

ALBERT TIANXIANG LIU

Department of Chemical Engineering • University of Michigan
NCRC, B28-2001E, 2800 Plymouth Rd, Ann Arbor, MI 48109
email: atliu@umich.edu • website: legos.engin.umich.edu

EDUCATION

- 2022 Postdoctoral Fellow, School of Medicine, Stanford University (*Advisor: Steven Chu*)
2020 Ph.D., Chemical Engineering, Massachusetts Institute of Technology
Thesis: [Colloidal Electronics](#) (*Advisor: Michael S. Strano*)
2014 B.S. with honor, Chemical Engineering, California Institute of Technology (**GPA: 4.0/4.0**)
Thesis: [Nickel-Catalyzed Asymmetric Alkylation of \$\alpha\$ -Halo Boronic Esters](#) (*Advisor: Gregory C. Fu*)
2012 B.A. with honor, Chemistry, Grinnell College, *Valedictorian* (**GPA: 4.0/4.0**)

ACADEMIC APPOINTMENTS

- 2022– **Assistant Professor**, Department of Chemical Engineering, University of Michigan
by courtesy, Macromolecular Science and Engineering Program, University of Michigan
by courtesy, Department of Materials Science and Engineering, University of Michigan

OTHER POSITIONS AND AFFILIATIONS

- 2023– [Academic Affairs Advisory Committee](#), University of Michigan Faculty Senate
2023– **University of Michigan Student Chapter Advisor**, American Institute of Chemical Engineers
2023– **Division Chair**, [Nanoscale Science & Engineering Forum](#), American Institute of Chemical Engineers
2023 **Area Co-Chair**, Composites, Materials Engineering & Science Division, American Institute of Chemical Engineers
2023– **Nanoscale Horizons**, Editorial Community Board, Royal Society of Chemistry
2023– **Frontiers in Materials**, Review Editor, Editorial Board, Frontiers
2020– ACS Materials Letters [Early Career Advisory Board](#), American Chemical Society
2018–19 [Graduate Programs Committee](#), Office of Graduate Education, MIT
2014 **Facilities Engineering Intern**, Chevron Energy Technology Company, Chevron U.S.A. Inc.

TEACHING

University of Michigan

- 2023– **ChE 696 Particles and Particle Systems**
2022– [ChE 342 Mass and Heat Transfer](#) (co-instructor: Jovan Kamcev)

Prior to University of Michigan

- 2019 [Teaching Development Fellowship](#), MIT
2018 [Kaufman Teaching Certificate Program](#), MIT Teaching and Learning Laboratory
2017-18 **Lecturer**, [SPARK](#), [SPLASH](#), [HSSP](#), MIT Educational Studies Program
MIT run program to teach middle and high school students ([teaching profile](#))
 - (2018 Summer HSSP) Molecular Machines and Electronics – Industrial Revolution 5.0?
 - (2018 Spring SPARK, HSSP) How Do You Generate Electricity from Water?
 - (2017 Spring SPLASH) From Molecular Conformation to Nanotechnology, Energy and Medicine
 - (2017 Spring SPARK) Nanotechnology Enabled Artificial Cells
- 2016-18 **Project Consultant**, [Chemical Engineering Projects Lab](#), MIT
2010–19 **Teaching Assistant**
 - (2019) Chemical Reactor Engineering (Klavs F. Jensen, Michael S. Strano, MIT)
 - (2016) Analysis of Transport Phenomena (William M. Deen, Martin Z. Bazant, MIT)
 - (2014) Chemical Reaction Engineering (Frances H. Arnold, Caltech)

- (2014) Separation Processes (John H. Seinfeld, *Caltech*)
- (2012) Organic Chemistry I & II (Stephen R. Sieck, T. Andrew Mobley, *Grinnell*)
- (2011) Classical Mechanics (Sujeev Wickramasekara, *Grinnell*)
- (2010) Organic Chemistry Laboratory (James G. Lindberg, *Grinnell*)

AWARDS AND HONORS

- 2024 MMRI Faculty Investigator Award, *Michigan Materials Research Institute*
- 2023 ACS PRF Doctoral New Investigator Award, *American Chemical Society*
- 2023 Center for Complex Particle Systems (COMPASS), *Natioanl Science Foundation*
- 2023 Michigan Bold Challenge BOOST Award, *University of Michigan*
- 2023 College of Engineering START Young Investigator Award, *University of Michigan*
- 2022 Semiconductor Technology REU Award, *Intel Corporation*
- 2020 SCS Rising Star, *IEEE Solid-State Circuits Society*
- 2020 [Materials Research Society](#) Graduate Student Award (Spring), *Materials Research Society*
- 2019 Excellence in Graduate Polymer Research, *American Institute of Chemical Engineers*
- 2019 Individual Accomplishment Citation, Dept. of Chemical Engineering, *MIT*
- 2019 Outstanding [Graduate Teaching](#) Assistant Award (for 10.65 – Chemical Reaction Engineering), *MIT*
- 2019 [Teaching Development Fellowship](#), *MIT*
- 2018 [Inorganic Materials](#) Graduate Student Award (**1st place**), *American Institute of Chemical Engineers*
- 2018 [PPG Polymer Engineering Award](#), Macromolecular Science & Engineering Symposium, *University of Michigan*
- 2018 Judge's Choice (**1st place team**), [Harvard Surgical Program in Innovation](#), *Harvard Medical School*
- 2017 [Materials Research Society](#) Graduate Student Award (Fall), *Materials Research Society*
- 2017 [Electronic & Photonic Materials](#) Graduate Student Award, finalist, *American Institute of Chemical Engineers*
- 2017 Outstanding [Graduate Teaching](#) Assistant Award (for 10.50 – Transport Phenomena), *MIT*
- 2017 [Goodwin](#) Teaching Medal, finalist (nominated by Dept. of Chemical Engineering), *MIT*
- 2016 [Carbon Nanomaterials](#) Graduate Student Award (**1st place**), *American Institute of Chemical Engineers*
- 2014 [Presidential](#) Graduate Fellowship, *MIT*
- 2014 Gordon Wu Fellowship (declined), *Princeton University*
- 2014 Merck Index Award, *Caltech*, sponsored by *Merck & Co., Inc.*
- 2014 [Tau Beta Pi](#), *California Beta Chapter*
- 2013 [Jack E. Froehlich](#) Memorial Award, *Caltech*
- 2013 David S. Koons Research Fellowship, *Caltech*
- 2013 Don Shepard Award, *Caltech*
- 2013 [Andrew W. Archibald Prize](#) for Highest Scholarship (**Valedictorian**), *Grinnell*
- 2013 Chemistry Alumni Award, Department of Chemistry, *Grinnell*
- 2013 [Phi Beta Kappa](#), *Iowa Beta Chapter*
- 2011 ACS Polymer Chemistry Award, *Polymer Education Committee, American Chemical Society*
- 2011–13 Summer Undergraduate Research Fellowship (three semesters), *Caltech*
- 2011 [Snyder](#) Scholarship (declined), *University of Illinois at Urbana-Champaign*
- 2010 Mentored Advanced Project Fellowship, *Grinnell*
- 2010 Silver Medal, Grinnell College Team, Iowa Collegiate Mathematics Competition, *University of Iowa*
- 2009 Neil Klausner Award, *Grinnell*
- 2009–12 Dean's Lists (all semesters), *Grinnell*
- 2003 Silver Medal, National Mathematical Olympiad, *Chinese Mathematical Society*

PATENTS

- 2018 **(04)** Cottrill, A. L.; Strano, M. S.; Mahajan, S. G.; Liu, A. T. Materials, Devices, and Methods for Resonant Ambient Thermal Energy Harvesting using Thermal Diodes. [US 11,616,184 B2](#).
- 2017 **(03)** Strano, M. S.; Cottrill, A. L.; Mahajan, S. G.; Liu, A. T. Koman, V. B. Energy Harvesting from Ambient Thermal Fluctuations using a Thermal Resonance Device. *18135.124217*.
- 2017 **(02)** Liu, A. T.; Liu, P.; Koman, V. B.; Kozawa, D.; Strano, M. S. 2D Electronic Microparticles. *US 62/525,752*.
- 2016 **(01)** Liu, A. T.; Davis, T. M.; Lew, C. M.; Xie, D.; Elomari, S. A.; Deem, M. Method for Preparing Zeolite SSZ-52. [US 2016/0068402 A1](#).

(* Equal contribution; † Corresponding author.)

- 2023 **(32)** Liu, A. T.† Measuring Carrier Density and Mobility in Single-Walled Carbon Nanotubes via Nuclear Magnetic Resonance. *Nanoscale Horizons* **2024**.
- 2023 **(31)** Liu, A. T.; Hampel, M.; Yang, J. F.; Pervan, A.; Koman, V. B.; Zhang, G.; Kozawa, D.; Murphey, T. D.; Palacios, T.†; Strano, M. S.† Colloidal Robotics. *Nature Materials* **2023**, *22*, 1453–62.
- 2023 **(30)** Gong, X.; Kwak, S.-Y.; Cho, S.-Y.; Lundberg, D.; Liu, A. T.; McGee, M. K.; Strano, M. S.† Single-Molecule Methane Sensing Using Palladium-Functionalized nIR Fluorescent Single-Walled Carbon Nanotubes. *ACS Sensors*, **2023**, *8*, 4207–15.
- 2023 **(29)** Kozawa, D.; Li, X. S.; Ichihara, T.; Rajan, A. G.; Gong, X.; He, G.; Koman, V. B.; Zeng, Y.; Kuehne, M.; Sillmore, K. S.; Parviz, D.; Liu, P.; Liu, A. T.; Faucher, S.; Yuan, Z.; Warner, J.; Blankschtein, D.; Strano, M. S.† Discretized Hexagonal Boron Nitride Quantum Emitters and Their Chemical Interconversion. *Nanotechnology*, **2023**, *34*, 115702.
- 2022 **(28)** Yang, J. F.*; Berrueta, T. A.*; Brooks, A. M.; Liu, A. T.; Zhang, G.; Gonzalez-Medrano, D.; Yang, S.; Koman, V. B.; Chvykov, P.; LeMar, L. N.; Miskin, M. Z.; Murphey, T. D.; Strano, M. S.† Emergent Microrobotic Oscillators via Asymmetry-induced Order. *Nature Communications* **2022**, *13*, 5734.
- 2022 **(27)** Zeng, Y.; Gordiichuk, P. Ichihara, T.; Zhang, G.; Sandoz-Rosado, E.; Wetzel, E. D.; Tresback, J.; Yang, J.; Kozawa, D.; Yang, Z.; Kuehne, M.; Quien, M.; Yuan, Z.; Gong, X.; He, G.; Lundberg, D. J.; Liu, P.; Liu, A. T.; Yang, J. F.; Kulik, H. J.; Strano, M. S.† Irreversible Synthesis of an Ultrastrong Two-dimensional Polymeric Material. *Nature* **2022**, *602*, 91–5.
- 2022 **(26)** Yang, J. F.; Liu, A. T.; Berrueta, A. T.; Zhang, G.; Brooks, A. M.; Koman, V. B.; Yang, S.; Gong, X.; Murphey, T. D.; Strano, M. S.† Memristor Circuits for Colloidal Robotics: Temporal Access to Memory, Sensing, and Actuation. *Advanced Intelligent Systems* **2021**, 2100205.
- 2021 **(25)** Liu, A. T.*; Kunai, Y.*; Cottrill, A. L.; Kaplan, A.; Zhang, G.; Kim, H.; Mollah, R. S.; Eatmon, Y. L.; Strano, M. S.† Solvent-induced Electrochemistry at an Electrically Asymmetric Carbon Janus Particle. *Nature Communications* **2021**, *12*, 1–9.
- 2021 **(24)** Liu, A. T.*; Yang, J. F.*; LeMar, L. N.; Zhang, G.; Pervan, A.; Murphey, T. D.; Strano, M. S.† Autoperforation of Two-dimensional Materials to Generate Colloidal State Machines Capable of Locomotion. *Faraday Discussions* **2021**, *227*, 213–32.
- 2020 **(23)** Zhang, G.; Cottrill, A. L.; Koman, V. B.; Liu, A. T.; Mahajan, S. G. Piephoff, D. E.; Strano, M. S.† Persistent, Single-polarity Energy Harvesting from Ambient Thermal Fluctuations Using a Thermal Resonance Device with Thermal Diodes. *Applied Energy* **2020**, *280*, 115881.
- 2019 **(22)** Salem, D. P.; Gong, X.; Liu, A. T.; Akombi, K.; Strano, M. S.† Immobilization and Function of nIR-Fluorescent Carbon Nanotube Sensors on Paper Substrates for Fluidic Manipulation. *Analytical Chemistry* **2019**, *92*, 916–23.
- 2019 **(21)** Cottrill, A. L.; Zhang, G.; Liu, A. T.; Bakytbekov, A.; Sillmore, K. S.; Koman, V. B.; Shamim, A.; Strano, M. S.† Persistent Energy Harvesting in the Harsh Desert Environment Using a Thermal Resonance Device: Design, Testing, and Analysis. *Applied Energy* **2019**, *235*, 1514–23.
- 2018 **(20)** Liu, A. T.; Ge, Z.; Cottrill, A. L.; Strano, M. S.† Direct Energy Generation via Molecular Interaction with Nano-structured Materials, a Mechanistic Perspective. *Advanced Energy Materials* **2018**, *8*, 1802212.
- 2018 **(19)** Liu, A. T.*; Liu, P.*; Kozawa, D.; Dong, J.; Saccone, M.; Koman, V. B.; Wang, S.; Son, Y.; Wong, M. H.; Strano, M. S.† Autoperforation of 2D Materials for Generating Two Terminal Memresistive Janus Particles. *Nature Materials* **2018**, *17*, 1005–12.
- 2018 **(18)** Cottrill, A. L.; Wang, S.; Liu, A. T.; Strano, M. S.† Dual Phase Change Thermal Diodes for Enhanced Rectification Ratios: Theory and Experiment. *Advanced Energy Materials* **2018**, 1702692.
- 2018 **(17)** Koman, V. B.; Liu, P.; Kozawa, D.; Liu, A. T.; Cottrill, A. L.; Son, Y.; Lebron, J. A.; Strano, M. S. Colloidal, Nanoelectronic State Machines Based on 2D Materials for Aerosolizable Electronics.† *Nature Nanotech.* **2018**, *13*, 819–827.
- 2018 **(16)** Cottrill, A. L.; Liu, A. T.; Kunai, Y.; Koman, V. B.; Kaplan, A.; Mahajan, S. G.; Liu, P.; Toland, A. R.; Strano, M. S.† Ultra-High Thermal Effusivity Materials for Resonant, Ambient Thermal Energy Harvesting. *Nature Comm.* **2018**, *9*, 664.

- 2018 (15) Liu, P.; Cottrill, A. L.; Kozawa, D.; Koman, V. B.; Parviz, D.; **Liu, A. T.**; Yang, J.; Tran, T. Q.; Wong, M. H.; Wang, S.; Strano, M. S.† Emerging Trends in 2D Nanotechnology that Are Redefining Our Understanding of “Nanocomposites”. *Nano Today* **2018**, *21*, 18–40.
- 2017 (14) Salem, D. P.; Gong, X.; **Liu, A. T.**; Koman, V. B.; Dong, J.; Strano, M. S.† Ionic Strength Mediated Phase Transitions of Surface Adsorbed DNA on Signed-walled Carbon Nanotubes. *J. Am. Chem. Soc.* **2017**, *139*, 16791–16802.
- 2017 (13) Bellisario, D. O.; **Liu, A. T.**; Kozawa, D.; Han, R.; Harris, J. K.; Zabala, R. B.; Wang, Q. H.; Agrawal, K. V.; Son, Y.; Strano, M. S.† Experimental Observation of Real Time Molecular Dynamics using Electromigrated Tunnel Junctions. *J. Phys. Chem. C* **2017**, *121*, 22550–22558.
- 2017 (12) **Liu, A. T.***; Kunai, Y.*; Cottrill, A. L.; Koman, V. B.; Strano, M. S.† Observation of the Marcus Inverted Region of Electron Transfer from Asymmetric Chemical Doping of Pristine (*n*, *m*) Single-walled Carbon Nanotubes. *J. Am. Chem. Soc.* **2017**, *139*, 15328–15336.
- 2017 (11) Son, Y.*; Kozawa, D.*; **Liu, A. T.**; Koman, V. B.; Wang, Q. H.; Strano, M. S.† A Study of Bilayer Phosphorene Stability under MoS₂ Passivation. *2D Materials* **2017**, *4*, 025091.
- 2017 (10) Kwak, S.; Wong, M. H.; Lew, T. T. S.; Bisker, G.; Lee, M. A.; Kaplan, A.; Dong, J.; **Liu, A. T.**; Koman, V. B.; Sinclair, R. M.; Hamann, C.; Strano, M. S.† Nanosensor Technology Applied to Living Plant Systems. *Annu. Rev. Anal. Chem.* **2017**, *10*, 113–140.
- 2016 (09) Schmidt, J.; Choi, J.; **Liu, A. T.**; Slusarczyk, M.; Fu, G. C.† A General, Modular Method for the Catalytic Asymmetric Synthesis of Alkylboronate Esters via Alkyl-Alkyl Cross-Coupling. *Science* **2016**, *354*, 1265–1269.
- 2016 (08) **Liu, A. T.***; Kunai, Y.*; Liu, P.; Kaplan, A.; Cottrill, A. L.; Smith-Dell, J. S.; Strano, M. S.† Electrical Energy Generation via Reversible Chemical Doping on Carbon Nanotube Fibers. *Advanced Materials* **2016**, *28*, 9752–9757.
- 2016 (07) **Liu, A. T.***; Mahajan, S. G.*; Cottrill, A. L.; Kunai, Y.; Bender, D.; Castillo, J.; Gibbs, S. L.; Strano, M. S.† Sustainable Power Sources Based on High Efficiency Thermopower Wave Devices. *Energy and Environmental Science* **2016**, *9*, 1290–1298.
- 2016 (06) Davis, T. M.†; **Liu, A. T.**; Lew, C. M.; Xie, D.; Benin, A. I.; Elomari, S.; Zones, S. I.; Deem, M. W. Computationally Guided Synthesis of SSZ-52: A Zeolite for Engine Exhaust Clean-up. *Chemistry of Materials* **2016**, *28*, 708–711.
- 2014 (05) **Liu, A. T.**; Zaveri, R. A.; Seinfeld, J. H.† Analytical Solution for Transient Partitioning and Reaction of a Condensing Vapor Species in a Droplet. *Atmospheric Environment* **2014**, *89*, 651–654.
- 2014 (04) Lai, H. W. H.; **Liu, A. T.**; Emenike, B. U.; Carroll W. R.; Roberts, J. D.† Conformational Preferences of N,N-Dimethylsuccinamate as a Function of Alkali and Alkaline Earth Metal Salts: Experimental Studies in DMSO and Water as Determined by ¹H-NMR Spectroscopy. *J. Phys. Chem. A* **2014**, *118*, 1965–1970.
- 2013 (03) **Liu, A. T.** Nag, M.; Carroll, W. R.; Roberts, J. D.† Conformational Analysis of N,N,N-Trimethyl-(3,3-dimethylbutyl)ammonium Iodide by NMR Spectroscopy: a Sterically Hindered Trans-standard. *Magn. Reson. Chem.* **2013**, *51(11)*, 701–704.
- 2013 (02) **Liu, A. T.**; Emenike, B. U.; Carroll, W. R.; Roberts, J. D.† Conformational Equilibria of N,N-Dimethylsuccinamic Acid and Its Lithium Salt as a Function of Solvent. *Org. Lett.* **2013**, *15(4)*, 760–763.
- 2013 (01) Emenike, B. U.; **Liu, A. T.**; Naveo, E. P.; Roberts, J. D.† Substituent Effects on Energetics of Peptide-Carboxylate Hydrogen Bonds as Studied by ¹H-NMR Spectroscopy: Implications for Enzyme Catalysis. *J. Org. Chem.* **2013**, *78(23)*, 11765–11771.

BOOK CHAPTERS

- 2019 (02) **Liu, A. T.**; Ge, Z.; Strano, M. S. Energy Harvesting Techniques Mediated by Molecular Interactions with Nanostructured Carbon Materials. *Robotic Systems and Autonomous Platforms*, edited by Walsh, S. M.; Strano, M. S. (Elsevier ISBN 978-0-08-102260-3, Woodhead Publishing in Materials **2019**, 389–424).
- 2019 (01) Yang, J. F.; Liu, P.; Koman, V. B.; **Liu, A. T.**; Strano, M. S. Synthetic Cells: Colloidal-Sized State Machines. *Robotic Systems and Autonomous Platforms*, edited by Walsh, S. M.; Strano, M. S. (Elsevier ISBN 978-0-08-102260-3, Woodhead Publishing in Materials **2019**, 389–424).

INVITED SEMINARS AND CONFERENCE PROCEEDINGS

- 2024 Colloidal Electronic Matter, **Dept. of Materials Science & Engineering Seminar** (Mar. 08), NC State, Raleigh, NC

2024 Collective Intelligence Discussion Leader, [Gordon Research Conference](#), Robotics (Jan. 16, 2024), *Ventura, CA*

2023 Colloidal Electronic Matter, **Department of Chemical Engineering Seminar** (Nov. 16), *University of Toledo, OH*

2023 Colloidal Electronic Matter, **2023 AIChE National Meeting** (Nov. 05, 2023), *Orlando, FL*

2023 Colloidal Electronic Matter, **ACS Fall 2023 National Meeting** (Aug. 16, 2023), *San Francisco, CA*

2023 Dynamic Self-Assembly in Anisotropic Colloidal Systems for Emergent and Synchronized Oscillation, **Complex Mechanical Metamaterials ICAM Workshop** (Jul. 14, 2023), *Ann Arbor, MI*

2023 Colloidal Electronic Matter, **ACS Colloidal and Surface Science Symposium** (Jun. 07, 2023), *Raleigh, NC*

2023 Colloidal Electronics, **Department of Chemistry Seminar** (Mar. 21, 2023), *Oakland University, MI*

2023 Colloidal Electronics, [Gordon Research Conference](#), Complex Active and Adaptive Material Systems (Jan. 31, 2023), *Ventura, CA*

2022 Colloidal Electronics, **Biodesign Institute Seminar** (Nov. 16, 2022), *Arizona State University, Phoenix, AZ*

2020 Colloidal Electronics, **Electrical Engineering Dept. Seminar** (Mar. 09), *Caltech, Pasadena, CA*

2020 Colloidal Electronics, **MSE Dept. Seminar** (Mar. 06), *University of California, Berkeley, CA*

2020 Colloidal Electronics, **CBE Department Seminar** (Feb. 18), *National University of Singapore, Singapore*

2020 Colloidal Electronics, **MechE Dept. Seminar** (Feb. 12), *University of Illinois, Urbana-Champaign, IL*

2020 Colloidal Electronics, **CBE Dept. Seminar** (Feb. 10), *Georgia Institute of Technology, Atlanta, GA*

2020 Colloidal Electronics, **CBE Dept. Seminar** (Feb. 05), *University of California, Los Angeles, CA*

2020 Colloidal Electronics, **ChemE Dept. Seminar** (Feb. 03), *Caltech, Pasadena, CA*

2020 Colloidal Electronics, **ChemE Dept. Seminar** (Jan. 30), *University of Michigan, Ann Arbor, MI*

2020 Colloidal Electronics, **Mechanical Engineering and Materials Science Dept. Seminar** (Jan. 23), *Washington University at Saint Louis, Saint Louis, MO*

2019 2D-Macromolecular Layered Composites Enabled Electronic Microparticles, **2019 AIChE Annual National Meeting** (Nov. 12, 2019), *Orlando, FL*

2019 Emergent Computation Enabled by Colloidal State Machines, **Army Research Office MURI Kickoff Meeting** (Aug. 22, 2019), *Georgia Tech, Atlanta, GA*

2019 Colloidal State Machines, **ACS Colloidal and Surface Science Symposium** (Jun. 17, 2019), *Atlanta, GA*

2019 Microscale Energy Generation, **Applied Energy Symposium and Summit 2019** (May 23, 2019), *MIT*

2018 Microscale Energy Storage & Harvesting – Thermopower Wave and Asymmetric Chemical Doping, **2018 Materials Research Society Fall Meeting** (Nov. 30, 2018), *Boston, MA*

2018 Colloidal State Machines, **2018 AIChE Annual National Meeting** (Oct. 25, 2018), *Pittsburgh, PA*

2018 2D-Macromolecular Heterostructures Enabled Colloidal State Machines, **Macromolecular Science & Engineering Symposium** (Oct. 24, 2018), *University of Michigan*

2018 Foldable and Adaptive Two-dimensional Electronics, **Air Force Office of Scientific Research MURI Annual Review** (Sep. 21, 2018), *Cornell University*

2018 Single-walled Carbon Nanotube Mediated *in situ* Electrochemistry, **256th ACS National Meeting** (Aug. 23, 2018), *Boston, MA*

2018 From Asymmetric Doping to Colloidal Electronics – Concepts in Biosensing and Energy Generation using Low Dimensional Materials, **256th ACS National Meeting** (Aug. 21, 2018), *Boston, MA*

2018 Synthetic Cells – Colloidal Electronic Microparticles, **Boston Academic Researchers Symposium** (July. 19, 2018), *Northeastern University*

2018 From Thermopower Waves to Asymmetric Chemical Doping – New Concepts in Energy Storage and Generation Using Molecular Interactions with Single-Walled Carbon Nanotubes, **233rd ECS Meeting** (May. 14), *Seattle, WA*

2018 2D Materials Encapsulated Colloidal Electronic Cells, **MIT Polymer Day** (Apr. 11, 2018), *MIT*

2018 Autoperforation of 2D Materials for Generating Memristive Janus Particles, **255th ACS National Meeting** (Mar. 22, 2018), *New Orleans, LA*

2018 Electricity from Asymmetric Chemical Doping, **MIT Chemical Engineering Department Student Seminar** (Mar. 12, 2018), *MIT*

2018 Synthetic Electronic Cells: Distributed, Modular, Particulate Electronic Devices as Platform for Data Collection and Storage, **MIT Intelligent Quest 2018** (Mar. 01, 2018), *MIT*

2018 Autoperforation of 2D Materials for Self-Powered, Memresistive Microparticles, **2018 Microsystems Annual Research Conference** (Jan. 30, 2018), *Bretton Woods, NH*

2017 Towards a Modular Memristive Microparticle – Nanoscale Device Fabrication and Electricity Generation, **2017 Materials Research Society Fall Meeting** (Nov. 28, 2017), *Boston, MA*

2017 Nano-Materials Enabled 2D Colloidal Electronics and Electrical Energy Generation Processes, **2017 AIChE Annual National Meeting** (Oct. 31, 2017), *Minneapolis, MN*

2017 New Materials by Folding and Autoperforation of 2D Surfaces, **Air Force Office of Scientific Research MURI Annual Review** (Oct. 26, 2017), *MIT*

- 2017 Design and Fabrication of Colloidal State Machines for Petrochemical Applications, **E&P Technical Exchange at King Fahd University of Petroleum and Minerals** (Oct. 16, 2017), *Dhahran, Saudi Arabia*
- 2017 Chirality Associated Marcus Inverted Region Observed in Single-Walled Carbon Nanotubes via Asymmetric-doping Induced Electrical Potential (Aug. 22, 2017), **254th ACS National Meeting**, *Washington, DC*
- 2017 Conformational Analysis Guided Molecular Transformation and Energy Generation Processes, **Department Invited Seminar Series** (Jul. 17, 2017), *Zhejiang University, Hangzhou, China*
- 2017 Autoperforation of 2D Materials for Generating Two Terminal Memresistive Janus Particles, **2017 Sense.nano Symposium** (May 25, 2017), *MIT*
- 2017 Electrical Energy Generation via Asymmetric H₂O Doping (Mar. 22, 2017), **MIT Water Night**, *MIT*
- 2016 Sustainable Power Sources Based on High Efficiency Thermopower Wave Devices, **2016 AIChE Annual National Meeting** (Nov. 15, 2016), *San Francisco, CA*
- 2016 Electrical Energy Generation via Reversible Chemical Doping on Carbon Nanotube Fibers, **2016 AIChE Annual National Meeting** (Nov. 14, 2016), *San Francisco, CA*
- 2016 Ambient Energy Harvesting: Thermal Resonators, **MIT Energy Night** (Oct. 13, 2016), *MIT*
- 2016 Graphene Autoperforation: Mold-based Strain Controlled Crack Propagation, **Air Force Office of Scientific Research MURI Annual Review** (Sep. 22, 2016), *Cornell University*
- 2016 Novel Energy Sources Based on Excess Thermopower and Carbon Nanotube Fibers, **252nd ACS National Meeting** (Aug. 23, 2016), *Philadelphia, PA*
- 2016 Technologies for Performance Enhancement and Persistence of Low-Temperature Undersea Dives, **Office of Naval Research Neptune Program Annual Review** (May 23, 2016), *Arizona State University*
- 2016 Fascination towards Nanoscale Energy Generation using Thermopower Waves, **Material Processing Center Project Pitch**, Center for Material Science and Engineering (Jun. 10, 2016), *MIT*
- 2014 Development towards Facile Synthesis of Zeolite SSZ-52, **Chevron R&D Department Seminar**, *Richmond, CA*
- 2014 Nickel-Catalyzed Asymmetric Alkylation of α -Halo Boronic Esters, **Senior Thesis Defense**, *Caltech*
- 2012 Theoretical Study of the NO₂ Decomposition over a Modified Cu-FAU Zeolite, **244th ACS National Meeting**, *Philadelphia, PA*
- 2011 Determination of the Dihedral Angles in Predominantly *trans*-1,2-disubstituted Ethane Systems Using NMR Spectroscopy, **243rd ACS National Meeting**, *San Diego, CA*
- 2011 Substituent Effects on Energetics of Peptide-Carboxylate Hydrogen Bonds, **Summer Undergraduate Research Fellow Seminar**, *Caltech*
- 2011 Decomposition of NO₂ and N₂O gases on Cu-Al and Fe-Al Modified Zeolite Catalysts, **Undergraduate Research Symposium**, *University of Chicago*
- 2011 Oxime Cross-Metathesis towards Nitrones, **Student Research Seminar**, *Grinnell College*
- 2010 Computational Study of the Decomposition of NO₂ and N₂O gases on Fe-Al Modified Zeolite Catalysts, **Undergraduate Research Symposium**, *Washington University at Saint Louis*
- 2009 Computational Study of the Decomposition of NO₂ and N₂O gases on Cu-Al Modified Zeolite Catalysts, **Mentored Advanced Project Seminar**, *Grinnell College*

CONFERENCE PROCEEDINGS BY TRAINEES

- 2024 Colloidal Electronic Matter, **Dept. of Materials Science & Engineering Seminar** (Mar. 08), *NC State, Raleigh, NC*
- 2024 Collective Intelligence Discussion Leader, **Gordon Research Conference**, Robotics (Jan. 16, 2024), *Ventura, CA*
- 2023 Colloidal Electronic Matter, **Department of Chemical Engineering Seminar** (Nov. 16), *University of Toledo, OH*
- 2023 Colloidal Electronic Matter, **2023 AIChE National Meeting** (Nov. 05, 2023), *Orlando, FL*
- 2023 Colloidal Electronic Matter, **ACS Fall 2023 National Meeting** (Aug. 16, 2023), *San Francisco, CA*

CONTRIBUTED GRANT PROPOSALS

University of Michigan

- 2024 **Project Title:** Integrating intermetallic CoPc-PtZn electrocatalysts with colloidal graphene quantum dots towards highly selective CO₂ upgrading into methanol (co-PI)
Source of Support: Michigan Materials Research Institute (Feb. 26, 2024)
Award Amount: \$60,000
- 2023 **Project Title:** Field-assisted Conductive Microgel Assembly at the Electrode-Electrolyte Interface for Reconfigurable Electrocatalysis (PI)
Source of Support: American Chemical Society Petroleum Research Fund (Nov. 12, 2023)
Award Amount: \$110,000
- 2023 **Project Title:** Center for Complex Particle Systems (COMPASS) (co-investigator)

- Source of Support:** National Science Foundation Science and Technology Center (Sep. 16, 2023)
Award Amount: \$30,000,000
- 2023 **Project Title:** Advancing Battery-less Sensing for Sustainable Living and Civil Infrastructures (PI)
Source of Support: Michigan Bold Challenge BOOST Program (May. 15, 2023)
Award Amount: \$75,000
- 2023 **Project Title:** Dynamic Nanopore Microfluidic Transfection via Electroporation (DyNaMiTE) (PI)
Source of Support: Michigan Engineering START Grant (May. 11, 2023)
Award Amount: \$30,000

Under the supervision of Steven Chu (PI)

- 2021 **Project Title:** Extending the Temporal and Spatial Capabilities of Single-molecule Methods
Source of Support: U.S. National Institute of Health (R01)
Total Award Amount: \$3,021,770

Under the supervision of Michael S. Strano (PI)

- 2019 **Project Title:** MURI – Formal Foundations of Algorithmic Matter and Emergent Computation
Source of Support: U.S. Army Research Office (ARO)
Total Award Amount: \$6,250,000
- 2018 **Project Title:** ISN4 – 1.2 Shock Mitigating and Reinforcing Molecular Nanocomposites
Award Number: W911NF-18-2-0048
Source of Support: ARO-ISN, University Affiliated Research Centers (UARC)
Total Award Amount: \$90,000
- 2017 **Project Title:** Synthetic Routes to Graphamid and Grapheylene by High Pressure Control of In-Plane Polymerization and Activation
Source of Support: U.S. Army Research Office
Total Award Amount: \$500,000
- 2015 **Project Title:** Thermal Management Technologies for Low-Temperature Undersea Drive Persistence
Award Number: N00014-16-1-2144
Source of Support: U.S. Navy Office of Naval Research (ONR)
Total Award Amount: \$497,246
- 2015 **Project Title:** MURI – Foldable and Adaptive Two-dimensional Electronics (FATE)
Award Number: FA9550-15-1-0514
Source of Support: U.S. Air Force Office of Scientific Research (AFOSR)
Total Award Amount: \$534,746

STUDENTS SUPERVISED

University of Michigan

Postdoctoral Scholars

| | <i>Name</i> | <i>PhD</i> | <i>Contact</i> | <i>Current Affiliation</i> |
|-------|-------------|------------|--|----------------------------|
| 2023- | Rong Ma | Texas A&M | rongm@umich.edu | |

Graduate Students

| | <i>Name</i> | <i>Department</i> | <i>Contact</i> | <i>Current Affiliation</i> |
|-------|----------------|-------------------|--|----------------------------|
| 2023- | Jongbin Won | ChemE | finrod@umich.edu | |
| 2023- | Jihpeng Sun | ChemE | jpsun@umich.edu | |
| 2022- | Matthew Manion | ChemE | mlman@umich.edu | |
| 2022- | Sungwan Park | ChemE | sungwan@umich.edu | |
| 2022- | Emily McCorkle | ChemE | mccorkle@umich.edu | |

Undergraduate Students

| | <i>Name</i> | <i>Department</i> | <i>Contact</i> | <i>Current Affiliation</i> |
|-------|---------------|-------------------|--|----------------------------|
| 2024- | Sarvikaa Ram | ChemE | srakeshr@umich.edu | |
| 2024- | Ryan Mark | ChemE | ryanmark@umich.edu | |
| 2023- | Mohammed Harp | ChemE | mohamh@umich.edu | |

| | | | |
|---------|--------------------|----------|--|
| 2023- | Justin Choi | ChemE | chjustin@umich.edu |
| 2023- | Jebril Thaxton | ChemE | gthaxton@umich.edu |
| 2023- | Huron Tu | Physics | hurontu@umich.edu |
| 2023- | Aaron Tao | EE | guanrent@umich.edu |
| 2023 | Landon Gates | EE (USI) | gatesl@umich.edu |
| 2023 | Youwen Duan | EE | youwend@umich.edu |
| 2023 | Nadine El Ghaffir | ChemE | nghaffir@umich.edu |
| 2023 | Nhayeon Lee | ChemE | nhayeonl@umich.edu |
| 2022-23 | Hemil Kiri | ChemE | kirihemi@umich.edu |
| 2022-23 | Anika Gupta | ChemE | anigup@umich.edu |
| 2022-23 | Joshua Doctor | EE | joshdoc@umich.edu |
| 2022-23 | Andrew Householder | Physics | andhouse@umich.edu |
| 2022-23 | Alexander Bowler | Robotics | albowler@umich.edu |
| 2022-23 | Andrew Schaefer | MechE | drewscha@umich.edu |
| 2022-23 | Kathryn Darlak | BME | gkdarlak@umich.edu |

High School Students

| | Name | School | Contact |
|-------|---------------|----------|--|
| 2023- | Fiona Nikolla | EE (USI) | nikollafiona06@gmail.com |

Prior to University of Michigan

| | Name | Affiliation | Duration | Projects (contributed publications) |
|---------|--------------------------------------|----------------|-----------|---|
| 2019 | Lexy N. LeMar | Caltech | 10 weeks | Emergent collective locomotion of active colloids (24) |
| 2019 | Ian Timothy | Newbury, MA | 8 weeks | Autoperforation - theory and experiments |
| 2018 | Paul A. Baynard | Westampton, NJ | 8 weeks | Autoperforation of synthetic cells |
| 2017 | Yannick L. Eatmon | MIT | 9 months | Electricity generation via SWNT/H ₂ O doping (25) |
| 2016- | Rafid S. Mollah | MIT | 1.5 years | Electrochemistry using SWNT/CH ₃ CN electricity (25) |
| 2016-17 | Linh Nguyen | MIT | 1 year | Chemical doping of 2D materials |
| 2016 | Max A. Saccone | Dartmouth | 3 months | MD simulation of graphene autoperforation (19) |
| 2015-16 | Jamila S. Smith-Dell | MIT | 1 year | High efficiency Thermopower Wave Devices (08) |
| 2015 | Stephen L. Gibbs | U. Florida | 10 weeks | Magnetic flux compression of Thermopower waves (07) |

SERVICE AND OUTREACH

Department, College, or University Committees

| | |
|-------|---|
| 2024- | Chair, Department Seminar Committee, Department of Chemical Engineering |
| 2023- | Academic Affairs Advisory Committee , University of Michigan Faculty Senate |
| 2023- | University of Michigan Student Chapter Advisor, American Institute of Chemical Engineers |
| 2023 | Leaders and Honors Awards Committee, College of Engineering |
| | Harry B. Benford Award for Entrepreneurial Leadership |
| 2022- | Graduate Committee, Department of Chemical Engineering |

Peer Reviews

| | |
|-------|---|
| 2024- | Science Robotics, American Association for the Advancement of Science |
| 2023- | Chemistry of Materials, American Chemical Society |
| 2023- | EcoMat, Wiley |
| 2020- | Nano Letters, American Chemical Society |
| 2019- | Advanced Functional Materials, Wiley |
| 2018- | Energy and Environmental Science, Royal Society of Chemistry |
| 2018- | Advanced Materials, Wiley |
| 2017- | Journal of American Chemical Society, American Chemical Society |
| 2016- | ACS Applied Materials & Interfaces, American Chemical Society |

Review Panels

| | |
|-------|---|
| 2024- | Office of Basic Energy Sciences (BES), Department of Energy |
| 2023- | National Defense Science and Engineering Graduate Fellowship, Department of Defense |

PhD Thesis Committees

- 2023– Andrew Jalbert (Faculty Advisor: Yiyang Li), *Department of Materials Science and Engineering*
- 2023– Zhengtao Hu (Faculty Advisor: Xiwen Gong), *Department of Materials Science and Engineering*
- 2023– Ignacio Blanco (Faculty Advisor: Sharon Glotzer), *Department of Chemical Engineering*
- 2023– Sijun Seong (Faculty Advisor: Xiwen Gong), *Department of Chemical Engineering*
- 2023– Oluwatosin Ohiro (Faculty Advisor: Bryan Goldsmith), *Department of Chemical Engineering*
- 2023– Fjorela Xhyliu (Faculty Advisor: Joerg Lahann), *Department of Chemical Engineering*
- 2023– Chih-Mei Young (Faculty Advisor: Michael Solomon), *Department of Chemical Engineering*
- 2023– Syahidah Mohd Khairi (Faculty Advisor: Michael Solomon), *Department of Chemical Engineering*

Master Thesis Committees

- 2022 Jierui Zhao (Faculty Advisor: Xiwen Gong), *Department of Materials Science and Engineering*

Department Seminars

- 2023 Faculty Host (Jose Mendoza, Michigan State University), *Blue-Green Seminar, Chemical Engineering*

Internal Invited Seminars

- 2024 American Institute of Chemical Engineers (AIChE) Student Chapter Luncheon (Feb. 22, 2024)
- 2023 ChE Homecoming Lightening Talk – Matter by Design (Sep. 22, 2023)
- 2023 American Institute of Chemical Engineers (AIChE) Student Chapter (Feb. 16, 2023)
- 2023 Omega Chi Epsilon Chemical Engineering Society (OXE) (Feb. 02, 2023)
- 2022 Department of Materials Science and Engineering Seminar (Sep. 02, 2022)

Student Engagement

- 2024 Sungwan Park (PhD advisee) and Matthew Manion (PhD advisee), Graduate Student Recruiting Committee
- 2023 Matthew Manion (PhD advisee), Panelist, American Institute of Chemical Engineers (AIChE) Student Chapter (Oct. 19, 2023)
- 2023 Chemical Engineering Graduate Research Symposium Oral Presentation Judge (Sep. 21, 2023)
- 2023 Matthew Manion (PhD advisee), Co-Chair, Chemical Engineering Graduate Research Symposium (Sep. 21, 2023)
- 2023-24 Matthew Manion (PhD advisee), Graduate Student Peer-Mentor
- 2023 ChE 595 Academic Panel (Invited by Greg Thurber) (Sep. 19, 2023)
- 2023 Chemical Engineering Graduate Society Gradchat: Communicating Your Research (Apr. 30, 2023)
- 2023 Chemical Engineering Undergrad Research Symposium Poster Judge (Mar. 21, 2023)
- 2023 Faculty Chat: Decision Making (Mar. 01, 2023)
- 2023 Chemical Engineering Undergraduate Open House (Feb. 21, 2023)
- 2023 Chemical Engineering Graduate Society Gradchat: Goal Setting (Feb. 10, 2023)
- 2023 Faculty Chat: Where is Chemical Engineering Going? (Jan. 26, 2023)
- 2022 Chemical Engineering Graduate Society Gradchat: Social Styles (Nov. 29, 2022)
- 2022 ChE 230 Academic Panel (Invited by Jouha Min) (Nov. 15, 2022)
- 2022 ChE 230 Poster Session Judge (Invited by Jouha Min) (Nov. 04, 2022)
- 2022 Chemical Engineering Undergraduate Open House (Oct. 24, 2022)
- 2022 Chemical Engineering Graduate Student Symposium Judge (Oral and Poster Sessions) (Sep. 21, 2022)

Professional Development

- 2023-24 NIH [R01 Bootcamp](#), UM School of Medicine (Sep. 11, 2023 – Apr. 22, 2024)
- 2023 Fireside Chat with President Santa Ono, Network to Advance Faculty of Color, UM-ADVANCE Program (May 30, 2023)
- 2023 DEI Teaching Circles (Options 1 & 2), Teaching Equity-Centered Engineering, Center for Research on Learning & Teaching in Engineering (May 2 – Jun. 1, 2023)
- 2023 Network to Advance Faculty of Color, UM-ADVANCE Program (Feb. 9, 2023)
- 2022 Everything is Fine: Mentoring to Support Graduate Student Mental Health Workshop, UM-ADVANCE Program (Dec. 7, 2022)
- 2022 Faculty Workshop on Holistic Graduate Admissions for Excellence and Diversity (Oct. 19, 2022)
- 2022 Workshop on the Key to Superior Teaching Performance (by Fawwaz Ulaby) (Oct. 06, 2022)

External Department Faculty Recruiting

- 2023 Suraj Shankar (Feb. 21, 2023), *Collegiate Fellow, Department of Physics*
- 2023 Hailing Shi (Feb. 20, 2023), *Single Cell Spatial Analysis Program*

External Services

- 2023– Vice President, Nanoscale Science & Engineering Forum, American Institute of Chemical Engineers
2023 Co-Chair, Area 08F (Composites), Materials Engineering & Science Division, American Institute of Chemical Engineers
- 2023 Session Chair, Carbon Nanomaterials I: Dispersion, Surface Structure, and Biointeractions, American Institute of Chemical Engineers
- 2023 Session Co-Chair, Active Colloidal Systems, American Institute of Chemical Engineers
- 2023 Session Co-Chair, Bio-inspired Composites, American Institute of Chemical Engineers
- 2023 Session Co-Chair, Dynamic Processes at Interfaces, American Institute of Chemical Engineers
- 2022 Carbon Nanomaterials Graduate Student Award Judge (Nov. 14, 2022), American Institute of Chemical Engineers National Meeting
- 2020– ACS Materials Letters Early Career Advisory Board, American Chemical Society
2019 Session Chair (Jun. 17, 2019), Active & Responsive Matter, ACS Colloidal and Surface Science Symposium, American Chemical Society

Outreach Activities

- 2024 Jihpeng Sun (PhD advisee), Volunteer (Mar. 09, 2024), FEMMES Capstone activity to promote scientific literacy for fourth through sixth grade students, *Ann Arbor*
- 2023 [Interdisciplinary Research Opportunities Program for Undergraduates in Semiconductor Technology](#), *Intel Cooperation and University of Michigan*
- 2023 [Discover Engineering](#) (Aug. 13, 2023), design hands on experience to broaden local high school students' interests in science and engineering, *Ann Arbor*
- 2023 Hosted high school student Fiona Nikolla (Utica Academy for International Studies) over the summer for hands-on research experience, *Ann Arbor*
- 2022 Matthew Manion (PhD advisee), [Volunteer](#) (Dec. 13, 2022), [FEMMES](#) Capstone activity to promote scientific literacy for fourth through sixth grade students, *Ann Arbor*
- 2019 Panelist (Aug. 26, 2019), School of Engineering TA Training, *MIT*
- 2019 Workshop (with Felice Frankel, May 13, 2019), 'Is Your Graphics the Best It Can Be?', *MIT*
- 2019 Panelist (May 02, 2019), [Nord Anglia School STEAM Week](#), 'Using Visuals to Communicate Science', *MIT*
- 2019 Workshop (Apr. 10, 2019), 'Teaching & Mentoring Skills for English-as-Second-Language Speakers', *MIT*
- 2018 Lecturer (Apr. 18, 2018), Digital Play Day: New Ways to Interface with Technology, [Cambridge Science Festival](#), *MIT Museum*