

Carolyn E. Ramírez, Ph.D.

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Education

Doctor of Philosophy in Chemical Engineering 09/2017 – 06/2022

Northwestern University | McCormick School of Engineering

- Dissertation: “Understanding photophysics of rylene diimides and tetrapyrroles in the solid state for enhancement of organic photovoltaic performance”
- Advisor: Michael R. Wasielewski, Ph.D.
- Committee: Michael R. Wasielewski, Randall Snurr, Mark Hersam, Linsey Seitz, Jeffrey Lopez

Bachelor of Science in Chemical Engineering 08/2013 – 05/2017

The University of Texas at Austin | Cockrell School of Engineering

Research Experience

Dunn Research Group – Northwestern University | Evanston, IL 08/2024 – 09/2025

Environmental Sustainability Post-Doctoral Researcher

Applied technical analysis and science communication expertise to research the technological and commercial viability of a Midwest direct air capture (DAC) hub and demonstrate potential of new technologies to reduce microplastic pollution.

- Applied life cycle analysis (LCA) GHG accounting to DAC hub to understand technology sustainability.
- Conducted collaborative LCA of microplastic filter technology implementation in Great Lakes region.
- Used GIS and modeling software to understand characteristics of geography for both projects.
- Provided supervisory mentorship to graduate students in research group through research and job development.

Natural Resources Defense Council (NRDC) | Chicago, IL 06/2022 – 07/2024

Natural Climate Solutions Staff Scientist

Worked as a scientist and advocate for the Nature Program's Forest Team, shaping federal policy in the U.S. Forest Service and Bureau of Land Management protecting old-growth forests and trees on federal lands.

- Collaboratively published original forest ecology research utilizing federal forest inventory data.
- Independently developed LCA model for forest carbon accounting on federal lands.
- Conducted several field visits across the U.S. to engage with community stakeholders and Tribal representatives.
- Wrote technical reports, literature reviews, federal technical comments, and op-eds to build advocacy platform.
- Served as primary forest ecology technical expert/spokesperson for NRDC to media, honing communication skills.

Wasielewski Research Group – Northwestern University | Evanston, IL 09/2017 – 06/2022

Graduate Researcher

Conducted both independent and collaborative chemistry and science policy research in the field of artificial photosynthesis, resulting in the publication of four first-author papers in high-impact journals and the completion of my Ph.D. thesis.

- Independently designed lab-based experiments using numerous characterization techniques.
- Used many types of spectroscopy, x-ray diffraction and scattering, and many types of chromatography.
- Broadened data science skills by processing data in original MATLAB and Excel models.
- Performed molecular computational research using density functional theory (DFT) and time-dependent DFT.
- Gained experience with MS Office for all research presentations and infographic design.
- Applied technical work to community policy implications through science policy writing.
- Co-founded and led department DEI committee, developing anti-racist education and research.

Korgel Research Group – University of Texas at Austin | Austin, TX 09/2014 – 05/2017

Undergraduate Research Assistant

Assisted graduate researchers with projects focused on nanomaterial synthesis and characterization. Applied for and received my own research funding from the university multiple semesters.

- Innovated silicon nanomaterial/aerogel synthesis and silicon anodes for lithium-ion batteries.
- Synthesized and performed electrical testing on perovskite photovoltaics.
- Trained in numerous material characterization techniques including electron microscopy and x-ray diffraction.

ExxonMobil Research and Engineering Company | Paulsboro, NJ 06/2016 – 08/2016

Fuel Product Technology Intern

Conducted independent research on biodiesel blends with various additives for vehicle performance.

- Collaborated with Baytown and Baton Rouge Refineries to build additive response models for diesel blending.
- Blended samples and ran physical property tests (FTIR) to generate data for fuel property response models.

Ruoff Research Group – University of Texas at Austin | Austin, TX 09/2013 – 05/2014

Undergraduate Research Assistant

Supported graduate students and post-docs with nanomaterials research and characterization.

- Synthesized graphite/graphene super capacitors and batteries.
- Investigated graphite exfoliation and chemical etching for graphene and carbon nanotube synthesis.

Texas Undergraduate Research Journal (URJ) – University of Texas at Austin | Austin, TX 09/2013 – 05/2015

Associate Editor of Engineering

Led team of assistant editors for undergraduate research journal in selecting and editing science paper submissions.

- Served as primary editor for two publications featured in URJ 2014 and 2015.
- Journal distributed to top universities and housed in the Library of Congress.

Ajayan Research Group – Rice University | Houston, TX 01/2013 – 08/2013

Research Assistant

Gained research lab experience as a senior in high school working in Rice's materials science department.

- Synthesized Carbon NanoSponges (boron-doped carbon nanotubes) and conducted mechanical testing.
- Co-authored publication on carbon nanotube synthesis method, contributing to the mechanical analysis section.

Teaching Experience

Loyola University Chicago | Chicago, IL 08/2025 – Present

Adjunct Instructor

- Spring 2026: Teaching two sections in the School of Environmental Sustainability (SES)
 - ENV 101: The Scientific Basis of Environmental Issues – Freshman-level core curriculum course for non-science majors and SES students focused on the scientific principles and global impacts of climate change, biodiversity, energy conservation, and pollution.
- Fall 2025: Taught two courses in the Engineering Department within the School of Arts and Sciences
 - ENGR 362: Water & Wastewater Engineering – Senior-level engineering course focused on hydraulics and wastewater treatment characteristics (biological, chemical, physical, environmental justice).
 - ENGR 383: Environmental Engineering Capstone Design – Senior-level project-based engineering course where students design an implementable project with industry partners and faculty guidance.

Social Ecologies | Chicago, IL 04/2025

Science & Outreach Assistant

Co-developed and taught a virtual and asynchronous soil chemistry course for group of students throughout North America.

- Taught important chemistry topics including: chemical reactions, stoichiometry, acids/bases, redox reactions, etc.
- Designed field work and "lab" testing using common household reagents.

Northwestern University | Evanston, IL 09/2017 – 06/2021

Senior Design Teaching Assistant

Supported Professor Jennifer Cole with instruction of the capstone senior design course for chemical engineers.

- Held regular office hours where students brought technical questions and worked through them.
- Gave lectures when Prof. Cole was unavailable and regularly gave software demonstrations.
- Supported students in project development, helping them frame engineering problems in real-world context.

Additional Professional Experience

Social Ecologies | Chicago, IL 03/2025 – 10/2025

Science & Outreach Assistant

Provided research and outreach support to director via connecting with clients and scientific collaborators. Social Ecologies builds regenerative systems for ecological projects, focusing on local land stewardship and conservation practices.

- Conducted soil testing field work to understand soil chemistry, geology, & biology for proactive land stewardship.

- Developed curricula and co-taught clients about topics like soil chemistry to apply to bioremediation projects.

SUM = everyone + outdoors | Chicago, IL

08/2024 – Present

Bilingual Nature Guide

Ongoing contract work supporting SUM as an ecology expert and community organizer. SUM curates outdoor experiences for various clients across the Chicagoland area, focused on wellness and restoration.

- Leading nature tours and excursions focused on engaging with local ecology and education about conservation.
- Providing support for director including communication with Spanish-speaking clients to ensure inclusivity.

ExxonMobil Refining and Supply (R&S) Company | Baton Rouge, LA

06/2015 – 08/2015

Process Engineering Intern - Light Ends Contact Engineer

Worked as process engineer in charge of maintaining three fractionation towers and associated units.

- Coordinated/executed plant test on Wet Gas Scrubber.
- Re-purposed idle plate/frame heat exchanger for Alkylation unit.
- Wrote and pushed through Management of Change Requests (MOCs) for sample extraction sites.

Academic Publications

Birdsey, R.A., D.A. DellaSala, W.S. Walker, S.R. Gorelik, G. Rose, and **C.E. Ramírez**. “Assessing carbon stocks and accumulation potential of mature forests and larger trees in U.S. federal lands.” *Frontiers in Forests and Global Change* (2023) 5. <https://doi.org/10.3389/ffgc.2022.1074508>.

Chintam, K., A. Prybutok, W. Brenneis, J.M. Chan, J. Green, R. Li, M. Olsen, S.L. Ramesh, **C.E. Ramírez**, D.R. Vemulapalli, J. Cole, “Designing and Implementing a Workshop on the Intersection between Social Justice and Engineering.” *American Society for Engineering Education Annual Conference & Exposition* (2023) <https://peer.asee.org/42969>.

Ramírez, C.E., R. Jacobberger, R.M. Young, and M.R. Wasielewski. “Photophysics of Zinc 2,11,20,29-Tetra-tert-butyl-2,3-Naphthalocyanine: Aggregation-Induced S₂ Emission and Rapid Intersystem Crossing in the Solid State.” *Journal of Physical Chemistry C* (2022) 126, 28, 11680–11689. <https://doi.org/10.1021/acs.jpcc.2c03226>.

Ramírez, C.E. “Understanding Photophysics of Rylene Diimides and Tetrapyrroles in the Solid State for Enhancement of Organic Photovoltaic Performance.” *Northwestern University ProQuest Dissertations & Theses* (2022) 29256560. <https://www.proquest.com/dissertations-theses/understanding-photophysics-rylene-diimides/>.

Williams, M.W.,* I. Schlesinger,* **C.E. Ramírez**,* R.M. Jacobberger, P.J. Brown, R.M. Young, and M.R. Wasielewski. “Effect of Crystallinity on Endoergic Singlet Fission in Perylenediimide Single Crystals and Polycrystalline Films.” *Journal of Physical Chemistry C* (2022) 126, 25, 10287–10297. <https://doi.org/10.1021/acs.jpcc.2c02298>.

Ramírez, C.E. “Without Environmental Justice, the Renewable Energy Transition Will Leave Low-Income and BIPOC Communities Behind.” *Journal of Science Policy & Governance* (2021) 18, 03. <https://doi.org/10.38126/JSPG180306>.

Ramírez, C.E.,* S. Chen,* N.E. Powers-Riggs, I. Schlesinger, R.M. Young, and M.R. Wasielewski. “Symmetry-Breaking Charge Separation in the Solid State: Tetra(phenoxy)perylene-diimide Polycrystalline Films.” *Journal of the American Chemical Society* (2020) 142, 42, 18243–18250. <https://doi.org/10.1021/jacs.0c09185>.

Jiang, C., A. Saha, C.C. Young, D.P. Hashim, **C.E. Ramírez**, P.M. Ajayan, M. Pasquali, and A.A. Martí. “Macroscopic Nanotube Fibers Spun from Single-Walled Carbon Nanotube Polyelectrolytes.” *ACS Nano* (2014) 8, 9, 9107-9112 27. <https://doi.org/10.1021/nn502552q>.

*co-first authors

Op-eds/Expert Blogs

Habeeb, G., R. Frost, and **C. E. Ramírez**. “No Need to Reinvent the Forest.” *Natural Resources Defense Council* (2024) <https://www.nrdc.org/bio/gabrielle-habeeb/no-need-reinvent-forest>.

Rath, D. and **C.E. Ramírez**. “How Management Affects Carbon Stored in Forest Soils.” *Natural Resources Defense Council* (2023) <https://www.nrdc.org/bio/daniel-rath/how-forest-management-affects-soil-carbon>.

Pepper, E. and C.E. Ramírez. “On International Day of Forests, the Global North Must Show Leadership.” *Natural Resources Defense Council* (2023) <https://www.nrdc.org/bio/elly-pepper/international-day-forests-global-north-must-show-leadership>.

Ramírez, C.E. “Op-ed: Public lands are not neutral. We must grapple with their racist roots.” *Environmental Health News* (2023) <https://www.ehn.org/public-lands-environmental-justice-2659274278.html>.

*published as an Agents of Change in Environmental Justice Fellow

Ramírez, C.E. "Op-ed: Solving the climate crisis requires more than switching to renewables—everyone needs equal access." *Environmental Health News* (2021) [Invited op-ed] <https://www.ehn.org/energy-justice-2655379074.html>.

Ramírez, C.E. “Op-ed: Renewable Energy Technology is Not Fully Helping Communities That Need It Most.” *Union of Concerned Scientists* (2021) <https://blog.ucsusa.org/science-blogger/renewable-energy-not-fully-helping-communities-that-need-it-most/>.

Awards and Honors

Research Fellowships & Awards

Agents of Change in Environmental Justice Fellowship 09/2022 – 08/2023
Post-doc fellowship award from Columbia School of Public Health and Environmental Health News

Distinguished Trainee Service Award 2022
Inaugural service award from Northwestern Dept. of Chemical and Biological Engineering

GEM Associate Fellowship 04/2018
Graduate fellowship award from the GEM Consortium for Ph.D. students

Undergraduate Research Fellowship (URF) 09/2016
Awarded URF for Silicon Nanowire Aerogel research project in Korgel Group
McKetta Department of Chemical Engineering at the University of Texas at Austin

Undergraduate Research Fellowship (URF) 03/2015
Awarded URF for Perovskite research project in Korgel Group
McKetta Department of Chemical Engineering at the University of Texas at Austin

National and State Scholarship Awards

Terry Foundation Scholarship 2013 – 2017
Full four-year scholarship to the University of Texas at Austin

ExxonMobil Technical Scholarship 2015
Awarded based on nomination by internship supervisor

Hispanic Scholarship Fund/AT&T Foundation Scholarship 2013 – 2014
First year scholarship awarded through the Hispanic Scholarship Fund

Texas Association for the Gifted & Talented Laura Allard Future Vision Scholarship 2013 – 2014
Scholarship awarded for achievements in Fort Bend ISD GT Mentorship Program

Girl Scout Emerald Circle Scholarship 2013 – 2014
Awarded by Girl Scouts of America for achieving Girl Scout Gold Award

University of Texas at Austin Awards

President's Achievement Scholarship 2013 – 2017
Prestigious four-year scholarship awarded through the University of Texas at Austin

<i>University Honors</i> Award for achieving high semester GPA at the University of Texas at Austin	05/2014 & 05/2016
<i>Cockrell School of Engineering Scholarship</i> Scholarship awarded through the University of Texas at Austin engineering program	2013 – 2014
<i>Texas Top Ten Percent Scholarship</i> Scholarship awarded to Texas residents who graduate top 10% of high school class	2013 – 2014

Presentations

Climate Forests: The Case for Protecting Ancient Forests <i>Carolyn E. Ramirez</i> Wild Earth Guardians Webinars Natural Resources Defense Council	04/2023
Understanding photophysics of rylene diimides and tetrapyrroles in the solid state for enhancement of organic photovoltaic performance <i>Carolyn E. Ramirez, Michael R. Wasielewski</i> Ph.D. Thesis Defense Northwestern University, Department of Chemical and Biological Engineering	06/2022
Understanding photophysics of rylene diimides and tetrapyrroles in the solid state for enhancement of organic photovoltaic performance <i>Carolyn E. Ramirez, Michael R. Wasielewski</i> Northwestern Chemical and Biological Engineering Department Seminar Northwestern University, Department of Chemical and Biological Engineering	04/2022
Tetra(phenoxy)perylene diimide polycrystalline films: Symmetry-breaking charge separation in the solid state for open-circuit voltage enhancement in organic photovoltaics <i>Carolyn E. Ramirez, Su Chen, Natalia E. Powers-Riggs, Itai Schlesinger, Ryan M. Young, Michael R. Wasielewski</i> American Physical Society National Conference, Chicago, IL Northwestern University, Department of Chemical and Biological Engineering & Department of Chemistry	03/2022
Enhanced resolution imaging of polymer materials using structurally benign super-resolution optical microscopy <i>Carolyn E. Ramirez, Muzhou Wang</i> GEM National Conference Poster Session Northwestern University, Department of Chemical and Biological Engineering	09/2018
Expanding the horizon of 2-dimensional nanomaterials with silicon nanosheets <i>Carolyn E. Ramirez, Tushti Shah, Brian A. Korgel</i> Undergraduate Research Poster Session The University of Texas at Austin, McKetta Department of Chemical Engineering	05/2016
Organometal halide perovskite solar cells for energy conversion <i>Carolyn E. Ramirez, Timothy D. Siegler, Brian A. Korgel</i> Undergraduate Research Poster Session The University of Texas at Austin, McKetta Department of Chemical Engineering	05/2015
Mechanical characterization of as-produced and chemically modified “NanoSponges” <i>Carolyn E. Ramirez, Daniel P. Hashim, Robert Vajtai, Pulickel M. Ajayan</i> Gifted and Talented Mentorship Program Poster Session, Fort Bend Independent School District, Rice University, Department of Materials Science and Nanoengineering	05/2013

Outreach & DEI

NRDC Nature Program and Chicago Office DEI Committees	2022 – 2024
Northwestern Chemical and Biological Engineering Department Anti-racism, Diversity, Equity, & Inclusion (ARDEI) Committee <ul style="list-style-type: none">• Co-founder and Co-Chair• Co-led committee of ~30 members with faculty member.• Established annual ARDEI Seminar in graduate school department.• Established annual ARDEI workshop for graduate program.• Led meetings and coordinated initiatives throughout department.	2020 – 2022
The Society for Advancement of Chicanos/Hispanics and Native Americans in Science (SACNAS) – Northwestern University <ul style="list-style-type: none">• Executive Board Position: Outreach Chair• Aimed to increase underrepresented minority participation in STEM.• Volunteered at schools, held science panels, worked to create a more inclusive environment on the Northwestern campus for minority students.	2017 – 2020
Paredes Middle School Tutoring <ul style="list-style-type: none">• Weekly volunteering with Theta Tau Professional Engineering Fraternity.• Tutored middle school students in math to pass STAAR state-wide testing.	2016 – 2017
UTeach Outreach – University of Texas at Austin <ul style="list-style-type: none">• Engineering/natural science volunteering program aimed at promoting STEM education in elementary and middle schools.• Taught first grade students science lessons every week with experiments.	2016
Introduce a Girl to Engineering Day <ul style="list-style-type: none">• Annual STEM education day at the University of Texas at Austin for elementary/middle school students to participate in interactive science experiments hosted by student organizations.	2015 – 2016

Professional Affiliations

<i>Green Latinos</i> – Member	2023 – Present
<i>American Physical Society</i> – Member	2021 – 2022
<i>American Association for the Advancement of Science</i> – Member	2017 – Present
<i>Society of Hispanic Professional Engineers</i> – Member	2014 – Present
<i>Theta Tau Professional Engineering Fraternity</i>	2013 – Present
<i>American Institute of Chemical Engineers (AIChE)</i> – Member	2013 – Present