Genesis Mariana Higueros

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Profile

- Investigating **radiative thermal management wearables** by fundamental theorem analysis and nanofabrication methods
- Experienced in **microfabrication** technology including photolithography and reactive ion etching (RIE)
- 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-Present — **Duke University**
Expected graduation: May 2024 — **Ph.D. in Mechanical Engineering & Materials Science**
Cumulative GPA: 3.45
Advisor: Prof. Po-Chun Hsu

2015-2019 — **University of California, Merced**
Cumulative GPA: 3.89 — **Bachelor of Science in Environmental Engineering**

Publications

(*corresponding author, †equal contribution)

G. Higueros, C. Sui, R. Wu, P.-J. Hung, P.-C. Hsu* "Synthesis of Ultra-thin, Ultra-long Silver Nanowires by Imprint Method" (2025) ***In progress***

G. Higueros, P.-C. Hsu* "The Next Ten Years of Wearable Passive Radiative Thermoregulation" *ACS Materials Letters* (2024) ***In progress***

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* "An All-Solution-Processed Mid-IR Electrochromic (ASPIRE) Device" (2024) ***In progress***

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* (2024) ***In review***

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

March 2023 – Present Hsu Group/ Wearable Transparent Thermal Radiation Shield

- 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 – March 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-Present 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

Teaching & Mentoring Experience

- **Spring 2022 – ME 555: Electrochemistry in Energy Applications (Duke)**. Teaching assistant responsible for homework grading. Office hours were held twice in the semester.
- **Fall 2021 – ME 431: Heat and Mass Transfer (Duke)**. One out of five teaching assistants for a 70-student class. Responsible for grading homework assignments.
- **Spring 2021 – ME 331: 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

Extracurricular Activities

Jun 2020 – Jul 2022 Materials Research Society at Duke University

- Acted as the 2021-2022 President responsible for overseeing club activities, events, and Executive Board
- Outreach Coordinator from 2020-2021 responsible for undergraduate and graduate outreach events, local community engagement, and membership retainment
- Managed advertisement of events and designed all flyers
- Assisted President with his duties on managing executive board and regularly provided advice as a past student organization President

Aug 2017 – Apr 2019 Solar Energy Association at UC Merced

- President from 2018-2019 and responsible for overseeing executive board, general meetings and events
- Vice President from 2017-2018 and assisted President with her duties
- Managed the Solar Charging Station Project from January to May 2018
- Provided key lectures on solar panels and power calculations