

Rachel A. Yang, Ph.D.

Assistant Professor at Rutgers University New Brunswick (Chemical and Biochemical Engineering)
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EDUCATION

Ph.D. Chemical and Biological Engineering, Princeton University, conferred May 28, 2024

- Research Adviser: Dr. Michele L. Sarazen
- Committee: Dr. Bruce E. Koel, Dr. Paul J. Chirik, Dr. A. James Link, Dr. Sankaran Sundaresan
- Dissertation title: Adsorption, reactivity, and deactivation mechanisms on metal-organic framework catalysts and sorbents (*Jui Dasgupta Outstanding Dissertation Award*)

B.S. Chemical and Biochemical Engineering, Rutgers University, conferred May 13, 2018

- Cumulative GPA: 3.915, *summa cum laude*
- Major GPA: 4.000
- Research Adviser: Dr. Fuat E. Celik
- Engineering Honors Academy, Chemical and Biochemical Engineering Honors Academy

RESEARCH

Chemical and Biochemical Engineering, Rutgers University, January 2027 – present

Assistant Professor

My research program involves chemical kinetics and material synthesis/design to investigate promising porous solid catalysts. We utilize insights gained through spectroscopic and kinetic assessments to develop unifying mechanistic concepts that guide the modification of catalyst structures and compositions for improved reactivity, selectivity, and stability for existing and new chemistries. Broadly, my research team's current work investigates:

1. **Dynamic, flexible MOF catalysts/adsorbents** for shape-selective chemical conversions/adsorption,
2. **Pore environments in (biomimetic) chiral MOFs** for regioselective/asymmetric catalysis, and
3. **Meso/macroporous mixed metal oxides** to enhance the atom-efficiency of metal sites for a diverse carbon-centered reaction portfolio.

Chemical Engineering, University of Michigan Ann Arbor, June 2024 – October 2026

Post-doctoral fellow and Lab Manager, Nikolla Group

- **Ligation of catalytically active cations within perovskite oxides for CO₂ and methane conversion**
 - Hydrothermal and solid-state synthesis methods combined with spectroscopic and kinetic experiments for the efficient conversion of CH₄ with CO₂ co-reactants
- **Non-stoichiometric mixed-metal oxides for oxidative methane coupling**
 - Synthesis combined with spectroscopic and kinetic experiments to elucidate reaction mechanisms for the oxidative coupling of methane over Ruddlesden-Popper phase oxides
- **Dynamic perovskite oxide structures to control selective C—O bond cleavage in polyethylene terephthalate upcycling**
 - In collaboration with the Pagán-Torres Group at the University of Puerto Rico-Mayaguez
 - Synthesis of Ruddlesden-Popper phase oxides and doped ABO₃ perovskites
 - Kinetic experiments to determine structure-function relationships to enhance hydrogen-assisted selective C—O bond cleavage in probe molecules for polyethylene terephthalate upcycling
- **Photon-driven mechanisms for CO-desorption limited reactions on Rh-doped perovskite oxides**

- In collaboration with the Center for Programmable Energy Catalysis (CPEC)
- Kinetic studies for the derivation of operative rate laws within CO-desorption limited chemistries (probe CO oxidation) and the perturbation of limiting species surface coverages utilizing light
- **Photolysis of thermodynamically stable geminal dicarbonyl Rh complexes**
 - In collaboration with Dr. Michael G. Allan (Nikolla Group), the Christopher Group (UCSB), and the Gordon Group (UCSB)
 - Characterization (N_2 physisorption, CO-TPD) and kinetic analysis to decipher mechanisms for photolysis of geminal dicarbonyl Rh species supported on non-reducible oxides and doped within semiconducting perovskites

Chemical and Biological Engineering, Princeton University, September 2018 – April 2024

Graduate Student, Sarazen Research Group

- **Kinetic and deactivation mechanisms of isostructural metal-organic frameworks for green alkene oxidation**
 - Investigating Cr and Fe crystalline porous metal carboxylate frameworks for liquid-phase batch aryl epoxidations utilizing benign oxidants to understand reaction and deactivation mechanisms through kinetic and spectroscopic experiments
- **Reaction pathways and deactivation phenomena for isometallic metal-organic frameworks for small-molecule organic oxidation on base metals**
 - Utilizing isometallic Fe metal-organic frameworks to investigate the effect of coordination environment, pore size, and chemical functionality on reaction pathways and deactivation mechanisms for small-molecule organic oxidations
- **Design of CO₂ adsorbents utilizing aminopolymers supported on metal-organic frameworks**
 - Synthesize novel aminopolymers supported on MOFs that exhibit enhanced thermal and oxidative stability for CO₂ capture (direct air and flue gas compositions)
 - Characterize aminopolymer-MOF interactions, quantify CO₂ adsorption efficiency
- **Modulation of metal-organic framework crystal size for novel thin-film synthesis**
 - Collaboration with Dr. Antoine Kahn (Department of Electrical and Computer Engineering, Princeton University)
 - Designing and optimizing synthetic procedures to control crystal size and growth of metal-organic framework thin-films for spectroscopic investigation of electronic structure
- **Isolated-site Pd metal-organic frameworks for cross-coupling reactions**
 - Collaboration with Bristol Myers Squibb (Dr. Ronald Carrasquillo)
 - Synthesizing isolated single-site Pd tethered to UiO-67(Zr) at various weight loadings to elucidate metal-acid site proximity effects for Suzuki (and other) coupling reactions; additional spectroscopic and textural characterization of Pd supported on reducible oxides is performed on BMS samples to rationalize their reactivity

Chemical and Biochemical Engineering, Rutgers University, July 2022 – July 2023

Research Scholar, Celik Catalysis Group

- **Fe carboxylate metal-organic frameworks for gas-phase continuous epoxide carbonylation**
 - Hosted by Dr. Fuat E. Celik at Rutgers University New Brunswick
 - Spectroscopic and mechanistic investigation of co-catalyst free, continuous, gas-phase styrene oxide carbonylation to cyclic carbonates over MIL-101(Fe) and NH₂-MIL-101(Fe)

Chemical and Biochemical Engineering, Rutgers University, May 2015 – May 2018

Undergraduate Researcher, Celik Catalysis Group

- **Low pressure flame synthesis of titanium dioxide**, May 2015 – May 2018
 - Collaboration with Dr. Stephen D. Tse's laboratory in Mechanical & Aerospace Engineering
 - Low pressure flame synthesis of anatase phase TiO₂ nanoparticles for sustainable chemical and fuel production via photocatalytic methane steam reforming
 - Apparatus proficiency: Valve systems, UV-Visible Spectroscopy, Scanning Electron Microscopy (SEM), Gas Chromatography (GC), Vacuum systems, PID controllers
 - Software proficiency: use of LabVIEW interface to control and monitor real-time experimental parameters, Agilent ChemStation
- **High pressure high temperature annealing of titanium dioxide**, May 2015 – May 2018
 - Experimental synthesis, characterization, and analysis of high-pressure high temperature annealed TiO₂ for photocatalytic methane steam reforming applications
 - Apparatus proficiency: Parr reactors (autoclaves), SEM, X-ray diffraction
 - Software proficiency: Matlab, Microsoft Office, OriginLab, Fityk, Agilent ChemStation
- **Immobilized pincer-ligated iridium catalysts**, May 2017 – September 2017
 - Collaboration with Dr. Alan S. Goldman's laboratory in Chemistry & Chemical Biology
 - Organic synthesis and analysis of supported immobilized pincer ligated iridium catalysts for heterogeneous thermocatalytic light alkane dehydrogenation
 - Apparatus proficiency: Extended experience with glovebox techniques and operating under air-free conditions, valve systems
 - Software proficiency: Agilent ChemStation
- **Synthesis and analysis of platinum (tin) alloys for alkane dehydrogenation**, August 2017 – May 2018
 - Assistance from Prof. Robert B. Barat from The New Jersey Institute of Technology
 - Synthesis, characterization, and analysis of Pt-alloys supported on hydrotalcite-derived material to elucidate mechanisms of coke formation and test activity for alkane dehydrogenation reactions in a heterogeneous continuous flow system
 - Basis for a J.J. Slade Scholar Senior Thesis
 - Led experimental efforts and training of an undergraduate and graduate student
- **Synthesis and analysis of metal-modified titanium dioxide**, May 2015 – May 2018
 - Synthesis, characterization and analysis of copper and palladium nanoparticles supported on P25 TiO₂ for photocatalytic conversion of renewable feedstock to H₂ gas
- **Supported heteropoly acids on titanium dioxide**, May 2017 – August 2017
 - Initial synthesis, characterization, and analysis of supported heteropoly acid Keggin structures on titanium dioxide for photocatalytic production of oxygenates from methane
 - Started independent research effort to determine the feasibility of the project

Chemical and Biochemical Engineering, Rutgers University

Senior Design Coursework

- **Computational Study of the Conversion of Natural Gas to Acetic Acid**, September 2017 – May 2018
 - Faculty adviser: Dr. Fuat E. Celik
 - Computational and economics investigation using ASPEN PLUS software to design and model a self-sustaining chemical production plant based on forward-thinking technologies in literature for implementation in the next decade
 - Maintained leadership role while working with a team of 6 peers

- Fall and spring semesters culminated in comprehensive proposal with full plant simulation and economics evaluation
- Software proficiency: ASPEN PLUS, Matlab

PUBLICATIONS

1. **Yang, R.A.**; Omodt, L.; Christopher, P.; Nikolla, E. Beyond Thermal Limits: Manipulating Reactive Intermediate Coverages and Turnover Rates via Visible Photon-Mediated Catalysis on Rh-Doped Perovskite Oxides. *J. Am. Chem. Soc.* **2026**. *148*, 32827.
2. **Yang, R.A.**; Nikolla, E. Tuning the interplay of metal and oxygen environments within mixed metal oxide catalysts for oxidative methane conversions. **2026**. *Invited; in revisions at Energy & Fuels*.
3. **(co-first) Yang, R.A.**; Bhat, S.; Ortega, C.; Aunkon, R.; Sepúlveda-Pagán, M.; Sun, K.; Frenkel, A.; Pagán-Torres, Y.; Nikolla, E. Reversible modulation of metal active site ensembles within doped perovskite oxides to drive switchable catalytic outcomes. **2026**. *In revisions at JACS Au*.
4. **Yang, R.A.**; Sun, K.; Nikolla, E. Ligation of Single-Site Ruthenium within Perovskite Oxides for Efficient Conversion of Thermodynamically Stable Molecules. *ACS Catal.* **2026**. *16*, 1645.
5. Velinkar, K.K.; **Yang, R.A.**; Nikolla, E. Insights into Acidic Oxygen Evolution Reaction over Ru-Pyrochlore Oxide Electrocatalysts: Role of Lanthanide Cations in Dictating Stability. *ACS Catal.* **2026**. *16*, 16092.
6. Joo, H.; **Yang, R.A.**; Sun, K.; Nikolla, E. Impacts of A-Site Composition on the Cation Dissolution-Mediated Surface Restructuring of Layered Nickelate Oxide Electrocatalysts During Alkaline Oxygen Evolution Reaction. *ChemElectroChem.* **2026**. *0*, e202500414.
7. **Yang, R.A.**; Trettin, J.L.; Miller, J.L.; Sarazen, M.L. Catalytic implications of pore structure, nodal identity, and coordination environment on alkene oxidation by hydrogen peroxide over metal-organic frameworks. *J. Am. Chem. Soc.* **2025**. *147*, 34527.
8. **(co-first) Yang, R.A.**; Allan, M.G.; Marino, S.; Gordon, M.; Christopher, P.; Nikolla, E. Visible light-induced desorption of strongly bound chemical species from Rh single cationic sites doped in a semiconductor perovskite oxide. *J. Am. Chem. Soc.* **2025**. *147*, 898.
9. Hullfish, C.W.; **Yang, R.A.**; Sarazen, M.L. Insights into liquid-phase titration of Pd surfaces. *Ind. Eng. Chem. Res.* **2025**. *64*, 1011.
10. Moore, S.C.; Carrasquillo-Flores, R.; **Yang, R.A.**; Trettin, J.L.; Becwar, S.; Huo, J.; Wood, S.; Nye, J.; Sarazen, M.L. Investigation of Pd speciation and support interactions for Suzuki reactions. *Appl. Cat. A. Gen.* **2025**. *700*, 120279.
11. **Yang, R.A.**; Hughes, S.N.; Cho, S.; and Sarazen, M.L. Implications of defect density for CO₂ capture on amine-functionalized MIL-101(Cr). *ChemSusChem* **2024**, e202400249.
12. **Yang, R.A.** and Sarazen, M.L. Coupling deviations in local structure to long-range functionality in MOF materials. *Chem. Catalysis* **2023**. *3*, 100576.
13. *Contributor to Addressing Rigor and Reproducibility in Thermal, Heterogeneous Catalysis.* **2023**. <https://doi.org/10.5281/zenodo.8029159>.
14. **Yang, R.A.**; Ganza, D.R.; Jiang, E.; Vandermel, J.A.; Sarazen, M.L. Solvent stabilization of branched aminopolymer/Uio-67(Zr) composite materials for CO₂ capture. *Mater. Adv.* **2023**. *4*, 901.
15. **Yang, R.A.**; Moore, S.C.; Smith, M.R.; Trettin, J.L.; and Sarazen, M.L. Kinetic Impacts of Defect Sites in Metal-Organic Framework Catalysts under Varied Driving Forces. *ACS Energy Lett.* **2023**. *8*, 1397.
16. **Yang, R.A.** and Sarazen, M.L. Mechanistic impacts of metal site and solvent identities for alkene oxidation over carboxylate Fe and Cr metal-organic frameworks. *ACS Catal.* **2022**. *12*, 14476.
17. **Yang, R.A.** and Sarazen, M.L. Reaction pathways and deactivation mechanisms of isostructural Cr and Fe MIL-101 during liquid-phase styrene oxidation by hydrogen peroxide. *Catal. Sci. Technol* **2021**. *11*, 5282.
18. Pennington, A.M.; **Yang, R.A.**; Munoz, D.T.; Traeger, S.M.; Celik, F.E. Photocatalytic Methane Steam Reforming over Defect-Rich Anatase TiO₂. *Int. J. Hydrogen Energy.* **2018**, *43*, 15176.
19. **Yang, R.A.**; Celik, F.E. Investigation of Platinum-tin Bi-metallic alloys for Production of Butenes via Catalytic Butane Dehydrogenation. *James J. Slade Scholars Program* **2018**. Senior thesis.

FELLOWSHIPS

Graduate Student, Princeton University

- **Wallace Memorial Fellowship in Engineering**
 - Highest award conferrable to graduate students in the School of Engineering and Applied Science
 - Students must be nominated by their department to be considered for an Honorific Fellowship
 - Provides full university fellowship tuition and a 12-month premium stipend set at a rate which exceeds standard support
- **First Year Fellowship**
 - Awarded to new students in Natural Science and Engineering departments
 - Includes full tuition and 10-month stipend

Undergraduate Student, Rutgers University

- **National Aeronautics and Space Administration (NASA) Undergraduate Research Fellow**
 - Duration: May 2017 – September 2017
 - Research advisor: Dr. Fuat E. Celik
 - Awarded stipend from the New Jersey Space Grant Consortium (NJS GC) for the investigation of titanium dioxide based photocatalysts for the generation of hydrogen from biogas
 - Full time summer fellowship for a total of 9 weeks
 - Culminated in a public oral presentation, poster presentation, and a short thesis
- **Center for Enabling New Technologies through Catalysis (CENTC) Undergraduate Research Fellow**
 - Duration: May 2017 – September 2017
 - Research advisor(s): D. Fuat E. Celik, Dr. Alan S. Goldman
 - Awarded stipend from CENTC for the investigation of immobilized pincer ligated iridium catalysts for light alkane dehydrogenation in heterogeneous flow systems
 - Full time summer fellowship for a total of 10 weeks
- **Rutgers Energy Institute Undergraduate Summer Intern**
 - Duration: May 2016 – September 2016
 - Research advisor: Dr. Fuat E. Celik
 - Awarded stipend for research investigating high pressure high temperature annealed anatase titanium dioxide for photocatalytic generation of fuels and chemicals
 - Full time summer internship with the Rutgers Energy Institute for a total of 10 weeks
 - Culminated in a public oral presentation, poster presentation, and a short thesis
- **Aresty Research Center Summer Science Scholar**
 - Duration: May 2015 – September 2015
 - Research advisor: Dr. Fuat E. Celik
 - Awarded stipend for research investigating metal deposition on TiO₂-based photocatalysts for sustainable production of chemicals and fuels from renewable feedstocks
 - Full time summer opportunity for a total of 9 weeks
 - Culminated in a public poster presentation

PRESENTATIONS

Post-doctoral Fellow, University of Michigan Ann Arbor

1. **Yang, R.A.**; Omodt, L.; Christopher, P.; Nikolla, E. (2026, November) *Visible light engineering of surface constrained catalysis on photo-active Rh-doped perovskite oxides*. Oral presentation accepted at the 2026 AIChE Annual Meeting in Minneapolis, MN.
2. **Yang, R.A.**; Omodt, L.; Christopher, P.; Nikolla, E. (2026, May) *Interplay of thermal and photochemical transformations for selective catalysis on photo-active Rh-doped perovskite oxides*. Oral presentation at the Michigan Catalysis Society 47th Annual Spring Symposium in Midland, MI.
3. **Yang, R.A.**; Nikolla, E. (2026, March) *Design of ligated metal sites within perovskite oxides to satisfy site requirements for activation of stable molecules*. Invited oral presentation at the ACS Spring 2026 Meeting in Atlanta, GA.
4. **Yang, R.A.**; Nikolla, E. (2025, November) *Design of doped transition metal oxides to satisfy site requirements for activation of stable molecules*. Oral presentation at the 2025 AIChE Annual Meeting in Boston, MA.

5. **Yang, R.A.**; Nikolla, E. (2025, November) *Tuning the interplay of metal and oxygen sites within mixed-metal oxides for oxidative methane conversions*. Oral presentation at the 2025 AIChE Annual Meeting in Boston, MA.
6. **Yang, R.A.**; Nikolla, E. (2025, August) *Ligation of single-site transition-metal cations within perovskite oxides for efficient conversion of stable molecules*. Oral presentation at the ACS Fall 2025 Meeting in Washington, DC.
7. **Yang, R.A.**; Nikolla, E. (2025, June) *Deciphering transition-metal B-site reactivity, selectivity, and stability for oxidative C₁ hydrocarbon upgrading on perovskite oxides*. Poster presentation at the 29th North American Catalysis Society Meeting in Atlanta, GA.
8. **Yang, R.A.**; Nikolla, E. (2025, May) *Catalytic consequences of metal and oxygen site interplay within mixed-metal oxides for oxidative methane conversions*. Poster presentation at the Michigan Catalysis Society 46th Annual Spring Symposium in Warren, MI.
9. **Yang, R.A.**; Sarazen, M.L. (2024, October) *Elucidating the Role of Defects within Chromium MOFs for Carbon Transformations and Capture*. Oral presentation at the 2024 Annual AIChE Meeting in San Diego, CA.
10. **Yang, R.A.**; Sarazen, M.L. (2024, October) *Tailoring the Coordinating Environment Around Active Iron Centers within MOFs for Liquid-Phase Oxidation Reactions*. Oral presentation at the 2024 Annual AIChE Meeting in San Diego, CA.
11. **Miller, J.**; **Yang, R.A.**; Sarazen, M.L. (2024, October) *Probing Structural Dynamics and Selectivities during MOF Oxidation Reactions*. Oral presentation at the 2024 Annual AIChE Meeting in San Diego, CA.

Graduate Student, Princeton University

1. **Yang, R.A.**; Sarazen, M.L. (2024, March) *Coordination environment effects on alkene oxidation kinetics of iron carboxylate metal-organic frameworks*. Invited oral presentation at the 2024 Spring ACS Meeting in New Orleans, LA.
2. **Yang, R.A.**; Sarazen, M.L. (2023, December) *Leveraging Modularity in Metal-Organic Frameworks for Sustainable Liquid Hydrocarbon Upgrading*. Invited oral presentation at the 3rd International Forum on Energy and Informatics in Bali, Indonesia.
3. **Yang, R.A.**; Sarazen, M.L. (2023, November) *Effects of coordination environment on the reactivity, selectivity, and stability of iron carboxylate MOFs for peroxide-mediated alkene oxidation*. Oral presentation accepted at the 2023 Annual AIChE Meeting in Orlando, FL.
4. **Yang, R.A.**; Sarazen, M.L. (2023, August) *Implications of iron coordination environment in carboxylate metal-organic frameworks for alkene oxidation*. Accepted at the 2023 Fall ACS Meeting San Francisco, CA.
5. **Yang, R.A.** (2023, July) *Overcoming obstacles in catalysis*. Oral presentation at the 2023 CBE Diversity, Equity, and Inclusion Symposium in Princeton, NJ.
6. **Yang, R.A.**; Sarazen, M.L. (2023, June) *Implications of pore structure and coordination environment for green alkene oxidation over iron-based metal-organic frameworks*. Oral presentation at the 28th North American Catalysis Society Meeting in Providence, RI.
7. **Yang, R.A.**; Sarazen, M.L. (2023, May) *Kinetic and deactivation mechanisms of Fe and Cr carboxylate metal-organic frameworks for styrene oxidation*. Poster presentation at the 2022-2023 Catalysis Club of Philadelphia Annual Student Poster Session at Villanova University in Wayne, PA.
8. **Yang, R.A.**; Sarazen, M.L. (2022, December) *Elucidating catalytic mechanisms and inefficiencies in Fe- and Cr-carboxylate metal-organic frameworks*. Poster presentation at the 26th Meeting of the North-East Corridor Zeolite Association at Villanova University in Wayne, PA.
9. **Yang, R.A.**; Sarazen, M.L. (2022, November) *Consequences of solvent and coordination environments on alkene oxidation reactivity and deactivation of Fe and Cr metal-organic frameworks*. Oral presentation at the 2022 Annual AIChE Meeting in Phoenix, AZ.
10. **Yang, R.A.**; **Sarazen, M. L.** (2022, October) *(Un)desired transformations of metal-organic frameworks (MOFs) catalysts for small molecule conversions*. (Invited) oral presentation to be given at the CCNY Chemical Engineering Seminar.
11. **Yang, R.A.**; Sarazen, M.L. (2022, June) *Consequences of solvent and coordination environments on alkene oxidation reactivity and deactivation of Fe and Cr metal-organic frameworks*. Poster presentation at the 2021-2022 Catalysis Club of Philadelphia Annual Student Poster Session at Villanova University in Wayne, PA.

12. **Yang, R.A.**; Sarazen, M.L. (2022, May) *Elucidation of Isostructural MIL-101 Deactivation Mechanisms for Liquid-Phase Styrene Oxidation By Hydrogen Peroxide*. Poster presentation at the 27th North American Catalysis Society Meeting in New York City, NY.
13. **Yang, R.A.**; **Sarazen, M.L.** (2022, May) *Reaction Pathways and Kinetic Descriptors of Iron- and Chromium-Based Metal-Organic Frameworks for Aryl Alkene Oxidation*. Oral presentation at the 27th North American Catalysis Society Meeting in New York City, NY.
14. **Yang, R.A.**; Moore, S.C.; **Sarazen, M. L.** (2022, March) *Ramifications of solvent and coordination environments on iron carboxylate MOF-catalyzed oxidation reactions*. (Invited) oral presentation at the American Chemical Society Spring Meeting.
15. **Yang, R.A.**, Moore, S.C.; **Sarazen, M. L.** (2022, March) *Ramifications of solvent and coordination environments on iron carboxylate MOF-catalyzed oxidation reactions*. (Invited) oral presentation at the 2022 American Chemical Society Spring Meeting.
16. **Yang, R.A.**; **Sarazen, M. L.** (2022, March) *(Un)desired transformations of metal-organic frameworks (MOFs) catalysts for small molecule conversions*. (Invited) oral presentation at the Michigan Catalysis Society.
17. **Yang, R.A.**; **Sarazen, M. L.** (2021, December) *Investigating kinetic and deactivation mechanisms of isostructural MIL-101 for organic small-molecule oxidation*. (Invited) oral presentation at the International Chemical Congress of Pacific Basin Societies 2021.
18. **Yang, R.A.**; Sarazen, M.L. (2021, December) *Catalytic implications of pore environment in Fe-based metal-organic frameworks*. Poster (oral) presentation at the 25th Virtual Meeting of the North-East Corridor Zeolite Association.
19. **Yang, R.A.**; Sarazen, M.L. (2021, November) *Iron carboxylate metal-organic frameworks for green styrene oxidation*. Oral presentation at the 2021 Annual AIChE Meeting in Boston, MA.
20. **Yang, R.A.**; **Sarazen, M.L.** (2021, November) *Deciphering mechanisms of reaction and deactivation over isostructural metal-organic frameworks for small-molecule organic oxidation*. Oral presentation at the 2021 Annual AIChE Meeting in Boston, MA.
21. **Yang, R.A.**; **Sarazen, M.L.** (2021, December) *Investigating kinetic and deactivation mechanisms of iron- and chromium-based metal-organic frameworks for aryl alkene oxidation*. Oral presentation for an award session at the Pacificchem 2021 Congress in Honolulu, HI.
22. **Yang, R.A.**; **Sarazen, M. L.** (2021, August) *Survive and advance: A study of metal-organic frameworks deactivation mechanisms for small-molecule conversions*. (Invited) oral presentation at the American Chemical Society Fall Meeting.
23. **Yang, R.A.**; **Sarazen, M. L.** (2021, June) *Influence of Kinetic and deactivation mechanisms of isostructural MIL-101 for organic small-molecule oxidations*. (Invited) oral presentation at the American Chemical Society Middle Atlantic Regional Meeting.
24. **Yang, R.A.**; Ko, M.; Sarazen, M.L. (2021, March) *Cr and Fe metal-organic frameworks for green small-molecular aryl alkene oxidation*. Poster (oral) presented at the 2021 Catalysis Society of Metropolitan NY Annual Symposium hosted by Princeton University in Princeton, NJ.
25. **Yang, R.A.**; Sarazen, M.L. (2020, December) *Fe and Cr metal-organic frameworks for benign aryl alkene oxidation*. Poster (oral) presented at the 24th Virtual Meeting of the North-East Corridor Zeolite Association hosted by Princeton University in Princeton, NJ.
26. **Yang, R.A.**; **Sarazen, M. L.** (2020, November) *Investigating kinetic and deactivation mechanisms of isostructural MIL-101 for organic small-molecule oxidation*. (Invited) oral presentation at the 2020 American Institute of Chemical Engineers Meeting (postponed due to COVID-19).
27. **Yang, R.A.**; Sarazen, M.L. (2020, October) *Spectroscopic and kinetic investigation of isostructural metal-organic frameworks for green styrene oxidation*. Poster (oral) presented at the 2020 Andlinger Center Annual Meeting at Princeton University in Princeton, NJ.
28. **Yang, R.A.**; **Sarazen, M.L.** (2020, June) *Kinetic and Deactivation Mechanisms of Alkene Oxidation Reactions on Fe and Cr Based Metal-Organic Frameworks*. Accepted for oral presentation at the 17th International Congress on Catalysis in San Diego, CA. (postponed due to COVID-19)
29. **Nsanzineza, S.P.**; **Yang, R.A.**; Sarazen, M.L. *Investigation of the impact of crystal size of Metal-Organic Frameworks on their heterogeneous catalytic activity for oxidation reactions*. Oral defense of senior thesis.
30. **Yang, R.A.**; Ko, M.; Sarazen, M.L. (2020, March) *Investigation of kinetic and deactivation mechanisms of metal-organic frameworks for small-molecule oxidation reactions*. Poster accepted for presentation at the 2020 Catalysis Society of Metropolitan NY Annual Symposium at the New Jersey Institute of Technology in Newark, NJ (cancelled due to COVID-19).

31. **Yang, R.A.**; Ko, M.; Sarazen, M.L. (2019, November) *Investigation of Metal-Organic Frameworks as Heterogeneous Catalysts for Aryl Oxidation*. Poster presented at the 2019 Joint Meeting between the Catalysis Club of Philadelphia and the Catalysis Society of Metropolitan NY at Lehigh University in Bethlehem, PA.
32. **Yang, R.A.**; Sarazen, M.L. (2019, November) *Kinetic and Deactivation Mechanisms of Oxidation Reactions on Metal-Organic Frameworks*. Poster accepted for presentation at the Andlinger Center for Energy and the Environment 2019 Annual Meeting at Princeton University in Princeton, NJ.
33. **Yang, R.A.**; Sarazen, M.L. (2019, October) *Kinetic and Deactivation Mechanisms of Oxidation Reactions on Metal-Organic Frameworks (MOFs)*. Poster presented at the 2019 Andlinger Center Annual Meeting at Princeton University in Princeton, NJ.
34. **Ko, M.**; **Yang, R.A.**, Sarazen, M.L. (2019, August) *Investigation of MIL-101(Cr): Synthesis, Characterization, and Catalysis*. Poster presented at the 2019 REU Poster Night hosted by the Princeton Center for Complex Materials at Princeton University in Princeton, NJ.

Undergraduate Student, Rutgers University

1. **Yang, R.A.**; Barat, R.B.; Celik, F.E. (2018, May). *Investigation of Platinum Alloys for Light Alkane Dehydrogenation*. Oral presentation given at the 2018 Aresty Colloquium at Rutgers University in New Brunswick, NJ.
2. **Yang, R.A.**; Barat, R.B.; Sheludko, B.; Celik, F.E. (2018, April). *Investigation of Platinum Alloys for Light Alkane Dehydrogenation*. Poster presented at the 2018 Annual Undergraduate Research Day at Rutgers University in New Brunswick, NJ.
3. **Yang, R.A.**; Barat, R.B.; Sheludko, B.; Celik, F.E. (2018, April). *Investigation of Platinum Alloys for Light Alkane Dehydrogenation*. Poster presented at the 2018 James J. Slade Symposium at Rutgers University in New Brunswick, NJ.
4. **Yang, R.A.**; Barat, R.B.; Sheludko, B.; Celik, F.E. (2018, April). *Investigation of Platinum Alloys for Light Alkane Dehydrogenation*. Poster presented at the 2018 AIChE Mid-Atlantic Regional Conference at Princeton University in Princeton, NJ.
5. **Pennington, A.M.**; **Yang, R.A.**; Munoz, D.T.; Celik, F.E. *Sustainable Production of Hydrogen via Photocatalytic MSR Over Stable Defect Rich Anatase TiO₂*. Poster presented at the 2017 Catalysis Club of Philadelphia Meeting in Claymont, DE.
6. **Yang, R.A.**; Barat, R.B.; Celik, F.E. (2017, October). *Investigation of Platinum Alloys for Light Alkane Dehydrogenation*. Poster presented at the 2017 AIChE Annual Meeting in Minneapolis, MN.
7. **Pennington, A.M.**; Hook, A.; **Yang, R.A.**; Celik, F.E. (2017, August). *Photocatalytic Methane Steam Reforming over Defect-Rich TiO₂*. Oral presentation given at the 254th American Chemical Society National Meeting in Washington, DC.
8. **Yang, R.A.**; Pennington, A.M.; Dagnall, K.A.; Tse, S.D.; Celik, F.E. (2017, August). *Low Pressure Flame Synthesized TiO₂ for Sustainable Fuel and Chemical Production*. Oral presentation given at the 2017 New Jersey Space Grant Consortium Summer Fellowship Conference at Rutgers University in New Brunswick, NJ.
9. **Yang, R.A.**; Pennington, A.M.; Celik, F.E. (2017, May). *High Pressure High Temperature Annealed TiO₂ for Photocatalytic Biomass Reforming*. Poster presented at the 2017 Undergraduate Research Day at Rutgers University in New Brunswick, NJ.
10. **Yang, R.A.**; Pennington, A.M.; Celik, F.E. (2017, March). *High Pressure High Temperature Annealed TiO₂ for Photocatalytic Biomass Reforming*. Poster presented at the 2017 2nd Annual Society of Women Engineers Graduate Symposium at Rutgers University in New Brunswick, NJ.
11. **Yang, R.A.**; Pennington, A.M.; Celik, F.E. (2017, March). *High Pressure High Temperature Annealed TiO₂ for Photocatalytic Biomass Reforming*. Oral presentation given at the 2017 AIChE Mid-Atlantic Regional Conference at Rowan University in Glassboro, NJ.
12. **Yang, R.A.**; Pennington, A.M.; Celik, F.E. (2017, February). *High Pressure High Temperature Annealed TiO₂ for Photocatalytic Biomass Reforming*. Poster presented at the 2017 Engineering Showcase at the Johnson & Johnson World Headquarters in New Brunswick, NJ.
13. **Yang, R.A.**; Pennington, A.M.; Dagnall, K.A.; Tse, S.D.; Celik, F.E. (2017, February). *Low Pressure Flame Synthesized TiO₂ for Sustainable Fuel Generation*. Poster presented at the 2017 Catalysis Society of Metropolitan New York Annual Symposium at the Research and Development Center of the ExxonMobil Research and Engineering Company in Clinton, NJ.

14. **Yang, R.A.**; Pennington, A.M.; Celik, F.E. (2016, November). *High Pressure High Temperature Annealed TiO₂ for Photocatalytic Biomass Reforming*. Poster presented at the 2016 AIChE Annual Meeting in San Francisco, CA.
15. **Pennington, A.M.**; Dagnall, K.A.; **Yang, R.A.**; Parikh, U.; Okonmah, A.I.; Celik, F.E. (2016, August). *Flame Synthesis and High Pressure High Temperature Annealing of Anatase TiO₂ for Increased Photocatalytic Activity*. Oral presentation given at the 252nd American Chemical Society National Meeting in Philadelphia, PA.
16. **Yang, R.A.**; Pennington, A.M.; Celik, F.E. (2016, August). *High Pressure High Temperature Annealed TiO₂ for Photocatalytic Biogas Reforming*. Oral presentation given for the completion of a summer internship with the Rutgers Energy Institute.
17. **Pennington, A.M.**; Dagnall, K.A.; **Yang, R.A.**; Parikh, U.; Okonmah, A.I.; Celik, F.E. (2016, April). *Flame Synthesis and High Pressure High Temperature Annealing of Anatase TiO₂ for Increased Photocatalytic Conversion of Biogas*. Poster presented at the Food Waste-to-Low Carbon Energy Conference in New Brunswick, NJ.
18. **Yang, R.A.**; Pennington, A.M.; Celik, F.E. (2016, April). *High Pressure High Temperature Annealed TiO₂ for Photocatalytic Production of Sustainable Fuels*. Poster presented at the 2016 Aresty Undergraduate Symposium at Rutgers University in New Brunswick, NJ.
19. **Yang, R.A.**; Pennington, A.M.; Celik, F.E. (2016, April). *High Pressure High Temperature Annealed TiO₂ for Photocatalytic Production of Sustainable Fuels*. Poster presented at the 2016 AIChE Mid-Atlantic Regional Conference at the University of Delaware in Newark, DE.
20. **Pennington, A.M.**; Dagnall, K.A.; **Yang, R.A.**; Parikh, U.; Okonmah, A.I.; Celik, F.E. (2016, March). *Flame Synthesis and High Pressure High Temperature Annealing of Anatase TiO₂ for Increased Photocatalytic Activity*. Poster presented at the Catalysis Society of Metropolitan New York – 2016 Annual Symposium in New Brunswick, NJ – Selected for 4th place award.
21. **Yang, R.A.**; Pennington, A.M.; Celik, F.E. (2016, March). *Synthesis of Hydrogen Annealed TiO₂ for Photocatalytic Production of Sustainable Fuels*. Poster presented at the 1st Annual Society of Women Engineers Graduate Symposium at Rutgers University in New Brunswick, NJ.
22. **Yang, R.A.**; Pennington, A.M.; Celik, F.E. (2016, March). *High Pressure High Temperature Annealed TiO₂ for Photocatalytic Production of Sustainable Fuels*. Poster presented at the 2016 Chemical & Biochemical Engineering Undergraduate Symposium at Rutgers University in New Brunswick, NJ.
23. **Pennington, A.M.**; Dagnall, K.A.; **Yang, R.A.**; Lavroff, R.H.; Dickson, K.M.; Celik, F.E. (2015, November). *Production of Hydrogen via Visible-Light Photocatalytic Methane Steam Reforming Over Modified Titanium Dioxide*. Poster presented at the Catalysis Society of Philadelphia Annual Student Poster Contest in Wilmington, DE.
24. **Yang, R.A.**; Pennington, A.M.; Tse, S.D.; Celik, F.E. (2015, August). *Low Pressure Flame Synthesized TiO₂ Nanoparticles for Biomass Reforming*. Poster at the 2015 Aresty Undergraduate Summer Science Research Symposium at Rutgers University in New Brunswick, NJ.

HONORS & AWARDS

Post-doctoral Research Fellow, University of Michigan Ann Arbor

- **University of Michigan Post-doctoral Association Travel Award 2024-25** for the 29th North American Catalysis Society Meeting in Atlanta, GA for a poster presentation

Graduate Student, Princeton University

- **Jui Dasgupta Outstanding Dissertation Award** for written doctoral dissertation in Chemical & Biological Engineering entitled: Adsorption, reactivity, and deactivation mechanisms on metal-organic framework catalysts and sorbents
- **CATL-ChemCatBio Graduate Student Travel Award** at the 2024 Spring American Chemical Society Meeting in New Orleans, LA for an oral presentation
- **Student poster runner-up winner** at the 2024 NYCS Spring Symposium in Newark, NJ
- **Women in Chemical and Biological Engineering March Spotlight** at Princeton University, NJ
 - Nominated for “exceptional research capability and mentorship”
 - Recognizes achievements of women in the department

- **SEAS Award of Excellence** at Princeton University in 2022
 - Recognizes (fifteen) advanced graduate students who have performed at the highest levels as scholars, researchers, and teachers
 - Nominated by the Department of Chemical & Biological Engineering faculty
- **Nominated for a 2023 School of Engineering and Applied Science Excellence in Teaching Award**
 - Selected by the Department of Chemical & Biological Engineering faculty
 - For Assistant in Instruction in CBE 346 (Chemical Engineering Laboratory) in 2023
 - *Application supported by letters from 4 faculty members and 4 previous students*
- **Nominated for a 2022 School of Engineering and Applied Science Excellence in Teaching Award**
 - Selected by the Department of Chemical & Biological Engineering faculty
 - For Assistant in Instruction in CBE 346 (Chemical Engineering Laboratory) in 2022
 - *Application supported by letters from 4 faculty members and 9 previous students*
- **Women in Chemical Engineering (WIC) Travel Award** at the 2022 American Institute of Chemical Engineers (AIChE) Annual Meeting in Phoenix, AZ for a paper (oral) presentation
- **Kokes Award** at the 2021 27th North American Catalysis Society Meeting
- **Poster competition winner** at the 2021 25th North East Corridor Zeolite Association (NECZA) Annual Meeting
- **Catalysis & Reaction Engineering (CRE) Student Award** at the 2021 American Institute of Chemical Engineers (AIChE) Annual Meeting in Boston, MA for a paper (oral) presentation

Undergraduate Student, Rutgers University

- **James J. Slade Scholars Program**
 - Selected in the summer of 2017 to pursue highly independent research with an honors thesis and 6 semester credits of research during the last year of undergraduate study at Rutgers University in New Brunswick, NJ
 - Research Advisor: Dr. Fuat E. Celik in the Department of Chemical & Biochemical Engineering
 - Completed thesis serves as the foundation for a peer-reviewed publication that is currently in preparation
- **Sigma Xi Inductee**
 - Inducted into Sigma Xi, the Scientific Research Honor Society, in May 2018
- **Rutgers University Presidential Scholarship**
 - Awarded in February 2014 prior to enrollment at Rutgers University and renewed every year.
 - Prestigious, merit-based award granted to 1% of admitted undergraduate students
 - Full coverage of \$25,000 per academic year
- **Undergraduate Student Award in Applied Spectroscopy**
 - Awarded in May 2017 by the New York Section of the Society for Applied Spectroscopy (NYSAS).
 - Received for recognized excellence in the field of applied spectroscopy as applied to research.
- **Leadership Researcher Scholar Award**
 - Awarded in May 2017 by the New Jersey Local Section of the American Institute of Chemical Engineers (AIChE).
 - Received for demonstrated excellence in undergraduate research, sustained academic performance, and leadership as president of the Rutgers University Undergraduate chapter of AIChE.
- **Rutgers University Academic Excellence Award**
 - Awarded in 2016 at Rutgers University
 - Awarded to the top 10% of undergraduate students based on cumulative GPA in the School of Engineering.
- **Dean's List Scholar**
 - Received every semester from Fall 2014 to Fall 2018.
 - Recognized for attaining a GPA of 3.5 or higher every semester.
- **Honors Society Membership**
 - Rutgers School of Engineering Honors Academy
 - Chemical & Biochemical Engineering Honors Academy
- **Research presentation awards:**
 - *1st place poster* at the 2017 AIChE Annual Meeting in Catalysis & Reaction Engineering Division II

- *1st place poster* at the Rutgers University 2017 Undergraduate Research Day Poster Session
- *2nd place poster* at the 2016 AIChE Annual Meeting in Catalysis & Reaction Engineering Division II
- *2nd place poster* at the 2017 2nd Annual Rutgers University Society of Women Engineers Graduate Symposium
- *2nd place poster* at the Rutgers University 2018 Undergraduate Research Day Poster Session
- **Conference Travel Awards**
 - March 2016 Aresty Research Center Conference Funding
 - November 2016 Aresty Research Center Conference Funding
 - November 2017 Rutgers Undergraduate Student Chapter of the American Institute of Chemical Engineers Conference Funding
 - April 2017 Rutgers Undergraduate Student Chapter of the American Institute of Chemical Engineers Conference Funding
 - November 2016 Rutgers Undergraduate Student Chapter of the American Institute of Chemical Engineers Conference Funding
 - April 2016 Rutgers Undergraduate Student Chapter of the American Institute of Chemical Engineers Conference Funding
- **Fall 2017 Aresty Research Center Fellowship Grant**
 - Highly independent research project on the investigation of platinum alloys for alkane dehydrogenation
 - Received grant request in full for written proposal
- **Roxbury High School Class of 2014 Valedictorian**
- **2014 U.S. Marine Corps Scholastic Excellence Award**

TEACHING & MENTORSHIP

- **Assistant in Instruction: Chemical Engineering Laboratory**, Princeton University, Spring 2020, Spring 2022, Spring 2023
- **Undergraduate Senior Thesis Mentor**, Princeton University
 - **Stanley Cho** (September 2022 – May 2023), *Aminopolymers supported on carboxylate metal-organic frameworks for CO₂ capture from flue gas and air*
 - **Sydney N. Hughes** (September 2021 – May 2022), *Utilizing aminopolymer adsorbents supported on metal-organic frameworks for CO₂ capture*
 - **Jeffrey E. Barzach** (June 2021 – May 2022), *Optimizing the visible light receptiveness of MOFs for photocatalytic wastewater pollutant degradation*
 - **Serge Priam Nsanzineza** (September 2019 – April 2020), *Investigation of the impact of crystal size of Metal-Organic Frameworks on their heterogeneous catalytic activity for oxidation reactions*
- **Undergraduate Junior Independent Work Mentor**, Princeton University
 - **Stanley Cho** (January 2022 – May 2022), *CO₂ capture by aminopolymers supported on mesoporous MIL-101(Cr)*
- **Andlinger Summer Intern Mentor**, Princeton University
 - **Darius Rudasingwa Ganza** (May 2022 – August 2022), *CO₂ capture by aminopolymers supported on Zr-based UiO-67*
- **2022 Laboratory Learning Program (Summer Internships for High School Students)**, Princeton University
 - **Jaqueline A. Vandermel** (June 2022 – August 2022)
 - **Elizabeth Jiang** (July 2022 – August 2022)
- **Undergraduate Research Mentor**, Princeton University, Summer 2019

Served as a graduate student mentor for an REU student to guide his summer research project on MIL-101(Cr) for oxidation reactions. Taught experimental techniques including hydrothermal synthesis, various electron microscopies, and liquid-phase batch kinetic studies analyzed by proton nuclear magnetic resonance.

- **Matthew Ko** (Cornell University), *Investigation of MIL-101(Cr): Synthesis, Characterization, and Catalysis*

- **Undergraduate Research Mentor, Rutgers University, Summer 2017**

Served as a mentor for other undergraduate students and helped provide direction for each of their research projects. Engaged in teaching experimental techniques for catalyst synthesis and preparation as well as analysis techniques to process raw data.

- **Daryll T. Munoz**, *Synthesis and Analysis of High-Pressure High Temperature Annealed Anatase*
- **Valerie Ballance**, *Investigation of Methylene Blue Degradation to Test Photocatalyst Activity*
- **Taniya Arora**, *Utilization of Fourier Transform Infrared Spectroscopy for Catalyst Characterization*
- **Stefanie M. Traeger**, *Investigation of Optimal Flow Parameters for Photocatalytic Methane Steam Reforming over Anatase*

- **Office of Student Services Multidisciplinary Tutor, Rutgers University, January 2015 – December 2016**

Provided weekly one-on-one peer tutoring sessions with over 10 Rutgers engineering students of all years in the following subjects: Matlab, Calculus I-IV, General Chemistry I-II, Physics I-II. Dedicated at least 5 hours per week to tutoring and also served as a mentor to provide insight on students' inquiries about research experience, study habits, course organization, and time management.

LEADERSHIP & SERVICE

Co-Bin Leader for the Catalysis and Reaction Engineering Division of the American Institute of Chemical Engineers (Session: Green Chemical Reaction Engineering for Sustainability), November 2026

Webmaster, Catalysis Society of Metropolitan New York, September 2021 – September 2024

- Elected by society membership
- Rebuilt entire website, including mobile platform compatibility
- Manage all website announcements and updates, including a job listing page
- Responsible for all inquiries submitted through the website

Poster Session Chair, Catalysis Society of Metropolitan New York, May 11-12, 2023

- 2023 CSNY Spring Symposium
- Facilitated and organized virtual student poster session (flash talks)

President, Rutgers Undergraduate Student Chapter of the American Institute of Chemical Engineers, December 2016 – December 2017

- Efficient delegation of tasks between 6 executive board members, 5 committee chairs, and faculty advisor
- Serve as a liaison between the department faculty, student body of over 300 students, industry contacts, other chapters, and over 60 general members
- Organization of 10+ events every year in addition to regular weekly meetings
- Successful at maintaining corporate sponsorships from Merck & Co., Inc. and Phillips 66
- Extended communication, presentation, and leadership skills to recruit members and promote the department to prospective students

Research Connections Committee Chair, Rutgers Undergraduate Student Chapter of the American Institute of Chemical Engineers, December 2015 – December 2016

- Organization of poster sessions to encourage undergraduate students to engage in research
- Collaboration with other engineering societies for interdisciplinary representation of projects
- Managed and delegated tasks to 5 undergraduate student committee members

Reviewer for ACS Catalysis, Journal of Catalysis, Applied Catalysis B: Environment and Energy, ACS Sustainable Chemistry & Engineering, ACS Applied Materials & Interfaces. ACS Energy Letters