 9060-9071. DOI: 10.1021/acscatal.9b02460

12. Dissanayake, D. M. M. M.; Melville, A. D.; *Vannucci, A. K. "Electrochemical Anion Pool Synthesis of Amides with Concurrent Benzyl Ester Synthesis" *Green Chem.* **2019**, *21,* 3165-3171 DOI: 10.1039/C9GC00707E

11. Key, R. J.; Smith, M. D.; *Vannucci, A. K. "A Molecular/Heterogeneous Nickel Catalyst for Suzuki-Miyaura Coupling" *Organometallics*, **2019**, *35,* 2007-2014. DOI: 10.1021/acs.organomet.9b00082

10. Dissanayake, D. M. M. M.; *Vannucci, A. K. "Selective N1-Acylation of Indazoles with Acid Anhydrides using and Electrochemical Approach" *Org. Lett.* **2019**, *21*, 457-460. DOI: 10.1021/acs.orglett.8b03683

9. Sindt, A. J.; DeHaven, B. A.; McEachern Jr., D. F.; Dissanayake, D. M. M. M.; Smith, M. D.; Vannucci, A. K.; Shimizu, L. S. "UV-irradiation of self-assembled triphenylamines affords persistent and regenerable radicals" *Chem. Sci.* **2019**, *10,* 2670-2677. DOI: 10.1039/C8SC04607G

8. Key, R. J.; *Vannucci, A. K. "Nickel Dual Photoredox Catalysis for the Synthesis of Aryl Amines" *Organometallics*, **2018**, *37*, 1468-1472. DOI: 10.1021/acs.organomet.8b00121

7. DeLucia, N. A.; Das, N.; *Vannucci, A. K. "Mild Synthesis of Silyl Ethers via Potassium Carbonate Catalyzed Reactions between Alcohols and Hydrosilanes" *Org. Biomol. Chem.* **2018**, *16*, 3415-3418. DOI: 10.1039/C8OB00464A.

6. DeLucia, N. A.; Das, N.; Overa, S.; Paul, A.; *Vannucci, A. K. "Low temperature selective hydrodeoxygenation of model lignin monomers from a homogeneous palladium catalyst" *Catal. Today* **2018**, *302*, 146-150. DOI: 10.1016/j.cattod.2017.05.050

5. Dissanayake, D. M. M. M.; *Vannucci, A. K. "Transition-Metal-Free and Base-Free Electrosynthesis of 1H-Substituted Benzimidazoles" *ACS Sustainable Chem. Eng.* **2017**, *6*, 690-695. DOI:

10.1021/acssuschemeng.7b03029

4. Paul, A.; Smith, M. D.; *Vannucci, A. K. "Photoredox-Assisted Reductive Cross-Coupling: Mechanistic Insight into Catalytic Aryl-Alkyl Cross-Coupling" *J. Org. Chem.* **2017**, *82*, 1996-2003. DOI: 10.1021/acs.joc.6b02830

3. Rice, A. M.; Fellows, W. B.; Dolgopolova, E. A.; Greytak, A. B.; Vannucci, A. K.; Smith, M. D.; Karakalos, S. G.; Krause, J. A.; Avdoshenko, S. M.; Popov, A. A.; Shustova, N. B. "Hierarchical Corannulene- Based Materials: Energy Transfer and Solid-State Photophysics" *Angew. Chem. Int. Ed.* **2017**, *56*, 4525.

2. Salapage, S. R.; Paul, A.; Banerjee, T.; Hanson, K.; Smith, M. D.; Vannucci, A. K.; Shimizu, L. S. "Structure, Electrochemistry and Photophysical Properties of an Exocyclic Di-Ruthenium Complex and its Application as a Photosensitizer" *Dalton Trans.* **2016**, *45*, 9601.

1. Fellows, W. B.; Rice, A. M.; Williams, D. E.; Dolgopolova, E. A.; Vannucci, A. K.; Pellechia, P. J. Smith, M. D.; Krause, J. A.; Shustova, N. B. "Redox-Active Corannulene Buckybowls in a Crystalline Hybrid Scaffold" *Angew. Chem. Int. Ed.* **2015**, *55*, 2195.

TEACHING

- CHEM 112 – General Chemistry II
- CHEM 511 – Inorganic Chemistry
- CHEM 619/719 – Special Topics in Inorganic Chemistry: Catalysis

COMMITTEES

- USC Top Scholar Faculty Mentor (2025 – present)
- USC National Fellowships and Scholar Program Goldwater Committee (2024 – present)
- Undergraduate American Chemical Society Chapter co-advisor (2020 – 2024)
- Ada B. Thomas Outstanding Advisor Award Selection Committee (2020 – 2024, Chair: 2022-2024)
- Department of Chemistry and Biochemistry Awards Committee (2020 – 2022)
- Department of Chemistry and Biochemistry Recruiting Committee (2019 – present, Chair: 2022-present)
- Department of Chemistry and Biochemistry Computing Committee (2019 – present)
- University Heterogeneous High Performance Computing Committee (2017 – 2019)
- NMR Facilities Committee University of South Carolina (2017 – present)
- Curriculum Committee University of South Carolina (2016 – present)
- Bouknight Scholarship Committee University of South Carolina (2014 – 2020)

ORGANIZED MEETINGS/SYMPOSIA

SERMACS 2024 – October 23rd-26th – Atlanta, GA. Co-Organizer of the Developing Catalyst Systems for More Sustainable Energy Relevant Catalysis symposium.
International Coordination Chemistry Conference 2024 – July 28th-August 3rd – Fort Collins, CO. Co-Organizer of the Coordination Chemistry and Catalysis for Renewable Fuels symposium.
NC Photochem 2023 – October 6th-7th, 2023 – Charlotte, NC. Co-Organizer of conference.
NC Photochem 2022 – October 7th-8th, 2022 – Columbia, SC. Lead-Organizer of conference.
NC Photochem 2021 – October 22nd-23rd, 2021 – Chapel Hill, NC. Co-Organizer of conference.
NC Photochem 2020 – October 8th-9th, 2020 – virtual conference. Co-Organizer of conference.
SERMACS 2016 – October 23rd-26th – Columbia, SC. Organizer of Electrocatalysis symposium.

SEMINAR PRESENTATIONS (30+ invited seminars given)

email vannucci@mailbox.sc.edu for complete list of presented seminars.