

Omar Gowayed

Curriculum Vitae

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Education

Completed May 2021: New York University, Tandon School of Engineering. Ph.D. in Materials Chemistry in Department of Chemical and Biomolecular Engineering

Completed December 2014: The Ohio State University: B.Sc. in Materials Science and Engineering; Minor in Computer and Information Science.

Professional Appointments

June 2021-present: Post-Doctoral Associate at the Naval Research Laboratory: Researching laser shaping of gold nanorods to enhance their optical functions, and electric field alignment of gold nanoparticles for multispectral imaging analysis. Awarded position from the National Academies of Sciences, Engineering, and Medicine National Research Council Research Associateship Program (2020).

Research Experience

June 2021-present: Postdoctoral Research: Worked on proof-of-concept experimentation on multispectral filter prototype by integrating photonic Au displays, high voltage electronics, and MATLAB image analysis. This resulted in VIS-NIR filtering for cameras.

January 2021-present: Extracurricular Research: Investigating the toxicity of composting polyurethane, polyethylene terphthalate and polystyrene foam using a fungus, mealworms, and genetically modified bacteria respectively. Funded by the Environmental Protection Agency P3 grant. In collaboration with Icahn School of Medicine at Mount Sinai. Under the advisement of Prof. Andrea Silverman.

September 2020-present: Global Collaboration: Wrote a proposal to the European Commission's Marie Skłodowska-Curie actions in collaboration with Prof. Anne Spasojevic-de Biré located in CentraleSupélec, University of Paris-Saclay, entitled, "Observing solar cells in a flash: Use of Non-Photochemical Laser-Induced Nucleation to observe the nucleation pathway of perovskite solar cells." Virtually mentored an undergrad researcher at that institution on the nucleation of perovskite crystals using NPLIN techniques.

January 2017-May 2021: Doctoral Research: Investigating a Laser Induced Phase Separated droplet formed in aqueous glycine solutions with the application of optical tweezers. Non-Photochemical Laser Induced Nucleation, or the use of high-powered pulsed laser beams to initiate the nucleation of supersaturated solutions, as well as dynamic light scattering were used

to study the effects of optical tweezers on aqueous glycine solutions. Under the advisement of Prof. Bruce Garetz.

June 2012-December 2014: Undergraduate Research: Worked as an undergraduate research assistant in Materials Science and Engineering department on optimizing growth of TiO₂ nanofiber by oxidizing β -titanium sputtered onto alumina (Under the advisement of Dr. Sheikh Akbar), converted 2D hybrid texture synthesis code to 3D in MATLAB (Under the advisement of Dr. Stephen Niezgod), and investigated potential piezoelectric optical effects in GaN/AlN nanofiber devices (Under advisement of Dr. Myers and Dr. Niezgod).

Publications

2021: Gowayed, O.; Moosa, T.; Moratos, A.; Hua, T.; Arnold, S.; Garetz, B. Dynamic Light Scattering Study of a Laser-Induced Phase-Separated Droplet of Aqueous Glycine. *J. Phys. Chem. B.* **2021**, *125*, 7828–7839.

2020: Hua, T.; Valentín-Valentín, C.; Gowayed, O.; Lee, S.; Garetz, B.; Hartman, R. Microfluidic Laser-Induced Nucleation of Supersaturated Aqueous Glycine Solutions. *Cryst. Growth Des.* **2020**, *20*, 6502–6509.

2020: Paredes, I.; Farrell, S.; Gowayed, O. Standardizing Climate Education in New York State. *J. Sci. Pol. Governance.* **2020**, *17*, 1.

2019: Gowayed, O.; Tasnim, T.; Fuentes-Rivera, J. J.; Aber, J. E.; Garetz, B. A. Nonphotochemical pulsed-laser-induced nucleation in a cw-laser-induced phase-separated solution droplet of aqueous glycine formed by optical gradient forces. *Cryst. Growth Des.* **2019**, *19*, 7372-7379.

2019: Hua, T.; Gowayed, O.; Grey-Stewart, D.; Garetz, B. A.; Hartman, R. L.; Microfluidic Laser-Induced Nucleation of Supersaturated Aqueous KCl Solutions, *Cryst. Growth Des.* **2019**, *19*, 3491-3497.

2018: Tasnim, T.; Goh, A.; Gowayed, O.; Hu, C. T.; Chen, T.-Y.; Aber, J. E.; Garetz, B. A. Dendritic Growth of Glycine from Nonphotochemical Laser-Induced Nucleation of Supersaturated Aqueous Solutions in Agarose Gels, *Cryst. Growth Des.* **2018**, *18*, 5927-5933.

Patents

2021: Ryan Hartman, Bruce Garetz, Tianyi Hua, Omar Gowayed. Systems and Methods for Continuous Flow Laser-Induced Nucleation. *NYU*. U.S. Patent Pending. 20210025075, 16/936196. Jan 28, 2021.

Professional Experience

February 2022: Independent Consulting: Training graduate and undergraduate students at NYU on non-photochemical laser-induced nucleation theory, optics, lasers, and solubility evaluation.

Sept 2020-present: Co-Founder and Treasurer of NYC STEAM Collective Incorporated: Established a non-profit for March for Science NYC and manage the finances and banking of the organization. March for Science NYC is a science advocacy organization that calls for the use of the scientific information for the common good as well as the promotion of evidence-based policy.

Oct 2014-May 2018: CTO & Co-founder of Oyster World LLC: Founded a travel education company in which travelers can learn how to enjoy different cultures while traveling on a budget.

Jan 2015- June 2016: Materials Information Consultant, Materials Data Management Inc: Consulted Fortune 500 companies, national labs, and research facilities on organizing their materials information in the Granta system software and conducted hands on workshops for engineers, scientists, and IT professionals.

May 2013- August 2013: Student Co-op at PCC Airfoils, LLC: Worked for Research and Development department of Special Metals Corporation. Conduct corrosion and yield enhancement experiments on nickel alloys.

April 2012 to August 2012: Research for Command Alkon: Improved effectiveness of a moisture probe at varying temperature for concrete systems.

Sept 2011-June 2012: Student Research Assistant, Ohio State University: Updated Literary Map of Africa in Thompson Library (under the advisement of Dr. Miriam Conteh-Morgan). Website: <https://library.osu.edu/literary-map-of-africa>

Teaching Experience

2020: Science Diplomacy Course: The Role of Science in International Relations and Global Development. Co-organized course for postdoctoral candidates and graduate students by moderating student discussions and inviting speakers with Prof. Ingrid Paredes and Stephen Farrell.

2018 to 2020: Urban Food Lab: Built an aquaponic (fish provide nutrients) vertical farm in the NYU Makerspace with awarded funding and created a multi-semester vertical farming course Vertically Integrated Project program where students run their own research projects and learn about vertical farming, sustainability, and project design. Responsibilities included: grading, syllabus creation, mentoring student projects, funding student projects, bi-weekly lectures and workshops, and weekly office hours.

2017: Numerical Methods in Chemical Engineering: teaching assistant for Prof Miguel Modestino. Responsibilities included: reviewing syllabus, reviewing homework assignments before they were sent out, grading weekly homework assignments, offering weekly office hours, and grading exams.

Grants and Fellowships

2020: The National Academies of Sciences, Engineering, and Medicine Fellowships Office National Research Council Research Associateship Program: Awarded to fund postdoctoral work at the Naval Research Laboratory.

2020: Union of Concerned Scientists Science Rising Challenge: Funding awarded for informational get out the vote webinars in which we brought together scientists and community activists to discuss topics pressing to the elections.

2020: US Environmental Protection Agency People, Prosperity and the Planet (P3) Student Design Competition: Awarded to assess the toxicity of composting polyurethane, polyethylene terphthalate and polystyrene foam using a fungus, mealworms, and genetically modified bacteria respectively. In collaboration with Icahn School of Medicine at Mount Sinai. Under the advisement of Prof. Andrea Silverman.

2018: NYU Office of Sustainability's Green Grant: Awarded to create a NYU Vertically Integrated Projects vertical farming class (VIP-UY 300X I) where students can learn about vertical farming by working on projects in their own disciplines.

2018: NYU Office of Sustainability's Green Grant: Awarded to build a March for Science NYC movement.

2017: NYU Prototyping Fund Phase II: Awarded by Design Lab at New York University Tandon MakerSpace and the NYU Entrepreneurial Institute to construct a farm inside of a refurbished refrigerator.

2017: NYU Office of Sustainability's Green Grant: Awarded to construct an enclosure in the basement of the NYU Makerspace with an aquaponic farm.

2016: NYU Prototyping Fund Phase I: Awarded by Design Lab at New York University Tandon MakerSpace and the NYU Entrepreneurial Institute to construct a desktop hydroponic vertical farm.

Awards and Honors

2021: American Conference on Crystal Growth and Epitaxy and 20th U.S. Biennial Workshop on Organometallic Vapor Phase Epitaxy. Photo Contest in the 'Natural Untouched Micrographs or Photographs'; *Smiling Gly-Gly Alien*. August 5, 2021.

2019: NYU's Top 10 Influential Students 2019. Washington Square News selected students who are "redefining what environmentalism means both on campus and around the world" in an article titled: *An Activist Determined to Lead with Science*.

2019: Invited to UN Youth Climate Summit 2019. Invited as one of the 500 of the world's most impactful youth climate leaders. *Sept 21-28, 2019*.

Conference Activity

2021: Gowayed, O.; Fuentes-Rivera, J. J.; Hua, T.; Moosa, T.; Moratos, A.; Tasnim, T.; Aber, J.; Arnold, S.; Garetz, B. Investigation of laser-induced phase-separated droplet of aqueous glycine using non-photochemical laser-induced nucleation and dynamic light scattering (no. 1234). *22nd American Conference on Crystal Growth and Epitaxy*. Virtual, August 2-4, 2021.

2020: Gowayed, O.; Tasnim, T.; Fuentes-Rivera, J. J.; Aber, J. E.; Garetz, B. A. Non-photochemical laser-induced nucleation in laser-induced phase-separated droplet of aqueous glycine and its implications. *ACS Fall 2020 Virtual Meeting & Expo*. Virtual, August 17-20, 2020.

2020: Gowayed, O.; Tasnim, T.; Fuentes-Rivera, J. J.; Aber, J. E.; Garetz, B. A. Combining Optical Tweezers and Laser Induced Nucleation to Get Liquid Phase Separation and Polymorphically Selective Crystals. *American Physics Society*, Denver, Colorado, March 6, 2020.

2019: Hua, T.; Gowayed, O.; Grey-Stewart, D.; Garetz, B. A.; Hartman, R. L.; Microfluidic Laser-Induced Nucleation of Supersaturated Aqueous KCl Solutions. *2019 AIChE Annual Meeting*, Orlando, November 11, 2019.

2019: Gowayed, O.; Tasnim, T.; Fuentes-Rivera, J. J.; Aber, J. E.; Garetz, B. A. Nonphotochemical laser-induced nucleation of a "dense liquid droplet" of aqueous glycine formed by optical gradient forces. *ICCOSS XXIV*, New York University, June 17, 2019.

2019: Gowayed, O.; Tasnim, T.; Fuentes-Rivera, J. J.; Aber, J. E.; Garetz, B. A. Nonphotochemical laser-induced nucleation of a "dense liquid droplet" of aqueous glycine formed by optical gradient forces. *Abstracts of Papers of the American Chemical Society 257*, Orlando, April 4, 2019.

2018: SIGNS Global Networking Skill-Building Summit. Invited to represent March for Science NYC. *Jul 6-8, 2018*.

Invited Conferences and Talks

2021: Cooper Union Sustainable Agriculture Project. Invited to discuss my experiences with building a vertical farm and a class around it. *April 15, 2021*. Virtual.

2021: Multicultural Center at The Ohio State University. Invited to speak as an alumnus about activism after graduation. *March 18, 2021*. Virtual.

2020: Environmental Justice Class at John Jay College (Prof. Mary Ting). Invited to present about March for Science NYC and the importance of science advocacy in environmental justice. *Sept 30, 2020*. Virtual.

2020: The Cooper Climate Coalition's Cooper x Climate Week at Cooper Union (Virtual). Invited to speak on viewing science from a social lens in a talk titled "Science for Liberation". *Sept 28, 2020*

2019: Environmental Justice Class at John Jay College (Prof. Mary Ting). Invited to present about March for Science NYC and its involvement in the UN Youth Climate Summit. *Sept 25, 2019*.

Campus Talks

2020: Science in Environmental Policy at NYU (Prof. David Kanter). Invited to speak about my path towards a Ph.D., my research, and path to involvement with March for Science NYC. *Feb 20, 2020*.

2019: Gowayed, O.; Ucho, S.; White, G.; Chen, Y.; Lamboglia, L. Urban Food Labs, NYU's VIP Vertical Farming Class. *Made In Brooklyn Showcase*. New York University, October 25, 2019.

2019: Gowayed, O. Urban Food Labs, NYU's VIP Vertical Farming Class. *NYU EarthMatter's Environmental Research Tour*. New York University, October 8, 2019.

2019: Gowayed, O.; Pereira, N.; Moratos, A.; Seidenstein, A. *NYU Earth Matter's Sustainability Conference*. New York University, April 7, 2019.

2019: Yang, D.; Gowayed, O.; Garetz, B. A. Crystal alignment during laser-induced nucleation of supersaturated solutions using pulsed laser. *Thirteenth Annual Summer Undergraduate Research Program. NYU Tandon School of Engineering*.

2019: Moosa, T.; Gowayed, O.; Garetz, B. A. Nucleation of glycyl-glycine dipeptide using optical tweezer. *Thirteenth Annual Summer Undergraduate Research Program. NYU Tandon School of Engineering*.

2019: Fejzić, H.; Gowayed, O.; Garetz, B. A. Investigation of cluster sizes using dynamic light scattering. *Thirteenth Annual Summer Undergraduate Research Expo. NYU Tandon School of Engineering*.

2019: Mahjabin, F.; Gowayed, O.; Seidenstein, A. From Skin Care to Medicine: Anti-Inflammatory and Wound Healing Properties of Calendula Officinalis Flowers Grown in a Vertical Farm. *Thirteenth Annual Summer Undergraduate Research Program. NYU Tandon School of Engineering*.

2019: Zhengxing, W; Gowayed, O.; Seidenstein, A. Bacteria Analysis in an Urban Aquaponic Vertical Farming System. *Thirteenth Annual Summer Undergraduate Research Program. NYU Tandon School of Engineering*.

2018: Heaney, D.; Gowayed, O.; Seidenstein, A. Farmbytes: Machine learning for vertical farms. *Twelfth Annual Summer Undergraduate Research Program. NYU Tandon School of Engineering*. (cover)

2018: Brush, K.; Moratos, A; Gowayed, O.; Seidenstein, A. Farmbytes-WE ARE THE NEW FARMERS- Analysis of Nitrifying Bacteria. *Twelfth Annual Summer Undergraduate Research Program. NYU Tandon School of Engineering*. (cover)

2018: Moratos, A; Gowayed, O.; Seidenstein, A. WE ARE THE NEW FARMERS- Spirulina Growth. *Twelfth Annual Summer Undergraduate Research Expo. NYU Tandon School of Engineering.* (cover)

2017: Siwicka, Z.; Chen, T.; Gowayed, O.; Aber, J.; Garetz, B. A. Effect of Gold Nanoparticles on Laser-Induced Nucleation. *Eleventh Annual Summer Undergraduate Research Program. NYU Tandon School of Engineering.*

2017: Tasnim, T.; Gowayed, O.; Aber, J.; Garetz, B. A. Laser-Induced Nucleation of Millimeter-Scale Dense Liquid Droplet in Aqueous Glycine. *Eleventh Annual Summer Undergraduate Research Program. NYU Tandon School of Engineering.*

Departmental Service

August 2020-May 2021: Justice Equity Diversity and Inclusivity (JEDI) Committee of the Department of Chemical and Biomolecular Engineering at New York University Tandon School of Engineering: Helped establish a departmental committee that included faculty, staff, post-docs, and graduate students to address increasing diversity and inclusivity within the department and on campus. Served as programing chair

October 2020-February 2021: Admissions Committee of the Department of Chemical and Biomolecular Engineering at New York University Tandon School of Engineering: served as one of three PhD candidates on the PhD admissions selection committee to review applications and select students. This role was born out of the JEDI committee to ensure increased inclusivity in the selection process.

October 2020-May 2021: Graduate Student Council of the Department of Chemical and Biomolecular Engineering at New York University Tandon School of Engineering: worked with my fellow graduate students to form a graduate student council in the CBE department in order to address issues pertaining to graduate student life and to give power within the department to collectively advocate for graduate students

Community Involvement

March 2021-present: Advisory Group of The Aspen Institute Science & Society Program: The Aspen institute aims to generate greater public support to using of science to address challenges facing the public. Serve as an advisor to the institute's *Our Future is Science* underrepresented minority in sciences mentorship initiative.

April 2018-present: March for Science NYC: Co-chair of March for Science NYC from April 2018 until August 2021. Co-founder of NYC STEAM Collective Incorporated (March for Science NYC's legal name as a 501(c)3 non-profit organization) since September 2020. March for Science NYC is a non-partisan science advocacy organization that stands for the open access of scientific information, using science for the common good and an informed democracy, and human rights and environmental justice. Treasurer responsibilities include: financial accounting, filing legal documents, and getting appropriate permits. Co-chair responsibilities included:

writing constitution and setting values, organizing rallies, organizing panel discussions, managing team, and partnering with other activist organizations.

2018 to 2020: Urban Food Lab: Co-founder and manager of aquaponic vertical farm. Organized volunteers, local community members, and students to work collaboratively on vertical farm. Gave regular farm tours to local K-12 students and NYU undergraduate students. Made open to the public forums inviting local chefs and farmers to discuss their projects. Organized interactive tables at NYC events such as the World Science Festival.

Media Coverage

2021: Engineers & Scientists Acting Locally. “*Materials Chemist Brings His Science-Based Activism to New York.*” Written by Devin Reese.

2020: New York University. “*Vertical Farming Takes Root at NYU’s Urban Food Lab.*” Written by Nathan Healy.

2020: Nanotech NYC. “*Meet Omar Gowayed: Chemical and Biomolecular Engineering PhD Student.*” Written by Francesco Lavini.

2019: Washington Square News. “*An Activist Determined to Lead with Science.*” Written by Alexandria Johnson.

2019: Inside HigherEd. “*The Grad Activist: Organizing on Campus.*” Written by Ingrid Paredes.

2018: New York University: “*Tandon’s Newest Crop of High-Tech Farmers Garners NYU Green Grant.*” Written by Shonna Keogan.

2018: Inside HigherEd. “*Getting Involved: Combining Work and Play.*” Written by Ingrid Paredes.

Mentorship

Current Students

Brandon Kim, NYU, B.A. Global Liberal Studies. *Sept 2019-present.*

Emma Cruite, NYU, B.S. Chemical and Biomolecular Engineering. *Sept 2020-present.*

Emma Tedoldi, CentraleSupélec, B.S. Coursus Ingenieur de Centralesupélec. *Nov 2020-present.*

Past Students

Tzu-Yi Chen, NYU, B.S. Biomolecular Science. *June 2017-May 2018.*

Zofia Siwicka, Vassar College, B.S. Chemistry. *June 2017-Aug 2017.*

Tasfia Tasnim, NYU, B.S. Biomolecular Science, *Jan 2017-May 2018.*

YanQing Jiang, NYU, B.S. Chemical and Biomolecular Science, *Jan 2017-May 2018.*

Mahmoud Abdo, NYU, B.S. Computer Engineering. *June 2017-May 2019.*

David Heaney, University of Wyoming, B.S. Computer Science. *June 2018-Aug 2018.*

Kelli Brush, NYU, B.S. Biomolecular Science. *June 2018-Dec 2018.*

Nelson Pereira, NYU, B.S. Mathematics & Physics. *June 2018-Aug 2019.*

Vi Dang, NYU, B.S. Chemical and Biomolecular Engineering. *Sept 2018-May 2019.*

Maxine Kho, NYU, B.S. Integrated Digital Media. *Sept 2018-Dec 2018.*
Maggie Haxhia, NYU, B.S. Mechanical Engineering. *Sept. 2018- present.*
Harvey Ng, NYU, B.S. Biomolecular Science. *Sept 2018-May 2019.*
Nichelle Campbell, NYU, B.S. Computer Science & Engineering. *Jan 2019-Aug 2019.*
Leonardo Lamboglia, NYU, B.S. Computer Science & Engineering. *Jan 2019-Aug 2019.*
Yimei Ng cen, NYU, B.S. Chemical and Biomolecular Engineering. *Jan 2019-May 2019.*
Tara Nicole Umesh, NYU, B.S. Computer Engineering. *Aug 2019-Dec 2019.*
Zhenxing Wu, NYU, B.S. Biomolecular Science. *June 2019-Dec 2019.*
Kevin D Banh, NYU, B.S. Sustainable Urban Environments. *June 2019-May 2020.*
Steve Ucho, NYU, B.S. Computer Science. *Aug 2019- May 2020.*
Patricia Celeste Dougherty, NYU, B.A. Environmental Studies. *Aug 2019- May 2020.*
Yu-ren Chen, NYU, M.S. Biotechnology & Entrepreneurship. *Aug 2019- May 2020.*
Hannah Fejzić, California State University, San Bernardino, B.S. Applied Physics and B.S. Chemistry. *Jun 2019-Aug 2019.*
Dingyi Yang, NYU, B.S. Chemical and Biomolecular Science. *June 2019-Aug 2019.*
Morgan Lorenzo, NYU, B.S. Chemical and Biomolecular Engineering. *Jan 2020- May 2020.*
Kiera Elisabeth Quishenberry, NYU, B.A. Environmental Studies. *Jan 2020- May 2020.*
Zosia Caes, Yale, B.S. Chemistry. *June 2020-August 2020.*
Janae Isaacs, NYU, B.S. Sustainable Urban Environments. *Sept 2018-May 2020.*
Fariha Mahjabin, NYU, B.S. Chemical and Biomolecular Engineering. *Jan 2019- May 2020.*
Molly Beth Cheevers, NYU, B.S. Chemical and Biomolecular Engineering. *Jan 2019- May 2020.*
Natan Charytan, NYU, B.A. Individualized Major. *Sept 2019- Dec 2021.*
Yams Gupta, NYU, B.S. Mathematics. *Sept 2020- Dec 2021.*
Savannah Sookchan, NYU, B.S. Biomolecular Science. *Sept 2020- Dec 2021.*
Angelica Moratos, NYU, B.S. Chemical and Biomolecular Engineering. *June 2018-May 2021.*
Gianna White, NYU, B.S. Sustainable Urban Environments. *June 2019- May 2021.*
Amy Ryu, NYU, B.S. Computer Science & Engineering. *Sept 2020- May 2021.*
Tahany Moosa, NYU, B.S. Biomolecular Science. *May 2019-May 2021.*

Languages

English: Native. Fully Fluent.

Arabic: Native. Conversationally fluent. Intermediate reading and writing.

French: Good. Can read and write with dictionary.