

Katelyn Ripley

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EDUCATION

Massachusetts Institute of Technology (MIT) Cambridge, MA
Ph.D. Student, *Brushett Research Group* (GPA: 5.0/5.0) May 2025

Northeastern University Boston, MA
BS in Chemical Engineering/MS in Engineering Management May 2020
Summa cum laude (GPA: 3.99/4.00)

Honorary Societies: Tau Beta Pi, Omega Chi Epsilon, University Honors Program
Activities: Peer Mentor for Intro to Engineering, American Institute of Chemical Engineers (AIChE) STEM Outreach Chairperson, AIChE Executive Student Committee Representative, Energy Systems Society, Society of Women Engineers, Pep Band, Club and Intramural Volleyball, NU Downhillers Ski and Snowboard Club

WORK EXPERIENCE

Electrochemical Research and Development Co-op, 1 patent January-August 2019
Form Energy, Somerville, MA

- Directed electrochemical stability testing to develop a flow battery electrolyte for use in long duration energy storage applications with a levelized cost of storage less than \$0.05/kWh-cycle.
- Led 90+ experiments to prove cycling reversibility and demonstrate stable potential ranges.
- Developed a symmetric flow cell cycling method that extended cycling time by over 300 hours and tracked the electrolyte capacity fade associated with side reactions.
- Coordinated four academic and commercial teams under the ARPA-E DAYS program and ran a 2-day training program on flow battery operation and experimentation to synchronize with research collaborators.
- Conducted failure analysis of cell component incompatibilities by utilizing SEM/EDS techniques and identified alternate components that improved cycling lifetimes and met techno-economic requirements.
- Leveraged technical and management experience to co-develop and submit a patent application for a proprietary electrochemical system (has since been published).

Energy Storage Intern January-August 2018
Lockheed Martin Advanced Energy Storage, Cambridge, MA

- Developed and operated “sub-scale” cell tests by controlling Arbin software to assist in designing a flow battery capable of performing at the multi-MW level.
- Collected electrochemical impedance spectroscopy data to measure cell and membrane resistances. This data was presented weekly and used to identify the root cause of decreased cell performance over time.
- Designed and validated new methods for quantifying cation exchange membrane properties such as selectivity, conductivity, and mechanical strength for membrane screening purposes.
- Orchestrated a project to upgrade the membrane mechanical testing capabilities of the sub-scale system by introducing new hardware (gear pumps) and system controls to a test stand.

Process Engineering Co-op
TEL NEXX, Billerica, MA

January-June 2017

- Improved and qualified preventive maintenance techniques to extend the lifetime of a component of a wafer-plating tool.
- Developed methods to use Fujifilm Prescale Film to characterize the pressure and force applied on a panel by different seal designs; provided recommendations for further testing.
- Operated and troubleshooted the Stratus tool to perform electroplating on silicon wafers.
- Documented work instructions and standard operating procedures to establish safe and repeatable processes; also created spreadsheets to be utilized by future data collectors.

RESEARCH EXPERIENCE

Undergraduate Research Assistant

September 2018-2020

Northeastern University – Complex Electrochemical Systems Lab

- Design experiments under Dr. Joshua Gallaway's supervision to test the reversibility of a bismuth-modified manganese dioxide (MnO_2) cathode with copper inclusion for applications in grid-scale energy storage.
- Synthesize and battery cycle birnessite ($\delta\text{-MnO}_2$) cathodes against zinc anodes to test the capacity retention and cell performance over 100 cycles.
- Worked with Andrea M. Bruck to qualify an operando Raman Spectroscopy technique to track electrode structure transformations during charge and discharge.
- Surveyed literature sources to develop a lithium-ion coin cell assembly procedure that served as a baseline for future cell tests.

Undergraduate Research Assistant

September 2016-December 2017

Northeastern University – Nanomaterial Laboratory for Catalysis and Advanced Separations

- Performed weekly experiments to synthesize and develop metal organic frameworks for capturing CO_2 to use in sustainable business practices and renewable energy.

PATENTS

- 1) *Aqueous Polysulfide-Based Electrochemical Cell*. Su, L.; Xie, W.; Chiang, Y.M.; Woodford, W.H.; Cohen, L.; Silver, J.; **Ripley, K.**; Weber, E.; Ferrara, M.; Jaramillo, M.C.; Wiley, T.A., United States patent US 2020/0006796 A1, issued January 2, **2020**.

PRESENTATIONS

- 1) J. Gallaway; A. M. Bruck; M. A. Kim; T. Owen; E. Ruoff; **K. Ripley**, "Mechanistic role of dopants in conversion reactions of layered birnessite MnO_2 ", *Oral Presentation*, EN09 Spring MRS "Advances in Conversion Electrodes for Reliable Electrochemical Energy Storage", Seattle, WA, USA, **2021**.

TEACHING AND MENTORING EXPERIENCE

Omega Chi Epsilon Peer Mentor

September 2017-Present

Northeastern University, Boston, MA

- Meet with first- and second-year chemical engineering students monthly to offer advice on co-op searches and provide insight into the career paths available to chemical engineers in various industries.

Introduction to Engineering Peer Mentor September 2017-December 2018
Northeastern University, Boston, MA

- Taught first-year engineering students how to best approach their academic careers by offering insight into course planning, time management, resume building, and involvement in extracurricular activities.
- Ran a resume editing workshop to give first-year students feedback on their resume drafts for internship applications and research opportunities.

Cornerstone Engineering Teaching Assistant September-December 2016
Northeastern University, Boston, MA

- Mentored 32 students outside of class in C++, Matlab, AutoCAD, and Solidworks to help them develop their engineering skills in design and problem solving.
- Provided assistance to Professor Maheswaran by grading student homework and exams.

Orientation Leader May-September 2016
Northeastern University, Boston, MA

- Aided 2,800 incoming first-year students transition to college at their orientation sessions.
- Presented to groups of students and answered questions on a panel in front of approximately 250 parents.

COMMUNITY SERVICE

AICHe STEM Outreach Chairperson December 2017-May 2019
Northeastern University, Boston, MA

- Led the AICHe STEM Outreach Committee in planning, organizing, and facilitating fifteen interactive events intended to teach science and engineering to elementary, middle, and high school students in the Boston area.

KEY SKILLS

Electrochemical Techniques: Battery Cycling (Arbin and Maccor), Potentiostats (Bio-Logic VSP, Squidstat, Gamry), Cyclic Voltammetry, Rotating Disk Electrode, Linear Square Voltammetry, Electrochemical Impedance Spectroscopy, Polarization Curves, Flow Battery Assembly and Operation, MnO₂ Electrode Synthesis, Reference Electrode Calibration

Laboratory/Characterization: SEM, EDS, Ultraviolet Visible (UV-Vis) Spectrophotometry, Raman Spectroscopy, Solution Preparation, Pipetting, Thin Layer Chromatography, Experimental Design and Implementation

Process Safety: Safety and Chemical Engineering Education (SACHe) Certificate Program

Computer: MATLAB, Python, Jupyter, SolidWorks, AutoCAD, Minitab, Microsoft Office

Management: Gantt Chart, Failure Mode and Effect Analysis, Risk Matrix, Root Cause Analysis, RACI Chart, Time Management, Communication

AWARDS AND HONORS

Northeastern University College of Engineering Compass Award April 2020

- The Compass Awards Program recognizes exemplary students from the senior class who, during their time on campus, have demonstrated a true dedication to a core set of values: leadership, volunteerism, academic integrity, and commitment to Northeastern. Students

who display strength in these values demonstrate to us that they are on a path to alumni leadership.

- Effectively the 2nd highest award a student can receive from the College of Engineering.

Omega Chi Epsilon Xi Chapter Student of the Year April 2020

- The Omega Chi Epsilon Student of the Year Award recognizes a senior with overall accomplishment and outstanding achievement in Chemical Engineering.

Senior Capstone Design Award April 2020

- My senior Capstone Design group developed a “Zinc-Air Battery for Grid Scale Energy Storage Applications” which won the award for *Innovative Sustainable Energy Solution*.

AICHE Outstanding Junior/Senior Award April 2019/2020

- Each year, the Department of Chemical Engineering at Northeastern University awards this to a single fourth/fifth year student who has provided outstanding contributions to the Northeastern University American Institute of Chemical Engineers student chapter.

Tau Beta Pi Stable Scholarship May 2019

- This monetary award honors students on the basis of high academic achievement, campus leadership and service, and the promise of substantial contributions to the engineering profession.

Nabil Morris Award April 2019

- One junior out of several hundred at Northeastern University is selected for this award by demonstrating outstanding achievement and exhibiting high moral character in his/her work in and out of the classroom. The chemical engineering faculty at Northeastern jointly selects a student they believe is an ideal candidate.

William Rand Award April 2019

- This award is given to two outstanding middlers (third year students), juniors, or seniors in the Tau Beta Pi MA-E Chapter who have conferred honor on the University by distinguished scholarship, exemplary character, and contribution to their community and campus.

Clara and Joseph Ford Scholarship March 2018

- Award recipients are active participants in student activities, have “demonstrated a democratic and tolerant spirit,” and are well disposed toward people of all creeds and races.

Dorothy P. Morris Scholarship May 2017

- This is a scholarship awarded by the Society of Women Engineers to one young woman out of almost 4,000 applicants who demonstrates outstanding academic achievement and strong engineering potential.