

## CURRICULUM VITAE

### Gang Wu, Professor

Department of Chemical and Biological Engineering  
University at Buffalo (UB), The State University of New York (SUNY),  
Buffalo, New York, USA

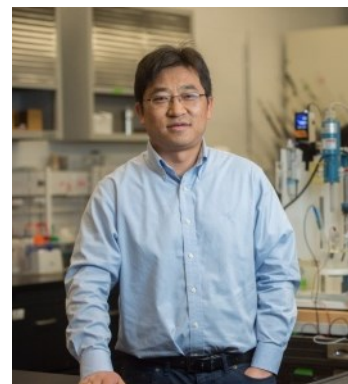
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Google Scholar:

<https://scholar.google.com/citations?user=fRf374gAAAAJ&hl=en>



### Education

- 2004. Ph.D.: Environmental Engineering, Harbin Institute of Technology, Harbin, China.
- 1999. M.S.: Applied Chemistry, Harbin Institute of Technology, Harbin, China.
- 1997. B.S.: Electrochemical Engineering, Harbin Institute of Technology, Harbin, China.

### Employment History

- Aug 2020- present, *Professor*, University at Buffalo, SUNY, USA
- Aug 2018-Aug 2020, *Associate Professor*, University at Buffalo, SUNY, USA
- Aug 2014-Aug 2018, *Assistant Professor*, University at Buffalo, SUNY, USA
- May 2010-Aug 2014, *Staff Scientist*, Los Alamos National Laboratory (LANL), USA
- Jan 2008-May 2010, *Postdoc*, Los Alamos National Laboratory, USA
- Feb 2006-Jan 2008, *Postdoc*, University of South Carolina, USA
- Jan 2004-Jan 2006, *Postdoc*, Tsinghua University, Beijing, China

### Major Research Interest

- Electrochemical Science and Engineering for Energy Technologies;
- Electrocatalysis and photocatalysis for clean energy conversion: fuel cells, electrolyzers, CO<sub>2</sub> reduction; electrosynthesis;
- Electrochemical energy power sources for energy storage: batteries and supercapacitors;
- Carbon-free nitrogen chemistry/electrochemistry for renewable energy storage and conversion (e.g., NH<sub>3</sub> electrosynthesis, oxidation, and cracking for H<sub>2</sub> generation).

### Key Achievements and Recognition

- Dr. Wu is one of the pioneers in the research of platinum group metal (PGM)-free fuel cell catalysts. In 2011, he published his pioneering work in **Science** (3770 citations) as the first author. After that, he further expanded the concept of a series of fuel cell catalysts based on atomically dispersed metal sites, which were published in the top international journals **J. Am. Chem. Soc.** (2017, 920 citations), **Nature Catalysis** (2018, 690 citations), **Advanced Materials** (2018, cited 690 times), **Energy Environ. Sci.** (2019, cited 470 times), **Agnew. Chem. Int. Ed.** (2019, Cited 230 times), and **Nature Energy** (2022), etc. The related fuel cell catalyst technology has applied for 10 US patents. Due to his outstanding contributions in the field of electrochemical energy technology, Dr. Wu has been invited to publish reviews and review articles in internationally renowned journals, including **Nature Catalysis** (2019, 2021), **Chemical Reviews** (2020), **Chemical Society Reviews** (2020), **Materials Today** (2020) **Nano Today** (2016), **Advanced Materials** (2019, 2020, 2021, 2022), **ACS Energy Letters** (2019), **Joule** (2020), **Advanced Energy Materials** (2020), **Small** (2020, 2021) and **Account of Materials Research** (2022), etc.

- Awarded around **\$6.0 M** in grant funding from federal agencies (DOE and NSF) since joining UB in August 2014. Those projects focus on the development of advanced materials for electrochemical energy conversion and storage technologies such as fuel cells, water splitting, batteries, and renewable fuel (e.g., NH<sub>3</sub>).
- Published more than **300** scientific papers in prestigious journals, including *Science*, *Nature Energy*, *Nature Catalysis*, *J. Am. Chem. Soc.*, *Angew. Chem. Int. Ed.*, *Advanced Materials*, *Energy Environ. Sci.*, *Chemical Reviews*, *Chemical Society Reviews*, *Materials Today*, *Nano Today*, *ACS Nano*, *ACS Catalysis*, etc., along with **12** patents and patent applications, **9** invited book chapters, and over **100** presentations.
- Work has garnered ~**37,000** citations by June 2022, leading to citation metrics of *h* index: **103** [Google Scholar]. <https://scholar.google.com/citations?user=fRf374gAAAAJ&hl=en>
- Continuously named a Highly Cited Researcher by Clarivate Analytics since **2018** in recognition of exceptional research performance demonstrated by publishing multiple highly cited papers that ranked in the top 1% in the Web of Science.
- Completed more than **1000** manuscript peer-reviews (~1 per day) for renowned journals including *Science*, *Nature*, *PNAS*, *Nature Chemistry*, *Nature Nanotechnology*, *Nature Communications*, *Nature Energy*, *Nature Catalysis*, *Journal of the American Chemical Society*, *Angewandte Chemie*, *Advanced Materials*, *Nano Letters*, *ACS Nano*, *Materials Today*, *Nano Today*, *Energy and Environmental Science*, *Advanced Energy Materials*, *Advanced Functional Materials*, *Small*, *Chemistry of Materials*, *Nano Energy*, and many others.
- Served as a panelist or proposal reviewer for the *U.S. National Science Foundation (NSF)*, *U.S. DOE Office of Science*, *Office of Energy Efficiency and Renewable Energy (EERE)*, *Czech Science Foundation*, *Research Grants Council of Hong Kong*, *National Research Foundation of Singapore*, *United States-Israel Binational Science Foundation*, *Estonian Research Council*, and *Natural Sciences and Engineering Research Council of Canada*.

### Academic Awards

- SUNY Chancellor's Award for Excellence in Scholarship & Creative Activities, 2021.
- UB's Exceptional Scholar – Sustained Achievement Award, 2020.
- UB SEAS (Engineering School) Senior Research Award, 2019.
- UB SEAS (Engineering School) Early Career Research Award, 2017.
- LANL LDRD-ER Award, 2014.
- DOE, EERE office Outstanding Research Team Award, 2011.
- LANL Early Career LDRD Award, 2010.

### Honors

- Named a 2018, 2019, 2020, and 2021 Highly Cited Researcher by Thomson Reuters, Clarivate Analytics
- Elected an at-large Member of Energy Technology Division, Electrochemical Society
- Selected as "*Professor of the Year*" by the UB AIChE student chapter, 2016.
- Rank as a Top 1% reviewer for *ACS Catalysis*, 2015
- 2011 *Science* paper was ranked among the top 10 most-cited articles in Chemistry, 2013
- Selected as a Featured Scientist at LANL, 2011
- Recognized for a Top 10 most-cited paper in *Electrochemistry Communications*, 2010

## Professional Memberships and Activities

- Member of the American Institute of Chemical Engineers (AIChE), 2014-
- Member of the Electrochemical Society (ECS), 2008-
- Member of the American Chemical Society (ACS), 2008-
- Member of the Materials Research Society (MRS), 2013-
- Board Committee Member of The International Academy of Electrochemical Energy Science
- Editorial Board of *ChemistrySelect* (a new journal from ChemPubSoc Europe, Wiley-VCH Publisher) 2015- present
- Editorial Board Member for *Scientific Reports*, (Nature Publishing Group), 2016- present
- Associate Editor of *RSC Advances* (a journal in the Royal Society of Chemistry, UK), 2016-present
- Associate Editor of *SusMat* (a journal published by Wiley), 2021-present

## Professional Service

- Vice Chair for Transport and Energy Processes (TEP) Division at the American Institute of Chemical Engineers (AIChE).
- Award Committee Member, *Energy Technology Division* (2018- present) and *Toyota Young Investigator Fellowships* (2020-present) for the Electrochemical Society
- National Science Foundation (NSF) Panel Reviewer for CAREER proposals in *Electrochemical Systems* and *Catalysis* program; Ad Hoc review for NSF Engineering Research Center (ERC) proposals, 2019.
- National Science Foundation (NSF) Panel Reviewer for *Catalysis* and *Energy Sustainability* programs, 2019.
- National Science Foundation (NSF) Panel Reviewer for *Chemical Catalysis* program, 2018.
- Lead organizer for symposia “*Fundamentals of Electrochemical Processes*” and “*Materials for Electrochemical Energy Storages*”; co-organizer for “*Electrocatalysis and Photocatalysis*” at the American Institute of Chemical Engineers (AIChE) meeting, 2016, 2017, 2018, and 2019.
- Lead organizer for the symposium “*Energy Conversion Systems Based on Nitrogen 3*” at the 237<sup>th</sup> *Electrochemical Society Meeting* (ECS), Montreal, Canada, May 2020.
- Symposium co-organizer for “*Innovative Chemistry & Electrocatalysis for Low-Carbon Energy & Fuels: Discovery to Application*” at the 257<sup>th</sup> American Chemical Society National Meeting, Orlando FL, March 2018.
- Co-organizer for symposia “*Advances and Perspectives on Modern Polymer Electrolyte Fuel Cells - Symposium in Honor of Shimshon Gottesfeld*”, “*Energy Conversion Systems Based on Nitrogen*”, and “*Materials for Low Temperature Electrochemical Systems*” at the 235<sup>th</sup> Electrochemical Society (ECS) Meeting in Dallas, May 2019.
- Lead organizer for symposium “*Energy Conversion Systems Based on Nitrogen*” and co-organizer for symposia “*Materials for Low Temperature Electrochemical Systems*” and “*Oxygen or Hydrogen Evolution Catalysis for Water Electrolysis*” at the 233<sup>rd</sup> Electrochemical Society (ECS) Meeting in Seattle, May 2018.
- Lead organizer for symposium “*Advanced Electrocatalysis for Clean Energy and Environment*” at the 256<sup>th</sup> American Chemical Society National Meeting, Boston, MA, August 2018.

- Symposium co-organizer for “*Innovative Chemistry & Electrocatalysis for Low-Carbon Energy & Fuels: Discovery to Application*” at the 254<sup>th</sup> American Chemical Society National Meeting, Washington DC, August 2017.
- Co-organizer for “*Electrocatalysis and Photoelectrocatalysis*”, and “*Composites for Environmental applications*”, at the American Institute of Chemical Engineers (AIChE) meeting, 2015, 2016, and 2017.
- Co-organizer for symposium “*Multiple electron redox for battery technologies*” at the 232<sup>nd</sup> Electrochemical Society Meeting (ECS), National Harbor, MD, October, 2017.
- Co-organizer for symposium “*Innovative Chemistry & Electrocatalysis for Low-Carbon Energy & Fuels: Discovery to Application*” at the 254<sup>th</sup> American Chemical Society (ACS) National Meeting, August, Washington DC, 2017.
- Lead organizer for symposium “*Electrochemical energy materials*” at the Northeastern Regional Meeting of the American Chemical Society (NERM), Binghamton, NY, 2016.
- Co-organizer and session chair for symposium “*Electrochemical energy production, conversion, and storage*” at the 252<sup>nd</sup> American Chemical Society (ACS) National Meeting, Philadelphia, PA, August 2016
- Session chair in *Electrochemical Society Meetings (ECS)*, 2015, 2016, and 2017.
- Completed more than 1000 manuscript peer-reviews (~3-4 per week) for renowned journals including *Science*, *Nature*, *PNAS*, *Nature Chemistry*, *Nature Nanotechnology*, *Nature Communications*, *Nature Energy*, *Nature Catalysis*, *Journal of the American Chemical Society*, *Angewandte Chemie*, *Advanced Materials*, *Nano Letters*, *ACS Nano*, *Nano Today*, *Energy and Environmental Science*, *Advanced Energy Materials*, *Advanced Functional Materials*, *Small*, *Chemistry of Materials*, *Nano Energy*, and many others.
- Served as a panelist or proposal reviewer for the *U.S. National Science Foundation (NSF)*, *U.S. DOE Office of Science*, *Office of Energy Efficiency and Renewable Energy (EERE)*, *Czech Science Foundation*, *Research Grants Council of Hong Kong*, *National Research Foundation of Singapore*, *United States-Israel Binational Science Foundation*, *Estonian Research Council*, and *Natural Sciences and Engineering Research Council of Canada*.

### Courses Taught

- CE 328 Chemical Engineering Lab and Lectures (*Spring*), 70-90 undergraduate: 2019-present
- CE 433/534, Materials Science and Corrosion (*Spring*), 90-110 undergraduate/graduate students: 2015-2018 and 2021-
- CE 422/522, Electrochemical Energy and Environment (*Fall*), 40-50 undergraduate/graduate students: 2015-present

### Research Supervision

**Graduated Ph.D. students (7)** : *Shiva Gupta (2017, Research scientist, Intel)*; *Hanguang Zhang (2019, Postdoc at Los Alamos National Laboratory)*; *Zhi Qiao (2020, Postdoc at Texas A&M)*; *Yanhua He (2020, Postdoc at Los Alamos National Laboratory)*; *Shreya Mukherjee (2021, Scientist, Air Products)*; *Mengjie Chen (2021, Postdoc at George Tech)*, *Nadia Mohd Adli (female) (2021)*

**Former postdocs and visiting scholars:** Shengwen Liu, Qiurong Shi, Xiaoxia Wang, Qiang Tan, Leilei Lu, Deyu Li, Lin Guo, Jinhui Zhu, Xiaojuan Wang, Li Song, Jiazhan Li, Huanhuan Wang, Yi Li, Xiaoxuan Yang

**M.S. students (10):** Yingjie Chen, Kemakorn Ithisuphalap (*female*), Janel Abbott (*female*), Bryan Matthews, Kate Chen, Joshua Sokolowski, Vishal Tuli, Bingzhang Zhang, Viswa Phani Marthi, Zimin Wang

**Undergraduate researchers (17):** Vyomika Sangwan (*female*), Obianuju Joy Obiano (*African American female*), Jing Xue, Hannah Osgood (*female*), Ana Santandreu (*female*), Emmanuel Nsengiyumva (*African American*), Hengyu Pan, Jingyun Wang (*female*), William Kellogg, Daniel Matera, Qinqin Xiao (*female*), Victor Pang, Anna Sviripa (*female*), Ziming Wang (*female*), Dylan Tiffany, Cameron Priest, Jieun Chang (*female*)

### Current Advisees

- Ph.D. students (6): Bingzhang Zhang, Kate Chen, Cameron Priest; Joshua Sokolowski, Ryan Heitkamp, Max Pupucevski
- Postdocs (4): Yachao Zeng; Hassina Tabassum (*female*), Cehuang Fu, Manman Qi (*female*);

### Grant Support

To date (Feb 2022), secured more than **\$5.8 M** (\$5,843K) for UB from federal funding since joining UB in August 2014. (All of the funding amounts shown in **bold** are for UB portion of projects)

#### The PI of the National Science Foundation (NSF) Awards

- “Collaborative Research: Designing Nitrogen Coordinated Single Atomic Metal Electrocatalysts for Selective CO<sub>2</sub> Reduction to CO”, National Science Foundation (NSF) - CBET-Catalysis-1804326, **\$200,000**, (**PI**, 100%), 2018-2021.
- “Engineering Nanocarbon Air Cathodes for High-Temperature Solid-State Li-O<sub>2</sub> Batteries”, National Science Foundation (NSF) - CBET-Process & Reaction Engineering-1604392, **\$300,000**, (**PI**), 2016-2021.
- “Three-dimensional porous nanographene for highly efficient energy storage in Li-ion batteries”, National Science Foundation (NSF) - CBET-Energy Sustainability-1511528, **\$300,000**, (**PI**, 80%); co-PIs: Chong Cheng (10%) and Johannes Hachmann (10%), 2015-2019.

#### The PI at UB from the Department of Energy (DOE) and Department of Defense (DOD)

- “Integrating Highly Durable Carbon Supports and Intermetallic PtCo Catalysts for Heavy-Duty MEAs”, U.S. DOE, EERE, Million Mile Fuel Cell Truck (M2FCT) consortium, UB Funding **\$200,000**, PI (100%), 2022-2023.
- “Durable High-Efficiency Membrane and Electrode Assemblies for Heavy-Duty Fuel Cell Vehicles” U.S. Department of Energy, SBIR Phase I. UB Funding **\$60,000**. PI at UB (100%), led by Giner Inc, 2021-2022.

- “A compact energy efficient Oxygen generator for deployed military applications” U.S. Department of Defense, SBIR Phase I. UB Funding: **\$50,000**. PI at UB (100%), led by *Bettergy Corp*, 2021-2022.
- “Mesoporous Carbon based PGM-free Catalyst Cathodes”, U.S. Department of Energy, Energy Efficiency Renewable Energy (EERE) Office, UB Funding: **\$397,000**, PI at UB (100%), led by Prof. Jian Xi at *Indiana University Purdue University*; Teams includes UB and *United Technologies Corporation*; Total funding: \$1,000,000, 2019-2021.
- “Advanced Electrocatalysts through crystallographic enhancement” U.S. Department of Energy, EERE, Fuel Cell Technologies Office, UB Funding: **\$320,000**, PI at UB (100%), led by Dr. Jacob Spendelow at *Los Alamos National Laboratory*; Teams include UB, *Brown University*, *University of Pennsylvania*, and *TW-II Inc*. Total funding: \$2,000,000, 2016-2021.
- “Stationary Direct Methanol Fuel Cells Using Pure Methanol”, U.S. Department of Energy, Energy Efficiency Renewable Energy (EERE) Office, UB Funding: **\$240,000**, PI at UB (100%), led by Prof. Xianglin Li at *University of Kansas*; Teams include UB, *Carnegie Mellon University*, and *Kansas State University*; Total Funding: \$1,000,000, 2019-2022.
- *High-Efficiency Reversible Alkaline Membrane Fuel Cells*, U.S. Department of Energy, Energy Efficiency Renewable Energy (EERE) Office, UB Funding: **\$150,000**, PI at UB (100%), led by Dr. Hui Xu at *Giner*; Teams include UB, *University of Delaware*, and *National Renewable Energy Laboratory*; Total Funding: \$1,000,000, 2019-2021.
- “PGM-free OER Catalysts for PEM Electrolyzer”, U.S. Department of Energy, Energy Efficiency Renewable Energy (EERE) Office, UB Funding: **\$65,000** (Phase II), PI at UB (100%), led by Dr. Di-jia Liu at *Argonne National Laboratory*; Teams include UB and *Giner Inc*; Total Funding: \$250,000, 2019-2020.
- “Durable Mn-based PGM-Free Catalysts for Polymer Electrolyte Membrane Fuel Cells”, U.S. Department of Energy, Energy Efficiency Renewable Energy (EERE) Office, UB Funding: **\$640,000**, PI at UB (100%), led by Dr. Hui Xu at *Giner Inc*; Teams include UB, *General Motor*, and *University of Pittsburg*; Total Funding: \$2,000,000, 2018-2021.
- “Advanced PGM-free Cathode Engineering for High Power Density and Durability”, U.S. Department of Energy, Energy Efficiency Renewable Energy (EERE) Office, UB Funding: **\$528,000**, PI at UB (100%), led by Prof. Shawn Lister at *Carnegie Mellon University*; Teams include UB, *3M*, and *Giner Inc*; Total Funding: \$2,000,000, 2017-2021.
- “PGM-free OER Catalysts for PEM Electrolyzer”, U.S. Department of Energy, Energy Efficiency Renewable Energy (EERE) Office, UB Funding: **\$75,000** (Phase I), PI at UB (100%), led by Dr. Dijia Liu at *Argonne National Laboratory*; Teams include UB and *Giner Inc*; Total funding: \$250,000, 2017-2018.
- “Low Temperature NH<sub>3</sub> Cracking Membrane Reactor for H<sub>2</sub> Generation” U.S. Department of Energy, Advanced Research Projects Agency-Energy (APRA-e) Office, UB Funding: **\$285,000**, PI at UB (100%), led by Dr. Zhong Tang at *Bettergy Corp*; Total funding: \$800,000, 2017-2020.
- “High-Efficiency Ammonia Production from Water and Nitrogen” U.S. Department of Energy, Advanced Research Projects Agency-Energy (APRA-e) Office, UB Funding: **\$320,000**, PI at UB (100%), led by Dr. Hui Xu at *Giner Inc.*; Teams include UB, *University of Delaware*, and *National Renewable Energy Laboratory*; Total funding is \$1,500,000, 2017-2020.

- “Advanced catalysts and MEAs for reversible alkaline fuel cells”, U.S. Department of Energy, EERE, Fuel Cell Technologies Office, UB Funding: **\$280,000**, PI at UB (100%), led by Dr. Hui Xu at Giner Inc.; Teams include UB and National Renewable Energy Laboratory; Total funding: \$1,000,000, 2015-2017.

#### National Laboratories and Industry Funding

- “Strategic collaborations between UB and LANL to develop high-performance fuel cell catalysts”, Los Alamos National Laboratory: **\$622,000**, 2021-2024. (PI at UB, 100%)
- “High-temperature electrolyzers for Hydrogen production”, Idaho National Laboratory, UB Funding: **\$180,000**, 2021-2023 (PI, 100%).
- “Nanographene anode for highly efficient energy storage”, Los Alamos National Laboratory, UB Funding: **\$150,000**, 2014-2017 (PI, 100%).

#### New York State, SUNY, and UB internal funding

- Buffalo Blue Sky Golden Award: **\$25,000**, University at Buffalo, SUNY, 2020-2022.
- “Green and Low-Cost Hydrogen Peroxide On-Site Production for Disinfection”, New York State Center of Excellence in Materials Informatics, **\$50,000**, 2015 (PI, 100%), 2021-2022.
- “High-performance Hydrogen Fuel Cell Catalysts for Transportation” UB Accelerator Fund, **\$87,000**, PI (100% share) 2021/2 to 2022/06.
- “High-efficient ammonia cracking for hydrogen generation” New York State Energy Research and Development Authority (NYSERDA), **\$90,000**, PI at UB (100%), collaborating with Bettergy Corp (Peekskill, NY); Total funding: \$300,000, 2019-2022.
- Buffalo Blue Sky Golden Award: **\$20,000**, University at Buffalo, SUNY, 2018-2020.
- “Atomic-metal-rich carbon electrocatalysts for sustainable energy via CO<sub>2</sub> reduction” **\$35,000**, RENEW Award (co-PI, 33%); PI: Luis Velarde (CHE, 34%), Michel Dupuis (CBE, 33%), 2017-2018.
- “Si Nanocomposite Anode Coated with Lithium-Rich Ferroelectric Layer for High-Performance Lithium-Ion Batteries”, **\$35,000**, SMART Award (co-PI, 30%); PI Fei Yao (40% and Quanxi Jia (30%) at MDI, 2017-2018.
- “Engineering graphene tubes as fuel cell supports”, New York State Center of Excellence in Materials Informatics, **\$27,000**, (PI, 100%), 2016-2017.
- “3D Printing Flexible Solid-State High-Energy-Density Graphene Supercapacitors”, UB SMART Award **\$34,500** (co-PI, 50%); PI: Chi Zhou (50%) from Industrial and Systems Engineering, 2016-2017.
- “Engineering Photocatalysts for Clean H<sub>2</sub> Generation” IMPACT Award, **\$33,000**, (PI, 40%); Co-PIs: Hao Zeng (30%) and Peihong Zhang (30%), 2016-2017.
- “Advanced carbon nanomaterials for supercapacitor energy storage”, SUNY Network of Excellence in Materials and Advanced Manufacturing. **\$12,500**, (PI at UB, 100%, led by Stony Brook, 2015-2016.

- “Solid-state graphene-based high-performance supercapacitors”, New York State Center of Excellence in Materials Informatics, **\$25,000**, 2015 (PI, 100%), 2014-2015.

### Peer-Refereed Publication List

(More than **300** publications in total with **>37,000** citations [Google Scholar], h-index: **103**);  
 Google Scholar profile: <http://scholar.google.com/citations?user=fRf374gAAAAJ&hl=en>

### 2022

1. S. Liu, C. Li, M. J. Zachman, Y. Zeng, H. Yu, B. Li, M. Wang, J. Braaten, J. Liu, H. M. Meyer III, M. Lucero, A. J. Kropf, Q. Gong, Q. Shi, Z. Feng, G. Wang\*, D. J. Myers\*, J. Xie\*, D. A. Cullen\*, L. Shawn\*, G. Wu\*. Durable and High-Power Iron-Based Cathodes in Competition with Platinum for Proton-Exchange Membrane Fuel Cells. *ChemRxiv. Cambridge: Cambridge Open Engage; 2021; Nature Energy*, in press, 2022.
2. X. Yang, C. Priest, Y. Hou, G. Wu\*, “Atomically dispersed dual-metal-site PGM-free electrocatalysts for oxygen reduction reaction: Opportunities and challenges”, *SusMat*, doi: 10.1002/sus2.69 (2022).
3. H. Zhu, X. Ren, X. Yang, X. Liang, A. Liu, G. Wu\*, “Fe-based catalysts for nitrogen reduction toward ammonia electrosynthesis under ambient conditions”, *SusMat*, doi: 10.1002/sus2.70 (2022).
4. J. Zhu, Z. Fang, X. Yang, M. Chen, Z. Chen, F. Qiu, M. Wang, P. Liu, Q. Xu, X. Zhuang, G. Wu\*, “Core–Shell Structured Fe–N–C Catalysts with Enriched Iron Sites in Surface Layers for Proton-Exchange Membrane Fuel Cells”, *ACS Catalysis* 12, 6409-6417 (2022).
5. H. Tabassum, X. Yang, R. Zou, G. Wu\*, “Surface engineering of Cu catalysts for electrochemical reduction of CO<sub>2</sub> to value-added multi-carbon products”, *Chem Catalysis*, 10.1016/j.checat.2022.04.012 (2022).
6. G. Chen, Y. An, S. Liu, F. Sun, H. Qi, H. Wu, Y. He, P. Liu, R. Shi, J. Zhang, A. B. Kuc, U. Kaiser, T. Zhang, T. Heine, G. Wu\*, X. Feng\*, “Highly Accessible and Dense Surface Single Metal FeN<sub>4</sub> Active Sites for Promoting Oxygen Reduction”, *Energy Environ. Sci.*, 10.1039/D2EE00542E (2022).
7. Y. Li, W. Shan, M. J. Zachman, M. Wang, S. Hwang, H. Tabassum, J. Yang, X. Yang, S. Karakalos, Z. Feng, G. F. Wang, G. Wu\*, “Atomically Dispersed Dual-Metal Site Catalysts for Enhanced CO<sub>2</sub> Reduction: Mechanistic Insight into Active Site Structures”, *Angew. Chem.-Int. Edit.*, e202205632 (2022).
8. K. Wang, Y. Wang, B. Yang, Z. Li, X. Qin, Q. Zhang, L. Lei, M. Qiu, G. Wu\*, Y. Hou\*, “Highly active ruthenium site stabilized by modulating electron-feeding for sustainable acidic oxygen-evolution electrocatalysis”, *Energy Environ. Sci.*, doi:10.1039/D1EE03610F (2022).
9. X. Jia, H. Kang, X. Yang, Y. Li, X. Wu, W. Qin, G. Wu\*, “Amorphous Ni(III)-based sulfides as bifunctional water and urea oxidation anode electrocatalysts for hydrogen generation from urea-containing water”, *Appl. Catal. B-Environ.*, 121389 (2022).
10. F. Pan, X. Yang, T. O’Carroll, H. Li, K. J. Chen, G. Wu\*, “Carbon Catalysts for Electrochemical CO<sub>2</sub> Reduction toward Multicarbon Products”, *Adv. Energy Mater.* 12, doi: 10.1002/aenm.202200586 (2022).



11. Y. Li, N. M. Adli, W. Shan, M. Wang, M. J. Zachman, S. Hwang, H. Tabassum, S. Karakalos, Z. Feng, G. Wang, Y. C. Li, G. Wu\*, "Atomically Dispersed Single Ni Site Catalysts for High-Efficiency CO<sub>2</sub> Electroreduction at Industrial-Level Current Densities", *Energy Environ. Sci.* 15, 2108-2119 (2022).
12. F. Ma, X. Liu, X. Wang, J. Liang, J. Huang, C. Priest, J. Liu, S. Jiao, T. Wang, G. Wu, Y. Huang, Q. Li, "Atomically Dispersed Zn-Co-N-C Catalyst Boosting Efficient and Robust Oxygen Reduction Catalysis in Acid via Stabilizing Co-N Bonds", *Fundamental Research* , 10.1016/j.fmre.2022.03.008 (2022).
13. Z. Miao, S. Li, C. Priest, T. Wang, G. Wu, Q. Li, "Effective Approaches for Designing Stable M-Nx/C Oxygen-Reduction Catalysts for Proton Exchange Membrane Fuel Cells", *Adv. Mater.* , 2200595 (2022).
14. M. E. Abdelrahman, H. Zhang, G. Wu, X. Li, S. Litster, "Half-cell electrode assessments of a crossover-tolerant direct methanol fuel cell with a platinum group metal-free cathode", *Electrochim. Acta* , 140262 (2022).
15. M. Chen, C. Li, B. Zhang, Y. Zeng, S. Karakalos, S. Hwang, J. Xie, G. Wu\*, "High-Platinum-Content Catalysts on Atomically Dispersed and Nitrogen Coordinated Single Manganese Site Carbons for Heavy-Duty Fuel Cells", *J. Electrochem. Soc.* 169, 034510 (2022).
16. S. Shen, L. Li, C. Fu, G. Wei, X. Cheng, J. Yin, X. Yan, G. Wu, J. Zhang, "A Facile Strategy to Boost the Active Sites of Fe-N-C Electrocatalyst for the Oxygen Reduction Reaction", *J. Electrochem. Soc.* 169, 034506 (2022).
17. Q. Wang, M. Zhu, G. Chen, N. Dudko, Y. Li, H. Liu, L. Shi, G. Wu\*, D. Zhang\*, "High-Performance Microsized Si Anodes for Lithium-Ion Batteries: Insights into the Polymer Configuration Conversion Mechanism", *Adv. Mater.* 34, 2109658 (2022).
18. X. Yang, Y. Zeng, W. Alnoush, Y. Hou, D. Higgins, G. Wu\*, "Tuning Two-Electron Oxygen-Reduction Pathways for H<sub>2</sub>O<sub>2</sub> Electrosynthesis via Engineering Atomically Dispersed Single Metal Site Catalysts", *Adv. Mater.* 33, 2107954 (2022).
19. Y. He, G. Wu\*, "PGM-Free Oxygen-Reduction Catalyst Development for Proton-Exchange Membrane Fuel Cells: Challenges, Solutions, and Promises", *Accounts of Materials Research* 2, doi: 10.1021/accountsmr.1c00226 (2022).
20. Y. He, X. Yang, Y. Li, L. Liu, S. Guo, C. Shu, F. Liu, Y. Liu, Q. Tan, G. Wu\*, "Atomically Dispersed Fe-Co Dual Metal Sites as Bifunctional Oxygen Electrocatalysts for Rechargeable and Flexible Zn-Air Batteries", *ACS Catalysis* 12, 1216-1227 (2022).
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- 308 Nallathambi V; Wu G; Subramanian N; Kumaraguru S; Lee JW; Popov B, Highly active carbon composite electrocatalysts for PEM fuel cells, ***ECS Transactions***, 11, 241-247, 2007.
- 309 Li X; Colon-Mercado H; Wu G; Lee JW; Popov B, Development of stable Pt-Co cathode catalysts for PEM fuel cells, ***ECS Transactions***, 11, 1259-1266, 2007.

#### Book Charters

#### After joining UB

- Wang T., Li Q.,\* Wu G.\*, “Heteroatom-Doped, Carbon-Supported Metal Catalysts for Electrochemical Energy Conversions” for “*Carbon-Based Metal-Free Catalysts: Design and Applications*”, Editors: Liming Dai, *John Wiley & Sons, Inc.*, 2018.
- Wu G.\*, Xu P., “Graphene Composite Catalysts for Electrochemical Energy Conversion” for “*Multifunctional Nanocomposites for Energy and Environmental Applications*”, Editors: Zhanhu Guo, Yuan Chen, Na Luna Lu, *John Wiley & Sons, Inc.*, 2018.
- Chung H., Wu G., Higgins D., Zamani P., Chen Z., and Zelenay P\*. “Heat-Treated Non-precious Metal Catalysts for Oxygen Reduction” for *Electrochemistry of N4 Macrocyclic Metal Complexes, Volume 1: Energy*, Editors: J. H. Zagal, F. Bedioui, Springer, 2016.
- Li Q; Wu G.\* “Nanocarbon-based catalysts for oxygen reduction reaction in various electrolytes” for *Nanocarbons for Advanced Energy Conversion*, Editor: Xinliang Feng, *John Wiley & Sons, Inc.*, 2015.
- Wu G.\* and Wilkinson D.P., “Future catalyst approaches for electrochemical energy storage and conversion” for *Advanced Materials and Technologies for Electrochemical Energy*, Editor: Jiujun Zhang, *CRC press*, 2015.
- Wu G.\* and Gao W, “GO/rGOs as advanced materials for energy storage and conversion” for *Graphene Oxide: Reduction Recipes, Spectroscopy, and Applications*, Editor: Wei Gao, *Springer*, 2015.

#### Before joining UB

- Elbaz L; Wu G.; Zelenay P, “Heat-treated non-precious-metal-based catalysts for oxygen reduction” for *Electrocatalysis in Fuel Cells: Non and Low Platinum Approach*; Editor: Minhua Shao, *Springer*, 2013.
- Wu G.\*, Chen Z; Zhang JJ, “Nanostructured transition metal-N-C catalysts for oxygen reduction in PEM fuel cells” for *Nanostructured and Advanced Materials in Fuel Cells*, Editor: San-Ping Jiang and Peikang Shen, *CRC Press*, 2013.
- Li Q; Wu G.\* “Carbon composite cathodes for alkaline PEM fuel cells” for *Non-Noble Metal Catalysts for Fuel Cells*, Editors: Jean-Pol Dodelet and Jiujun Zhang, *John Wiley & Sons, Inc.*, 2013.

#### **Patents & Patent Applications**

1. “Atomically dispersed PGM-free Catalysts via Environmentally Benign Aqueous Synthesis”, US Provisional 63/073,371, filed 09/02/2020.
2. Chemical vapor deposition for atomically dispersed and nitrogen coordinated single metal site catalysts, US provisional 63/068,937, filed 08/21/2020.
3. “3D Porous Graphitic Nanocarbon for Enhancing Performance and Durability of Pt Catalysts”: US Provisional 63/051,703 filed 7/14/2020.
4. “High-Performance Platinum Group Metal-free Fuel Cell catalysts”: US Provisional 63/068,937 filed 8/21/2020.
5. “Metal Alloy/Oxide Composite Catalyst for Ammonia Decomposition” U.S. Provisional Application 16920056, filed 07/02/2020.
6. “Catalytic Oxidation of Dimethyl Ether”, U.S. Patent, US9334575B2.
7. “Nitrogen-doped carbon-supported cobalt-iron oxygen reduction catalyst”, U.S. Application Serial No. 13/094,594

8. "Preparation of supported electrocatalysts comprising multiwalled carbon nanotubes", U.S. Application Serial No. 61/333,667
9. "Non-precious fuel cell catalysts comprising polyaniline", U.S. Application Serial No. 13/267,579
10. "Carbon-based composite electrocatalysts for low-temperature fuel cells", U.S. Patent, US7629285B2

### Invited Talks and Presentations

More than 150 presentations (> 50 invited talks) at universities and national labs along with conferences (e.g., ECS, ACS, AIChE, MRS).

#### Invited seminar talks at universities, DOE national labs, and Industrial Companies.

1. Wu G, Advanced PGM and PGM-free catalyst development at the University at Buffalo, **Ballard Power Inc.** Vancouver, BC, Canada, June 2, 2022.
2. Wu G, Advanced catalyst technologies for hydrogen fuel cells and water electrolyzer, **EcoMat online webinar**, May 16, 2022.
3. Wu G., Single Metal Site Catalysts for Proton-Exchange Membrane Fuel Cells, **University of Louisiana- Lafayette, Department of Chemical Engineering**, Invited seminar, Jan 15<sup>th</sup>, 2022.
4. Wu G., Durable and High-Power Iron-Based Cathodes for Proton-Exchange Membrane Fuel Cells, **PlugPower Inc.** Invited seminar, August 5<sup>th</sup>, 2021. (*Virtual seminar*)
5. Wu G., Advanced Electrocatalysis for Energy and Environmental Sustainability, **University of Rochester**, Department of Chemical Engineering, invited department seminar, April 14, 2021. (*Virtual seminar*)
6. Wu G., Advanced Electrocatalysis for Energy and Environmental Sustainability, **University of Illinois Urbana-Champaign**, Department of Chemical and Biological Engineering, invited department seminar, January 21, 2021. (*Virtual seminar*)
7. Wu G., Precious Metal Catalysts for Electrochemical Energy Applications, **University of Cincinnati, Department of Chemical Engineering**, invited department seminar, April 19, 2020. (Cancelled due to Covid-19)
8. Wu G., Single Metal Site Catalysts for Electrochemical Energy Applications, **University of California, Riverside, Department of Chemical and Environmental Engineering**, invited department seminar, March 03, 2020. (Cancelled due to Covid-19).
9. Wu G., Atomically Dispersed Metal Site Catalysts for Oxygen Reduction, **University of Houston, Department of Physics**, invited department seminar, November 19, 2019.
10. Wu G., Advanced Electrocatalysis for Clean Energy Conversion, **Stevens Institute of Technology, Department of Mechanical Engineering**, invited seminar, November 7, 2019.
11. Wu G., Achievements, challenges and perspectives on cathode catalysts in proton exchange membrane fuel cells, **University of Illinois at Chicago, Department of Chemical Engineering**, invited department seminar, October 31, 2019.
12. Wu G., Advanced cathode catalysts in proton-exchange membrane fuel cells, **Clemson University, Department of Materials Science and Engineering**, invited department seminar, September 19, 2019.

13. Wu G., Atomically Dispersed Metal Site Catalysts for Proton Exchange Membrane Fuel Cells, *Pittsburgh-Cleveland Catalysis Society (PCCS) meeting at the University of Pittsburgh*, August 22, 2019.
14. Wu G., Single metal site electrocatalysis for sustainable energy conversion, *Rensselaer Polytechnic Institute, Department of Chemistry*, invited department seminar, March 12, 2019.
15. Wu G., PGM-free catalysts for hydrogen fuel cells, *University of South Carolina, Department of Chemical Engineering*, invited department seminar, February 21, 2019.
16. Wu G., Atomically dispersed metal sites catalysts for sustainable energy conversion, *University of Florida, Department of Chemical Engineering*, invited department seminar, December 11, 2018.
17. Wu G., Advanced PGM-free cathode catalysts for hydrogen fuel cells, *2018 Electrochemical Energy Symposium at Carnegie Mellon University Wilton E. Scott Institute for Energy Innovation*, November 15, 2018.
18. Wu G., Advanced cathode catalysts for hydrogen fuel cells, *Pacific Northwest National Laboratory*, invited division seminar, May 30, 2018.
19. Wu G., PGM-free catalysts for electrochemical energy conversion through water reactions, *Renewable Energy National Laboratory*, invited division seminar, Feb 13, 2018.
20. Wu G., Atomic metal site catalyst for energy conversion, *Florida International University – Department of Mechanical and Materials Engineering*, December 1, 2017.
21. Wu G., Large-size Graphene Tube Catalysts for Sustainable Electrochemical Energy Storage and Conversion, *Binghamton University, Department of Chemistry*, February 22, 2016.
22. Wu G., Carbon nanocomposite catalysts for Sustainable Electrochemical Energy Storage and Conversion, *Cornell University, Department of Materials Science and Engineering*, March 19, 2016.
23. Wu G., Bifunctional carbon nanocomposite catalysts for Sustainable Electrochemical Energy Conversion, *University of Missouri-Columbia, Department of Chemical Engineering*, March 11, 2016.

#### Invited talks at national and international conferences and workshops

24. Wu G., Advanced atomically dispersed metal catalysts for fuel cells, ACS Fall 2019 National Meeting & Exposition in San Diego, CA, August 25 - 29, 2019.
25. Wu G., Discussion on the formation mechanisms of Fe-N<sub>4</sub> active sites during the thermal activation, Telluride Science Workshop: PGM-free Catalysis for fuel cell application, Telluride, CO, June 24-29, 2019
26. Wu G., Polymer Hydrogel-Derived Carbon Supports for Highly Stable Pt/C Cathode Catalysts in PEM Fuel Cells, 235<sup>th</sup> Electrochemical Society Meeting, Dallas, TX, May 28, 2019
27. Wu G., Metal-Organic Framework-Derived Carbon Electrocatalysts for Nitrogen Reduction, 235<sup>th</sup> Electrochemical Society Meeting, Dallas, TX, May 28, 2019
28. Wu G., Advanced Atomically Dispersed Metal Cathode Catalysts for Hydrogen Fuel Cells, 235<sup>th</sup> Electrochemical Society Meeting, Dallas, TX, May 28, 2019

29. Wu G., Highly Stable Carbon-Based Catalysts for Bifunctional Oxygen Reduction and Evolution for Reversible Alkaline Fuel Cells, 2019 Spring Material Research Society meeting, Phoenix, AZ, April 23, 2019.
30. Wu G., MOF-Derived Atomically Dispersed Metal Site Cathode Catalysts for Proton Exchange Membrane Fuel Cells, 2019 Spring Material Research Society meeting, Phoenix, AZ, April 23, 2019.
31. Wu G., Atomically Dispersed and Nitrogen Coordinated Metal Site Catalysts for Oxygen Reduction in Acids, 2018 AIChE Fall meeting, Pittsburgh, PA, October 30, 2018.
32. Wu G., Advances Cathodes for Future Hydrogen Fuel Cells, 2018 International Roundtable of NanoScience and NanoTechnology, Shanghai University, September 25 2018.
33. Wu G., PGM-Free Bifunctional Electrocatalyst for Oxygen Reduction and Evolution Reactions in Reversible Alkaline Fuel Cells, 234<sup>th</sup> Electrochemical Society Meeting, October 2, 2018.
34. Wu G., High-Performance PGM-Free and Fe-Free Catalysts for Oxygen Reduction in Acidic Media, 233<sup>th</sup> Electrochemical Society Meeting, Seattle, WA, May 28, 2018
35. Wu G., Size-Controlled Carbon Catalysts Derived from Metal-Organic Frameworks for Non-Aqueous Li-Air Battery, 233<sup>th</sup> Electrochemical Society Meeting, Seattle, WA, May 28, 2018.
36. Wu G., Active Carbon Supports for Pt Cathode Catalysts in PEM Fuel Cells, 233<sup>th</sup> Electrochemical Society Meeting, Seattle, WA, May 28, 2018.
37. Wu G., PGM-Free and Iron-Free Catalysts for Oxygen Reduction in Acids, 234<sup>th</sup> Electrochemical Society Meeting, Cancun, Mexico, Oct 1, 2018
38. Wu G., Nitrogen-Doped Highly Disordered Carbon for Nitrogen Reduction Reaction during Electrochemical Ammonia Synthesis, 234<sup>th</sup> Electrochemical Society Meeting, Cancun, Mexico, Oct 1, 2018
39. Wu G., Size-Tunable Atomic Iron Catalysts Derived from Metal-Organic Framework for Oxygen Reduction in Acid Media, 233<sup>th</sup> Electrochemical Society Meeting, Seattle, WA, May 28, 2018.
40. Wu G., Atomically dispersed iron catalysts for oxygen reduction in acids, 256th National Meeting and Exposition of the American-Chemical-Society (ACS) - Boston, MA Date: AUG 19-23, 2018.
41. Wu G., Highly disordered carbon for electrochemical ammonia synthesis using N<sub>2</sub> and H<sub>2</sub>O in alkaline electrolytes, 256th National Meeting and Exposition of the American-Chemical-Society (ACS) Boston, MA Date: AUG 19-23, 2018
42. Wu G., Fully ordered Pt<sub>3</sub>Co intermetallic nanoparticles derived from metal-organic framework for oxygen reduction, 256th National Meeting and Exposition of the American-Chemical-Society (ACS) - Boston, MA Date: AUG 19-23, 2018.
43. Wu G., Nitrogen coordinated single cobalt atom catalysts for oxygen reduction in fuel cells, 256th National Meeting and Exposition of the American-Chemical-Society (ACS), Boston, MA Date: AUG 19-23, 2018.
44. Wu G., Highly Stable Mn-Based Nanocarbon Bifunctional Electrocatalyst for Oxygen Reduction and Evolution Reactions in Reversible Fuel Cells, 232<sup>nd</sup> ECS Meeting, National Harbor, MD, October 1-5, 2017.



45. Wu G, Atomic iron-dispersed carbon electrocatalysts for oxygen reduction in challenging acid, 254th ACS National Meeting in Washington, DC, August 20-24, 2017.
46. Wu G, 3D high-surface-area and mesoporous graphene sheet-like nanocarbon for supercapacitors, 254th ACS National Meeting in Washington, DC, August 20-24, 2017.
47. Wu G., Elucidating Optimal Carbon Morphologies and Structures in Highly Active PGM-Free Cathodes for PEM Fuel Cells, *231<sup>st</sup> ECS Meeting*, New Orleans, LA, May, 2017.
48. Wu G., Large-size “Graphene Tube” Catalysts for Electrochemical Energy Storage and Conversion, 2016 NERM ACS Meeting, Binghamton, New York, October 7, 2016.
49. Wu G., PGM-free Cathode Catalysts for Proton Exchange Membrane Fuel Cells, 2016 NERM ACS Meeting, Binghamton, New York, October 7, 2016.
50. Wu G., “Graphene Tube” for Sustainable Electrochemical Energy Storage and Conversion, 252<sup>nd</sup> American Chemical Society National Meeting, August 20-25, Philadelphia, PA.
51. Wu G. Carbon catalysts for Sustainable Electrochemical Energy Storage and Conversion, 2016 2016 World Conference on Carbon, College station, PA, July 2016.
52. Wu G., Bifunctional nanocomposite catalysts for reversible electrochemical energy applications, *229<sup>th</sup> ECS meeting*, San Diego, CA, May, 2016.
53. Wu G., Large-size and few walled graphene tube catalysts for electrochemical energy storage and conversion, *2015 Fall MRS meeting*, Boston, MA, December, 2015.
54. Wu G, Nitrogen-Doped Large-Sized Graphene Tubes as an Active Support for a Hybrid Pt Electrocatalyst towards Oxygen-Reduction, *227<sup>th</sup> Meeting of The Electrochemical Society*, in Chicago, May 24-28, 2015.
55. Wu G, Graphene Nanocomposites Templated from Cage-Containing Metal-Organic Frameworks for Oxygen Reduction in Li-O<sub>2</sub> Batteries, *227<sup>th</sup> Meeting of The Electrochemical Society*, in Chicago, May 24-28, 2015.
56. Wu G, Graphene Nanocomposite Catalysts for Sustainable Electrochemical Energy Storage and Conversion, *64<sup>th</sup> Canadian Chemical Engineering Conference*, Niagara Fall, Canada, Oct 20-22, 2014.
57. Wu G, Nonprecious Metal Catalysts for Sustainable Electrochemical Energy Storage and Conversion, *Gordon Research Conference*, Nanomaterials for Applications in Energy Technology, Ventura Beach, CA, February 22-27, 2015.