# Richik Haldar

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## EDUCATION

**University of California, Los Angeles** **Sep 2021 – Expected Jun 2025**
*B.S. in Chemical Engineering* (GPA: 3.992/4.00)
Advisor: Prof. Yuzhang Li

## RESEARCH EXPERIENCE

**Yuzhang Li Group Undergraduate Researcher** **May 2022 – Present**
*University of California, Los Angeles, Los Angeles, CA*

- **Current Projects:** Calendar aging of aqueous zinc metal batteries; investigating hydrophobic water-air emulsion as low-cost solid-state electrolyte in zinc metal batteries.
- Built $60 potentiostat capable of running cyclic voltammetry and chronoamperometry for macroelectrodes and ultramicroelectrodes.
- Collaborated on development of an ML model to accurately predict anode voltage of lithium-ion battery cells with <3mV error.

**Applied Battery Research Intern** **Jun 2024 – Aug 2024**
*Pacific Northwest National Laboratory, Richland, WA*
Advisor: Dr. Wu Xu

- Formulated novel electrolyte systems with moderately solvating properties for high-performance lithium sulfur batteries.
- Conducted qualitative polysulfide solubility tests and coin cell cycling assessments, observing stability improvements compared to conventional electrolytes.

**Battery Engineering Intern** **Jun 2023 – Sep 2023**
*Feon Energy, Inc., Woburn, MA*
Manager/Advisor: Dr. Zhiao Yu

- Conducted electrochemical analysis of lithium metal battery performance to assess high-performance liquid electrolytes and make formulation improvement recommendations.
- Spearheaded regression model using TensorFlow to correlate electrolyte composition with half-cell coulombic efficiency.
- Reduced material usage by 15% and accelerated testing turnaround time by 1.5 weeks.

**Forensic Chemistry Research Assistant** **Apr 2020 – Feb 2021**
*The George Washington University, Washington, D.C.*
Advisor: Prof. Walter Rowe

- Investigated heating, liquid immersion, and laser printing effects on paper textures.
- Compared surface texture differences in 10 household brands after prolonged submersion in water, Pepsi, and acetone using 2D Fast Fourier Transform and 1D Power Spectra.

**Document Dating and Forgery Detection Project** **Aug 2020 – May 2021**
*Thomas Jefferson High School for Science and Technology, Alexandria, VA*
Advisor: Dr. Brian Kennedy

- Developed a method to date documents written in gel pen by measuring evaporation rates of primary compound(s) in ink used within 3.97% error.
- Compiled a database of evaporation rates and retention times for primary components of 30 different blue and black gel pens verified with Thin-Layer Chromatography.

## PUBLICATIONS

"Mitigating capacity loss during calendar aging of aqueous zinc metal batteries," submitted (3rd author).

## PRESENTATIONS

**Poster:** "Novel Electrolytes with Moderate Lithium Polysulfide Solubility for High-Performance Lithium-Sulfur Batteries." Pacific Northwest National Laboratory Research Symposium, August 22, 2024. Richland, Washington.

**Presentations:**

"Water Isn't Wet? Investigating the Electrochemical Capabilities of Dry Water in Battery Systems." UCLA Undergraduate Research Week, May 21, 2024. Los Angeles, California.

"Analysis of Evaporation Rates of Blue Ink Gel Pen Components for Document Authenticity." Thomas Jefferson Symposium to Advance Research, May 17, 2021. Virtual due to COVID.

"The Effects of Heating and Laser Printing on Paper Surface Textures as Assessed by Discrete Two-Dimensional Fast Fourier Transforms and One-Dimensional Power Spectra." American Academy of Forensic Sciences 73rd Annual Scientific Meeting, February 19, 2021. Virtual due to COVID.

## EXTRACURRICULAR PROJECTS

**UCLA Chem-E-Car Powering Mechanism Researcher** **Jun 2022 – May 2024**

- Designed 8.5V and 8.4 Zn-ion and Mg-ion battery backs to power a shoebox-size car to travel 30 meters in two minutes; won 3rd place in 2024 Western Regional Conference.
- Facilitated regular design reviews and ensured active involvement of department faculty members in multiple full-body trials.

**UCLA Bruin Formula Racing Powertrain Design Engineer** **Sep 2021 – Present**

- Performed heat transfer calculations to determine optimal airflow for battery pack cooling during endurance testing for this year's Mark 10 vehicle.
- Evaluated and ranked several battery pack insulation materials based on thermal and electrical conductivity, application feasibility, and cost.
- Spearheaded fuel tank baffle design and manufacturing process for 2022-2023 vehicle.

**UCLA Chemical Engineering Introductory Project Electronics Lead** **Sep 2021 – May 2022**

- Engineered and manufactured an Arduino-powered coffee machine under a $100 budget with a six-person team.
- Implemented motion-activated drip system utilizing an ultrasonic sensor to automate fluid flow regulation within peristaltic pump pipes.
- Optimized component cost using Microsoft Excel, reducing expenses by 58%.

## HONORS & AWARDS

2x UCLA Undergraduate Research Scholar ($6,000 scholarship) **2023-2025**
Tau Beta Pi - *National Engineering Honor Society* (top 12.5% of junior class) **2023**
UCLA Dean's Honor List **2021-2024**
National Merit Scholar **2020**

## STUDENT ORGANIZATIONS

UCLA American Institute of Chemical Engineers*: Academic mentor to underclassmen*
UCLA Bruin Formula Racing
Anime Geijutsu Arts & Music at UCLA: *President, Assistant Music Director*