

Nicholas A. Brunelli

The Ohio State University, Department of Chemical and Biomolecular Engineering
151 W. Woodruff Ave. Columbus, OH 43210 • (614) 688-3400 • [Brunelli.2@osu.edu](mailto: Brunelli.2@osu.edu) • catalysts.osu.edu

Education

- 2004 – 2010 **Ph.D. Chemical Engineering, Minor in Applied Physics**
California Institute of Technology, Pasadena, CA (Degree awarded June 2010)
National Science Foundation Graduate Fellow
- 2000 – 2004 **B.S. Chemical Engineering**
The Ohio State University, Columbus, OH (Degree awarded June 2004)
National Merit Scholar

Research Experience

- 2014 – present **The Ohio State University** **Assistant Professor** **Columbus, OH**
2018 – present **The Ohio State University** **H.C. “Slip” Slider Professorship**
Department of Chemical and Biomolecular Engineering
 - *Catalytic Material Design of Mesoporous Materials*
 - *Design and Synthesis of Zeolites*
 - *Scalable Synthesis of Nanomaterials*
- 2013 **Emory University** **Postdoctoral Fellow** **Atlanta, GA**
Department of Chemistry
Advisor: Huw M.L. Davies
 - ReactIR characterization of kinetic processes
 - Fiber immobilized dirhodium carbene catalysts for flow chemistry
 - DESI-MS of dirhodium carbene catalysts for investigation of catalyst deactivation
- 2010 – 2013 **Georgia Institute of Technology** **Postdoctoral Fellow** **Atlanta, GA**
Department of Chemical & Biomolecular Engineering
Advisor: Christopher W. Jones
 - Cooperative catalysis with acid/base bifunctional catalysts
 - Design and synthesis of novel organic-inorganic hybrid catalysts
 - Instrument design (isothermal cell, hollow fiber flow reactor, *in situ* fiber membrane reactor, and volumetric CO₂ adsorption system)
 - Examining differences in chemical and structural elements of CO₂ adsorbents
 - Microporous and mesoporous silica synthesis and characterization (N₂ physisorption, TGA, FTIR, SS NMR, XRD)
- 2004 – 2010 **California Institute of Technology** **NSF Graduate Research Fellow** **Pasadena, CA**
Department of Chemical Engineering
Advisor: Konstantinos P. Giapis; Co-Advisor: Richard C. Flagan
 - Instrument development (nano-RDMA) for aerosol particle size classification between 1 and 3 nm
 - Microplasma synthesis of Si, Ge, Fe, Co and Ni nanoparticles
 - Electrospray for growth of nanostructured thin films for the membrane electrode assembly of a medium temperature fuel cell
 - Characterization methods (AFM, XPS, SEM, Raman and Fluorescence Spectroscopy)

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Academic Honors and Awards

Professor Brunelli

- 2020 **Emerging Investigator**, RSC *Molecular Systems Design and Engineering*
- 2019 **Robert Augustine Award**, Organic Reactions Catalysis Society
AIChE Futures, AIChE Journal
Emerging Investigator, RSC *Reaction Chemistry and Engineering*
Lumley Research Award, The Ohio State University, College of Engineering
- 2018 **Class of Influential Researchers**, ACS *Industrial & Engineering Chemistry Research*
- 2017 **National Science Foundation CAREER Award**
Most Invention Disclosures Filed, Ohio State University Institute for Materials Research (OSU IMR) Materials Week Award for Invention Disclosures
- 2004 **Graduate Research Fellowship**, National Science Foundation (NSF GRFP)
- 2003 **Outstanding Senior Chemical Engineering Alumni Award**, The Ohio State University Department of Chemical Engineering
- 2002 **Dow Outstanding Junior Award in Chemical Engineering**, The Ohio State University Department of Chemical Engineering
- 2001 **AIChE Donald F. Otthmer Outstanding Sophomore Award**, The Ohio State University Department of Chemical Engineering
- 2000 **National Merit Scholar**, The Ohio State University

Research Group

- 2019 **1st Place Denman Undergraduate Research Forum**, Michael Hines and Montgomery Gray
Finalist Three Minute Thesis for Materials Week (OSU IMR), Pinaki Ranadive
- 2018 **2nd Place Three Minute Thesis for Materials Week (OSU IMR)**, Aamena Parulkar
- 2017 **2nd Place Denman Undergraduate Research Forum**, Kory Sherman and Lagnajit Pattanaik
American Institute of Chemists Undergraduate Research Honorable Mention, Lagnajit Pattanaik
- 2016 **Goldwater Scholar**, Lagnajit Pattanaik
- Honors Undergraduate Research Funding for Thesis
 - Brian Diep - \$5,200
 - Lagnajit Pattanaik - \$5,200
 - Honors Undergraduate Research
 - Nate Olson - \$3,500

Peer-Reviewed Publications (* = accepted corresponding author (14); 38 publications; 2083 citations)

2020

40. M. Gray, M. Hines, M. Parsutkar, A.J. Wahlstrom, N.A. Brunelli,* T.V. RajanBabu,* “On the Mechanism of Cobalt-Catalyzed Heterodimerization of Acrylates and 1,3-Dienes. Reaction Progress Kinetic Analysis and A Potential Role of Cationic Cobalt(I) Intermediates” (*accepted*).
39. M.R. Whitaker, A. Parulkar, N.A. Brunelli,* “Selective production of 5-hydroxymethylfurfural from fructose in the presence of an acid-functionalized SBA-15 catalyst modified with a sulfoxide polymer,” *Molecular Systems Design and Engineering*, 2020, 5, 257-268.
38. N. Deshpande, E.H. Cho, T. Kobayashi, M. Pruski L.-C. Lin,* N.A. Brunelli,* “Tuning Micropore Volume of SBA-15 to Enhance Catalytic Activity,” (*submitted*).

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2019

37. A. Kane, N. Deshpande, **N.A. Brunelli,*** “Impact of surface loading on catalytic activity of regular and low Micropore SBA-15 in the Knoevenagel Condensation,” *AIChE Journal*, 2019, 65 (12), e16791.
36. A. Parulkar, A.P. Spanos, N. Deshpande, **N.A. Brunelli,*** “Synthesis and catalytic testing of Lewis acidic nano zeolite Beta for epoxide ring opening with alcohols,” *Applied Catalysis A: General*, 2019, 577, 28-34.
35. N. Deshpande, E.H. Cho, A.P. Spanos, L.-C. Lin, **N.A. Brunelli,*** “Tuning Molecular Structure of Tertiary Amine Catalysts for Glucose Isomerization,” *Journal of Catalysis*, 2019, 372, 119-127.
34. P. Ranadive, A. Parulkar, **N.A. Brunelli,*** “Jet-Mixing Reactor for the Production of Monodisperse Silver Nanoparticles Using a Reduced Amount of Capping Agent,” *Reaction Chemistry and Engineering*, 2019, 4 (10), 1779-1789.
33. M.R. Whitaker, A. Parulkar, P. Ranadive, R. Joshi, **N.A. Brunelli,*** “Examining Acid Formation During the Selective Dehydration of Fructose to 5-Hydroxymethylfurfural in DMSO and Water,” *ChemSusChem*, 2019, 12 (10), 2211-2219.
32. N. Olson, N. Deshpande, S. Gunduz, U.S. Ozkan, **N.A. Brunelli,*** “Utilizing Imogolite Nanotubes as a Tunable Catalytic Material for the Selective Isomerization of Glucose to Fructose,” *Catalysis Today*, 2019, 323, 69-75.
31. N. Deshpande, A. Parulkar, R. Joshi, B. Diep, A. Kulkarni, **N.A. Brunelli,*** “Epoxide ring opening with alcohols using heterogeneous Lewis acid catalysts: Mechanism and Regioselectivity,” *Journal of Catalysis*, 2019, 370, 46-54.

2018

30. A. Parulkar, R. Joshi, N. Deshpande, **N.A. Brunelli,*** “Synthesis and Catalytic Testing of Lewis Acidic Nano-MFI Zeolites for the Epoxide Ring Opening Reaction with Alcohol,” *Applied Catalysis A: General*, 2018, 566, 25-32.
29. A. Parulkar, J.A. Thompson, M. Hurt, B.-Z. Zhan, **N.A. Brunelli,*** “Improving Hydrodenitrogenation Catalyst Performance through Analyzing Hydrotreated Vacuum Gas Oil Using Ion Mobility-Mass Spectrometry,” *Industrial and Engineering Chemistry Research* 2018, 57 (27), 8845-8854.

2017

28. A. Parulkar, **N.A. Brunelli,*** “High-Yield Synthesis of ZIF-8 Nanoparticles Using Stoichiometric Reactants in a Jet-Mixing Reactor,” *Industrial and Engineering Chemistry Research* 2017, 56 (37), 10384-10392.
27. N. Deshpande, L. Pattanaik, M.R. Whitaker, C.-T. Yang, L.-C. Lin, **N.A. Brunelli,*** “Selectively Converting Glucose to Fructose Using Immobilized Tertiary Amines.” *Journal of Catalysis* 2017, 353, 205-210.

2015

26. E.G. Moschetta, S. Negretti, K.M. Chepiga, **N.A. Brunelli,** Y. Labreche, Y. Feng, F. Rezaei, R.P. Lively, W.J. Koros, H.M.L. Davies,* and C.W. Jones.* “Composite Polymer/Oxide Hollow Fiber Contactors: Versatile and Scalable Flow Reactors for Heterogeneous Catalytic Reactions in Organic Synthesis.” *Angewandte Chemie International Edition* 2015, 54 (22), 6470-6474.

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25. L. Espinal, M.L. Green, D.A. Fischer, D.M. DeLongchamp, C. Jaye, J.C. Horn, M.A. Sakwa-Novak, W. Chaikittisilp, **N.A. Brunelli**, C.W. Jones. "Interrogating the Carbon and Oxygen K-edge NEXAFS of a CO₂-dosed Hyperbranched Aminosilica." *Journal of Physical Chemistry Letters* 2015, 6 (1), 148-152.
24. E.G. Moschetta, **N.A. Brunelli**, C.W. Jones. "Reaction-dependent heteroatom modification of acid-base catalytic cooperativity in aminosilica materials." *Applied Catalysis A: General* 2015, 504 (5), 429-439.
- 2014
23. A.J. Brown, **N.A. Brunelli**, K. Eum, F. Rashidi, J.R. Johnson, W.J. Koros, C.W. Jones, S. Nair. "Interfacial Microfluidic Processing of Metal-Organic Framework Hollow Fiber Membranes." *Science*. 2014, 345 (6192), 72-75.
22. D.-Y. Kang, **N.A. Brunelli**, G.I. Yucelen, A. Venkatasubramanian, J. Zang, J. Leisen, P.J. Hesketh, C.W. Jones, S. Nair. "Direct Synthesis of Single-Walled Aluminosilicate Nanotubes with Enhanced Molecular Adsorption Selectivity." *Nature Communication* 2014, 5, 1-9.
21. B.R. Pimental, A. Parulkar, E. Zhou, **N.A. Brunelli**,* R.P. Lively.* "Zeolite Imidazolate Frameworks: Next-Generation Materials for Energy-Efficient Gas Separations." *ChemSusChem* 2014, 7 (12), 3202-3240.
20. S.A. Didas, R. Zhu, **N.A. Brunelli**, D.S. Sholl, C.W. Jones. "Thermal, Oxidative, and CO₂ Induced Degradation of Primary Amines used for CO₂ Capture: Effect of Alkyl Linker on Stability," *Journal of Physical Chemistry C*. 2014, 118 (23), 12302-12311.
19. J.A. Thompson, J.T. Vaughn, **N.A. Brunelli**, W.J. Koros, C.W. Jones, S. Nair. "Mixed-linker zeolitic imidazolate framework mixed-matrix membranes for aggressive CO₂ separation from natural gas," *Microporous and Mesoporous Materials*. 2014, 192, 43-51.
18. H.J. Kim, **N.A. Brunelli**, A.J. Brown, K.S. Jang, W. Kim, F. Rashidi, J.R. Johnson, W.J. Koros, C.W. Jones, S. Nair. "Silylated Mesoporous Silica Membranes on Polymeric Hollow Fiber Supports: Synthesis and Permeation Properties," *ACS Applied Materials and Interfaces* 2014, 6 (20), 17877-17886.
- 2013
17. **N.A. Brunelli**, C.W. Jones, (2013), "Tuning Acid-Base Cooperativity to Create Next Generation Silica-Supported Organocatalysts." *Journal of Catalysis* 308, 60-72.
16. **N.A. Brunelli**,* E.L. Neiholdt, K.P. Giapis, R.C. Flagan, J.L. Beauchamp, (2013) "Continuous Flow Ion Mobility Separation with Mass Spectrometric Detection Using a Nano-Radial Differential Mobility Analyzer at Low Flow Rates." *Analytical Chemistry* (DOI: 10.1021/ac3032417).
15. W. Long, **N.A. Brunelli**, E.W. Ping, C.W. Jones. "A Single-Component Hybrid Pd Catalyst for the Highly-Selective Reduction of Alkynes to cis-Alkenes," *ACS Catalysis* 2013, 3 (8), 1700-1708.
14. K.M. Chepiga, Y. Fan, **N.A. Brunelli**, C.W. Jones, H.M.L. Davies. "Silica-Immobilized Chiral Dirhodium (II) Catalyst for Enantioselective Carbenoid Reactions," *Organic Letters* 2013, 15 (24), 6136-6139.
13. D.M. Holunga, **N.A. Brunelli**, R.C. Flagan. "A Tool for Uniform Coating of 300 mm Wafers with Nanoparticles," *Journal of Nanoparticle Research* 2013, 15 (11), 1-10.
12. A. Varga, M. Pfohl, **N.A. Brunelli**, M. Schreier, K. Giapis, S. Haile. "Carbon nanotubes as electronic interconnects in solid acid fuel cell electrodes," *Physical Chemistry Chemical Physics* 2013, 15 (37), 15470-15476.
11. J.A. Thompson, **N.A. Brunelli**, R.P. Lively, J.R. Johnson, C.W. Jones, S. Nair. "Tunable CO₂ Adsorbents by Mixed-Linker Synthesis and Postsynthetic Modification of Zeolitic Imidazolate Frameworks." *Journal*

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of Physical Chemistry C. 2013, 117 (16), 8198-8207.

2012

10. **N.A. Brunelli**, K. Venkatasubbaiah, C.W. Jones. "Cooperative Catalysis with Acid-Base Bifunctional Mesoporous Silica: Impact of Grafting and Co-condensation Synthesis Methods on Material Structure and Catalytic Properties." *Chemistry of Materials* 2012, 24 (13), 2433-2442.
9. **N.A. Brunelli**, K. Venkatasubbaiah, C.W. Jones. "Effect of Linker Length on the Cooperative Interactions of Supported Amines in Catalysis and CO₂ Capture," *Journal of the American Chemical Society* 2012, 134 (34), 13950-13953.
8. **N.A. Brunelli**, W. Long, K. Venkatasubbaiah, C.W. Jones. "Catalytic Regioselective Epoxide Ring Opening with Phenol using Homogeneous and Supported Analogues of Dimethylaminopyridine." *Topics in Catalysis* 2012, 55 (7-10), 432-438.
7. Y. Kuwahara, D.-Y. Kang, J. Copeland, **N.A. Brunelli**, S.A. Didas, P. Bollini, C. Sievers, T. Kamegawa, H. Yamashita, C.W. Jones. "Dramatic Enhancement of CO₂ Uptake by Poly(ethyleneimine) Using Zirconosilica Supports," *Journal of the American Chemical Society* 2012, 134 (26), 10757-10760.
6. J.A. Thompson, C.R. Blad, **N.A. Brunelli**, M.E. Lydon, R.P. Lively, C.W. Jones, S. Nair. "Hybrid Zeolitic Imidazolate Frameworks: Controlling Framework Porosity and Functionality by Mixed-Linker Synthesis," *Chemistry of Materials* 2012, 24 (10), 1930-1936.
5. P. Bollini, **N.A. Brunelli**, S.A. Didas, C.W. Jones. "Dynamics of CO₂ Adsorption onto Amine Adsorbents. 1. Assessment of Heat Effects," *Industrial and Engineering Chemistry Research* 2012, 51 (46), 15145-15152.
4. P. Bollini, **N.A. Brunelli**, S.A. Didas, C.W. Jones. "Dynamics of CO₂ Adsorption onto Amine Adsorbents. 2. Insights into Adsorbent Design," *Industrial and Engineering Chemistry Research* 2012, 51 (46), 15153-15162.

2011

3. J. Jiang, M. Attoui, M. Heim, **N.A. Brunelli**, P. McMurry, G. Kasper, R.C. Flagan, K. Giapis, G. Mouret. "Transfer Functions and Penetrations of Five Differential Mobility Analyzers for Sub-2 nm Particle Classification." *Aerosol Science and Technology* 2011, 45 (4), 480-492.

2010

2. A. Varga, N.A. **Brunelli**, M.W. Louie, K.P. Giapis, S.M. Haile. "Composite nanostructured solid-acid fuel-cell electrodes via electrospray deposition." *Journal of Materials Chemistry* 2010, 20 (30), 6309-6315.

2009

1. **N.A. Brunelli**, R.C. Flagan, K.P. Giapis. "Radial Differential Mobility Analyzer for One Nanometer Particle Classification." *Aerosol Science and Technology* 2009, 43 (1), 53-59.

Research Presentations (28 invited talks; 39 overall)

2020

Invited (28) "" N.A. Brunelli

Invited (27) "Catalytic Site Design for Lewis Acid Zeolites for Epoxide Ring Opening with Alcohols" N.A. Brunelli, N. Deshpande, A. Parulkar, A. Kulkarni, A. Spanos, M. Kasula, March 2020 (Philadelphia, PA).

Invited (26) "Mechanism Informed Design of Heterogeneous Catalysts," N.A. Brunelli, *Robert Augustine Award Lecture* March 2020 (Jacksonville, FL).

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2019

- Invited (25)** “Designing Catalytic Materials on the Atomic Level for Sustainable Biomass Conversion” N.A. Brunelli, AIChE, November 12, 2019 (Orlando, FL).
“Enhancing Acid-Base Cooperative Catalytic Activity of Aminosilica materials through tuning the micropore volume,” N.A. Brunelli, N. Deshpande, T. Kobayashi, C.-T. Yang, E.-H. Cho, M. Pruski, and L.-C. Lin, AIChE Annual Meeting, November 2019 (Orlando, FL).
“Regioselectivity of epoxide ring opening with alcohols using Lewis acidic zeolites and nano-zeolites,” N.A. Brunelli, N. Deshpande, A. Parulkar, R. Joshi, A. Kulkarni, AIChE Annual Meeting, November, 2019 (Orlando, FL).
- Invited (24)** “Catalytic site design for Lewis acid zeolites for the epoxide ring opening with alcohols.” N.A. Brunelli, August 2019 (San Diego, CA).
“Designing Heterogeneous Tertiary Amine Catalysts for the Isomerization of Glucose to Fructose,” N.A. Brunelli, N. Deshpande, T. Kobayashi, E.-H. Cho, M. Whitaker, L.-C. Whitaker, M. Pruski, NAM for North American Catalysis Society, June 2019 (Chicago, IL).
“Regioselective alcohol ring opening of epoxides using heterogeneous Lewis acidic Catalysts and nanozeolites,” N.A. Brunelli, N. Deshpande, A. Parulkar, A. Spanos, R. Joshi, B. Diep, A. Kulkarni, NAM for North American Catalysis Society, June 2019 (Chicago, IL).
- Invited (23)** “Designing Catalytic Materials on the Atomic Level for Sustainable Biomass Conversion” N.A. Brunelli, Departmental Seminar at Cornell University, February 11, 2019 (Ithaca, NY 2019).
- Invited (22)** “Designing Catalytic Materials on the Atomic Level for Sustainable Biomass Conversion” N.A. Brunelli, Departmental Seminar at University of Notre Dame, February 26, 2019 (South Bend, IN 2019).
- Invited (21)** “Designing Catalytic Materials on the Atomic Level for Sustainable Biomass Conversion” N.A. Brunelli, Departmental Seminar at University of California Santa Barbara, February 28, 2019 (Santa Barbara, CA 2019).
- Invited (20)** “Designing Catalytic Materials on the Atomic Level for Sustainable Biomass Conversion” N.A. Brunelli, Departmental Seminar at University of Maine, March 28, 2019 (Bangor, ME 2019).
- Invited (19)** “Designing Catalytic Materials on the Atomic Level for Sustainable Biomass Conversion” N.A. Brunelli, Departmental Seminar at University of California, Berkeley April 23, 2019 (Berkeley, CA 2019).

2018

- Invited (18)** “Material Design for Sustainable Synthesis: Creating Tools for Selective Reactions.” N.A. Brunelli, Departmental Seminar at Calgary University, October 1, 2018 (Calgary, Ontario).
- Invited (17)** “Tuning the Molecular Design of Tertiary Amine Catalysts on Amorphous Silica Supports for Glucose Isomerization” N.A. Brunelli, ACS Fall Meeting (Boston, MA 2018).
- Invited (16)** “Increasing Conversion Selectivity for Biomass Relevant Reactions through Molecularly Tuning Catalyst Design” N.A. Brunelli, ACS Fall Meeting (Boston, MA 2018).
- Invited (15)** “Tuning Catalytic Material Design of Zeolites and Mesoporous Materials to Increase Catalytic Selectivity” N.A. Brunelli, ACS Fall Meeting (Boston, MA 2018).
- Invited (14)** “Selective Glucose Isomerization to Fructose Using a Heterogeneous Immobilized Tertiary Amines with Tuned Molecular Design” N.A. Brunelli, 2018 International Symposium on Advancement and Prospect of Catalysis Science and Technology (Sydney, Australia 2018).
- Invited (13)** “Sustainable Material Design and Synthesis: Creating Tools for Selective Reactions Relevant to Fine Chemical Production and Biomass Conversion” N.A. Brunelli, Departmental Seminar at Cleveland State University (Cleveland, OH 2018).
“Regioselectivity of Epoxide Ring Opening with Alcohols Using Heterogeneous Lewis Acid Catalysts” N.A. Brunelli, ACS Fall Meeting (Boston, MA 2018).

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2017

- Invited (12)** “Tuning the Molecular Design of Catalytic Materials to Increase Activity and Selectivity for Mesoporous Silica Materials” N.A. Brunelli, ACS Fall Meeting (Washington, D.C. 2017).
- Invited (11)** “Rapid Assembly of Zeolitic Imidazolate Framework Nanomaterials Using a Jet-Mixing Flow Reactor” N.A. Brunelli, 9th Sino-United States Joint Conference on Chemical Engineering (SUCE) (Beijing, China 2017).
- Invited (10)** “Tuning the Molecular Design of Catalytic Materials to Increase Activity and Selectivity for Fine Chemical Production” N.A. Brunelli, AIChE National Meeting (Minneapolis, MN 2017).
- Invited (9)** “Molecular Design of Cooperative Interactions for Heterogeneous Catalytic Materials to Tune Catalytic Rates and Selectivities” N.A. Brunelli, ACS Spring Meeting (San Francisco, CA 2017).
- Invited (8)** “Creating Methods for Material Design and Synthesis for Microporous and Mesoporous Materials,” N.A. Brunelli, Brookhaven National Synchrotron Light Source II Lunchtime Learn Series (Brookhaven, NY, 03 March 2017).

2016

- “Molecular Design of Cooperative Interactions for Heterogeneous Catalytic Materials to Tune Catalytic Rates and Selectivities” N.A. Brunelli, AIChE National Meeting (San Francisco, CA 2016).
- “High Yield Stoichiometric Synthesis of ZIF-8 Nanoparticles Using Novel Reactor” A. Parulkar, N.A. Brunelli, AIChE National Meeting (San Francisco, CA 2016).
- Invited (7)** “Molecular Design of Cooperative Interactions for Heterogeneous Catalytic Materials to Tune Catalytic Rates and Selectivities” N.A. Brunelli, ACS Fall Meeting (Philadelphia, PA 2016).
- Invited (6)** “Sustainable Material Design and Synthesis: Creating Tools for Selective Reactions.” N.A. Brunelli, ACS Spring Meeting (San Diego, CA 2016).
- “High Yield Stoichiometric Synthesis of ZIF-8 Nanoparticles Using Stoichiometric Reactants in a Scalable Jet-Mixing Reactor” A. Parulkar, N.A. Brunelli, Graduate Research Symposium (Columbus, OH 2016).

2015

- Invited (5)** “Sustainable Material Design and Synthesis: Creating Tools for Selective Reactions.” N.A. Brunelli, Seminar at the University of Toledo (Toledo, OH 2015).
- Invited (4)** “Creating tools for sustainable MOF synthesis through investigating crystallization species.” N.A. Brunelli, AVS Ohio Chapter Meeting (Cleveland, OH 2015).
- Invited (3)** “Sustainable Material Design and Synthesis: Creating Tools for Selective Reactions.” N.A. Brunelli, Catalysis Group Presentation at Purdue University (West Lafayette, IN 2015).
- “Tuning Acid-Base Cooperativity of Amines and Silanols for C-C Bond Forming Reactions through Controlling the Linker Length and Pore Size.” N.A. Brunelli, E.G. Moschetta C.W. Jones, 24rd North American Meeting of the Catalysis Society, (Pittsburgh, PA 2015).
- “Stoichiometric Solution Synthesis of ZIF-8 using Novel Scalable Jet-Mixing Reactor” A. Parulkar, N.A. Brunelli, Graduate Research Symposium (Columbus, OH 2015).

2014

- “Designing Immobilized Dirhodium Carbenoid Catalysts for High Activity and Enantioselectivity.” N.A. Brunelli, K.M. Chepiga, Y. Fang, H.M.L. Davies, C.W. Jones, ACS Spring Meeting (Dallas, TX 2014).
- Invited (2)** “Designing Cooperative Catalytic Interactions.” N.A. Brunelli, Tri-State Catalysis Society Symposium (Louisville, KY 2014).
- Invited (1)** “Designing Acid-Base Cooperative Catalytic Interaction in Aminosilica Materials.” N.A. Brunelli, E. Moschetta, C.W. Jones, ACS Spring Meeting (Dallas, 2014).

2013

- “Accelerating C-C Bond Forming Reactions Through Tuning Amine-Silanol Cooperativity by Controlling the

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Linker Length and Pore Size.” N.A. Brunelli, C.W. Jones, AIChE (San Francisco, 2013).

“Pd-Impregnated Aminopolymer-Silica Materials As Hybrid Catalysts for the Selective Production of Olefins from Alkynes.” N.A. Brunelli, W. Long, E. Ping, S.A. Didas, C.W. Jones, 23rd North American Meeting of the Catalysis Society, (Louisville, KY 2013).

“Tuning Acid-Base Cooperativity of Amines and Silanols for C-C Bond Forming Reactions through Controlling the Linker Length and Pore Size.” N.A. Brunelli, H.J. Kim, C.W. Jones, 7th International Symposium on Acid-Base Catalysis (ABC-7), (Tokyo, Japan, 2013).

“The Sub-Nanometer Length Scale: Exploring Fundamental Challenges in Catalysis.” N.A. Brunelli, Georgia Tech Catalysis Series Lecture, (Atlanta, GA, 2013).

2012

“Tuning Acid-Base Cooperative Interactions through Controlling the Linker Length.” N.A. Brunelli, C.W. Jones. AIChE (Pittsburgh, PA, 2012).

“Pd-Impregnated Hyperbranched Aminosilica Materials as Hybrid Catalysts for the Selective Production of Olefins from Alkynes.” W. Long, N.A. Brunelli, E.W. Ping, S.A. Didas, C.W. Jones. AIChE (Pittsburgh, PA, 2012).

“Catalytic Regioselective Epoxide Ring Opening with Phenol using Homogeneous and Supported Analogues of Dimethylaminopyridine.” N.A. Brunelli, W. Long, K. Venkatasubbaiah, C.W. Jones. ORCS (Organic Reactions Catalysis Society), (Annapolis, MD, 2012).

2011

“Bifunctional Materials for Cooperative Catalysis through Incorporation of Brønsted Acid and Lewis Base Components.” N.A. Brunelli, K. Venkatasubbaiah, C.W. Jones. AIChE (Minneapolis, MN, 2011).

“Bifunctional Materials for Cooperative Catalysis through Incorporation of Brønsted Acid and Lewis Base Components.” N.A. Brunelli, K. Venkatasubbaiah, C.W. Jones. ISHHC XV (Berlin, Germany, 2011).

2007

“Size manipulation and control of nanoparticles produced from atmospheric-pressure microplasmas,” N.A. Brunelli, R.C. Flagan and K.P. Giapis, *AVS 54th Intern. Symp. Exhib* (Seattle, WA, 2007).

2006

“Use of Dual Atmospheric Microdischarges for Manipulating the Growth of Silicon Nanoparticles,” N.A. Brunelli, R.C. Flagan and K.P. Giapis, *AVS 53rd Intern. Symp. Exhib* (San Francisco, CA, 2006).

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Posters

2019

1st Place - “A Kinetic and Mechanistic Study of a Cobalt-Catalyzed Heterodimerization Between 1,3-Dienes and Acrylates” M. Hines, M. Gray, *Denman Undergraduate Research Forum* (Columbus, OH 2019)

2018

3rd Place – “Imogolite nanotubes as a catalyst for biomass conversion” Nate Olson, *AIChE National Conference* (Pittsburgh, PA, 2018).

“Synthetic Tuning of Catalytic Material Design to Enhance Activity and Selectivity for Biomass Conversion,” N.A. Brunelli, *Gordon Research Conference* (Colby-Sawyer College, NH, 2018).

“From Feedstock to Value Added Chemicals: A Kinetic and Mechanistic Study of a Cobalt-Catalyzed Heterodimerization Between 1,3-Dienes and Acrylates” M. Hines, M. Gray, A.J. Wahlstrom, T.V. Rajanbabu, N.A. Brunelli, *Denman Undergraduate Research Forum* (Columbus, OH 2019)

2017

1st Place - “Selective biomass conversion using silica-supported organic catalysts,” L. Pattanaik, N. Deshpande, K. Sherman, N.A. Brunelli, *Denman Undergraduate Research Forum* (Columbus, OH, 2017).

“Designing versatile paired-site mesoporous catalysts,” B. Diep, N.A. Brunelli, *Denman Undergraduate Research Forum* (Columbus, OH, 2017).

2016

2nd Place - “Selective biomass conversion using immobilized solvent effects,” L. Pattanaik, K. Sherman, N.A. Brunelli, *Denman Undergraduate Research Forum* (Columbus, OH, 2016).

“Designing versatile paired-site mesoporous catalysts,” B. Diep, N.A. Brunelli, *Denman Undergraduate Research Forum* (Columbus, OH, 2016).

2015

“Selective biomass conversion using immobilized solvent effects,” L. Pattanaik, K. Sherman, N.A. Brunelli, *Denman Undergraduate Research Forum* (Columbus, OH, 2015).

“Investigating Crystallization Mechanisms of Microporous Materials Using Ion Mobility-Mass Spectrometry (IM-MS)” A. Parulkar, N.A. Brunelli, Ohio Mass Spectrometry Symposiums (Columbus, OH 2015).

“Designing Cooperative Catalysts for C-C Bond Forming Reactions,” B. Diep, N.A. Brunelli, *STEP Expo* (Columbus, OH, 2015).

“Designing Cooperative Catalysts for C-C Bond Forming Reactions,” B. Diep, N.A. Brunelli, *Fall Undergraduate Research Forum* (Columbus, OH, 2015).

Patents

Silicon nanoparticle based sunscreen. N.A. Brunelli, K.P. Giapis, Maria Lambros (US 9,177,777 B2).

Direct Synthesis of Single-Walled Aminoaluminosilicate Nanotubes: One-Dimensional Nanomaterials with Enhanced Molecular Adsorptive Selectivity, Nair, S., Kang, D.-Y., Brunelli, N.A., Jones, C.W. (US 9,290,381 B2)

Flow Processing and Characterization of Metal-Organic Framework (MOF) Membranes in Tubular and Hollow Fiber Modules, Nair, S., Brown, A.J., Brunelli, N.A., Jones, C.W. (US 9,687,791 B2).

Composite Nanostructure Solid Acid Fuel Cell Electrodes via Electrospray Deposition: N. Brunelli, S. Haile, A. Varga, K. Giapis, M. Louie (US 2010/0227120 A1).

Nicholas A. Brunelli

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Zeolitic Materials Including Paired Lewis Acid Catalytic Sites. Brunelli, N.A., Deshpande, N., Parulkar, A. (US 15/815,413)

Methods and devices for the preparation of nanomaterials. Brunelli, N.A., Parulkar, A. (US 15/627,046)

Grants Received

2019

NSF CBET - Catalysis (\$450,000 total, \$175,000 per Co-PI Brunelli) – Understanding and Controlling Wax-Water Interactions in Pores of Fischer-Tropsch Synthesis Catalysts. National Science Foundation. (submitted April 22nd, 2019)

2018

OSU-MRI Facility Grant (\$2,000) IMR-FG0211 – Controlling Silanol Dimer Proximity to Alter Catalytic Activity

2017

NSF CAREER CBET - Catalysis and Biocatalysis (\$529,732) - CAREER: Increasing Catalytic Selectivity for Isomerization of Glucose to Fructose using Paired Lewis Acid Sites. National Science Foundation. (submitted July 22nd, 2016)

2016

NSF CBET - Catalysis and Biocatalysis (\$334,000) - Designing Cooperative Interactions to Increase Catalytic Performance for Biomass Conversion (submitted October 20th, 2015)

NSF MRI – (\$1,000,000) – Ambient Condition XPS – wrote portion of proposal and organized letters of collaboration for proposal with Robert Baker

2015

ACS-PRF-DNI (\$110,000) – Designing Uniform Paired Copper Catalytic Sites for Conversion of Methane to Methanol. (PRF# 55946-DNI5)

OSU-MRI Exploratory Materials Research Grant (\$40,000) - Investigating Crystallization Mechanisms of Microporous Materials Using Ion Mobility-Mass Spectrometry (IM-MS) (EMR-G000018)

OSU-MRI Facility Grant (\$2,000) – Novel Plasma Synthesis of Heteroatom Doped Carbon Nanostructures for Highly Active Oxygen Reduction Reaction Catalysts for PEM Fuel Cells (IMR-FG0148)

2014

OSU-MRI Facility Grant (\$2,000) IMR-FG0138 – Identifying Nucleation and Growth Species of ZIFs using IM-MS

OSU-MRI Facility Grant (\$2,000) IMR-FG0128 – Pairing Copper Sites for Selective Conversion of Methane to Methanol (January 17th, 2014)

Proposals Submitted (pending)

2019

NSF Chemistry - Catalysis (\$550,000) –Enantioselective Epoxide Ring Opening for Lewis Acidic Zeolites (submitted September 30th, 2019).

ACS-PRF New Directions (\$110,000) – Elucidating the Impact of Strain for Olefin Metathesis (submitted September 2019).

NSF CBET - Catalysis (\$330,000) – Tuning the Design of Catalysis for Glucose Isomerization (submitted December 2019).

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Proposals Submitted (not funded)

2019

ACS-PRF New Directions (\$110,000) – Elucidating the Impact of Strain for Olefin Metathesis (submitted March 2019).

NSF CBET - Catalysis (\$500,000) - (submitted May 6th, 2019).

OSU IMR Exploratory Materials Research Grant (\$40,000) (submitted March 2019)

2018

NSF Chemistry - Catalysis (\$658,000) – Regio- and Enantioselective Epoxide Ring Opening for Lewis Acidic Zeolites (submitted October 1st, 2018).

OSU IMR Exploratory Materials Research Grant (\$40,000) - (submitted March 17th, 2018)

2017

NSF CMMI – Nanomanufacturing (\$354,633) – “Robust Jet-mixing Reactor for the Continuous Production of ZIF-8 Nanomaterials” (submitted January 13th, 2017)

USDA/DOE (\$506,270) – “Valorizing Light Aldehydes from Pyrolysis Oil to Higher Molecular Weight Chemicals” (submitted September 27th, 2017)

Ohio Development Services Agency (OSDA) (\$160,000) Empowering CO₂ Capture through Creating Selective Zeolite Adsorbents (submitted September 18th, 2017)

NSF CMMI – Nanomanufacturing (\$356,093) – “Scalable Jet-mixing Reactor for the Continuous Production of ZIF-8 Nanomaterials” (submitted September 15th, 2017)

U.S. Department of Energy (DOE) – (\$30,000) – Catalysts for Converting Coker Pitch to Liquid Transportation Fuels (submitted April 3rd, 2017).

2016

DOE Basic Energy Sciences – Early Career Award (\$750,000) – “Structuring Catalytic Materials to Enhance Product Selectivity” (submitted November 14th, 2016)

National Science Foundation NRT-INFEWS – (\$3,000,000) – Graduate Training for Bridging Scales: From Catalysis to the Nexus of Food, Energy, and Water (submitted February 9th, 2019)

INFEWS (\$3,000,000) – “INFEWS: Pathways Toward Closing the Carbon Cycle.” PI Bakshi, Co-PI Brunelli, Co-PI Co, Co-PI Asthagiri, Co-PI Sohngen, Co-PI Khanal, Co-PI Bielicki (submitted March 11th, 2016)

Beckman Foundation Young Investigator Program (\$750,000) – “Bio-Inspired Synthesis of Paired Site Catalysts in Zeolites” (submitted August 14th, 2016)

NSF DMREF (\$1.58M over 4 years) – “Utilizing Computational Design to Create Selective Catalytic Materials” (submitted January 19th, 2016) PI Brunelli; Co-PI Asthagiri and Marek Pruski

NSF DMR – Solid State Materials Chemistry (SSMC) (\$340,000) – “Controlling, Investigating, and Scaling Crystallization Processes for Microporous Materials Using Jet-Mixing” (submitted October 31st, 2016)

Ohio Development Services Agency (OSDA) (\$160,000) – “Enhancing CO₂ Membrane Separation Performance through Hydrophobic Support Layers” (submitted April 11th, 2016)

2015

NSF DMREF – DMREF (\$863,000) – “Designing Uniform Paired Lewis Acid Sites for Tuning Zeolite Catalytic Activity.” PI Brunelli; Co-PI Asthagiri (submitted January 29th, 2015)

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NSF Career (\$533,000) - “Career: Paired Catalytic Sites in Zeolites: How the Local Composition Surrounding a Paired Site Influences Catalytic Properties of the Material” (submitted July 22nd)

ORAU Ralph E. Powe Award (\$10,000) – “Identifying Crystallization Species of Microporous Materials with IM-MS” (January 7th, 2015)

Ohio Development Services Agency (ODSA) (\$160,000) – “Solar-Empowered CO₂ Capture” (submitted February 17th, 2015)

William M. Keck Fellowship Foundation (\$1,200,000) – “Visualizing Molecular Assembly Mechanisms” (submitted April 29th, 2015)

ARPA-e (\$3,980,000) – “Solar-Enabled Methane Conversion to Methanol at Near-Ambient Conditions.” PI Brunelli; Co-PI Anne Co and Co-PI Umit Ozkan (submitted June 29th, 2015)

Packard Foundation Fellowship (\$875,000) – “Visualizing Crystallization Intermediates: Creating Tools to Look Inside the Black Box” (submitted April 20th, 2015)

NSF EAGER (\$100,000) – “Designing Novel Types of Cooperative Effects to Influence Catalytic Performance” withdrawn by request (submitted June 23rd, 2015)

ACS Green Chemistry Initiative (\$50,000) – “Solvent Engineering: Immobilizing Solvent Effects to Enhance Catalytic Enantioselectivity” (submitted August 28th, 2015)

Sloan Foundation (\$50,000) – “Catalytic Material Design: Creating Tools to Increase Catalytic Selectivity” (submitted September 15th, 2015)

DOE Basic Energy Sciences (\$538,000) – “Designing Catalytic Materials for Cascade Reactions: Selectively Converting Sugars to Chemicals and Fuels through Designing Solvent Interactions” (submitted November 16th, 2015)

2014

Science and Technology Center – Concept Paper (led by Aravind Asthagiri; co-PI) – “Science for Interfacial Technology for Electrochemistry”

NSF DMR – Solid State Materials Chemistry (\$390,000) – “Identifying Crystallization Species of Microporous Materials with Ion Mobility-Mass Spectrometry” (submitted October 31st, 2014)

NSF CHE – Chemical Catalysis (\$319,000) – “Designing Immobilization Strategies for Reusable Enantioselective Organocatalysts” (submitted September 30th, 2014)

Sloan Foundation (\$50,000) - Molecular Scale Interactions and Assembly of Materials for Energy Applications (submitted July 28th, 2014)

Beckman Foundation Young Investigator Program (\$750,000) – “Creating Bio-Inspired Paired Catalytic Sites in Heterogeneous Catalytic Materials” (submitted August 31st, 2014)

NSF CBET – Process and Reaction Engineering (\$319,000) – “Designing Catalytic Microenvironments for Greener Catalysts with Application to Selective Biomass Conversion” (submitted November 5th, 2014)

DOE Young Investigator Program (\$750,000) - Identifying Crystallization Species of Microporous Materials with Ion Mobility-Mass Spectrometry (submitted November 8th, 2014)

Ohio Development Services Agency (ODSA) (\$160,000) – “Selectively Converting CO₂ into Value-Added Products Using Hydrophobic Zeolite Catalysts” (submitted March 14th, 2014)

NSF CBET – Catalysis & Biocatalysis (\$300,000) - Designing Catalytic Microenvironments for Greener

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Biomass Processing (submitted February 19th, 2014)

OSU IMR Exploratory Materials Research Grant (\$40,000) - Investigating Crystallization Mechanisms of Microporous Materials Using Ion Mobility-Mass Spectrometry (IM-MS) (submitted March 17th, 2014)

NSF MRI grant (led by Josh Goldberger; co-PI) – “Acquisition of an Advanced Materials X-ray Diffractometer for Research and Education” (submitted January 6th, 2014)

Professional Service

Special Issue Guest Editor for *Catalysis Today*

Guest Editor for Special Issue Honoring Professor Umit Ozkan for the ACS Storch Award

- Invited, organized, and edited volume of *Catalysis Today*

Conferences

NAM Meeting for the North American Catalysis Society (2019 in Chicago, IL)

- Organized 15 sessions on catalysis synthesis and design
- Reviewed abstracts
- Chair of the session of Lignin Deconstruction
- Chair of the session of Upgrading Biomass

AIChE National Meeting (2018 in Pittsburgh, PA)

- Organized sessions on Atomically Dispersed Supported Metal Catalysts I

OSU IMR Materials Week (2018 in Columbus, OH)

- Organized sessions on Catalytic Materials for Energy Conversion

2018 International Symposium on Advancement and Prospect of Catalysis Science and Technology (2018 in Sydney, Australia)

- Chair of the session on Catalytic Material

AIChE National Meeting (2017 in Minneapolis, MN)

- Chair of the sessions on In Situ Spectroscopy Methods
- Chair of the sessions for the Acrivos Professional Progress Award

ACS Fall Meeting (2017 in Washington, DC)

- Organized and chair of the sessions for the ENFL Storch Award in Honor of Umit Ozkan

NAM Meeting for the North American Catalysis Society (2017 in Denver, CO)

- Reviewed abstracts
- Chair of the session of Surface Modification
- Chair of the session of Single Sites

ACS Spring Meeting (2017 in San Francisco, CA)

- Chair of the sessions on In Situ Spectroscopy Methods

AIChE National Meeting (2016 in San Francisco, CA)

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- Chair of the sessions on In Situ Spectroscopy Methods

AICHE National Meeting (2015 in Salt Lake City, Utah)

- Co-Chair of the session on Novel Nanostructured Catalytic Materials I
- Co-Chair of the session on Novel Nanostructured Catalytic Materials II

AICHE National Meeting (2014 in Atlanta)

- Chair of the session on Catalysis with Microporous and Mesoporous Materials IV
- Co-chair of the session on Catalytic Processing of Fossil and Biorenewable Feedstocks: Fuels III

AICHE National Meeting (2013 in San Francisco, CA)

- Co-chair of the session on Catalysis with Microporous and Mesoporous Materials IV

ACS 246th National Meeting & Exposition (2013)

- Reviewed abstracts and organized section of Catalysis Division poster session

7th International Symposium on Acid/Base Catalysis Session Chair (2013)

- Served as session chair

NSF Panel

- Data-Driven Chemistry (11-12 September 2014).

Peer Reviewing

- Journals
 - Reviewer for *Journal of the American Chemical Society (JACS)*, *ACS Catalysis*, *Journal of Vacuum Science & Technology*, *Analytical Chemistry*, *ChemCatChem*, *Environmental Science & Technology*, *ASME Journal of Nanotechnology in Engineering and Medicine*, *Comments on Inorganic Chemistry*, *Scientific Reports*, *Journal of Physical Chemistry*, *Journal of Catalysis*, *Applied Catalysis A: General*, *Applied Catalysis B: Environmental*, *Catalysis Today*, *Industrial and Engineering Chemistry Research*, *ACS Sustainable Chemistry and Engineering*, *Journal of Chemistry Physics Letters*, *ACS Applied Materials and Interfaces*, *The Journal of Organic Chemistry*
- Grants
 - Reviewer for FWO, DOE, ACS-PRF, NSF

Professional Societies

- AIChE, ACS, ORCS, ASMS, NAM, Tri-State Catalysis

Teaching Experience

Lecturing as an Assistant Professor – The Ohio State University

- Kinetics and Reactor Design (AU 2019) – taught 87 students
- Kinetics and Reactor Design (SP 2019) – taught 80 students
 - Added an ombudsperson to the class to provide mid-semester feedback on areas of success and areas needing improvement
- Kinetics and Reactor Design (AU 2018) – taught 107 students
- Kinetics and Reactor Design (SP 2018) – taught 85 students
 - Modified problem sets to improve student understanding of reactor design

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- Increased number of in class worksheets
- Separations (SP 2018) – taught 110 students
 - Added in class demonstration for extraction using coffee as an example
- Kinetics and Reactor Design (SP 2017) – taught 60 students
 - Modified problem sets to have a self-graded HW format
 - Created new handwritten notes and modified Powerpoint files
- Separations (AU 2016) – taught 61 students
 - Modified problem sets
 - Increased the number of problem sets associated with adsorption
- Separations (SP 2016) – taught 60 students
 - Improved problem sets
 - Increased
- Separations (SP 2015) – taught 65 students
 - Migrated content online to increase utilization of the capabilities of Carmen
 - Led effort with John Clay and Lisa Hall to record videos of class room content
- Separations (SP 2014) – taught 133 students
 - Developed new lecture notes to teach the important topics in separations for chemical engineers
 - Created online quizzes related to the content from the show, “How It’s Made” to connect abstract calculations to real world applications
 - Modified lecture notes to enable active adaptation of lecture notes through utilizing a Bamboo tablet from Wacom
 - Utilized self-graded homework to re-enforce student conceptual learning through repetition
 - Received an SEI score of 4.2/5.0 (40% response rate; college average 4.1/5.0)

Guest Lecturer

- Ohio State University
 - Separations (SP 2017) – lectured from self-derived notes on the topic of adsorption; used opportunity to improve content related to adsorption
 - Kinetics and Reactor Design (SP 2017) – lectured from lecturer-provided notes
 - Separations (AU 2016) – lectured from self-derived notes
- Georgia Institute of Technology
 - Kinetics and Reactor Design (2012) – lectured twice from lecturer-provided and self-developed notes

Undergraduate Project Mentor for CBE 4764

- AU 2019
 - Hosted project on using Lewis acid zeolites for fine chemical synthesis
- SP 2019
 - Hosted project on using heterogeneous catalysts for the isomerization of glucose to fructose
- SP 2017
 - Hosted three projects for David Tomasko; met with students on a weekly basis to discuss projects related to: (1) glucose isomerization to fructose; (2) fructose dehydration to HMF; and (3) CO₂ conversion to dimethylcarbonate and polycarbonates
- AU 2016
 - Hosted two projects for David Tomasko; meet with students on a weekly basis to discuss projects related to: (1) glucose isomerization to fructose and (2) fructose dehydration to HMF
- SP 2016
 - Hosted one project for Jeff Chalmers; meet with students on a weekly basis to discuss projects related to glucose conversion to HMF

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- SP 2014
 - Hosted one project for David Tomasko; meet with students on a weekly basis to discuss fructose dehydration; students did some work in the lab

Teaching Assistant – California Institute of Technology

- Microplasma Lab (2009) – developed new projects related to the production of hydrogen while teaching students microplasma operation
- Plasma Processing (2008) – lectured twice from self-developed class notes; created problem sets; graded assignments
- Microplasma Lab (2006) – developed new student projects including production of Fe nanoparticles and conversion of carbon dioxide to methanol
- Microplasma Lab (2005) – guided students in utilizing a microplasma reactor for decomposition of VOCs, synthesis of higher hydrocarbons from methane and detection aerosol particles through atomic emission spectroscopy

Teaching Assistant – The Ohio State University

- Chemical Engineering Process Calculations (2004) – graded assignments and held office hours

Mentoring

Research Mentor

- Graduate Students
 - Nitish Deshpande (2014 – 2018)
 - Aamena Parulkar (2014 – 2018)
 - Mariah Whitaker (2015 – present)
 - Rutuja Joshi (2016 – present)
 - Pinaki Ranadive (2016 – present)
 - Ashwin Kane (2017 – present)
 - Alex Spanos (2018 – present)
 - Jee-Yee Chen (2018 – present)
- Undergraduate Students
 - Katherine Ashley (2014) – “Designing Catalytic Microenvironments”
 - Successfully synthesized solvent-like organosilane
 - Kory Sherman (2015 – present) – “Creating Bi-functional Catalysts for the Selective Dehydration of Fructose to HMF”
 - Successfully product a bi-functional material containing separate sulfonic acid sites and DMSO like sulfoxide groups
 - Lagnajit Pattarnik (2015 – present) – “Organo-functionalized zeolites for the isomerization of glucose to fructose”
 - Synthesized, characterized, and tested catalytic materials
 - Brian Diep (2015 – present) – “Designing Cooperative Catalytic Materials for the Aldol Reaction and Condensation”
 - Adrianna Schneider (2015) – “Controlled synthesis of hybrid ZIF materials”
 - Synthesized and characterized single ligand and hybrid ZIFs
 - Steven Back (2015) – “Dynamic Immobilization of Cyclodextrin-Adamantane Linked Catalysts”
 - Synthesized and characterized MIDA boronate ester; determined adsorption
 - Michael Stenta (2015) – “Synthesis of zeolite nanosheets with paired Lewis acid sites”
 - Kyle Gersman (2016)
 - Nate Olson (2015 – 2018; graduate school at U. Illinois Urbana-Champaign)

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- Taylor Fitzgerald (2016 – 2017)
- AJ Wahlstrom (2016 – 2018)
- Michael Hines (2017 – present)
- Alex Spanos (2017 – 2018; continued on as a graduate student)
- Shuwei Lu (2017 - 2018)
- Nora Shaheen (2017 – 2018; graduate school at Case Western Reserve)
- Matthew Galligher (2017)
- Abrahm Williams (2018)
- William Baumgart (2018)
- Richard Szczepaniak (2019 - present)
- Justin Hopkins (2020 – present)

Georgia Tech Undergraduate Research

- “Cooperative Catalysis using Acid-Base Bifunctional Polymers,” (2011-2012).

Caltech SURF Program

- "Electrochemical Reduction Using a Microplasma: Bimetallic Catalytic Nanoparticles with Tunable Size and Composition," (2008).

Caltech REU Research

- Trace detection of sodium using atomic emission spectroscopy with a microplasma as the excitation source (2005).

Future Faculty Information Session (2013)

- Provided insight on the faculty search process to prospective graduate students and postdocs

Faculty Service

- Graduate Studies Chair (2019 – present)
 - Organized graduate admissions, recruitment, and orientation
- Graduate Studies Committee Member
 - Evaluated potential PhD and MS candidates for the 2014, 2015, 2016, and 2017 class
- Faculty Hiring Committee
 - Energy and Environment Position 2015 and 2016
 - Discovery Themes Position 2015 and 2016
- Vita Advisory Committee
 - Provided feedback to group developing Vita (application for preparing tenure and promotion materials)
- Thesis Defense Committee Member
 - Honors Undergraduate Thesis
 - Nick Blum
 - Lavanya Easwaran
 - Nathaniel Kramer
 - Justin Dilenschneider
 - Ph.D. Thesis
 - Cole Tyler Edwards – Geology (External Member 2014)
 - “Carbon, sulfur, and strontium isotope stratigraphy of the Lower-Middle Ordovician, Great Basin, USA: Implications for oxygenation and causes of global biodiversification”
 - Lin Zhao – Chemical & Biomolecular Engineering
 - “Advanced Reverse Osmosis Membranes for Desalination and

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Inorganic/Polymer Composite Membranes for CO₂ Capture”

- Yuanxin Chen – Chemical & Biomolecular Engineering
 - “Polymer Membranes for Flue Gas Carbon Capture and Fuel Cell Application”
- Ria Mazumder (External 2015)
 - “Estimation of Spatiotemporal Isotropic and Anisotropic Myocardial Stiffness Using Magnetic Resonance Elastography: A Study in Heart Failure.”
- Wenjia Luo – Chemical & Biomolecular Engineering
 - “First Principles Study of Ethanol and Methanol Steam Reforming on Co-based Materials”
- Varun Vakharia (2016)
 - “Development of Membrane Technology for CO₂ Removal and H₂ Purification: A Techno-Economic, Lab-Scale, and Pilot-Scale Study”
- Yaser Helal (External 2016)
 - “Submillimeter Spectroscopic Study of Semiconductor Processing Plasmas”
- Zi Tong (2017)
 - “CO₂ Facilitated Transport Membranes for Hydrogen Purification and Flue Gas Carbon Capture”
- Witopo Salim (2017)
- Minkyu Kim (2018)
- Peiyuan Teng (External 2018)
- Alexander Brust (External 2019)
- Kil Ho Lee (2019)
- Abhilasha Dehenkar (2019)
- MS Thesis Defense
 - Priya Sinha (2018)
- Qualifying Exam I Committee
 - Xiang Zhang (2014)
 - Nick Wood (2016)
 - Vance Gustin (2017)
 - Elizabeth Jergens (2018)
 - Jackelyn Miozzi (2019)
- Qualifying Exam II Committee
 - Hyun Tae Sohn (2014)
 - Yeonsil Park (2015)
 - Gokhan Celik (2015)
 - Witopo Salim (2016)
 - Kai Chen (2016)
 - Kyuha Lee (2017)
 - Eun Hyun Cho (2018)
 - Ting Yu Chen (2018)
 - Kayane Dingilian
 - Atefeh Alizadehbirjandi
 - Yan Liu
 - Changlong Zou (2019)
- Candidacy Exam
 - Chi Cheng (2014)

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- Sumant Patankar (2015)
- Varun Vakharia (2015)
- Witopo Salim (2016)
- Gauri Nabar (2016)
- Minkyu Kim (2016)
- Kilho Lee (2017)
- Dhruba Jyoti Deka (2017)
- Yensil Park (2017)
- Vinnie Ribeiro (2018)
- Yang Hang (2018)
- Eun Hyun Cho (2019)

- Revision of the Strategic Plan
 - Led effort to revise the department strategic plan in the area of graduate students
 - Suggested methods to improve graduate student recruitment, experience, and job placement
- OSU MRI Seed Grant Panel (2017)
 - Discussed application process for successful OSU MRI grant
- Residence Life Program (2017)
 - Discussed research opportunities and current research activities with undergraduate students
- Midnight Breakfast (AU 2018)
 - Assisted with a program from the development office to provide breakfast food to students during reading day
- Advisor for Omega Chi Epsilon (SP 2019 – present)
 - Worked with undergraduate students to help found Chemical Engineering honorary
- OSU IMR Materials Week Poster Judge
- Graduate Research Symposium Poster Judge
- AIChE Catalysis and Reaction Engineering Poster Judge
- Denman Undergraduate Research Forum Poster Judge