JOSHUA W. GALLAWAY, PhD

Curriculum Vitae

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Northeastern University, Department of Chemical Engineering
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RESEARCH INTERESTS

In our lab we study mechanisms within complex electrochemical systems. Practical electrochemical systems such as batteries, sensors, and fuel cells are often complex, involving engineered high surface area electrodes, starved electrolyte conditions, phase transformations, and interplay of the two electrodes. For these reasons there are significant deviations from ideal behavior as well as emergent or unexpected phenomena. We seek to understand these to engineer better devices for broad societal benefit, such as enabling the worldwide adoption of sustainable energy. Toward this end we have developed strategies for coupling electrochemical methods with materials synthesis, transport modeling, and operando analysis techniques, often based on high energy X-rays. Low cost and safe battery materials for electrical storage at the scale of the power grid are our primary interest.

EDUCATION

2007 **Columbia University**
Ph.D. Chemical Engineering (*with distinction*)
Primary area: Electrochemistry
Dissertation: *Redox Polymer Mediation for Enzymatic Biofuel Cells*
Thesis advisor: Scott Calabrese Barton

2004 **Columbia University**
M.S. Chemical Engineering
Thesis: *Methanol Oxidation on High Surface Area Platinum-Ruthenium in the Presence of Oxygen*

1997 **Case Western Reserve University**
B.S.E. Chemical Engineering (*summa cum laude*)

PROFESSIONAL EXPERIENCE

2017-present **Northeastern University**
DiPietro Assistant Professor
Department of Chemical Engineering
Complex Electrochemical Systems Laboratory

2009-2017 **The City College of New York**
Senior Research Associate
The CUNY Energy Institute (Sanjoy Banerjee, PI)
Research description: Development of low cost and sustainable rechargeable batteries for grid scale electrical storage

2010-2017 **New York University Tandon School of Engineering**
Adjunct Professor
Department of Chemical Engineering

2007-2009 **Columbia University**
Postdoctoral Fellow
Department of Chemical Engineering (Alan West, PI)
Research description: Development of microfluidic electrochemical devices for analysis of Cu electrodeposition for semiconductor fabrication

PROFESSIONAL AFFILIATIONS

2006-present	**The Electrochemical Society** Battery Division, *Member-At-Large* (2018-present)
2008-present	**American Chemical Society**
2009-present	**Materials Research Society**
2009-present	**American Institute of Chemical Engineers**

AWARDS AND HONORS

2017-present	**DiPietro Assistant Professorship**, Northeastern University
2010	**Electrochemical Society Battery Division Early Career Travel Award**
2009-2010	**Wallis Foundation Fellowship for Energy Research**, City College of New York
2002, 2003	**Teaching Assistant Award**, Columbia University
1997	**Kennedy Award for Writing**, Case Western Reserve University

PEER-REVIEWED PUBLICATIONS

28. **Gallaway, J. W.**; Yadav, G. G.; Turney, D. E.; Nyce, M.; Huang, J.; Chen-Wiegart, Y.-C. K.; Williams, G.; Thieme, J.; Okasinski, J. S.; Wei, X., "An Operando Study of the Initial Discharge of Bi and Bi/Cu Modified MnO_2." *Journal of the Electrochemical Society,* **2018,** *165* (13), A2935-A2947. DOI:10.1149/2.0221813jes

27. Yadav, G. G.; Wei, X.; **Gallaway, J. W.**; Chaudhry, Z.; Shin, A.; Huang, J.; Yakobov, R.; Nyce, M.; Vanderklaauw, N.; Banerjee, S., "Rapid electrochemical synthesis of δ-MnO_2 from γ-MnO_2 and unleashing its performance as an energy dense electrode." *Materials Today Energy,* **2017,** *6* (Supplement C), 198-210. DOI:10.1016/j.mtener.2017.10.008.

26. Huang, J.; Yadav, G. G.; **Gallaway, J. W.**; Wei, X.; Nyce, M.; Banerjee, S., "A calcium hydroxide interlayer as a selective separator for rechargeable alkaline Zn/MnO_2 batteries." *Electrochemistry Communications,* **2017,** *81*, 136-140. DOI:10.1038/ncomms14424

25. Turney, D. E.; **Gallaway, J. W.**; Yadav, G. G.; Ramirez, R.; Nyce, M.; Banerjee, S.; Chen-Wiegart, Y. C. K.; Wang, J.; D'Ambrose, M. J.; Kolhekar, S.; Huang, J. C.; Wei, X., "Rechargeable Zinc Alkaline Anodes for Long-Cycle Energy Storage." *Chemistry of Materials,* **2017,** *29* (11), 4819-4832. DOI:10.1021/acs.chemmater.7b00754

24. Yadav, G. G.; Wei, X.; Huang, J.; **Gallaway, J. W.**; Turney, D. E.; Nyce, M.; Secor, J.; Banerjee, S., "A conversion-based highly energy dense Cu^{2+} intercalated Bi-birnessite/Zn alkaline battery." *Journal of Materials Chemistry A,* **2017,** *5* (30), 15845-15854. DOI:10.1039/c7ta05347a.

23. Yadav, G. G.; **Gallaway, J. W.**; Turney, D. E.; Nyce, M.; Huang, J.; Wei, X.; Banerjee, S., "Regenerable Cu-intercalated MnO_2 layered cathode for highly cyclable energy dense batteries." *Nature Communications,* **2017,** *8*, 14424.

22. **Gallaway, J. W.**; Hertzberg, B. J.; Zhong, Z.; Croft, M.; Turney, D. E.; Yadav, G. G.; Steingart, D. A.; Erdonmez, C. K.; Banerjee, S., "Operando identification of the point of $[Mn_2]O_4$ spinel formation during gamma-MnO_2 discharge within batteries." *Journal of Power Sources,* **2016,** *321*, 135-142. DOI:10.1016/j.jpowsour.2016.05.002

21. Ingale, N. D.; **Gallaway, J. W.**; Nyce, M.; Couzis, A.; Banerjee, S., "Rechargeability and economic aspects of alkaline zinc-manganese dioxide cells for electrical storage and load leveling." *Journal of Power Sources,* **2015,** *276*, 7-18. DOI:10.1016/j.jpowsour.2014.11.010

20. **Gallaway, J. W.**; Menard, M.; Hertzberg, B.; Zhong, Z.; Croft, M.; Sviridov, L. A.; Turney, D. E.; Banerjee, S.; Steingart, D. A.; Erdonmez, C. K., "Hetaerolite Profiles in Alkaline Batteries Measured by High Energy EDXRD." *Journal of the Electrochemical Society,* **2015,** *162* (1), A162-A168. DOI:10.1149/2.0811501jes

19. Bhadra, S.; Hertzberg, B. J.; Hsieh, A. G.; Croft, M.; **Gallaway, J. W.**; Van Tassell, B. J.; Chamoun,

M.; Erdonmez, C.; Zhong, Z.; Sholklapper, T.; Steingart, D. A., "The relationship between coefficient of restitution and state of charge of zinc alkaline primary LR6 batteries." *Journal of Materials Chemistry A,* **2015,** *3* (18), 9395-9400. 10.1039/c5ta01576f.

18. **Gallaway, J. W.**; Erdonmez, C. K.; Zhong, Z.; Croft, M.; Sviridov, L. A.; Sholklapper, T. Z.; Turney, D. E.; Banerjee, S.; Steingart, D. A., "Real-time materials evolution visualized within intact cycling alkaline batteries." *Journal of Materials Chemistry A,* **2014,** *2* (8), 2757-2764. DOI:10.1039/C3TA15169G

17. **Gallaway, J. W.**; Gaikwad, A. M.; Hertzberg, B.; Erdonmez, C. K.; Chen-Wiegart, Y. C. K.; Sviridov, L. A.; Evans-Lutterodt, K.; Wang, J.; Banerjee, S.; Steingart, D. A., "An In Situ Synchrotron Study of Zinc Anode Planarization by a Bismuth Additive." *Journal of the Electrochemical Society,* **2014,** *161* (3), A275-A284. DOI:10.1149/2.037403jes

16. Turney, D. E.; Shmukler, M.; Galloway, K.; Klein, M.; Ito, Y.; Sholklapper, T.; **Gallaway, J. W.**; Nyce, M.; Banerjee, S., "Development and testing of an economic grid-scale flow-assisted zinc/nickel-hydroxide alkaline battery." *Journal of Power Sources,* **2014,** *264*, 49-58. DOI:10.1016/j.jpowsour.2014.04.067

15. Gaikwad, A. M.; **Gallaway, J. W.**; Desai, D.; Steingart, D. A., "Electrochemical-Mechanical Analysis of Printed Silver Electrodes in a Microfluidic Device." *Journal of the Electrochemical Society,* **2011,** *158* (2), A154-A162.

14. **Gallaway, J. W.**; Desai, D.; Gaikwad, A.; Corredor, C.; Banerjee, S.; Steingart, D., "A Lateral Microfluidic Cell for Imaging Electrodeposited Zinc near the Shorting Condition." *Journal of the Electrochemical Society,* **2010,** *157* (12), A1279-A1286.

13. von Gutfeld, R. J.; **Gallaway, J. W.**; West, A. C., "In Situ Immersion Plating of Copper and Nickel on Aluminum Using Laser Pulses for Oxide Removal." *Journal of the Electrochemical Society,* **2009,** *156* (12), D564-D569.

12. **Gallaway, J. W.**; Willey, M. J.; West, A. C., "Copper Filling of 100 nm Trenches Using PEG, PPG, and a Triblock Copolymer as Plating Suppressors." *Journal of the Electrochemical Society,* **2009,** *156* (8), D287-D295.

11. **Gallaway, J. W.**; West, A. C., "The effect of acid on superconformal filling in 100 nm trenches." *Journal of Vacuum Science & Technology B,* **2009,** *27* (5), 2200-2205.

10. Hudak, N. S.; **Gallaway, J. W.**; Barton, S. C., "Formation of mediated biocatalytic cathodes by electrodeposition of a redox polymer and laccase." *Journal of Electroanalytical Chemistry,* **2009,** *629* (1-2), 57-62.

9. **Gallaway, J. W.**; Willey, M. J.; West, A. C., "Acceleration Kinetics of PEG, PPG, and a Triblock Copolymer by SPS during Copper Electroplating." *Journal of the Electrochemical Society,* **2009,** *156* (4), D146-D154.

8. Hudak, N. S.; **Gallaway, J. W.**; Barton, S. C., "Mediated Biocatalytic Cathodes Operating on Gas-Phase Air and Oxygen in Fuel Cells." *Journal of the Electrochemical Society,* **2009,** *156* (1), B9-B15.

7. **Gallaway, J. W.**; Barton, S. A. C., "Effect of redox polymer synthesis on the performance of a mediated laccase oxygen cathode." *Journal of Electroanalytical Chemistry,* **2009,** *626* (1-2), 149-155.

6. Wheeldon, I. R.; **Gallaway, J. W.**; Barton, S. C.; Banta, S., "Bioelectrocatalytic hydrogels from electron-conducting metallopolypeptides coassembled with bifunctional enzymatic building blocks." *Proceedings of the National Academy of Sciences of the United States of America,* **2008,** *105* (40), 15275-15280.

5. **Gallaway, J. W.**; West, A. C., "PEG, PPG, and their triblock copolymers as suppressors in copper electroplating." *Journal of the Electrochemical Society,* **2008,** *155* (10), D632-D639.

4. **Gallaway, J. W.**; Barton, S. A. C., "Kinetics of redox polymer-mediated enzyme electrodes."

Journal of the American Chemical Society, **2008,** *130* (26), 8527-8536. DOI:10.1021/ja0781543

3. **Gallaway, J. W.**; Wheeldon, I.; Rincon, R.; Atanassov, P.; Banta, S.; Barton, S. C., "Oxygen-reducing enzyme cathodes produced from SLAC, a small laccase from Streptomyces coelicolor." *Biosensors & Bioelectronics,* **2008,** *23* (8), 1229-1235.

2. Barton, S. C.; Deng, W.; **Gallaway, J. W.**; Levendovsky, S.; Olson, T.; Atanassov, P.; Sorkin, M.; Kaufman, A.; Gibbard, H. F., "Mixed-feed direct methanol fuel cell: Materials and design solutions." *ECS Transactions,* **2006,** *1* (6), 315-322.

1. Barton, S. C.; **Gallaway, J. W.**; Atanassov, P., "Enzymatic biofuel cells for Implantable and microscale devices." *Chemical Reviews,* **2004,** *104* (10), 4867-4886.

BOOK CHAPTERS

3. **Gallaway, J. W.** and Barton, S. C., "Redox hydrogels as an efficient strategy for immobilization of enzymes at electrode interfaces" Chapter 7, in *Functional Electrodes for Enzymatic and Microbial Bioelectrochemical Systems,* Edited by Victoria Flexer and Nicolas Brun. World Scientific, **2017**.

2. **Gallaway, J. W.**, "Mediated Enzyme Electrodes" Chapter 9, in *Enzymatic Fuel Cells: From Fundamentals to Applications,* Edited by Heather R. Luckarift, Plamen B. Atanassov, and Glenn R. Johnson. John Wiley & Sons, Inc., **2014**.

1. **Gallaway, J. W.** and West, A. C., "Bioelectrochemical Sensors" Chapter 11, in *Electrochemistry and Electrochemical Engineering: An Introduction* by Alan C. West, **2012**.

PATENTS

2. *Alkaline Battery Operational Methodology*, Sholklapper, T.; **Gallaway, J.W.**; Steingart, D.; Ingale, N.; and Nyce, M. United States patent US 9,419,289 B2, issued August 16, **2016**.

1. *Nickel-Zinc Flow Battery*, Banerjee, S.; Ito, Y.; Klein, M.; Nyce, M.E.; Steingart, D.; Plivelich, R.; **Gallaway, J.W.**, United States patent US 9,379,373 B2, issued June 28, **2016**.

PATENT APPLICATIONS

3. *Rechargeable Alkaline Manganese Dioxide-Zinc Bipolar Batteries*. Yadav, G.G.; Nyce, M.; Wei, X.; Yakobov, R.; **Gallaway, J.W.**; Banerjee, S., PCT/US16/074678, filed 2 Feb 2016.

2. *Mixed Material Cathode For Secondary Alkaline Batteries*. Yadav, G.G.; **Gallaway, J.W.**; Nyce, M.; Banerjee, S., PCT/US15/55215, filed 13 Oct 2015.

1. *Rechargeable Alkaline Battery Comprising Metal Hydroxide Separator*. Huang, J.; Yadav, G.G.; **Gallaway, J.W.**; Nyce, M.; Banerjee, S., US Provisional Patent Application, filed 5 Oct 2015.

SELECTED CONFERENCE PRESENTATIONS

20. **Gallaway, J.W.** (speaker); Yadav, G.G.; Turney, D.E.; and Banerjee, S. "An Operando Study of Rechargeable MnO_2 Cathodes For Low Cost, High Energy Density Aqueous Batteries" CM03, 2019 Materials Research Society Fall Meeting, Boston MA, November **2019**.

19. **Gallaway, J. W.** (speaker); Yadav, G. G.; Turney, D. E.; Banerjee, S.; Chen-Wiegart, Y.-C. K.; Williams, G.; Thieme, J. "Operando XRF mapping and μ-XANES of a Cu-containing Bi-birnessite cathode for high density, low-cost aqueous batteries" 256th American Chemical Society National Meeting, Boston MA, August **2019**.

18. **Gallaway, J.W.** (speaker); Bliznakov, S.; Yadav, G.G.; Turney, D.E.; Ingale, N.; Nyce, M.; Banerjee, S.; Menard, M.; De Angelis, V.; and Couzis, A. "On the Fly EIS Tracking of Rechargeable Alkaline Zn-MnO_2 Batteries for Large-Scale Use" The Electrochemical Society 232nd Meeting, National Harbor MD, October

2017.

17. **Gallaway, J.W**. (speaker); Yadav, G.G.; Turney, D.E.; Huang, J.; Nyce, M.; Banerjee, S.; Okasinski, J.; Chen-Wiegart, Y.K.; Williams, G.; and Thieme, J. "An Operando Study of Deep-Cycling MnO2 Cathodes for Low Cost, High Energy Density Aqueous Batteries" The Electrochemical Society 231st Meeting, New Orleans LA, May **2017**.

16. **Gallaway, J.W.** (speaker, **invited talk**) "Battery Material Characterization as a Bridge From Fundamentals to Applications" 44th American Chemical Society Middle Atlantic Regional Meeting (MARM), 10 June **2016**.

15. **Gallaway, J.W.** (speaker, **invited talk**); Gaikwad, A.; Sviridov, L.A.; Banerjee, S.; Hertzberg, B.; Steingart, D.A; Erdonmez, C.K.; Chen-Wiegart, Y.K.; Evans-Lutterodt, and Wang, J.K. "Electrodeposited Zinc Planarized By Bismuth at 3ppm Concentration: A Mechanistic Study" The Electrochemical Society 227th Meeting, Chicago IL, May **2015**.

14. **Gallaway, J.W.** (speaker); Erdonmez, C.K.; Zhong, Z.; Croft, M.; Sviridov, L.A.; Banerjee, S.; and Steingart, D.A. "Transient Interface Evolution in Cycling Alkaline Batteries Resolved Using Synchrotron X-Rays" The Electrochemical Society 224th Meeting, San Francisco CA, October **2013**.

13. **Gallaway, J.W.** (speaker); Erdonmez, C.K.; Zhong, Z.; Croft, M.; Sviridov, L.A.; Banerjee, S.; and Steingart, D.A. "Transient Interfacial Zinc Oxide Formation in Cycling Alkaline Batteries Detected Using Synchrotron X-Rays" American Institute of Chemical Engineers Annual Meeting, San Francisco CA, November **2013**.

12. **Gallaway, J.W.** (speaker, **invited talk**) "Design of Enzyme Electrodes for Sensing and Power Applications" Fundamentals of Electrode and Cell Designs: A Tutorial Session AIChE Annual Meeting, Minneapolis MN, November **2012**.

11. **Gallaway, J.W.** (speaker); Erdonmez, C.K.; Sviridov, L.A.; Gaikwad, A.; Sholklapper, T.; Ingale, N.; Nyce, M.; Hertzberg, B.; Banerjee, S.; and Steingart, D.A. "Phase Changes in Secondary Manganese Dioxide Electrodes for Grid-Scale Batteries" American Institute of Chemical Engineers Annual Meeting, Pittsburgh PA, November **2012**.

10. **Gallaway, J.W.** (speaker); Nilesh, I.; Nyce, M.; Ito, Y.; Sviridov, L.; Gaikwad, A.; Lever, S.; Firouzi, A.; Banerjee, S.; and Steingart, D. "Secondary Manganese Dioxide Electrodes for Grid-Scale Batteries" American Institute of Chemical Engineers Annual Meeting, Minneapolis MN, October **2011**.

9. **Gallaway, J.W.** "Electrochemistry for Energy: Air-Breathing Enzymatic Electrodes for Batteries and Fuel Cells" American Institute of Chemical Engineers Annual Meeting, Minneapolis MN, October **2011**.

8. **Gallaway, J.W.** (speaker); Ingale, N.; Nyce, M.; Ito, Y.; Sviridov, L.; Gaikwad, A.; Lever, S.; Firouzi, A.; Banerjee, S.; and Steingart, D. "Cycle Life of Manganese Dioxide Electrodes for Grid-Scale Batteries" The Electrochemical Society 220th Meeting, Boston MA, October **2011**.

7. **Gallaway, J.W.** (speaker); Shojaei-Zadeh, S.; Gaikwad, A.; and Steingart, D. "Electrochemical and Optical Monitoring of Metal Electrodeposition Interfaces in a Microfluidic Cell" 2010 Materials Research Society Fall Meeting, Boston MA, December **2010**.

6. **Gallaway, J.W.** (speaker); Ito, Y.; Desai, D.; Nyce, M.; Banerjee, S.; and Steingart, D. "Zinc Layer Current Distribution in Secondary Zinc Metal Batteries for Grid Scale Electrical Storage" The Electrochemical Society 218th Meeting, Las Vegas NV, October **2010**.

5. **Gallaway, J.W.** (speaker); Shojaei-Zadeh, S.; and Steingart, D. "Microfluidic Electrochemistry: A Versatile Platform to Study Reactions at Electrodes" American Institute of Chemical Engineers Annual Meeting, Nashville TN, November **2009**.

4. **Gallaway, J.W.** (speaker); Willey, M.J.; and West, A.C. "PEG, PPG, and Their Triblock Copolymers as Suppressors in Copper Electroplating" The Electrochemical Society 214th Meeting, Honolulu HI, Oct. **2008**.

3. **Gallaway, J.W.** (speaker) and Calabrese Barton, S.A. "High Performance Redox Polymer Films for Enzymatic Electrodes" The Electrochemical Society 212th Meeting, Washington DC, Oct. **2007**.

2. **Gallaway, J.W.** (speaker) and Calabrese Barton, S.A. "Structure-Function Relationships in Redox Polymer-Enzyme Films for Biofuel Cell Applications" The Electrochemical Society 210th Meeting, Cancun, Mexico, Oct. **2006**.

1. **Gallaway, J.W.** (speaker) and Calabrese Barton, S.A. "Methanol Oxidation on High Surface Area Platinum-Ruthenium in the Presence of Oxygen" The Electrochemical Society 208th Meeting, Los Angeles CA, Oct. **2005**.

SEMINARS AND INVITED PRESENATIONS

10. **Gallaway, J.W.** "Electrochemistry as Chemical Engineering: A Report From the Front Lines of Sustainability" American Institute of Chemical Engineers Boston, Guppy Night, Boxborough MA, 9 November **2018**.

9. **Gallaway, J.W.** "Rechargeable Alkaline MnO_2 Batteries for Low Cost & Safe Grid Storage In situ & Operando Characterization of MnO_2" Ionic Materials, Woburn MA, 31 October **2018**.

8. **Gallaway, J.W.** "What makes a successful battery? Managing length scales and hierarchical structures for high energy density, high cycle life, and low cost" Northeastern University Convergence, Boston MA 18 May **2018**.

7. **Gallaway, J.W.** "Operando spectroscopy and diffraction to uncover complex mechanisms in electrochemical devices" National Synchrotron Light Source II Seminar Series, Upton NY, 2 December **2016**.

6. **Gallaway, J.W.** "Safe, Inexpensive, and Energy Dense Alkaline Batteries for the Grid Scale" NIST, Functional Nanostructured Materials Group, Gaithersburg MD, 22 September **2016**.

5. **Gallaway, J.W.** "Batteries for Massive-Scale Electrical Storage: Using New In Situ Techniques for Electrochemical Systems" Stony Brook University, Department of Materials Science, 25 February **2015**.

4. **Gallaway, J.W.** "Batteries for Massive-Scale Electrical Storage: Using New In Situ Techniques for Electrochemical Systems" Michigan State University, Department of Chemical Eng & Materials Sci, 18 September **2014**.

3. **Gallaway, J.W.** "Microscopic, In Situ Monitoring of Electrochemical Processes for Energy Storage Applications" Duracell, Danbury CT, December **2013**.

2. **Gallaway, J.W.** "Microscopic, In Situ Monitoring of Electrochemical Processes for Energy Storage Applications" Power Sources Technology Group, Sandia National Lab, January **2013**.

1. **Gallaway, J.W.** "Biological Catalysis in the Future of Energy: Electrochemistry for the 21st Century" New York Nanoscience Discussion Group, NYU, 11 November **2011**.

RESEARCH SUPPORT

Current support

Department of Energy, Office of Electricity — 9/1/18-8/31/19
Lambert, PI (Gallaway, co-PI: $104,875)
"Understanding Phase Change Processes of Energy Storage Materials"

Northeastern University, FY19 TIER 1 — 5/1/18-4/30/19
Gallaway, PI: $50,000
"A Dense Anthroquinone-Based Ionic Liquid For Grid-Scale Electrical Storage"

Northeastern University, DiPietro Assistant Professorship — 9/1/17-8/31/22
Gallaway, PI: $75,000

COURSES TAUGHT

2017-present	**Northeastern University** CHME 5621 Electrochemical Engineering (Sp 2019, Enrollment: 33), *new course* CHME 2308 Conservation Principles (Sp 2019, Enrollment: 53) CHME 2308 Conservation Principles (Fa 2018, Enrollment: 19) CHME 2308 Conservation Principles (Sp 2018, Enrollment: 48) CHME 2308 Conservation Principles (Fa 2017, Enrollment: 42)
2010-2017	**New York University Tandon School of Engineering** CBE-UY 3313 Transport Phenomena I (Taught 7 semesters, Total enrollment: 360) CBE-UY 3323 Transport Phenomena II (Taught 7 semesters, Total enrollment: 351)
2010	**The City College of New York** ENGR 23000 Thermodynamics (Su 2010, Enrollment: 21)

RESEARCH SUPERVISION

Northeastern University (graduate)

Alyssa Stavola (2018-present)
Thesis Project: "Tracking Battery State of Health by Electrochemical Impedance Spectroscopy"
PhD, Chemical Engineering, Northeastern University, expected 2023

Pushkar Gokhale (2018-present)
Thesis Project: "A Battery Anode Model to Understand Dissolution-Precipitation Mechanisms During Cycling"
MS, Chemical Engineering, Northeastern University, expected 2020

Matthew Kim (2017-present)
Thesis Project: "Understanding Phase Change Processes of Energy Storage Materials"
PhD, Chemical Engineering, Northeastern University, expected 2022

Benjamin Howell (2017-present)
Thesis Project: "A Dense Anthroquinone-Based Ionic Liquid For Grid-Scale Electrical Storage"
PhD, Chemical Engineering, Northeastern University, expected 2022

Zhicheng Liu (2017-present)
Thesis Project: "An MnO_2 Cathode Model to Optimize Penetration Depth During Long Term Cycling"
MS, Chemical Engineering, Northeastern University, expected 2019

Northeastern University (undergraduate)

Sydney Morris (2019-present)
Thesis Project: "A Quality Control Analysis of Li-ion Batteries"
BS, Chemical Engineering, New York University, 2014

Sofia Catalina (2018-present)
Thesis Project: "Levich Analysis of Redox Active Species"
BS, Chemical Engineering, Northeastern University, expected 2020

Katelyn Ripley (2018-present)
Thesis Project: "Fabrication of Li-ion Batteries"
BS, Chemical Engineering, Northeastern University, expected 2020

Nicholas Kamm (2018-present)
Thesis Project: "An Area Specific Impedance Analysis of Blended Cathode Li-ion Batteries"
CHME 4991 Directed Research Project Independent Study
BS, Chemical Engineering, Northeastern University, expected 2019

Tristan Owen (2017-present)
Thesis Project: "Cycling of Alkaline Batteries"
BS, Chemical Engineering, Northeastern University, expected 2021

The City College of New York (undergraduate)

Raven Bertot (2014-2015), visiting student from New York University
Thesis Project: "Measuring Impedance in MnO_2 Cathodes as a Function of State of Charge"
BS, Chemical Engineering, New York University, 2015

Amy Shin (2015), summer student from Herricks High School, New Hyde Park NY
Thesis Project: "Cycling of MnO_2 Electrodes: Influence of Additives on Cell Performance"
Project submitted to Siemens Competition in Math, Science and Technology and Intel STS, 2015

Zeeshan Chaudhry (2014-2015), visiting student from New York University
Thesis Project: "Incorporating Multiwalled Carbon Nanotubes into Birnessite MnO_2 Cathodes"
BS, Chemical Engineering, New York University, 2015

Dustin Liu (2014), summer student from Herricks High School, New Hyde Park NY
Thesis Project: "Barium Hydroxide as an Electrolyte Additive to Improve Zn/MnO_2 Battery Performance"
Project submitted to Siemens Competition in Math, Science and Technology and Intel STS, 2014

Desiree Kettell (2013-2014), visiting student from New York University
Thesis Project: "Barium Compounds as Additives in Shallow-Cycled MnO_2 Batteries"
BS, Chemical Engineering, New York University, 2014

Jerome Fineman (2011-2013), visiting student from New York University
Thesis Project: "The Effect of Bi on Ni-Zn Batteries with Electrolyte Under Forced Convection"
BS, Chemical Engineering, New York University, 2013

NU COMMITTEE SERVICE

MS and PhD Committees

Ankur Jadhav, PhD (Chem Eng), The City College of New York (Rob Messinger, Advisor), expected 2020
Ehsan Keyvani-Someh, PhD (CHME), Northeastern University (Hicham Fenniri, Advisor), expected 2019
Martin Kimani, PhD (CHME), Northeastern University (Edgar Goluch, Advisor), expected 2019
Huong Doan, PhD (CHEM), Northeastern University (Sanjeev Mukerjee, Advisor), expected 2019
Wenjun Zheng, MS (CHME), Northeastern University (Ming Su, Advisor), 2018
Haotian Zhang, MS (CHME), Northeastern University (Ming Su, Advisor), 2018
Deyang Li, PhD (CHME), Northeastern University (Elizabeth Podlaha-Murphy, Advisor), 2018
Miguel Angel Alvarez Sanchez, MS (CHME), Northeastern University (Thomas Webster, Advisor), 2018
Priyanka Satpute, MS (CHME), Northeastern University (Richard West, Advisor), 2018

NU Committees

Graduate Committee, Dept. of Chemical Engineering, Member (2017-present)
Graduate Student Council, Dept. of Chemical Engineering, Co-advisor (2018-present)
Curriculum Review Committee, Dept. of Chemical Engineering, Member (2017-2018)

PROFESSIONAL SERVICE

Ad hoc manuscript reviews

Journal of the Electrochemical Society
Journal of Power Sources
Journal of Applied Electrochemistry
Electrochemical and Solid State Letters
Materials Chemistry and Physics
Nature Communications
Joule
Journal of the American Chemical Society
Energy Storage Materials
Energy Storage Technologies

Session Chair

The Electrochemical Society, 2016-present
Materials Research Society, Fall 2019

EDUCATIONAL OUTREACH

Northeastern University Center for STEM, Building Bridges Program

"Storing Electricity with Batteries" Nov 2018, Apr 2019.