Andrew Weng
Curriculum Vitae

Mechanical Engineering, University of Michigan, e-mail: asweng@umich.edu, tel: +1-734-358-1894

(a) Professional Preparation

University of Michigan; Mechanical Engineering (Energy Systems); Ph.D.; GPA: 4.0/4.0 2024
Georgia Institute of Technology; Computer Science; M.S; GPA: 3.8/4.0 2020
University of Waterloo, Canada; Nanotechnology Engineering (Physics Option); B.A.Sc.; *Dean's List* 2013

(b) Professional and Research Positions

2024–present: **Postdoctoral Research Fellow**, University of Michigan, Ann Arbor, MI
2021–2024: **Staff Cell Engineer**, Tesla, Palo Alto, CA
2017–2021: **Senior Cell Research Engineer**, Tesla, Palo Alto, CA
2014–2017: **Cell Test Engineer**, Tesla, Palo Alto, CA
2013: **Battery Technology Intern**, Tesla, Palo Alto, CA
2013: **Nanotechnology Technician** US Nano LLC, South Bend, IN
2012: **Research Assistant**, Harvard-MIT Health Sciences and Technology, Cambridge, MA
2012: **Research Assistant**, University of Waterloo, Chemistry, Waterloo, ON, Canada
2012: **Technical Consultant Co-Op**, Blake, Cassels, & Graydon LLP, Toronto, ON, Canada
2011: **Research Assistant**, University of Waterloo, Mechanical Engineering, Waterloo, ON, Canada
2010: **Mechanical Quality Engineer Co-Op**, Applied Kinetics Inc, Ancaster, ON, Canada
2009: **Research Assistant**, University of Waterloo, Chemical Engineering, Waterloo, ON, Canada

(c) Awards and Recognition

2024: Top Poster, Technology Barriers to Electric Vehicle Implementation, Cell Press, Ann Arbor, MI
2023: S.M. and Benjamin Wu Fellowship in Manufacturing, University of Michigan
2020: Benton, Dwight F. Fellowship, University of Michigan
2020: Forrest Student Fellowship, University of Michigan
2013: Best Student Poster, Division of Theoretical Physics, CAP Congress, Montreal, Canada
2013: *NSERC Alexander Graham Bell Graduate Scholarship, University of Waterloo, Canada
2013: President's Graduate Scholarship, University of Waterloo, Canada
2011: *NSERC Undergraduate Student Research Award, University of Waterloo, Canada
2010: *NSERC Undergraduate Student Research Award, University of Waterloo, Canada
**national awards*

(d) Journal Papers

7. **A. Weng**, O. Y. Ahmed, G. Ehrlich, A. Stefanopoulou, "Higher labor intensity in US automotive assembly plants after transitioning to electric vehicles," *Nature Communications* (accepted) **2024**

6. **A. Weng**, E. Olide, I. Kovalchuk, J.B. Siegel, A. Stefanopoulou, "Modeling battery formation: boosted SEI growth, multi-species reactions, and irreversible expansion," Journal of the Electrochemical Society, Sep **2023**, 170 090523

5. **A. Weng**, H. Movahedi, C. Wong, J. B. Siegel, A. Stefanopoulou, "Current imbalance in dissimilar parallel-connected batteries and the fate of degradation convergence," *Journal of Dynamic Systems, Measurements, and Control*, Nov **2023**, 1-22

4. **A. Weng**, Eric J. Dufek, A. Stefanopoulou. "Battery passports for electric vehicle resale and repurposing," *Joule*, Vol. 7, Issue 5, 17 May **2023**, pp.837-842 (*Commentary*)

3. **A. Weng**, J.B. Siegel, A. Stefanopoulou. "Differential voltage analysis for battery manufacturing process control," *Frontiers in Energy Research*, Vol. 11, 22 March **2023**.

2. **A. Weng**, P. Mohtat, P.M. Attia, V. Sulzer, S. Lee, G. Less, A. Stefanopoulou. "Predicting the impact of formation protocols on battery lifetime immediately after manufacturing," *Joule*, Vol. 5, Issue 11, 17 November **2021**, pp.2971-2992.

1. P. Chen, Z. Luo, S. Güven, S. Tasoglu, A.V. Ganesan, **A. Weng**, U. Demirci. "Microscale assembly directed by liquid-based template," *Advanced Materials*, vol. 26, no. 34, pp. 5936–5941, **2014**.

(e) Conference Papers

5. H. Movahedi, **A. Weng**, S. Pannala, J.B. Siegel, A. Stefanopoulou. "The Case for DeepSOH: Addressing Path Dependency for Remaining Useful Life," *Modeling, Estimation, and Control Conference*, **2024**

4. C. Wong, **A. Weng**, S. Pannala, J. Choi, J.B., Siegel, A. Stefanopoulou. "Differential voltage analysis and patterns in parallel-connected pairs of imbalanced cells," *American Control Conference*, **2024**

3. **A. Weng**, S. Pannala J.B. Siegel, A. Stefanopoulou. "Parallel-Connected Battery Current Imbalance Dynamics," *Modeling, Estimation and Controls Conference, New Jersey*, *IFAC-PapersOnLine*, Vol. 55, Issue 37, **2022**, pp.37-43.

2. S. Pannala, **A. Weng**, I. Fischer, J.B. Siegel, A.G. Stefanopoulou, "Low-Cost Inductive Sensor and Fixture Kit for Measuring Battery Cell Thickness Under Constant Pressure," *Modeling, Estimation and Controls Conference, New Jersey*, *IFAC-PapersOnLine*, Vol. 55, Issue 37, **2022**, pp. 712-717.

1. O.Y. Ahmed, R.J. Middleton, V. Tran, **A. Weng**, A.G. Stefanopoulou, "Model Predictive Control of Diesel Combustion Phasing by Coordinating Fuel Injection Timing and Ignition Assist," *10th IFAC International Symposium on Advances in Automotive Control, 2022*, *IFAC-PapersOnline*, Vol. 55, Issue 24, **2022** pp. 90-96.

(f) Conference Abstracts

6. **A. Weng**, I. Kovalchuk, J.B. Siegel, A. Stefanopoulou. "Towards Rational Design of Battery Formation Protocols: From Electrochemical Modeling to Factory Deployment," *Electrochemical Society Spring Meeting*, **2024**

5. **A. Weng**, E. Olide, V. Tran, I. Kovalchuk, J. B. Siegel, A. Stefanopoulou. "Phenomenological model of solid electrolyte interphase formation and growth leveraging real-time expansion measurements," *ECS Fall Meeting, May 28 – June 2, Boston, MA*, **2023** (oral presentation)

4. **A. Weng**, P. Mohtat, P.M. Attia, V. Sulzer, S. Lee, G. Less, A. Stefanopoulou. "Voltage-based battery manufacturing diagnostics: opportunities and challenges" *Gordon Research Conference, Ventura, CA*, **2022** (poster presentation)

3. **A. Weng**, P. Mohtat, P.M. Attia, V. Sulzer, S. Lee, G. Less, A. Stefanopoulou. "Using Resistance as a Surrogate for Lithium Consumed During Formation for Cell Life Prediction," *MRS Spring Meeting, Hawaii* **2022** (oral presentation)

2. **A. Weng**, P. Mohtat, S. Lee, G. Less, A. Stefanopoulou. "Degradation diagnostics in graphite-NMC cells under fast SEI formation," *ECS Meeting Abstracts*, *May 30 – June 3*, **2021** (oral presentation)

1. **A. Weng**, M. Karttunen. "Spatio-temporal pattern formation in the Gray-Scott Model," *Congress of the Canadian Association of Physicists, Montréal, Canada* (**First Prize**, Best Student Poster, Division of Theoretical Physics), **2013** (poster presentation)

(g) Patents

3. **A. Weng**, J. B. Siegel, G. Less, A. Stefanopoulou. "Closed-loop battery manufacturing process control via end-of-line diagnostic features," *U.S. Patent App. 18/673,707*, **2024**/06/14

2. A. Stefanopoulou, I. Kovalchuk, V. Tran, J. B. Siegel, E. Olide, **A. Weng**. "Battery Formation Diagnostics Using Real-Time Expansion," *US Patent App. 63/469,269*, **2023**/05/09

1. A. Stefanopoulou, **A. Weng**, P. Mohtat, P. M. Attia, V. Sulzer, S. Lee, G. Less. "Early-Life Diagnostics For Fast Battery Formation Protocols And Their Impacts To Long-Term Aging," *US Patent App. 17/859,390*, **2023**/01/26

(h) Invited Talks

5. Battery Modeling Webinar Series, "Battery formation modeling and diagnostics: toward closed-loop battery manufacturing process control" (Feb **2024**)

4. Battery Modeling Webinar Series, "Battery passports: renewing the case for advanced BMS diagnostics" (August **2023**)

3. Tsinghua University (Webinar), 9th Seminar in Series of Transportation Electrification, eTransportation, "Predicting the impact of formation protocols on battery lifetime immediately after manufacturing" (April **2022**)

2. Carnegie Mellon University, Battery Modeling Webinar Series, "Predicting the impact of formation protocols on battery lifetime immediately after manufacturing" (November **2021**)

1. The Battery Show (Novi, MI) "Speeding up Battery Formation" (September **2021**)

(i) Teaching and Education

5. **Guest Lecturer, ME481/599: Manufacturing Process Fundamentals**, Ann Arbor, MI (Fall **2023**)

4. **Assistant Course Developer, ME499/599: Battery Eng. & Lifetime Mgmt.**, Ann Arbor, MI (Fall **2023**)
(i) Assisted in graduate course content development for a new introductory course on lithium-ion battery physics, lifetime management, and sustainability, led by Dr. Stefanopoulou; the course was launched in Fall 2023 with 47 students enrolled. (ii) Delivered two guest lectures on modern lithium-ion battery manufacturing technology.

3. **Course Instructor for Battery Boot Camp**, Ann Arbor, MI (Summer **2023**)
(i) Prepared and delivered 3 hours of course content for a 'train the trainers' workshop; topics covered battery materials, mining, manufacturing, and recycling; workshop was attended by local UAW leaders, community college instructors, and members from the local automotive industry.

2. **Graduate Student Instructor for ME565: Battery Systems and Control**, Ann Arbor, MI (Winter **2022**)
(i) Organized extra tutorials on Matlab/Simulink to help students with without a mechanical engineering background catch up on course prerequisites
(ii) Volunteered to update course homework, lecture material, and quizzes, to improve accessibility of course materials for students without a background in controls engineering

1. **Workshop Developer for American Control Conference**, Atlanta, GA (Summer **2022**)
(i) Developed and presented workshop tutorials on battery manufacturing, battery degradation mechanisms, and physics-based models for battery lifetime, to an audience of controls engineers

(j) Synergistic Activities

1. Mentorship:
(i) Mentored students as part of the Undergraduate Research Opportunities Program (UROP)

(a) Iaroslav Kovalchuk (EECS/Math), **2021 - present**
"Hybrid pulse power characterization for lithium-ion battery coin cells"

(b) Maisha Niha (MECHENG), **2022 - 2023**
"Impact of battery formation temperature and pressure on battery lifespan"

(c) Roger Ho (MECHENG/CS), **2021**
"Measuring battery cell properties at the extreme end of life"

(ii) Peer mentor for 3 mechanical engineering first-year masters students as part of the Mechanical Engineering Graduate Council (MEGC) Mentorship Program **(2020-2022)**
(iii) Provide technical mentorship, career guidance, and leadership development for 8 undergraduate students as part of Tesla's internship program **(2015 - 2024)**

2. **Community Service:**
(i) Co-authored *The Battery Report 2022*, the most-read report covering the battery ecosystem with readers from 100+ countries; wrote the "Talent" section, focusing on the impact of battery manufacturing on jobs and education **(2022)**.
(ii) Web developer for United Way of Washtenaw County to build a website to help low-income residents save money on their tax returns **(2021-2022)**.
(iii) Foodbank volunteer with Second Harvest of Silicon Valley and San Francisco-Marin Food Bank; assisted with food packaging at a distribution site; prepared and served free food at a local food pantry **(2019)**

3. **Journal Peer-Reviewer:**
Joule (5); *Journal of Power Sources* (2); *Energy Technology* (1); *IEEE Transactions on Transportation Electrification* (2); *Journal of the Electrochemical Society* (2); *Journal of Energy Storage* (1)

(k) Relevant Coursework

Graduate-Level: *University of Michigan:* Teaching Engineering; Battery Systems & Controls; Electrochemistry; Climate Economics & Policy; Linear Systems Theory; Model-Predictive Control; Automatic Control; Design of Digital Control Systems; Sensors; *Georgia Institute of Technology:* Graduate Algorithms; High-Performance Computer Architecture; Graduate Operating Systems; Artificial Intelligence; Computer Vision; Computer Networks; Software Analysis & Testing; Reinforcement Learning

Undergraduate-Level: *University of Waterloo:* Numerical Methods; Molecular Dynamics Simulation Methods; Computer-Aided Design; Materials Characterization; Theoretical Mechanics; Condensed Matter Physics; Mathematical Physics; Quantum Physics

(l) Collaborators & Other Affiliations

Collaborators and Co-Editors: *University of Michigan*: Gabriel Ehrlich (F); Everardo E. Olide (G); Vivian Tran (G); Hamid Movahedi (P); Omar Ahmed (G); Clement Wong (G); Iaroslav Kovalchuk (U); Suhak Lee (G); Greg Less (S); Peyman Mohtat (G); Maisha Niha (U); Sravan Pannala (G); Anna Stefanopoulou (F); Jionghua Jin (F); Jason B. Siegel (S); *Carnegie Mellon University*: Valentin Sulzer (P); *Stanford University*: Peter M. Attia; *Idaho National Laboratory*: Eric J. Dufek; *University of South Carolina*: Paul T. Coman (F); Ralph White (F); Enrico Santi (F); Roger Douglas (F); Matthew King (U); Austin Downey (F). *(U: undergraduate; G: graduate; P: post-doc; S: staff; F: faculty)*

Graduate Committee: Anna Stefanopoulou, *University of Michigan*; Neil Dasgupta, *University of Michigan*; Jason B. Siegel, *University of Michigan*; Jionghua (Judy) Jin, *University of Michigan*

Last Updated: March 28, 2024