

Genesis Mariana Higueros

San Rafael, CA 94901 | genesis.higueros@duke.edu | linkedin.com/in/genesis-higueros-a9201a147

Profile

- Investigating **radiative thermal management wearables** by **fundamental theorem analysis** and **nanofabrication** methods
- Experienced in **microfabrication** technology including UV photolithography and etching techniques
- Academic teaching in **thermodynamics and electrochemistry courses** for undergraduate and graduate students
- Hosted several **diversity initiatives and outreach** events including Light, Infrared, and Thermal Energy workshop for high school students of underrepresented backgrounds

Education

2019-2025

Cumulative GPA: 3.45

Advisor: Prof. Po-Chun Hsu

Duke University
Ph.D. in Mechanical Engineering & Materials Science

2015-2019

Cumulative GPA: 3.89

University of California, Merced
Bachelor of Science in Environmental Engineering

Publications

(*corresponding author, †equal contribution)

G. Higueros, Q. Li, C. Sui, R. Wu, P.-J. Hung, P.-C. Hsu* “Single-Layer Patterned Metallic Nanowires for Transparent Radiative Shields” (2026) *In progress*

Q. Li, Y. Chen, Z. Luo, C. Sui, X. Wu, R. Wu, Q. Fan, C.-T. Fu, P.-J. Hung, G. Yan, **G. Higueros**, T.-H. Chen, P.-C. Hsu* “Spectrally-selective dynamic radiative thermoregulation via phase engineering” (2026) *In submission* DOI: 10.48550/arXiv.2512.05388

P.-J. Hung, Q. Li, T.-H. Chen, C.-T. Fu, Y. Han, R. Wu, G. Yan, Q. Fan, J. Liu, P.-R. Huang, Y. Chen, C. Sui, **G. Higueros**, A. Flores, F. Shi, P.-C. Hsu* “All-Solution-Processed Mid-Infrared Electrochromics (ASPIRE) for Thermoregulation with Arbitrary Curvatures” (2026) *In submission* DOI: 10.26434/chemrxiv-2025-g97zs

R. Wu, H. E. Delgado, Y. Xi, Y. Chen, G. Yan, E. Luo, Q. Li, Q. Fan, Y. Han, **G. Higueros**, A. Ruthen, C. Sui, A. Suresh, D. Mitzi, C. Liu, A. Elgowainy, P.-C. Hsu* “Distributed direct air capture by carbon nanofiber air filters” *Science Advances* (2025) DOI: 10.1126/sciadv.adv6846

J. Liang, C. Sui, J. Tian, **G. Higueros**, T.-H. Chen, R. Wu, P.-J. Hung, Y. Deng, N. Rozman, W. J. Padilla, P.-C. Hsu* “Ionic Liquid-Based Reversible Metal Electrodeposition for Adaptive Radiative Thermoregulation Under Extreme Environments” *Advanced Functional Materials* (2025) DOI: 10.1002/adfm.202419087

G. Higueros, Q. Li, P.-C. Hsu* “Perspective on the Next Ten Years of Wearable Passive Radiative Thermoregulation” *ACS Materials Letters* (2025) DOI: 10.1021/acsmaterialslett.5c00231

G. Higueros†, K. Wang†, C. Sui, P.-C. Hsu* “Solution-Processed Metallic Nanowire Network for Wearable Transparent Thermal Radiation Shield” *ACS Nano* (2024) DOI: 10.1021/acsnano.4c02093

C. Sui, Z. Jiang, **G. Higueros**, D. Carlson, P.-C. Hsu* “Designing electrodes and electrolytes for batteries by leveraging deep learning” *Nano Research Energy* (2023) DOI: 10.26599/NRE.2023.9120102

C. Sui†, Y.-Y. Li†, X. Li, G. Higueros, K. Wang, W. Xie, P.-C. Hsu* “Bio-inspired computational design of vascularized electrodes for high-performance fast-charging batteries optimized by deep learning” *Advanced Energy Materials* (2022) DOI: 10.1002/aenm.202103044

Technical Experience

University of Chicago

Mar 2023 – Present *Hsu Group/ Wearable Transparent Thermal Radiation Shield*

- Synthesized non-circular 3D nanowires using conventional microfabrication techniques
- Designed experimental protocols and fabricated transparent radiation shield specimens
- Characterized visible transmittance and mid-infrared reflectance of single-layered AgNWs networks

Jun 2021 – Jul 2022 *MOF-199 for Carbon Dioxide Direct Air Capture (DAC)*

- Responsible for synthesis of metal organic framework, HKUST, filter for low pressure direct air capture
- Filter designed for decentralization of carbon dioxide sequestration

Duke University

Jun 2019 – Mar 2023 *Hsu Group/Vascular Enabled Advanced (VENA) Batteries*

- Fabricating dual-porous graphite anodes for fast-charging, high-energy density batteries by increased materials utilization and lowered ionic tortuosity
- A cleanroom fabrication process could produce sacrificial 2D micro-sized templates. Magnetic alignment for orientation purposes and CAD designs permits a myriad of possible 2D structures
- Our approach for vascularized channels in electrodes may be applied to various energy systems

Jul 2020 – Jun 2021 *Hsu Group/X-ray CT Battery Thermal Measurement*

- Assembled several Li-ion battery coin (CR2032) and cylindrical (18650) cells with resistant temperature detectors to predict battery thermal gradients using x-ray computed tomography in collaboration with Dr. Cristian Badea and group

University of California, San Diego

Jun 2018 – Aug 2018 *Summer Undergraduate Research Fellowship/Supercapacitors*

- Drop casted PEDOT:PSS and N2200 polymers onto electrodes for Type IV supercapacitors with Dr. Tse Nga Ng and characterized system utilizing three-electrode electrochemical cells and EC-Lab software

University of California, Merced

Jun 2017 – Aug 2017 *Summer Undergraduate Research Fellowship/Plasma Gasification*

- Researched effects of biochar steam activation and its resultant surface properties with Dr. Gerardo Diaz
- Operated gas chromatograph and PeakSimple software to analyze producer gas of activated peach pits

Awards and Fellowships

2019-2024	Alfred P. Sloan Foundation Scholarship, Duke University
2019	Outstanding Student Award for Environmental Engineering, University of California, Merced
2017-19	Summer Undergraduate Research Fellowship, University of California, Merced
2015	Project Recognition Award, The American Association of University Women

Verbal & Poster Presentations

- Poster “*Solution-Processed Metallic Nanowire Network for Wearable Thermal Transparent Radiation Shield*” MRS 2024 Spring Meeting, Seattle, CA, Tuesday April 23, 2024

- **Best Poster Award** for the symposium *Plasmonics and Metasurfaces: Design, Materials, and Applications* (EL08)
- Virtual Presentation “*Vascular ENabled Advanced (VENA) Electrodes for Fast Charging LIBs*” NC Space Symposium, NC, April 8, 2022
- Virtual Presentation “*Vascular ENabled Advanced (VENA) Electrodes for Fast Charging LIBs*” 9th Annual Triangle Student Research Competition, Raleigh, NC, October 7, 2021
- Presentation “*Dual-porosity Electrodes for Fast-Charging Li-ion Batteries*” Energy Materials Seminar, Durham, NC, January 10, 2020
- Poster “*Fabrication and Characterization of Polymers for Type IV Supercapacitors*” SHPE 2018 National Convention, Cleveland, OH, November 9, 2018
- Presentation “*Fabrication and Characterization of Polymers for Type IV Supercapacitors*” Summer Research Conference at UC San Diego, San Diego, CA, August 16, 2018
- Poster “*High Temperature Steam Activation of Peach Pit Biochar*” 2017 SACNAS International Conference, Salt Lake City, UT, October 20, 2017
- Presentation and Poster “*High Temperature Steam Activation of Peach Pit Biochar*” 2017 Annual Summer Undergraduate Research Symposium at UC Merced, Merced, CA, August 4, 2017

Skills

Software

- | | | |
|-----------------------|-----------|----------------|
| • EC-Lab | • COMSOL | • GasLab |
| • AutoCAD | • Fortran | • PeakSimple |
| • Autodesk Fusion 360 | • Matlab | • LayoutEditor |
| • Crystal Maker | • ImageJ | • PreForm |
| • OpenLCA | • Origin | • Audacity |

Technical

- | | | |
|---------------------------------|-----------------------------|-------|
| • Gas chromatography | • RIE/ICP | • SEM |
| • Atomic layer deposition | • Ion milling | • TEM |
| • UV photolithography | • High-density plasma CVD | • XPS |
| • Metal deposition (thermal) | • Confocal Raman microscopy | • XRD |
| • Metal deposition (sputtering) | | |

Teaching & Mentoring Experience

- **Spring 2022 – Electrochemistry in Energy Applications (Duke)**. Teaching assistant responsible for homework grading. Office hours were held twice in the semester.
- **Fall 2021 – Heat and Mass Transfer (Duke)**. One out of five teaching assistants for a 70-student class. Responsible for grading homework assignments.
- **Spring 2021 – Thermodynamics (Duke)**. Teaching assistant for approx. 40 undergraduate students. Responsible for grading homeworks and laboratory assignments as well as office hours.
- Lead organizer for **Light, Infrared, and Thermal Energy (LITE) Workshop**, a one-day outreach event for highschool students from underrepresented backgrounds in STEM. Managed volunteers, created lectures, and designed/implemented virtual-reality thermal-imaging headsets, 2022
- Moderated MRS@Duke **Implicit Bias Workshop** in collaboration with the University Program in Materials Science and Engineering and the Duke Office for Institutional Equity to promote discussion of racial biases and microaggressions in classrooms to prevent intolerance and foster community, 2020
- **Graduate student mentor** for first-year graduate students in the Mentorship Network Program at Duke University, 2020
- **Hosted STEM-based workshops** in collaboration with the Society of Women Engineers for Expand Your Horizons conference which aims to empower young female students, 2016, 2018, 2019
- **Lead organizer of LITE demo (UChicago)** for the annual South Side Science Festival, a one-day outreach event hosted for local community students, 2023, 2024