

Christopher Eugene Shuck

3716 Wallace Street, Philadelphia, PA | (412) 216-9724 | eshuck@alumni.princeton.edu

EDUCATION

University of Notre Dame Ph.D., Chemical and Biomolecular Engineering	Notre Dame, IN 2013-2017
<ul style="list-style-type: none">• Thesis: <i>Microstructure-reactivity Relationship for Gasless High-energy Density Materials</i>	
Princeton University B.S.E., Chemical and Biological Engineering	Princeton, NJ 2009-2013
<ul style="list-style-type: none">• Certificates in: Engineering Biology, Materials Science and Engineering• Thesis: <i>Desorption Kinetics of Alkali Metal Atoms from Transition Metal Surfaces</i>	

RESEARCH EXPERIENCE

Research Assistant Professor, Drexel Nanomaterials Institute <i>Drexel University</i> Advisor: Yury Gogotsi	Aug. 2021-Current Philadelphia, PA
<ul style="list-style-type: none">• Responsible for multiple successfully funded grants (\$850,000) from American (NSF) and international (European commission) agencies.• Develop and teach full major-required courses in Materials Science and Engineering department.• Pioneer research into novel MAX and MXenes, spanning nearly the entire periodic table, leading to new applications in biomedicine, electrochemical energy storage, catalysis, functional fabrics, and electromagnetic interference shielding.• Develop strategies to scale up 2D material synthesis from g to kg-scale using cheaper, green precursors for commercial and governmental use.• Advise graduate (Masters, Ph.D., visiting foreign students) and undergraduate students (co-op, senior design, freshmen) in developing original research plans, leading to multiple publications and awards• Manage multiple grants from industrial and governmental organizations, including organizing, planning, and executing research directions, organizing budget and funding, and ensuring that reporting and milestones are completed.• Take part in hiring and training of administrative staff, graduate students, and lab personnel.	
Postdoctoral Researcher, Drexel Nanomaterials Institute <i>Drexel University</i> Advisor: Yury Gogotsi	Mar. 2018-Aug. 2021 Philadelphia, PA
<ul style="list-style-type: none">• Develop and plan research directions focusing on synthesis of new MXenes for energy storage, electromagnetic shielding, and electrochromic devices.• Study the relationship between synthesis-structure-property of the MAX-MXene family of materials• Pioneer research into compositional solid solution MXenes.• Apply for and manage multiple grants (DOE, IARPA, NSF, ARO, etc.).• Advise multiple Ph.D., undergraduate, and high school students. Implement customized research directions for each student, depending on their interests, skills, and talents.• Developed a weeklong “MXene Synthesis, Processing, and Characterization” course with >300 participants over two years, bringing in >\$150,000 to the MSE department.	
Doctoral Researcher, Advanced Nanomaterials Laboratory <i>University of Notre Dame</i> , Advisor: Alexander Mukasyan	Oct. 2013-Feb. 2018 Notre Dame, IN
<ul style="list-style-type: none">• Established five multidisciplinary international collaborations, including two with US national labs.	

- Synthesized and characterized heterogeneous nanocomposite particles for new materials synthesis and fundamental understanding of solid state kinetics for combustion systems.
- Managed microscopy facilities, including training new users for SEM usage and performing maintenance on SEMs.
- Implemented lab safety program to become only lab that was 100% compliant for five years in a row.
- Mentored 2 graduate students and 3 undergraduate students.

Fulbright Scholar, **Inorganic Nanomaterials Laboratory** Sept. 2016-Jun. 2017
National University of Science and Technology, Advisor: Alexander Rogachev Moscow, Russia

- Studied the dynamics of phase transition in high-energy density materials.
- Utilized mechanical activation to enhance the chemical reactivity of solid-state reactions.
- Characterized and analyzed solid materials using a variety of experimental techniques.
- Led workshops dedicated to scientific English language, writing, and speaking skills.

PhD Intern, **Energetics Research Group** Jun. 2016-Sept. 2016
Lawrence Livermore National Laboratory, Advisor: Robert Reeves Livermore, CA

- Developed a new class of materials: structural energetics for defense applications.
- Coordinated with multiple departments to plan and execute multidisciplinary project.
- Planned and tested new safety procedures relating to energetic material testing.

Research Intern, **Princeton Plasma Physics Laboratories** Sept. 2012-Jun. 2013
Princeton University, Advisor: Bruce Koel Princeton, NJ

- Built and maintained ultra high vacuum equipment, including both commercial and custom devices.
- Examined computational and theoretical models to model surface adsorbates.
- Performed experiments to characterize and assess liquid lithium surfaces after exposure to plasma.

Research Intern, **Nanobiology and Structural Biology** Feb. 2011-Jun. 2013
Princeton University, Advisor: Janette Carey Princeton, NJ

- Coordinated collaboration, leading to 25% increase in publications between the labs.
- Trained eight students in both experimental and computational techniques.
- Created high-throughput method of protein ion pair interaction quantification.

Research Intern, **Structural Biology Lab** May 2012-Sept. 2012
Princeton University, Advisor: Rudiger Ettrich Nove Hradý, CZ

- Determined protein energy landscapes through molecular dynamics studies.
- Quantified ligand binding energy computationally and experimentally .

PUBLICATIONS

1. M. A. Unal, F. Bayrakdar, L. Fusco, O. Besbinar, **C. E. Shuck**, S. Yalcin, M. T. Erken, A. Ozkul, C. Gurcan, O. Panatli, G. Y. Summak, C. Gokce, M. Orecchioni, A. Gazzi, F. Vitale, J. Somers, E. Demir, S. S. Yildiz, H. Nazir, J. Grivel, D. Bedognetti, A. Crisanti, K. C. Akcali, Y. Gogotsi, L. G. Delogu, A. Yilmazer, “2D MXenes with Antiviral and Immunomodulatory Properties: A Pilot Study Against SARS-CoV-2” *Nano Today*, vol. 38, pp. 101136, 2021.
2. K. Maleski, **C. E. Shuck**, A. T. Fafarman, and Y. Gogotsi, “The Broad Chromatic Range of Two-Dimensional Transition Metal Carbides (MXenes) and its Electronic Origins,” *Advanced Optical Materials*, vol. 9, pp. 2001563, 2021.

3. M. Shekhiriev*, **C. E. Shuck***, A. Sarycheva and Y. Gogotsi, "Characterization of MXenes at Every Step, from Their Precursors to Single Flakes and Assembled Films," *Progress in Materials Science*, vol. 120, pp. 100757, 2021.
4. L. Wang, M. Han, **C. E. Shuck**, X. Wang, and Y. Gogotsi, "Adjustable Electrochemical Properties of Solid-Solution MXenes," *Nano Energy*, vol. 88, pp. 106308, 2021.
5. J. Wu, Q. Li, **C. E. Shuck**, K. Maleski, H. N. Alshareef, J. Zhou, Y. Gogotsi, and L. Huang, "An Aqueous 2.1 V Pseudocapacitor with MXene and V-MnO₂ Electrodes," *Nano Research*, DOI: 10.1007/s12274-021-3513-x
6. T. S. Mathis, K. Maleski, A. Goad, A. Sarycheva, M. Anayee, A. C. Foucher, K. Hantanasirisakul, **C. E. Shuck**, E. A. Stach, and Y. Gogotsi, "Modified MAX Phase Synthesis for Environmentally Stable and Highly Conductive Ti₃C₂ MXene," *ACS Nano*, vol. 15, pp. 6420-6429, 2021.
7. J. Li, X. Wang, W. Sun, K. Maleski, **C. E. Shuck**, K. Li, P. Urbankowski, K. Hantanasirisakul, X. Wang, P. Kent, H. Wang, and Y. Gogotsi, "Intercalation Induced Reversible Electrochromic Behavior of Two-dimensional Ti₃C₂T_x MXene in Organic Electrolytes," *ChemElectroChem*, vol. 8, pp. 151-156, 2021.
8. P. Singh, B. Akuzum, **C. E. Shuck**, K. Pal, Y. Gogotsi, E. C. Kumbur "MXene-based Suspension Electrode with Improved Energy Density for Electrochemical Flow Capacitors," *Journal of Power Sources*, vol. 506, pp. 230187, 2021.
9. M. Elanchezian, M. Eswaran, **C. E. Shuck**, S. Senthilkumar, S. Elumalai, R. Dhanusuraman, and V. K. Ponnusamy, "Facile Synthesis of Polyaniline/Titanium Carbide (MXene) Nanosheets/Palladium Nanocomposite for Efficient Electrocatalytic Oxidation of Methanol for Fuel Cell Application," *Fuel*, vol. 303, pp. 121329, 2021.
10. P. Ridley, C. Gallano, R. Andris, **C. E. Shuck**, Y. Gogotsi, and E. Pomerantseva, MXene-Derived Bilayered Vanadium Oxides with Enhanced Stability in Li-Ion Batteries, *ACS Applied Energy Materials*, vol. 3, pp. 10892-10901, 2020.
11. M. Han*, K. Maleski*, **C. E. Shuck***, Y. Yang, J. T. Glazar, A. C. Foucher, K. Hantanasirisakul, A. Sarycheva, N. C. Frey, S. J. May, V. B. Shenoy, E. A. Stach, and Y. Gogotsi "Tailoring Electronic and Optical Properties of MXenes through Forming Solid Solutions," *Journal of the American Chemical Society*, vol. 142, pp. 19110-19118, 2020.
12. D. O. Moskovskikh, S. Vorotilo, V. S. Buinevich, A. S. Sedegov, K. V. Kuskov, **C. E. Shuck**, M. Zhukovskyi, and A. S. Mukasyan, "Fabrication of Extremely Hard and Tough Bulk High-Entropy Nitride Ceramics (HfZrTaNbTi)N," *Scientific Reports*, vol. 10, 2020.
13. Q. Zhao, M. Seredych, E. Precetti, **C. E. Shuck**, M. Harhay, R. Pang, C. Shan, and Y. Gogotsi "Adsorption of Uremic Toxins Using Ti₃C₂T_x MXene for Dialysate Regeneration," *ACS Nano*, vol. 14, pp. 11787-11798, 2020.
14. **C. E. Shuck** and Y. Gogotsi, "Taking MXenes from the Lab to Commercial Products" *Chemical Engineering Journal*, vol. 401, pp. 125786, 2020.
15. **C. E. Shuck** and Y. Gogotsi, "MXenes: A Tunable Family of 2D Carbides and Nitrides with Diverse Applications" *Material Matters*, vol. 25, pp. 3-8, 2020.
16. D. Pinto, B. Anasori, H. Avireddy, **C. E. Shuck**, K. Hantanasirisakul, G. Deysher, J. R. Morante, W. Porzio, H. N. Alshareef, and Y. Gogotsi, "Synthesis and Electrochemical Properties of 2D Molybdenum Vanadium Carbides – Solid Solution MXenes," *Journal of Materials Chemistry A*, vol. 8, pp. 8957-8968, 2020.
17. M. Han, **C. E. Shuck**, R. Rakhmanov, D. Parchment, B. Anasori, C. M. Koo, G. Friedman, and Y. Gogotsi, "Beyond Ti₃C₂T_x: MXenes for Electromagnetic Interference Shielding," *ACS Nano*, vol. 14, pp. 5008-5016, 2020.
18. L. Li, X. Fu, S. Chen, S. Uzun, A. Levitt, **C. E. Shuck**, W. Han, and Y. Gogotsi, "Hydrophobic and Stable MXene-polymer Pressure Sensors for Wearable Electronics," *ACS Applied Materials & Interfaces*, vol. 12, pp. 15362-15369, 2020.

19. J. Zhang, S. Uzun, S. Seyedin, P. Lynch, B. Akuzum, Z. Wang, S. Qin, M. Alhabeb, **C. E. Shuck**, W. Lei, E. Kumbur, W. Yang, X. Wang, G. Dion, and Y. Gogotsi, "MXene Liquid Crystals and Fibers," *ACS Central Science*, vol. 6, pp. 254-265, 2020.
20. **C. E. Shuck**, A. Sarycheva, M. Anayee, A. Levitt, Y. Zhu, S. Uzun, V. Balitskiy, V. Zahrodna, O. Gogotsi, and Y. Gogotsi, "Scalable Synthesis of $\text{Ti}_3\text{C}_2\text{T}_x$ MXene," *Advanced Engineering Materials*, vol. 22, pp. 1901241, 2020.
21. G. Deysher, **C. E. Shuck**, N. Frey, A. Foucher, K. Maleski, A. Sarycheva, V. Shenoy, E. Stach, B. Anasori, and Y. Gogotsi, "Synthesis of Mo_4VAlC_4 MAX Phase and Two-Dimensional Mo_4VC_4 MXene with Five Atomic Layers of Transition Metals," *ACS Nano*, vol. 14, pp. 204-217, 2020.
22. W. Bao*, **C. E. Shuck***, W. Zhang, X. Guo, Y. Gogotsi, and G. Wang, "Boosting Performance of Na-S Batteries Using Sulfur-Doped $\text{Ti}_3\text{C}_2\text{T}_x$ MXene Nanosheets with a Strong Affinity to Sodium Polysulfides," *ACS Nano*, vol. 13, pp. 11500-11509, 2019.
23. **C. E. Shuck**, M. Han, K. Maleski, K. Hantanasirisakul, S. J. Kim, J. Choi, W. Reil, and Y. Gogotsi, "Effect of Ti_3AlC_2 MAX Phase on Structure and Properties of Resultant $\text{Ti}_3\text{C}_2\text{T}_x$ MXene," *ACS Applied Nano Materials*, vol. 2, pp. 3368-3376, 2019.
24. J. Li, L. An, H. Li, J. Sun, **C. Shuck**, X. Wang, Y. Shao, Y. Li, Q. Zhang, and H. Wang, "Tunable Stable Operating Potential Window for High-Voltage Aqueous Supercapacitors," *Nano Energy*, vol. 63, pp. 103848, 2019.
25. J. M. Pauls, **C. E. Shuck**, A. Genç, S. Rouvimov, and A.S. Mukasyan, "In-situ Transmission Electron Microscopy Determination of Solid-State Diffusion Kinetics in the Aluminum-Nickel System," *Journal of Solid State Chemistry*, vol. 276, pp. 114-121, 2019.
26. M. Seredych, **C. E. Shuck**, D. Pinto, M. Alhabeb, E. Precetti, G. Deysher, B. Anasori, N. Kurra, and Y. Gogotsi, "High-Temperature Behavior and Surface Chemistry of Carbide MXenes Studied by Thermal Analysis," *Chemistry of Materials*, vol. 31, pp. 3324-3332, 2019.
27. L. Yang, Y. Dall'Agnese, K. Hantanasirisakul, **C. E. Shuck**, K. Maleski, M. Alhabeb, G. Chen, Y. Gao, Y. Sanehira, A. K. Jena, L. Shen, C. Dall'Agnese, X.-F. Wang, and Y. Gogotsi, and T. Miyasaka, " SnO_2 - Ti_3C_2 MXene Electron Transport Layers for Perovskite Solar Cells," *Journal of Materials Chemistry A*, vol. 7, pp. 5635-5642, 2019.
28. P. Salles, D. Pinto, K. Hantanasirisakul, K. Maleski, **C. E. Shuck**, and Y. Gogotsi, "Electrochromic Effect in Titanium Carbide MXene Thin Films Produced by Dip-Coating," *Advanced Functional Materials*, vol. 29, pp. 1809223, 2019.
29. Q. Shan, X. Mu, M. Alhabeb, **C. E. Shuck**, D. Pang, X. Zhao, X. F. Chu, Y. Wei, F. Du, G. Chen, Y. Gogotsi, Y. Gao, and Y. Dall'Agnese, "Two-Dimensional Vanadium Carbide (V_2C) MXene as Electrode for Supercapacitors with Aqueous Electrolytes," *Electrochemistry Communications*, vol. 96, pp. 103-107, 2018.
30. K. Manukyan, J. Pauls, **C. Shuck**, S. Rouvimov, A. Mukasyan, K. Nazaretyan, H. Chatilyan, and S. Kharatyan, "Kinetics and Mechanism of Ignition in Reactive Al/Ni Nanostructured Materials," *The Journal of Physical Chemistry C*, vol. 122, pp. 27082-27092, 2018.
31. A. S. Mukasyan, **C. E. Shuck**, J. M. Pauls, K. V. Manukyan, D. O. Moskovskikh, and A. S. Rogachev, "The Solid Flame Phenomenon: A Novel Perspective," *Advanced Engineering Materials*, vol. 20, pp. 1701065, 2018.
32. J. M. Pauls, **C. E. Shuck**, and A. S. Mukasyan, "Micro-Heterogeneous Regimes for Gasless Combustion of Composite Materials," *Combustion Science and Technology*, vol. 190, pp. 893-908, 2018.
33. **C. E. Shuck** and A. S. Mukasyan, "Kinetics of Heterogeneous Self-Propagating High-Temperature Reactions" *Advanced Chemical Kinetics*, pp. 167-196, 2018.
34. A. S. Mukasyan and **C. E. Shuck**, "Kinetics of SHS Reactions: A Review," *International Journal of Self-Propagating High-Temperature Synthesis*, vol. 26, pp. 145-165, 2018.

35. K. V. Manukyan, A. V. Yeghishyan, **C. E. Shuck**, D. O. Moskovskikh, S. Rouvimov, E. E. Wolf, and A. S. Mukasyan, "Mesoporous Metal-Silica Materials: Synthesis, Catalytic and Thermal Properties," *Microporous and Mesoporous Materials*, vol. 257, pp. 175-184, 2018.
36. A. Salvadori, S. Lee, A. Gillman, K. Matouš, **C. Shuck**, A. Mukasyan, M.T. Beason, I.E. Gunduz, and S.F. Son, "Numerical and Experimental Analysis of the Young's Modulus of Cold Compacted Powder Materials," *Mechanics of Materials*, vol. 112, pp. 56-70, 2017.
37. **C. E. Shuck** and A. S. Mukasyan "Reactive Ni/Al Nanocomposites: Structural Characteristics and Activation Energy," *The Journal of Physical Chemistry A*, vol. 121, no. 6, pp. 1175–1181, 2017.
38. **C. E. Shuck**, J. M. Pauls, and A. S. Mukasyan "Ni/Al Energetic Nanocomposites and the Solid Flame Phenomenon," *The Journal of Physical Chemistry C*, vol. 120, no. 47, pp. 27066–27078, 2016.
39. **C. E. Shuck**, M. Frazee, A. Gillman, M. T. Beason, I. E. Gunduz, K. Matouš, R. Winarski, and A. S. Mukasyan "X-ray Nanotomography and Focused-Ion-Beam Sectioning for Quantitative Three-Dimensional Analysis of Nanocomposites," *Journal of Synchrotron Radiation*, vol. 23, no. 4 2016
40. K. V. Manukyan, **C. E Shuck**, M. J. Cherukara, S. Rouvimov, D. Y. Kovalev, A. Strachan, and A. S. Mukasyan "Exothermic Self-Sustained Waves with Amorphous Nickel," *Journal of Physical Chemistry C*, vol. 120, no. 10, pp. 5827-5838, 2016
41. **C. E. Shuck**, K. V Manukyan, S. Rouvimov, A. S. Rogachev, and A. S. Mukasyan, "Solid flame: Experimental Validation," *Combustion and Flame*, *Combustion and Flame*, vol. 163, pp. 487-493, 2016.
42. K. V. Manukyan, A. G. Avetisyan, **C. E. Shuck**, H. A. Chatilyan, S. Rouvimov, S. L. Kharatyan, and A. S. Mukasyan, "Nickel Oxide Reduction by Hydrogen: Kinetics and Structural Transformations," *The Journal of Physical Chemistry C*, vol. 119, pp. 16131–16138, 2015.
43. K. V. Manukyan, W. Tan, R. J. deBoer, E. J. Stech, A. Aprahamian, M. Wiescher, S. Rouvimov, K. R. Overdeep, **C. E. Shuck**, T. P. Weihs, and A. S. Mukasyan, "Irradiation-Enhanced Reactivity of Multilayer Al/Ni Nanomaterials," *ACS Applied Materials and Interfaces*, vol. 7, no. 21, pp. 11272–11279, 2015.
44. K. V. Manukyan, **C. E. Shuck**, A. S. Rogachev, and A. S. Mukasyan, "Preparation and Reactivity of Gasless Nanostructured Energetic Materials," *Journal of Visualized Experiments*, vol. 98, 2015.

FUNDED GRANTS

- NSF-Ceramics, \$600,000, award: 2041050, 2021-2025; co-wrote with Yury Gogotsi (Drexel University)
- European Commission – Marie Curie, \$250,000, award: 101029140, 2021-2023; co-wrote with Yury Gogotsi (Drexel University) and Lucia Gemma Delogu (University of Padua)

ORAL PRESENTATIONS

- **Keynote Presentation:** *MXenes: 2D Transition Metal Carbides and Nitrides*, International Virtual Conference on Materials Research, 2021
- **Invited Presentation:** *Novel Applications and Properties of MXenes*, International Conference on Advanced Materials and Mechanical Characterization, 2021
- **Invited Seminar:** *MXenes: 2D Transition Metal Carbides and Nitrides*, University of Duisburg-Essen Physics Seminar Series, 2020
- **Nominated Presentation:** *MAX Phases as Precursors to New MXenes*, North American Materials Colloquium Series, 2020
- **Keynote Presentation:** *MAX Phases as Precursors to New MXenes*, International workshop on functional MAX-materials, 2020
- *Mo₄VC₄: a Two-dimensional MXene with 5 Atomic Layers of Transition Metals*, CIMTEC 2020 (Canceled due to COVID-19)

- *Scalable Synthesis of $Ti_3C_2T_x$ MXenes*, at Materials Research Society Spring Meeting, 2020 (Canceled due to COVID-19)
- *Mo₄VC₄: a Two-dimensional MXene with 5 Atomic Layers of Transition Metals*, Beilstein Institute 2019
- *Effect of MAX Phase Synthesis on Resultant MXene Properties* at Materials Research Society Fall Meeting, 2018
- *Quantitative 3D Reconstruction of Reactive Nanocomposites: Effect of Nanostructure on Activation Energy* at International Symposium on Self-Propagating High-Temperature Synthesis, 2017
- *3-D Reconstruction of High Energy Density Materials: Effects of Nanostructure on Ignition Characteristic* at 4th Annual Midwest Imaging and Microanalysis Workshop, 2017
- *Reactive Nanocomposites: Surface Contact Area and Activation Energy of Ni-Al* at 3rd International Conference on Nonisothermal Phenomena & Processes, 2017
- **Keynote Presentation:** *3D Reconstruction of High Energy Density Materials: Effects of Nanostructure on Ignition Characteristics* at International Symposium on Self-Propagating High-Temperature Synthesis, 2015
- *Solid Flame: Experimental Validation* at American Institute of Chemical Engineers Annual Meeting, 2014
- *Solid Flame: Experimental Validation* At IEEE Annual Mini-symposium on Electron Devices and Photonics, 2014

AWARDS AND FELLOWSHIPS

- Steinbright Career Development Center Award (\$20,000), 2021
- Steinbright Career Development Center Award (\$7,250), 2020
- Outstanding Dissertation Award (Given to the top graduating PhD student in the department), 2018
- Plug & Play Tech Center Startup Camp Award, April 2017
- Best Scientific Report at 3rd International Conference on Nonisothermal Phenomena & Processes, 2017
- Notre Dame Integrated Imaging Facility Award for Best Electron Beam Imaging Publication for 2016
- Fulbright Program, U.S. Department of State, Principal, Russia, 2016
- Carl Storm Underrepresented Minority Fellowship, June 2016
- Graduate Student Union Conference Presentation Grant, April 2016
- California Initiative Fund Recipient, April 2016
- 2nd Place for the Notre Dame Graduate Student Union Symposium Oral presentation, April 2016
- Oliver Langenberg '35 Scholarship, 2013
- Charles Lockhart Scholarship 2010-2013
- William Randolph Heart Scholarship 2010-2011

TEACHING/OUTREACH EXPERIENCE

Drexel University

- MATE 280 Advanced Materials Laboratory (Instructor of record, 20+) 2021
- MXene Synthesis, Processing, and Characterization (Lead Instructor, 75+) 2020-2021
- ENGR220 Fundamentals of Materials (Recitation Instructor, 30 students) 2020
- ASM Materials Camp (Introduction to Materials Science, 45 students) 2019
- MATE-200 (Introduction to Materials Science, 75 students) 2019
- Drexel Emerging Graduate Scholars (Conference for PhD Students, 300+) 2018-2020
- Drexel Senior Design Projects (Mentor, 9 students) 2018-2020
- Drexel Co-op Program (Mentor, 6 students) 2018-2020

University of Notre Dame

2013-2015

- Chemical Engineering Thermodynamics (Required for Sophomores, over 100 students)
- Advanced Chemical Reaction Engineering (Graduate level course, including theory and computation)
- Chemical Engineering Laboratory I (Junior lab course, managed four experiments)
- Chemical Engineering Laboratory II (Senior lab course, managed four experiments)

BUSINESS EXPERIENCE

McCloskey Business Plan Competition, Team Leader

2015-2017

- Founded and managed a team of students, including Ph.D. and MBA students
- Conducted market research, developed an original solution to the problem, and wrote a business plan detailing all aspects of the business
- Placed in the finals during the 2016-2017 competition, receiving the Plug & Play Tech Center Startup Camp Award (\$75,000)

LEADERSHIP EXPERIENCE

Drexel Co-op Program, Mentor

2018-Present

- Hired, trained, and managed six Drexel undergraduate students to perform independent, individualized research projects
- Received \$27,250 funding (only 4 awards given university-wide per year) for original research project
- Student Outcomes:
 - Grayson Deysher: 3 Publications, Currently in PhD program at UCSD
 - Nicolas Trainor: Currently in PhD program at Penn State
 - William Reil: 1 Publication, Current Undergraduate
 - Kimberly Ventura-Martinez: Co-writing 2 publications, Current Undergraduate, Won Bruce and Cynthia Maryanoff Endowed Research Prize
 - Jonathan Shochat: Co-writing 1 publication, Current Undergraduate
 - Yuanzhe Zhu: 1 Publication, Current Undergraduate

Drexel Senior Design Projects, Mentor

2018-Present

- Proposed research plans serving as the senior project for Drexel undergraduates
 - $\text{Ti}_3\text{C}_2\text{T}_x$ MXene Production Plant: Four chemical engineering undergraduate students designed an industrial-sized production plant for MXene synthesis. The group was selected as the top senior design group in the chemical engineering department
 - Synthesis and Electrochemical Properties of Molten Salt MXenes: Four materials science undergraduate students will use a new molten salt approach to synthesis a variety of MXene chemistries with tailored surface chemistry. This project is ongoing.
 - Screening of MXenes for Photothermal Therapy: An interdisciplinary group of two students will focus on determining which MXene will have the highest light to heat conversion, while being biocompatible. This project is ongoing.

Materials Research Society, Government Affairs Committee

2019-Present

- Worked with the grassroots subcommittee to facilitate communication between the MRS community and national legislators
- Encouraged members to write personalized letters to national legislators to advocate for materials research

MXene Symposium, Organizer

2019

- Organized a symposium for 200+ attendees, including contacting and coordinating with presenters, managing accommodations, providing meals for all attendees, and organizing a sub-poster session within the symposium

International Program, Campus Ambassador

2015-2018

- Facilitated over twenty programs designed to for entire (1400+) international student body
- Led workshops for incoming international students including visas, finances, and transportation

Graduate Student Union, Department Representative

2014-2016

- Influenced campus-wide events and spending, directly led to 15% increased yearly budget
- Acted as liaison between administration and student body, leading 300% increase in events