

Bingjun Xu

Associate Professor, Centennial Development Professor of Chemical & Biomolecular Engineering

Department of Chemical & Biomolecular Engineering, University of Delaware

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EDUCATION

Harvard University

Cambridge, MA, USA

- Ph.D. Physical Chemistry (Adviser: Prof. Cynthia M. Friend) 2007 – 2011
Thesis: Fundamental Concepts in Catalytic Oxidative-Coupling Reactions on Metallic Gold

Fudan University

Shanghai, P.R. China

- M.S. Physical Chemistry (Adviser: Prof. Zi Gao) 2004 - 2007
- B.S. Chemistry 2000 - 2004

PROFESSIONAL EXPERIENCE

Centennial Development Associate Professor of Chemical & Biomolecular Engineering, Department of Chemical & Biomolecular Engineering, University of Delaware

2019 – Present

Assistant Professor, Department of Chemical & Biomolecular Engineering, University of Delaware

2013 – 2019

Thrust Leader, Catalysis Center for Energy Innovation, University of Delaware

2014 – Present

Postdoctoral Fellow, California Institute of Technology (Adviser: Prof. Mark E. Davis)

2011 – 2013

HONORS & AWARDS

I&EC 2018 Class of Influential Researchers	2018
National Science Foundation CAREER Award	2017
Air Force Office of Scientific Research Young Investigator Award	2016
ACS Petroleum Research Fund Doctoral New Investigator Award	2015
University of Delaware Research Foundation Award	2015
National Graduate Research Award of American Vacuum Society	2011
Fieser Lectureship of Department of Chemistry and Chemical Biology, Harvard University	2011
Chinese Government Award for Outstanding Students Abroad	2011
Harvard Graduate Consortium on Energy and Environment Fellowship	2008
Distinguished Master's Thesis Award	2008
Honeywell Scholarship	2006
Distinguished Graduate of Shanghai	2004
Unilever Scholarship	2003

PROFESSIONAL MEMBERSHIPS

American Institute of Chemical Engineers	2012 - Present
American Chemical Society	2008 - Present
North American Catalysis Society	2011 - Present
Catalysis Club of Philadelphia	2013 - Present
Northeast Corridor Zeolite Association	2016 - Present

PROFESSIONAL SERVICE

Editorial Board Member, Nature Scientific Reports	2016 – Present
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Program Chair, Northeast Corridor Zeolite Association
Early Career Editorial Advisory Board, ACS Catalysis
Director, Catalysis Club of Philadelphia

2016 – Present
2017 – 2018
2014 – 2016

RESEARCH GRANTS

Single PI or lead-PI grants

1. “Understanding Liquid Phase Tandem Catalysis on Zeolite Encapsulated Metal Nanoparticles”, NSF, CBET, Catalysis, \$300,000, 9/2019-8/2022.
2. “Efficient and Modular Methane Upgrading to Liquid Aromatics by Coupling Dehydroaromatization with Reactive Hydrogen Separation”, NSF, CBET, Process Systems, Reaction Engineering and Molecular Thermodynamics, \$300,000, 8/2018-7/2021.
3. “Efficient Chemicals Production via Chemical Looping”, Rapid Advancement in Process Intensification Deployment (RAPID), US Department of Energy, AMO, \$4,296,000, 1/2018-12/2021 (co-PIs: Vlachos, Lobo, Ogunnaike).
4. “Elucidating Molecular Level Interplay Between Catalysts and Electrolytes in Electrochemical Reduction of CO₂”, NSF CAREER, \$528,000, 3/2017-3/2022.
5. “Enabling Low Temperature Thermochemical Water and CO₂ Splitting”, University of Delaware Research Foundation – Strategic Initiative, \$45,000, 12/2017-5/2019 (co-PI: Lobo).
6. “Flameless Combustion of Hydrogen in UAVs: Develop Efficient Anode Catalyst for Hydrogen Oxidation Reaction in Alkaline Media”, Air Force Office of Scientific Research, \$360,000, 4/2017-4/2020.
7. “Low Temperature, Ambient Pressure Electrochemical Ammonia Synthesis in Alkaline Media: Mechanistic Studies and Catalyst Design”, US Department of Energy, BES, \$600,000, 9/2016-9/2019 (co-PI: Yan).
8. “Hydrogen oxidation reaction at alkaline polymer electrochemical interfaces Achieving mechanistic understanding through surface sensitive spectroscopy”, NSF Chemical Catalysis, \$300,000, 8/2016-8/2019 (co-PI: Yan).
9. “Production of Renewable Acrylic Acid via Catalytic Dehydration of Lactic Acid - Mechanistic Studies and Catalysts Design”, NSF, CBET, Catalysis, \$300,000, 11/2014-10/2017.
10. “Nonaqueous electrochemical activation of methane under ambient conditions for high-value liquid fuel production”, ACS Petroleum Research Fund, \$110,000, 9/2015-9/2017.
11. “Achieving Fundamental Understanding of Alkaline Electrochemical Interfaces by Surface Enhanced Infrared Spectroscopy”, University of Delaware Research Foundation, \$35,000, 6/2015-6/2016.

Co-PI grants

12. Catalysis Center for Energy Innovation, Energy Frontier Research Centers, DOE, 8/2018 - 7/2022, (PI: Vlachos).
13. “INFEWS: U.S. - CHINA: Solar-driven Carbon Dioxide Utilization for Environmental Sustainability”, NSF, CBET, Environmental Sustainability, \$500,000, 8/2018 - 7/2022 (PI: Jiao, \$200,000 for Xu)
14. “RAPID Multiscale Modeling Infrastructure”, Rapid Advancement in Process Intensification Deployment (RAPID), US Department of Energy, AMO, \$1,517,000, 1/2018-1/2021 (PI: Vlachos, \$100,000 for Xu).
15. “Highly Conductive, Stable and Robust Hydroxide Exchange Membranes based on Poly(aryl piperidinium)”, ARPA-E, \$1,800,000, 1/2017 -1/2019 (PI: Yan, \$200,000 for Xu).
16. “Highly Stable Anion-Exchange Membranes for High-Voltage Redox-Flow Batteries”, Department of Energy, \$500,000, 6/2015 - 6/2017 (PI: Yan, \$100,000 for Xu).
17. “Electrochemical Activation of Methane to High Value Hydrocarbons”, Innovative Energy Research Grants Program, UDEI, \$25,000, 5/2014 - 5/2015 (PI: Yan).
18. Catalysis Center for Energy Innovation, Energy Frontier Research Centers, DOE, 8/2014 - 7/2018, \$12,200,000 (PI: Vlachos, \$400,000 for Xu).
19. Catalysis Center for Energy Innovation (Phase I), Energy Frontier Research Centers, DOE, 8/2009 - 7/2014, \$15,000,000 (PI: Vlachos, \$100,000 for Xu).

PUBLICATIONS (*: Corresponding author, *Italicized: Undergraduate coauthor*)

1. X. Yang, J. Nash, N. Oliveira, Y. Yan*, and B. Xu*, "[Understanding the pH Dependence of Underpotential Deposited Hydrogen on Platinum](#)", *Angew. Chem. In. Ed.*, **2019**, in press.
2. X. Yang, S. Kattel, J. Nash, X. Chang, J. Lee, Y. Yan*, J. Chen* and B. Xu*, "[Quantification of Active Sites and Elucidation of Reaction Mechanism of Electrochemical Nitrogen Reduction Reaction on Vanadium Nitride](#)", *Angew. Chem. In. Ed.*, 131, **2019**, 13906. **(Cover Story)**
3. J. Nash, X. Yang, M. Dunwell, J. Anibal, S. Yao, K. Attenkofer, J. Chen, Y. Yan*, B. Xu*, "[Elucidation of the Active Phase and Deactivation Mechanisms of Chromium Nitride in the Electrochemical Nitrogen Reduction Reaction](#)", *J. Phys. Chem. C*, **2019**, in press.
4. F. Jiao*, B. Xu*, "[Electrochemical Ammonia Synthesis and Ammonia Fuel Cells](#)", *Adv. Mater.*, 31, **2019**, 1805173. **(Invited Perspective, Cover Story)**
5. Y. Zhao, B. Setzler, J. Wang, J. Nash, B. Xu and Y. Yan*, "[An Efficient Direct Ammonia Fuel Cell for Affordable Carbon-Neutral Transportation](#)", *Joule*, **2019**, Accepted.
6. H. Zhang, X. Chang, J. Chen, W. Goddard III, B. Xu*, M Cheng* and Q. Lu*, "[Computational and experimental demonstrations of one-pot tandem catalysis for electrochemical carbon dioxide reduction to methane](#)", 10, *Nat. Commun.*, 10, **2019**, 3310.
7. J. Wu, B. Murphy, N. Gould, C. Wang, L. Ma, B. Xu*, "[A FTIR Study of the Acidity of In-Situ Generated Brønsted Sites on NaY via Displacement Reactions](#)", *ChemCatChem*, 11, **2019**, 3253.
8. J. Wang, Y. Zhao, B. Setzler, S. Rojas-Carbonell, C. Yehuda, A. Amel, M. Page, L. Wang, K. Hu, L. Shi, S. Gottesfeld, B. Xu*, Y. Yan*, "[Poly\(aryl piperidinium\) Membranes and Ionomers for Hydroxide Exchange Membrane Fuel Cells](#)", *Nat. Energy*, 4, **2019**, 392.
9. J. Jiao, R. Lin, S. Liu, W. Cheong, C. Zhang, Z. Chen, Y. Pan, K. Wu, S. Hung, H. Chen, L. Zheng, Q. Lu, X. Yang, B. Xu, H. Xiao*, J. Li, D. Wang, Q. Peng, C. Chen*, Y. Li, "[Cu Atom-Pair Catalyst Anchored on Ally Nanowires for Selective and Efficient Electrochemical Reduction of CO₂](#)", *Nat. Chem.*, 11, **2019**, 222.
10. B. Murphy, J. Wu, H. Cho, J. Soreo, C. Wang, L. Ma, B. Xu*, "[Nature and Catalytic Properties of In Situ Generated Brønsted Acid Sites on NaY](#)", *ACS Catal.*, 9, **2019**, 1931. **(Cover Story)**
11. H. Cho, N. Gould, V. Vattipalli, S. Sabnis, W. Chaikittisilp, T. Okubo, B. Xu, W. Fan*, "[Fabrication of Hierarchical Lewis Acid Sn-BEA with Tunable Hydrophobicity for Cellulosic Sugar Isomerization](#)", *Microporous Mesoporous Mater.*, 278, **2019**, 387.
12. A. Malkani, M. Dunwell, B. Xu*, "[Operando Spectroscopic Investigations of Copper and Oxide Derived Copper Catalysts for Electrochemical CO Reduction](#)", *ACS Catal.*, 9, **2019**, 474.
13. J. Nash, J. Zheng, Y. Wang, B. Xu*, Y. Yan*, "[Mechanistic Study of the Hydrogen Oxidation/Evolution reaction over Bimetallic PtRu Catalysts in Alkaline Electrolytes](#)", *J. Electrochem. Soc.*, 165, **2018**, J3378.
14. H. Cho, D. Kim, J. Li, D. Su, B. Xu*, "[Zeolite Encapsulated Pt Nanoparticles for Tandem Catalysis](#)", *J. Am. Chem. Soc.*, 140, **2018**, 13514.
15. X. Yang, J. Nash, J. Anibal, M. Dunwell, S. Kattel, E. Stavitski, K. Attenkofer, J. Chen*, Y. Yan*, B. Xu*, "[Mechanistic Insights into Electrochemical Nitrogen Reduction Reaction on Vanadium Nitride Nanoparticles](#)", *J. Am. Chem. Soc.*, 140, **2018**, 13387.
16. S. Giles, J. Wilson, J. Nash, J. Zheng, B. Xu, D. Vlachos*, Y. Yan*, "[Recent Advances in Understanding the pH Dependence of the Hydrogen Oxidation and Evolution Reactions](#)", *J. Catal.*, 367, **2018**, 328.
17. M. Dunwell, X. Yang, Y. Yan*, B. Xu*, "[Potential Routes and Mitigation Strategies of Contamination in Interfacial Specific Infrared Spectroelectrochemical Studies](#)", *J. Phys. Chem. C*, 122, **2018**, 24658. **(Cover Story)**
18. B. Murphy, T. Mou, B. Wang, B. Xu*, "[Effect of Co-Fed Species on the Kinetics of Catalytic Methyl Lactate Dehydration on NaY](#)", *ACS Catal.*, 8, **2018**, 9066.
19. N. Gould, B. Xu*, "[Temperature Programmed Desorption of Pyridine on Zeolites in the Presence of Liquid Solvents](#)", *ACS Catal.*, 8, **2018**, 8699.
20. M. Dunwell, W. Luc, Y. Yan*, F. Jiao*, B. Xu*, "[Understanding Surface-Mediated Electrochemical Reactions: 2-Electron CO₂ Reduction and Beyond](#)", *ACS Catal.*, 8, **2018**, 8121. **(Invited Perspective)**
21. M. Dunwell, Y. Yan*, B. Xu*, "[Understanding the Influence of the Electrical Double-Layer on Heterogeneous Electrochemical Reactions](#)", *Curr. Opin. Chem. Eng.*, 20, **2018**, 151. **(Invited Review)**

22. M. Gilkey, R. Balakumar, D. Vlachos*, [B. Xu*](#), “[Adipic Acid Production Catalyzed by a Combination of a Solid Acid and an Iodide Salt from Biomass-Derived Tetrahydrofuran-2,5-dicarboxylic Acid](#)”, *Catal. Sci. Tech.*, 57, **2018**, 5591.
23. M. Dunwell, X. Yang, B. Setzler, J. Anibal, Y. Yan*, [B. Xu*](#), “[Examination of Near-Electrode Concentration Gradients and Kinetic Impacts on the Electrochemical Reduction of CO₂ using Surface Enhanced Infrared Spectroscopy](#)”, *ACS Catal.*, 8, **2018**, 3999.
24. M. Gilkey, C. Brady, D. Vlachos, [B. Xu*](#), “[Characterization of Oxidation States in Metal/Metal Oxide Catalysts in Liquid-Phase Hydrodeoxygenation Reactions with a Trickle Bed Reactor](#)”, *Ind. Eng. Chem. Res.*, 57, **2018**, 5591. **(Cover story)**
25. B. Murphy, [B. Xu*](#), “[Foundational Techniques for Catalyst Design in the Upgrading of Biomass-Derived Multifunctional Molecules](#)”, *Prog. Energy Combust. Sci.*, 67, **2018**, 1. **(Invited Review)**
26. J. Zheng, J. Nash, [B. Xu](#), Y. Yan*, “[Towards establishing apparent hydrogen binding energy as the descriptor for hydrogen oxidation/evolution reactions](#)”, *J. Electrochem. Soc.*, 105, **2018**, H27.
27. N. Gould, [B. Xu*](#), “[Catalyst Characterization in the Presence of Solvent: Development of Liquid Phase Structure-Activity Relationships](#)”, *Chem. Sci.*, 9, **2018**, 281. **(Invited Review)**
28. N. Gould, [B. Xu*](#), “[Quantification of Acid Site Densities on Zeolites in the Presence of Solvents via Determination of Extinction Coefficients of Adsorbed Pyridine](#)”, *J. Catal.*, 358, **2018**, 80.
29. A. Mehdad, N. Gould, [B. Xu](#), R. Lobo*, “[Effect of Steam and CO₂ on Ethane Activation over Zn-ZSM-5](#)”, *Catal. Sci. Tech.*, 8, **2018**, 358.
30. M. Gilkey, A. Mironenko, D. Vlachos*, [B. Xu*](#), “[Adipic Acid Production via Metal-Free Selective Hydrogenolysis of Biomass-Derived Tetrahydrofuran-2,5-dicarboxylic acid](#)”, *ACS Catal.*, 7, **2017**, 6619. **(Cover story)**
31. J. Nash, X. Yang, J. Anibal, J. Wang, Y. Yan*, [B. Xu*](#), “[Electrochemical Nitrogen Reduction Reaction on Noble Metal Catalysts in Proton and Hydroxide Exchange Membrane Electrolyzers](#)”, *J. Electrochem. Soc.*, 164, **2017**, F1712.
32. M. Dunwell, Y. Yan*, [B. Xu*](#), “[In-Situ Infrared Spectroscopic Investigations of Pyridine-Mediated CO₂ Reduction on Pt Electrocatalysts](#)”, *ACS Catal.*, 7, **2017**, 5410.
33. M. Gilkey, D. Vlachos*, [B. Xu*](#), “[Poisoning of Ru/C by Homogeneous Brønsted Acids in Hydrodeoxygenation of 2,5-Dimethylfuran via Catalytic Transfer Hydrogenation](#)”, *Appl. Catal. A*, 542, **2017**, 327.
34. S. Liu, S. Dutta, W. Zheng, N. Gould, Z. Cheng, [B. Xu](#), D. Vlachos*, B. Saha*, “[Catalytic Hydrodeoxygenation of High Carbon Furfurylmethanes to Renewable Jet-fuel Ranged Alkanes over a Rhenium Modified Iridium Catalyst](#)”, *ChemSusChem*, 10, **2017**, 3225. **(Cover story)**
35. C. Brady, B. Murphy, [B. Xu*](#), “[Enhanced Methane Dehydroaromatization via Coupling with Chemical Looping](#)”, *ACS Catal.*, 7, **2017**, 3924.
36. C. Friend*, [B. Xu*](#), “[Heterogeneous Catalysis – A Central Science for a Sustainable Future](#)”, *Acc. Chem. Res.*, 50, **2017**, 517. **(Invited Perspective)**
37. M. Dunwell, Q. Lu, J. Heyes, J. Rosen, J. Chen, Y. Yan*, F. Jiao*, [B. Xu*](#), “[The Central Role of Bicarbonate in the Electrochemical Reduction of CO₂ on Gold](#)”, *J. Am. Chem. Soc.*, 139, **2017**, 3774.
38. B. Murphy, M. Letterio, [B. Xu*](#), “[Catalyst Deactivation in Pyridine-Assisted Selective Dehydration of Methyl Lactate on NaY](#)”, *ACS Catal.*, 7, **2017**, 1912.
39. H. Cho, L. Ren, V. Vattipalli, Y. Yeh, N. Gould, [B. Xu](#), R. Gorte, R. Lobo, P. Dauenhauer, M. Tsapatsis, W. Fan*, “[Renewable p-Xylene from 2,5-Dimethylfuran and Ethylene Using Phosphorus-containing Zeolite Catalysts](#)”, *ChemCatChem*, 9, **2017**, 398.
40. M. Dunwell, J. Wang, Y. Yan*, [B. Xu*](#), “[Surface Enhanced Spectroscopic Investigations of Impact of Cations on Electrochemical Interfaces](#)”, *PhysChemChemPhys*, 19, **2017**, 971.
41. M. Gilkey, A. Mironenko, L. Yang, D. Vlachos*, [B. Xu*](#), “[Insights into Ring Opening of Biomass-Derived Furanics over Ru/C](#)”, *ChemSusChem*, 9, **2016**, 3113.
42. N. Gould, [B. Xu*](#), “[Effect of Liquid Water on Acid Sites of NaY: An in-situ Liquid Phase Spectroscopic Study](#)”, *J. Catal.*, 342, **2016**, 193.
43. J. Heyes, M. Dunwell, [B. Xu*](#), “[CO₂ Reduction on Cu at Low Overpotentials with Surface Enhanced In-Situ Spectroscopy](#)”, *J. Phys. Chem. C*, 120, **2016**, 17334.

44. B. Murphy, M. Letterio, B. Xu*, [“Selectivity Control in the Catalytic Dehydration of Methyl Lactate: The Effect of Pyridine”](#), *ACS Catal.*, 6, **2016**, 5117.
45. B. Murphy, M. Letterio, B. Xu*, [“Catalytic Dehydration of Methyl Lactate: Reaction Mechanism and Selectivity Control”](#), *J. Catal.*, 339, **2016**, 21.
46. K. Schwarz*, B. Xu, Y. Yan, R. Sundararaman, [“Partial Oxidation of Step-Bound Water Leads to Anomalous pH Effects on Metal Electrode Step-Edges”](#), *PhysChemChemPhys*, 18, **2016**, 16216.
47. J. Zheng, B. Xu*, Y. Yan*, [“Universal Dependence of Hydrogen Oxidation and Evolution Reaction Activity of Platinum-Group-Metals on pH and Hydrogen Binding Energy”](#), *Sci. Adv.*, 2, **2016**, e1501602. (Covered by [Phys.org](#))
48. J. Zheng, B. Xu*, Y. Yan*, [“Size-dependent Hydrogen Oxidation and Evolution Activities on Supported Palladium Nanoparticles in Acid and Base”](#), *J. Electrochem. Soc.*, 163, **2016**, F499.
49. M. Gilkey, B. Xu*, [“Heterogeneous Catalytic Transfer Hydrogenation as an Effective Pathway in Biomass Upgrading”](#), *ACS Catal.*, 6, **2016**, 1420. (Invited Review)
50. M. Dunwell, Y. Yan*, B. Xu*, [“A Surface-Enhanced Infrared Absorption Spectroscopic Study of pH Dependent Water Adsorption on Au”](#), *Surf. Sci.*, 650, **2015**, 51.
51. J. Wang, S. Gu, R. Xiong, B. Zhang, B. Xu*, Y. Yan*, [“Structure-Property Relationships in Hydroxide-Exchange Membranes with Cation Strings and High Ion-Exchange Capacity”](#), *ChemSusChem*, 8, **2015**, 4229.
52. J. Zheng, Y. Yan*, B. Xu*, [“Correcting Hydrogen Diffusion Limitation in Rotating Disk Electrode Measurements of Hydrogen Reaction Kinetics”](#), *J. Electrochem. Soc.*, 162, **2015**, F1470.
53. M. Gilkey, P. Panagiotopoulou, A. Mironenko, G. Jennes, D. Vlachos*, B. Xu*, [“Mechanistic Insights into Metal-Lewis Acid Mediated Catalytic Transfer Hydrogenation of Furfural to 2-Methylfuran”](#), *ACS Catal.* 5, **2015**, 3988.
54. J. Zheng, Z. Zhuang, B. Xu*, Y. Yan*, [“Correlating Hydrogen Oxidation/Evolution Reaction Activity With the Minority Weak Hydrogen-Binding Sites on Ir/C Catalysts”](#), *ACS Catal.* 5, **2015**, 4449.
55. A. Mironenko, M. Gilkey, P. Panagiotopoulou, G. Facas, D. Vlachos*, B. Xu*, [“Ring Activation of Furnace Compounds on Ru-Based Catalysts”](#), *J. Phys. Chem. C*, 119, **2015**, 6075.
56. B. Murphy, M. Davis, B. Xu*, [“The Effect of Adsorbed Molecule Gas-Phase Deprotonation Enthalpy on Ion Exchanged in Sodium Exchanged Zeolites: an *in-situ* FTIR Investigation”](#), *Top. Catal.*, 58, **2015**, 393.
57. S. Gu, B. Xu, Y. Yan*, [“Electrochemical Energy Engineering: A New Frontier of Chemical Engineering Innovation”](#), *Annu. Rev. Chem. Biomol. Eng.*, 5, **2014**, 429. (Invited Review)

Prior to joining University of Delaware

58. B. Xu, C. Siler, R. Madix, C. Friend, [“Predicting Gold-Mediated Catalytic Oxidative-Coupling Reactions from Single Crystal Studies”](#), *Acc. Chem. Res.*, 47, **2014**, 761.
59. B. Xu, C. Siler, R. Madix, C. Friend, [“Ag/Au Mixed Sites Promote Oxidative Coupling of Methanol on the Alloy Surface”](#), *Chem. Euro. J.* 20, **2014**, 4646. (Covered by ChemistryViews: [Understanding Noble Metal Catalysis](#))
60. B. Xu, R. Madix, C. Friend, [“Alkyl Groups as Synthetic Vehicles in Gold-Mediated Oxidative Coupling Reactions”](#), *Phys. Chem. Chem. Phys.*, 15, **2013**, 3179.
61. B. Xu, Y. Bhawe, M. Davis, [“Spinel Metal Oxide-Alkali Carbonate-Based, Low-Temperature Thermochemical Cycles for Water Splitting and CO₂ Reduction”](#), *Chem. Mater.* 25, **2013**, 1564.
62. B. Xu, Y. Bhawe, M. Davis, [“Low-Temperature, Manganese Oxide-Based Thermochemical Water Splitting Cycle”](#), *Proc. Natl. Acad. Sci.* 109, **2012**, 9260.
63. C. Siler, B. Xu, C. Friend, R. Madix, [“Role of Surface-Bound Intermediates in the Oxygen-Assisted Synthesis of Amides by Metallic Silver and Gold”](#), *J. Am. Chem. Soc.* 134, **2012**, 12604.
64. B. Xu, R. Madix, C. Friend, [“Dual-Function of Alcohols in Gold-Mediated Selective Coupling of Amines and Alcohols”](#), *Chem. Euro. J.* 18, **2012**, 2313.
65. B. Xu, R. Madix, C. Friend, [“Activated Metallic Gold as an Agent for Direct Methoxycarbonylation”](#), *J. Am. Chem. Soc.* 133, **2011**, 20378.
66. B. Xu, C. Friend, [“Oxidative Coupling of Alcohols on Gold: Insights from Experiments and Theory”](#), *Faraday Discuss.* 152, **2011**, 307.

67. B. Xu, C. Friend, R. Madix, "[A Paradigm for Predicting Selective Oxidation on Noble Metals: Oxidative Catalytic Coupling of Amines and Aldehydes on Metallic Gold](#)", *Faraday Discuss.* 152, **2011**, 241.
68. B. Xu, J. Haubrich, T. Baker, E. Kaxiras, C. Friend, "[Theoretical Study of O-Assisted Selective Coupling of Methanol on Au\(111\)](#)", *J. Phys. Chem. C* 155(9), **2011**, 3703.
69. B. Xu, R. Madix, C. Friend, "[Achieving optimum selectivity in oxygen assisted alcohol cross-coupling on gold](#)", *J. Am. Chem. Soc.* 132, **2010**, 16571.
70. B. Xu, J. Haubrich, C. Freyschlag, R. Madix, C. Friend, "[Oxygen-Assisted Cross-Coupling of Methanol with Alkyl Alcohols on Metallic Gold](#)", *Chem. Sci.* 1, **2010**, 310. (Cover story)
71. B. Xu, X. Liu, J. Haubrich, C. Friend, "[Vapor-Phase Gold-Surface-Mediated Coupling of Aldehydes with Methanol](#)", *Nat. Chem.* 2, **2010**, 61.
72. B. Xu, L. Zhou, R. Madix, C. Friend, "[Highly Selective Acylation of Dimethylamine Mediated by Oxygen Atoms on Metallic Gold Surfaces](#)", *Angew. Chem., Int. Ed.* 49, **2010**, 394.
73. L. Zhou, C. Freyschlag, B. Xu, R. Madix, C. Friend, "[Direct Selective Oxygen-Assisted Acylation of Amines Driven By Metallic Silver Surfaces: Dimethylamine with Formaldehyde](#)", *Chem. Commun.* 46, **2010**, 704.
74. X. Liu, B. Xu, J. Haubrich, R. Madix, C. Friend, "[Surface-Mediated Self-Coupling of Ethanol on Gold](#)", *J. Am. Chem. Soc.* 131, **2009**, 5757.
75. B. Xu, X. Liu, J. Haubrich, R. Madix, C. Friend, "[Selectivity Control in Gold-Mediated Esterification of Methanol](#)", *Angew. Chem., Int. Ed.* 48, **2009**, 4206.
76. L. Zhou, B. Xu, W. Hua, Y. Yue, Z. Gao, "[Sulfated Tin Oxide: An Efficient Catalyst for Alkylation of Hydroquinone with Tert-Butanol](#)", *Catal. Commun.* 9, **2008**, 2274.
77. B. Xu, T. Li, B. Zheng, W. Hua, Y. Yue, Z. Gao, "[Enhanced Stability of HZSM-5 Supported Ga₂O₃ Catalyst in Propane Dehydrogenation by Dealumination](#)", *Catal. Lett.* 119, **2007**, 283.
78. B. Xu, H. Li, W. Hua, Y. Yue, Z. Gao, "[MSU-S_{\(BEA\)} Mesoporous Molecular Sieve: An Active and Stable Catalyst for Alkylation of Hydroquinone](#)", *Microporous Mesoporous Mater.* 88, **2006**, 191.
79. B. Xu, B. Zheng, W. Hua, Y. Yue, Z. Gao, "[Support Effect in Dehydrogenation of Propane in the Presence of CO₂ over Supported Gallium Oxide Catalysts](#)", *J. Catal.* 239, **2006**, 470.
80. B. Xu, H. Li, W. Hua, Y. Yue, Z. Gao, "[Role of Surface Pockets on MCM-49 Structure in the Alkylation of Hydroquinone with Tert-Butanol](#)", *J. Catal.* 240, **2006**, 31.
81. B. Xu, W. Hua, Y. Yue, Z. Gao, "[Alkylation of Hydroquinone with Tert-Butanol over AISBA-15 Mesoporous Molecular Sieves](#)", *Catal. Lett.* 100, **2005**, 95.

PATENTS

1. B. Xu, Y. Yan, X. Yang, M. Dunwell, "In-Situ Quantification of Catalysts Dissolution in Stirred Spectroelectrochemical Cell", US Patent Application No. 62/643,347 (2018).
2. B. Xu, D. Vlachos, M. Gilkey, A. Mironenko, R. Balakumar, "Metal-Free Catalytic Production of Adipic Acid From Biomass-Derived Tetrahydrofuran-2,5-Dicarboxylic Acid", US Patent Application No. 62/537,493 (2017).
3. Y. Yan, B. Xu, J. Wang, Y. Zhao, "Poly(aryl piperidinium) polymers for use as hydroxide exchange membranes and ionomers", US Patent Application No. 62/314,008 (2016).
4. M. Davis, B. Xu, Y. Bhawe, "Methods and materials for the catalytic reduction of carbon dioxide", US Patent 9,206,042 (2015).
5. M. Davis, B. Xu, Y. Bhawe, "Methods and materials for the thermochemical production of hydrogen from water", US Patent 8,940,269 (2015).
6. C. Friend, R. Madix, B. Xu, "Gold-catalyzed synthesis of alkyl carbonates from carbon monoxide", US Patent Application No. 8,937,197 (2015).
7. R. Madix, L. Zhou, B. Xu, C. Friend, C. Freyschlag, "Silver-catalyzed synthesis of amides from amines and aldehydes", US Patent Application No. 8,889,908 (2014).

INVITED LECTURES

Academic Intuitions

1. B. Xu, X. Yang, M. Dunwell, A. Malkani, "Tailoring Efficient Renewable Catalytic Processes for a

- Sustainable Future”, Department of Chemical Engineering, **Stanford University**, CA, 2019.
2. B. Xu, X. Yang, M. Dunwell, A. Malkani, “Tailoring Efficient Renewable Catalytic Processes for a Sustainable Future”, Department of Chemical Engineering, **Stanford University**, CA, 2019.
 3. B. Xu, X. Yang, M. Dunwell, A. Malkani, “Rational Design of Thermo-/Electro-Catalytic Materials”, Department of Chemistry, **Tsinghua University**, Beijing, CHN, 2019.
 4. B. Xu, H. Cho, X. Yang, J. Nash, A. Malkani, “Achieving Molecular Level Understanding of Thermo- and Electro- Catalytic Processes”, College of Chemistry and Molecular Engineering, **Peking University**, Beijing, China, 2019.
 5. B. Xu, X. Yang, M. Dunwell, A. Malkani, “Achieving Molecular Level Understanding of Electrocatalytic Processes”, Department of Chemistry, **Boston College**, Boston, MA, 2018.
 6. B. Xu, X. Yang, H. Cho, “Tailoring Efficient Renewable Catalytic Processes for a Sustainable Future”, Department of Chemical & Biomolecular Engineering, **University of Massachusetts - Amherst**, Amherst, MA, 2018.
 7. B. Xu, X. Yang, H. Cho, “Tailoring Efficient Renewable Catalytic Processes for a Sustainable Future”, Department of Chemical & Biomolecular Engineering, **University of Pennsylvania**, Philadelphia, PA, 2018.
 8. B. Xu, X. Yang, J. Nash, M. Dunwell, “Understanding and Tailoring Materials for Electrocatalytic Processes”, Department of Materials Science & Engineering, **Cornell University**, Ithaca, NY, 2018.
 9. B. Xu, N. Gould, “Developing the Tool Kit to Probe Liquid-Solid Interfaces in Biomass Upgrading”, Mason Lecture Series, Department of Chemical Engineering, **Stanford University**, Palo Alto, CA, 2018.
 10. B. Xu, M. Dunwell, B. Murphy, M. Gilkey, X. Yang, “Deciphering Surface Mediated Thermo- and Electro-Catalytic Processes by In-situ Spectroscopies”, School of Engineering and Applied Sciences, **Harvard University**, Cambridge, MA, 2018.
 11. B. Xu, M. Dunwell, B. Murphy, “Deciphering Surface Mediated Thermo- and Electro-Catalytic Processes by In-situ Spectroscopies”, Department of Chemical and Biological Engineering, **University of Illinois**, Urbana-Champaign, IL, 2017.
 12. B. Xu, M. Dunwell, B. Murphy, “Deciphering Surface Mediated Thermo- and Electro-Catalytic Processes by In-situ Spectroscopies”, Department of Chemical Engineering, **University of Houston**, Houston, TX, 2017.
 13. B. Xu, M. Dunwell, B. Murphy, “Deciphering Surface Mediated Thermo- and Electro-Catalytic Processes by In-situ Spectroscopies”, Department of Chemical, Biological & Materials Engineering, **University of Oklahoma**, Norman, OK, 2017.
 14. B. Xu, M. Dunwell, B. Murphy, C. Brady, “Deciphering Surface Mediated Thermo- and Electro-Catalytic Processes by In-situ Spectroscopies”, Department of Mechanical Engineering, **Colorado School of Mines**, Golden, CO, 2017.
 15. B. Xu, M. Dunwell, B. Murphy, “Deciphering Surface Mediated Thermo- and Electro-Catalytic Processes by In-situ Spectroscopies”, Department of Chemical and Biological Engineering, **Drexel University**, Philadelphia, PA, 2017.
 16. B. Xu, M. Dunwell, B. Murphy, “Deciphering Surface Mediated Thermo- and Electro-Catalytic Processes by In-situ Spectroscopies”, Department of Chemical Engineering, **Iowa State University**, Ames, IA, 2017.
 17. B. Xu, M. Dunwell, J. Heyes, “In-situ Surface Enhanced Spectroscopic Investigations of Electrochemical Interfaces”, **Army Research Laboratory**, Adelphi, MD, 2016.
 18. B. Xu, B. Murphy, M. Letterio, “Deciphering Complex Biomass Upgrade Processes on the Molecular Level”, Institute for Catalysis, **Hokkaido University**, Sapporo, Hokkaido, Japan, 2015.
 19. B. Xu, M. Dunwell, B. Murphy, M. Letterio, Y. Yan, “Deciphering Surface Mediated Thermo- and Electro-Catalytic Processes by In-situ Spectroscopies”, Department of Chemistry, **Brigham Young University**, Provo, UT, 2015.
 20. B. Xu, M. Gilkey, B. Murphy, D. Vlachos, “Deciphering Complex Biomass Upgrade Processes on the Molecular Level”, Department of Chemical Engineering, **New Jersey Institute of Technology**, Newark, NJ, 2015.
 21. B. Xu, M. Gilkey, B. Murphy, D. Vlachos, “Deciphering Complex Biomass Upgrade Processes on the Molecular Level”, Department of Chemical Engineering, **Tianjin University**, Tianjin, CHN, 2015.

22. B. Xu, M. Gilkey, B. Murphy, D. Vlachos, “Deciphering Complex Biomass Upgrade Processes on the Molecular Level”, Department of Chemical Engineering, **Tsinghua University**, Beijing, CHN, 2015.
23. B. Xu, M. Gilkey, B. Murphy, P. Panagiotopoulou, D. Vlachos, “Develop Renewable Pathways to Monomers with a Bottom-Up Approach”, Department of Chemical Engineering, **Zhejiang University**, Hangzhou, CHN, 2014.
24. B. Xu, M. Gilkey, B. Murphy, P. Panagiotopoulou, D. Vlachos, “Achieve Mechanistic Understanding of Biomass Upgrade to Valuable Chemicals”, Department of Chemistry, **Fudan University**, Shanghai, CHN, 2014.

Conferences

1. B. Xu, H. Cho, D. Kim, “Zeolite Encapsulated Metal Nanoparticles for Tandem Upgrading of Biomass-Derived Feedstocks”, ACS Annual Meeting, San Diego, CA, 2019.
2. B. Xu, N. Gould, J. Wu, “Understanding the Impact of Solvent on the Adsorption and Reaction on Porous Catalysts”, ACS Annual Meeting, San Diego, CA, 2019.
3. B. Xu, X. Yang, J. Nash, Y. Yan, “On the pH Dependence in the Hydrogen Oxidation Reaction on Platinum Surfaces”, ACS Annual Meeting, San Diego, CA, 2019.
4. B. Xu, X. Yang, J. Nash, Y. Yan, “Identification of Active Phase of Oxide-Derived Cu in Electrochemical CO Reduction Reaction with Operando Spectroscopies”, ACS Annual Meeting, San Diego, CA, 2019.
5. B. Xu, B. Murphy, J. Wu, “Nature and Catalytic Properties of In Situ Generated Brønsted Acid Sites on NaY”, ACS Annual Meeting, San Diego, CA, 2019.
6. B. Xu, B. Murphy, J. Wu, “Electrochemical Nitrogen Reduction to Ammonia on Transition Metal Nitrides”, ACS Annual Meeting, San Diego, CA, 2019.
7. B. Xu, H. Cho, D. Kim, C. Brady, “Zeolite Encapsulated Metal Nanoparticles for Selective Tandem Catalysis”, Catalysis Society of Metropolitan New York, 2019.
8. B. Xu, C. Brady, Q. Debruyne, E. Steinman, “Upgrading Stranded Methane by Coupling Dehydroaromatization with Chemical Looping”, AIChE Spring Meeting, New Orleans, LA, 2019.
9. B. Xu, H. Cho, D. Kim, “Zeolite Encapsulated Metal Nanoparticles for Selective Tandem Catalysis”, Catalysis Club of Philadelphia, 2019.
10. B. Xu, M. Dunwell, A. Malkani, X. Yang, “Distributed Ammonia Production via Electrochemical Nitrogen Reduction Reaction”, 68th Canadian Chemical Engineering Conference, Toronto, CA, 2018.
11. B. Xu, N. Gould, “Developing the Tool Kit to Probe Liquid-Solid Interfaces in Biomass Upgrading”, 17th National Young Scholar Catalysis Conference, Lanzhou, CHN, 2018.
12. B. Xu, J. Nash, X. Yang, J. Anibal, “Distributed Ammonia Production via Electrochemical Nitrogen Reduction Reaction”, Electrochemical Society meeting, Seattle, WA, 2018.
13. B. Xu, B. Murphy, M. Letterio, “Identification of Active Sites for Methyl Lactate Dehydration on Faujasites”, International Conference on Catalysis and Chemical Engineering, Baltimore, MD, 2017.
14. B. Xu, N. Gould, “Characterization and Quantification of Acid Sites on Zeolites in the Presence of Solvents”, American Chemical Society Meeting, Washington DC, 2017.
15. B. Xu, M. Dunwell, Q. Lu, J. Heyes, J. Rosen, J. Chen, Y. Yan, F. Jiao, “Mechanistic Insights into the Electrochemical Reduction of CO₂ using In-Situ Surface Enhanced Spectroscopy”, American Chemical Society Meeting, Washington DC, 2017.
16. B. Xu, N. Gould, “Characterization and Quantification of Acid Sites on Zeolites in the Presence of Solvents”, ACS Award in Surface Science session, American Chemical Society Meeting, San Francisco, CA, 2017.
17. B. Xu, M. Dunwell, Q. Lu, J. Heyes, J. Rosen, J. Chen, Y. Yan, F. Jiao, “Mechanistic Insights into the Electrochemical Reduction of CO₂ Using In-situ Surface Enhanced Spectroscopy”, American Chemical Society Meeting, San Francisco, CA, 2017.
18. B. Xu, B. Murphy, M. Letterio, N. Gould, “Deciphering Complex Biomass Upgrade Processes with In-situ Spectroscopies”, American Chemical Society Meeting, Philadelphia, PA, 2016.
19. B. Xu, M. Gilkey, A. Mironenko, P. Panagiotopoulou, G. Facas, D. Vlachos, “Metal Lewis Acid Bifunctional Catalyst Mediated Catalytic Transfer Hydrogenation of Furfural”, American Chemical Society Meeting, Philadelphia, PA, 2016.

20. B. Xu, B. Murphy, M. Letterio, "Identification of Active Sites for Methyl Lactate Dehydration and Rational Catalyst Design", Catalysis Club of Philadelphia, Philadelphia, PA, 2016.
21. B. Xu, "Biomass as a Renewable Feedstock for Fuels and Bioproducts", UD-Africa Energy Conference, Newark, DE, 2016.
22. B. Xu, M. Gilkey, A. Mironenko, P. Panagiotopoulou, G. Facas, D. Vlachos, "Metal Lewis Acid Bifunctional Catalyst Mediated Catalytic Transfer Hydrogenation of Furfural", American Chemical Society Meeting, San Diego, CA, 2016.
23. B. Murphy, B. Xu, "A FTIR Study on Lactic Acid Dehydration on NaY – A Lewis Acid or Base Site Catalyzed Reaction?", Annual Symposium of Catalysis Society of Metropolitan New York, 2014.
24. B. Xu, M. Gilkey, P. Panagiotopoulou, G. Facas, D. Vlachos, "In-Situ Vibrational Spectroscopies and Isotopic Labeling Techniques", Spring Symposium of Catalysis Center for Energy Innovation (CCEI), University of Delaware, 2014.
25. B. Xu, M. Gilkey, P. Panagiotopoulou, G. Facas, D. Vlachos, "A Mechanistic Study of Hydrodeoxygenation of Furfural to 2-Methylfuran over Ru-based Catalysts", University of Delaware Energy Institute (UDEI) Annual Symposium, Newark, DE, 2014.
26. B. Xu, "Gold surface: A Versatile Chemical Bench-Top", CCST Annual Review, Newark, DE, 2013.

CONFERENCE PRESENTATIONS

1. B. Xu, B. Murphy, J. Wu, "Nature and Catalytic Properties of In Situ Generated Brønsted Acid Sites on NaY", NAM 26, Chicago, IL, 2019.
2. B. Xu, M. Dunwell, Q. Lu, J. Heyes, J. Rosen, J. Chen, Y. Yan, F. Jiao, "Mechanistic Insights into the Electrochemical Reduction of CO₂ Using In-situ Surface Enhanced Spectroscopy", NAM 25, Denver, CO, 2017.
3. B. Xu, M. Gilkey, A. Mironenko, D. Vlachos, "Metal-Free Adipic Acid Production from Biomass Derivatives", AIChE Meeting, Minneapolis, MN, 2017.
4. B. Xu, N. Gould, "Quantification of Brønsted and Lewis Acid Sites on Zeolites in the Presence of Solvents", AIChE Meeting, San Francisco, CA, 2016.
5. B. Xu, B. Murphy, M. Letterio, "Catalytic Dehydration of Lactic Acid and Methyl Lactate on NaY: Selectivity Control", AIChE Meeting, San Francisco, CA, 2016.
6. B. Xu, N. Gould, "Effect of Liquid Water on Acid Sites of NaY: An In-Situ Liquid Phase Spectroscopic Study", AIChE Meeting, San Francisco, CA, 2016.
7. B. Xu, B. Murphy, M. Letterio, "Catalytic Dehydration of Lactic Acid and Methyl Lactate: Selectivity Control", American Chemical Society Meeting, San Diego, CA, 2016.
8. B. Xu, J. Zheng, Y. Yan, "Effect of Hydrogen Diffusion on Hydrogen Oxidation/Evolution Kinetics", American Chemical Society Meeting, San Diego, CA, 2016.
9. B. Xu, M. Dunwell, Q. Lu, J. Heyes, J. Rosen, J. Chen, Y. Yan, F. Jiao, "Roles of Bicarbonate in the Electrochemical Reduction of CO₂ on Gold", American Chemical Society Meeting, San Diego, CA, 2016.
10. B. Xu, J. Zheng, Y. Yan, "Universal Correlation between HOR Activity and Hydrogen Energy on Precious Metals", AIChE Meeting, Salt Lake City, UT, 2015.
11. B. Xu, M. Gilkey, P. Panagiotopoulou, G. Facas, D. Vlachos, "A Mechanistic Study of Hydrogendeoxygenation of Furfural to 2-Methylfuran over Ru-based Catalysts", AIChE Meeting, Salt Lake City, UT, 2015.
12. B. Xu, B. Murphy, "Catalytic Dehydration of Lactic Acid and Methyl Lactate: Selectivity Control", AIChE Meeting, Salt Lake City, UT, 2015.
13. B. Xu, B. Murphy, "Mechanistic Insights into Catalytic Dehydration of Lactic Acid and Methyl Lactate", NAM 24, Pittsburgh, PA, 2015.
14. B. Xu, M. Gilkey, P. Panagiotopoulou, G. Facas, D. Vlachos, "Understanding the Mechanism of Hydrodeoxygenation of Furfural over Ru-based Catalysts", AIChE Meeting, Atlanta, GA, 2014.
15. B. Xu, B. Murphy, "Catalytic Dehydration of Lactic Acid on Active Sites Generated In-Situ", AIChE Meeting, Atlanta, GA, 2014.
16. B. Xu, B. Murphy, "Catalytic Dehydration of Lactic Acid – Active Sites and Reaction Mechanism", American Chemical Society Meeting, San Francisco, CA, 2014.

17. B. Xu, M. Gilkey, P. Panagiotopoulou, G. Facas, D. Vlachos, "Isotopic Labeling Study of Hydrodeoxygenation of Furfural to 2-Methylfuran over Ru/RuO_x/C catalyst", American Chemical Society Meeting, San Francisco, CA, 2014.
18. B. Xu, B. Murphy, "FTIR Study of Lactic Acid Dehydration on NaY", American Chemical Society Meeting, Dallas, TX, 2014.

CONFERENCE PRESENTATIONS BY STUDENTS AND POSTDOCS

(presenter underlined, undergraduate presenter italicized)

1. J. Anibal, A. Malkani, B. Xu, "Effect of Metal on the Electrochemical Reduction of Benzaldehyde", NAM 26, Chicago, IL, 2019.
2. A. Malkani, M. Dunwell, B. Xu, "Operando Spectroscopic Investigations of Copper and Oxide Derived Copper Catalysts for Electrochemical CO Reduction", AIChE Meeting, Pittsburgh, PA, 2018.
3. H. Cho, B. Xu, "Synthesis of Metal Nanoparticles Encapsulated within Zeolites for Substrate Selective Heterogeneous Catalysis", AIChE Meeting, Pittsburgh, PA, 2018.
4. H. Cho, B. Xu, "Bifunctional Zeolite-encapsulated Pt Catalysts for Tandem Aldol Condensation and Hydrogenation of Furfural with Acetone", AIChE Meeting, Pittsburgh, PA, 2018.
5. J. Nash, X. Yang, J. Anibal, B. Xu, Y. Yan, "Electrochemical Synthesis of Ammonia Using Metal Nitride Catalysts", ECS Fall Meeting, Pittsburgh, PA, 2018.
6. J. Zheng, J. Nash, J. Wang, X. Yang, Y. Yan, and B. Xu, "Effect of Hydrogen Diffusion on Hydrogen Oxidation/Evolution Kinetics (Invited)" AIChE Meeting, Pittsburgh, PA, 2018.
7. X. Yang, M. Dunwell, Y. Yan, B. Xu, "Towards an Ultrasensitive Method for the Quantification of Metal Ions Using Surface-Enhanced Infrared Absorption Spectroscopy", AIChE Meeting, Pittsburgh, PA, 2018.
8. X. Yang, J. Nash, J. Anibal, M. Dunwell, Y. Yan, B. Xu, "Electrochemical Nitrogen Reduction Reaction on Transition Metal Nitride Nanoparticles in Proton Exchange Membrane Electrolyzers", AIChE Meeting, Pittsburgh, PA, 2018.
9. H. Landfield, N. Gould, B. Xu, "Reductive Amination of Biomass Derived Furanics", AIChE Meeting, Pittsburgh, PA, 2018.
10. J. Wang, B. Setzler, L. Wang, K. Hu, S. Rojas-Carbonell, B. Xu, Y. Yan, "Poly(aryl piperidinium) Based Hydroxide Exchange Membranes and Ionomers", Electrochemical Society meeting, Seattle, WA, 2018.
11. H. Landfield, N. Gould, B. Xu, "Reductive Amination of Furfural and Hydrogenation of Furonitrile", AIChE Meeting, Minneapolis, MN, 2017.
12. M. Gilkey, A. V. Mironenko, D. G. Vlachos, B. Xu, "Metal-Free Production of Adipic Acid from Biomass Derivatives," 25th North American Catalysis Society Meeting, Denver, CO, 2017.
13. J. Soreo, B. Murphy, B. Xu "Characterization of Brønsted Acid Sites Generated in-situ on Zeolites via Gas-solid Ion Exchange", ACS National Meeting, Washington, D.C., 2017.
14. M. Gilkey, A. V. Mironenko, D. G. Vlachos, B. Xu, "Metal-Free Production of Adipic Acid from Biomass Derivatives", ACS National Meeting, Washington, D.C., 2017.
15. R. Balakumar, M. Gilkey, B. Xu, "Production of Renewable Adipic Acid with Solid Acids", ACS National Meeting, Washington, D.C., 2017.
16. M. Gilkey, P. Panagiotopoulou, A. V. Mironenko, G. R. Jenness, D. G. Vlachos, B. Xu, "Mechanistic Insights into Metal and Lewis Acid-Mediated Catalytic Transfer Hydrogenation Reactions," ACS National Meeting, Washington, D.C., 2017.
17. M. Dunwell, X. Yang, B. P. Setzler, J. Anibal, Y. Yan, B. Xu, "Quantification of Near-Electrode pH Changes during the Electrochemical Reduction of CO₂ using Surface Enhanced Infrared Spectroscopy", 232nd ECS Meeting, National Harbor, MD, 2017.
18. M. Dunwell, Y. Yan, B. Xu, "In-Situ Infrared Spectroscopic Investigation of Pyridine-Mediated CO₂ Reduction on Pt Electrocatalysts", 232nd ECS Meeting, National Harbor, MD, 2017.
19. B. Murphy, M. Letterio, J. Soreo, B. Xu, "Mechanistic Insights into the Dehydration of Methyl Lactate to Acrylates over NaY", 25th North American Catalysis Society Meeting, Denver, CO, 2017.

20. N. Gould, B. Xu, "Quantification of Brønsted and Lewis Acid Sites on Zeolites in the Presence of Solvents", American Chemical Society Conference, Washington DC, 2017.
21. N. Gould, B. Xu, "Quantitative Liquid Phase FTIR for Thermodynamics of Zeolite Micropores", 25th North American Catalysis Society Meeting, Denver, CO, 2017 (Poster).
22. N. Gould, B. Xu, "Liquid Phase Temperature Programmed Desorption of Pyridine from Zeolites", Northeast Corridor Zeolite Association, Philadelphia, PA, 2017.
23. J. Nash, J. Zheng, B. Xu, Y. Yan, "Effect of pH on the Activity of Hydrogen Oxidation Reaction/Hydrogen Evolution Reaction over PtRu Bimetallic Catalysts", 232nd ECS Meeting, National Harbor, MD, 2017
24. J. Nash, J. Anibal, J. Wang, Y. Yan, B. Xu, "Electrochemical Synthesis of Ammonia Using Proton and Hydroxide Exchange Membrane Cells", 232nd ECS Meeting, National Harbor, MD, 2017
25. J. Nash, X. Yang, J. Anibal, Y. Yan, B. Xu, "Electrochemical Nitrogen Reduction Reaction", 232nd ECS Meeting, National Harbor, MD, 2017
26. B. Murphy, M. Letterio, J. Soreo, B. Xu, "Mechanistic Investigation of the Catalytic Dehydration of Methyl Lactate over Zeolites: Exercising Selectivity Control", ACS National Meeting, Washington, DC, 2017.
27. M. Gilkey, A. V. Mironenko, D. G. Vlachos, B. Xu, "Metal-Free Production of Adipic Acid via Hydrogenolysis of Biomass-Derived Tetrahydrofuran-2,5-Dicarboxylic Acid in Organic Acid Solvents," Annual Research Review for the Center for Catalytic Science and Technology, Newark, DE, 2016.
28. B. Murphy, M. Letterio, B. Xu, "Selectivity Control in Catalytic Dehydration of Methyl Lactate over Zeolites", American Chemical Society Meeting, Philadelphia, PA, 2016.
29. M. Gilkey, D. G. Vlachos, B. Xu, "Mechanistic Insights into the Ring Opening of Biomass-Derived Tetrahydrofuran-2,5-Dicarboxylic Acid to Adipic Acid," Annual Research Review for the Center for Catalytic Science and Technology, Newark, DE, 2016.
30. M. Dunwell, Q. Lu, J. Heyes, J. Rosen, Y. Yan, J. Chen, F. Jiao, B. Xu, "Mechanistic Insights into the Electrochemical Reduction of CO₂ using *In-situ* Infrared Spectroscopy", American Chemical Society Meeting, Philadelphia, PA, 2016.
31. B. Murphy, M. Letterio, B. Xu, "Highly Active and Selective Catalysts for the Dehydration of Lactates to Acrylates" Gordon Research Seminar & Conference: Catalysis, New London, NH, 2016.
32. J. Nash, J. Zheng, B. Xu, Y. Yan, "Effect of pH on the activity of hydrogen oxidation reaction/hydrogen evolution reaction over PtRu bimetallic catalysts", American Chemical Society Fall Meeting, Philadelphia, PA, 2016.
33. J. Nash, J. Zheng, B. Xu, Y. Yan, "Effect of pH on the activity of hydrogen oxidation reaction/hydrogen evolution reaction over PtRu bimetallic catalysts", Center for Catalytic Science and Technology Annual Research Review, Newark, DE, 2016.
34. J. Heyes, M. Dunwell, B. Xu, "Electrochemical reduction of CO₂ on Cu at low overpotentials", American Chemical Society Fall Meeting, Philadelphia, PA, 2016.
35. N. Gould, B. Xu. "Solvent Effects on Zeolites: Liquid Phase FTIR Extinction Coefficient Determination", Center for Catalytic Science and Technology, Newark, DE, 2016.
36. N. Gould, B. Xu. "Effect of Liquid Water on the Acid Sites of NaY: an In-situ Liquid Phase Spectroscopic Study", American Chemical Society Meeting, Philadelphia, PA, 2016.
37. N. Gould, B. Xu. "Effect of Liquid Water on the Acid Sites of NaY: an In-situ Liquid Phase Spectroscopic Study", Gordon Research Conference on Catalysis, New London, NH, 2016.
38. B. Murphy, M. Letterio, B. Xu, "Selective Methyl Lactate Dehydration and Rational Catalyst Design", Catalysis Club of Philadelphia, Philadelphia, PA, 2015.
39. M. Gilkey, P. Pangiotopoulou, D. G. Vlachos, B. Xu, "Mechanistic Investigation of the Hydrodeoxygenation of Furfural to 2-Methylfuran," Catalysis Club of Philadelphia, Wilmington, DE, 2015.
40. M. Gilkey, P. Panagiotopoulou, A. V. Mironenko, G. R. Jenness, D. G. Vlachos, B. Xu, "Mechanistic Investigation of the Hydrodeoxygenation of Furfural to 2-Methylfuran over Ru/C using Isotopic Labeling Techniques," 24th North American Catalysis Society Meeting, Pittsburgh, PA, 2015.
41. M. Dunwell, Q. Lu, J. Heyes, J. Rosen, Y. Yan, J. Chen, F. Jiao, B. Xu, "The Central Role of Bicarbonate in the Electrochemical Production of CO on Gold", Center for Catalytic Science & Technology Annual Review, Newark, DE, 2015.

42. M. Dunwell, Y. Yan, B. Xu, "Potential-Dependent Behavior of Near-Electrode Water on Au", American Institute of Chemical Engineers Annual Meeting, Salt Lake City, UT, 2015.
43. J. Nash, J. Zheng, B. Xu, Y. Yan, "pH Dependence of HOR/HER Activity for PtRu/C", Center for Catalytic Science and Technology Annual Research Review Annual Research Review, Newark, DE, 2015.
44. M. Dunwell, Q. Lu, J. Heyes, J. Rosen, Y. Yan, J. Chen, F. Jiao, B. Xu, "The Central Role of Bicarbonate in the Electrochemical Production of CO on Gold", American Institute of Chemical Engineers Annual Meeting, Salt Lake City, UT, 2015.
45. N. Gould, B. Xu. "Solvent Effects on Zeolites: Liquid Phase FTIR Spectroscopy", Center for Catalytic Science and Technology, Newark, DE, 2015.
46. N. Gould, B. Xu. "Solvent Effects on Zeolites: Liquid Phase FTIR Spectroscopy", Catalysis Club of Philadelphia, Wilmington, DE, 2015.
47. J. Nash, J. Zheng, B. Xu, Y. Yan, "pH Dependence of HOR/HER Activity for PtRu/C", Catalysis Club of Philadelphia Poster Session, Wilmington, DE, 2014.
48. M. Dunwell, Y. Yan, B. Xu, "Infrared Spectroscopic Studies of Organic Cation Adsorption on Au Electrodes", Catalysis Club of Philadelphia, Wilmington, DE, 2014
49. M. Dunwell, Q. Lu, Y. Yan, J. Chen, F. Jiao, B. Xu, "The Central Role of Bicarbonate in the Electrochemical Production of CO on Gold", Catalysis Club of Philadelphia, Wilmington, DE, 2016.
50. B. Murphy, M. Letterio, B. Xu, "Selectivity Control in the Catalytic Dehydration of Methyl Lactate over Zeolites" Catalysis Club of Philadelphia, Wilmington, DE, 2015.
51. B. Murphy, B. Xu, "Reaction Mechanism of Catalytic Dehydration of Methyl Lactate over Zeolites" 24th North American Catalysis Society Meeting, Pittsburgh, PA, 2015.
52. B. Murphy, B. Xu, "Mechanistic Understanding of Ion Exchange at the Gas-Solid Interface on Zeolites", Northeast Corridor Zeolite Association 18th Annual Meeting, Philadelphia, PA, 2014.
53. B. Murphy, B. Xu, "Mechanistic Understanding of Ion Exchange at the Gas-Solid Interface on Zeolites", Catalysis Club of Philadelphia, Wilmington, DE, 2014
54. B. Murphy, B. Xu, "Lactate Dehydration to Acrylate Catalyzed by Active Sites Generated In-Situ" Center for Catalytic Science and Technology Annual Research Review, Newark, DE, 2014

TEACHING

CHEG 332: Chemical Engineering Kinetics (Fall 2014, 2015 and 2016)

CHEG 345: Chemical Engineering Junior Lab (Spring, 2016, 2017 and 2019)

CHEG 616/867: Chemistry and Physics of Surfaces and Interfaces (Spring, 2015 and 2018)

CHEG 835: Applied Chemical Kinetics (Fall 2013, and 2018)

UNIVERSITY & DEPARTMENT SERVICE

Graduate Recruiting in Department of Chemical and Biomolecular Engineering	<i>2018 - Present</i>
Junior Faculty Advisory Council of College of Engineering	<i>2017 - Present</i>
Search committee member of Chemical and Biomolecular Engineering	<i>2017-2018</i>
Search committee member of Chemical and Biomolecular Engineering Chair	<i>2017</i>
Centennial Seminar Series of Department of Chemical and Biomolecular Engineering	<i>2014 – 2015</i>
Seminar Series of Department of Chemical and Biomolecular Engineering	<i>2015 – Present</i>
Safety committee of Department of Chemical and Biomolecular Engineering	<i>2014 – Present</i>
Faculty Advisor of Chemical Engineering Undergraduate Students	<i>2013 – Present</i>

Member of Ph.D. Thesis committees

CBE: Timothy Courtney, Kimmel Yannick, Robert Kaspar, Andrew Tibbitts, Edward Schreiner, Tyler Josephson, Ryan Patet, Huibo Sheng, Geun Ho Gu, Emily Jeng, Alexander Mironenko, Yifan Wang, Mark Lafollette, Hsuan-Lan Wang, Sai Praneet Batchu, Himaghna Bhattacharjee, Maximilian Cohen, Jason Lee, Zhaoxing Wang

Chemistry & Biochemistry: Jing Zhao, Qiuqi Cai

Mechanical Engineering: Matthey Lindemer

PROFESSIONAL ACTIVITIES

Discussion leader, Gordon Research Conference 2018
Abstract reviewer and session chair, 24th and 25th North America Catalysis Society Meetings 2015, 2017
Chair, Catalytic processing of fossil and biorenewable feedstocks, AIChE meeting 2016
Co-chair, In-situ/operando spectroscopy and biomass conversion sessions, AIChE meeting 2016
Chair, Biomass conversion, ACS meeting, Philadelphia 2016
Co-chair, In-situ/operando spectroscopy and biomass conversion sessions, AIChE meeting 2015
Co-chair, Biomass, AIChE meeting 2015
Co-chair, ACS Annual Meetings 2014, 2019

Ad hoc reviewer for research journals 2013 - Present

ACS Catalysis, ACS Energy Letters, ACS Sustainable Chemistry & Engineering, Analyst, Angewandte Chemie, Applied Catalysis A: General, Applied Catalysis B: Environmental, Catalysis Today, Catalysts, Chemical Engineering Science, Chemistry of Materials, ChemSelect, ChemSusChem, Energy & Fuels, Industrial and Engineering Chemistry Research, Joule, Journal of American Chemical Society, Journal of Catalysis, Journal of Physical Chemistry C, Journal of Physical Chemistry Letters, Journal of Molecular Catalysis A, Microporous Mesoporous Materials, Nano Energy, Nature Catalysis, Nature Communications, New Journal of Catalysis, PhysChemChemPhys, Science Advances, Surface Science, Topics in Catalysis

Ad hoc reviewer for funding agencies 2014 - Present

Panelist, *National Science Foundation (CBET Catalysis, Reaction Engineering, Energy for Sustainability and DMREF)*

Reviewer, *Department of Energy, Office of Basic Science*

Reviewer, *Department of Energy, Office of Technology Transitions*

Reviewer, *American Chemical Society, Petroleum Research Fund*

Reviewer, *Research Grants Council of Hong Kong*

RESEARCH MENTORING

Postdoctoral Researchers

- Dr. Shoucheng Du (co-advise with Lobo) 2018 – 2019
- Dr. Hongjie Tang (co-advise with Jiao and Yan) 2017 – 2019
- Dr. Hongjie Cho 2017 – Present
- Dr. Xuan Yang (co-advise with Yan) 2017 – Present
- Dr. Junhua Wang (co-advise with Yan) 2014 – Present
- Dr. Xiaoxia Chang 2018 – Present
- Dr. Sourav Biswas 2019 – Present
- Dr. Yaran Zhang 2019 – Present
- Dr. Leelavathi Annamalai 2019 – Present

Graduate Students

- Nicholas Oliveira, CBE 2019 – Present
- Jian Pan, CBE 2019 – Present
- Yong Yuan, CBE 2019 – Present
- Doyoung Kim, CBE 2018 – Present
- Eric Steinman, CBE 2018 – Present
- Jacob Anibal, CBE 2017 – Present
- Arnav Malkani, CBE 2017 – Present
- Casper Brady, CBE 2016 – Present
- Jared Nash, CBE (co-advise with Yan) 2015 – 2019

- Nicholas Gould, CBE 2015 – 2019
- Brian Murphy, CBE 2014 – 2018
- Marco Dunwell, CBE (co-advise with Yan) 2014 – 2018
- Matthew Gilkey, CBE (co-advise with Vlachos) 2014 – 2018
- Jie Zheng, CBE (co-advise with Yan) 2014 – 2016
- Jeffery Heyes, CBE 2015 – 2016

Exchange Students

- Jingcheng Wu 2017 –
Present

Undergraduate Researchers

- Owen Oesterling, University of Delaware, Class 2019 2018 – 2019
- Kevin, Sanchez Rivera, University of Puerto Rico, Class 2019 2018
- Navya Jagarlamudi, University of Delaware, Class 2020 2018
- Harrison Landfield, University of Delaware, Class 2020 2017 – 2019
- Juliana Soreo, University of Delaware, Class 2019 2017 – 2018
- Rachana Balakumar, University of Delaware, Class 2019 2017 – 2018
- Brian Dinkelacker, University of Delaware, Class 2017 2015 – 2017
- Michael Letterio, University of Delaware, Class 2016 2015 – 2016
- Ryan Van Manen, University of Delaware, Class 2016 2014 – 2016
- Abhilash Sharma, University of Delaware, Class 2018 2014 – 2016
- Leerang Yang, Columbia University, Class of 2017 2015
- Gregory Facas, University of Delaware, Class 2015 2014 – 2015

High School Summer Interns

- Cynthia He, Charter School of Wilmington, DE, Junior Research Project (2nd place in Junior Research Science Fair (EE, Mechanical/Electrical Engineering)) Summer 2014
- Chelsea Gbemudu, Charter School of Wilmington, DE Summer 2017
- Victoria Deng, Charter School of Wilmington, DE Summer 2018

Student Honors

- Casper Brady, Koke Travel Award, NAM26 2019
- Nicholas Gould, Saurabh A. Palkar Graduate Award for Mentoring 2019
- Matthew Gilkey, CCEI Achievement Award 2017
- Nicholas Gould, Koke Travel Award, NAM25 2017
- Nicholas Gould, Poster Competition Award, NECZA 2017
- Brian Murphy, Air Products Fellowship 2016
- Nicholas Gould, Best Poster Presentation, Gordon Research Conference 2016