

Arthur J. Shih

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Education

Ph.D.	Purdue University - West Lafayette, Chemical Engineering	2018
B.S.E.	University of Michigan - Ann Arbor, Chemical Engineering	2013
	Minors in Music and Mathematics	

Professional Experience

Postdoctoral Researcher	Leiden University - The Netherlands, Chemistry Advisor: Marc Koper	2019 -
Graduate Research Assistant	Purdue University - West Lafayette, Chemical Engineering Advisor: Fabio H. Ribeiro	2013 - 2018
Research Intern	Avery Dennison Corporation, Pasadena, CA	2012
Webmaster	University of Michigan - Ann Arbor, Chemical Engineering H. Scott Fogler, Essentials of Chemical Reaction Engineering	2011 - 2013
Undergraduate Research Assistant	University of Michigan - Ann Arbor, Chemical Engineering Advisor: Ralph T. Yang Advisor: Thomas Wang	2012 - 2013 2008 - 2011

Publications

- **A.J. Shih**, J.M. González, I. Khurana, L. Pérez Ramírez, A. Peña L., A. Yezerets, R. Gounder, A.L. Villa, and F.H. Ribeiro, "Synthesis of Cu-SSZ-13 Materials with Cu_xO_y Species," *In Preparation*
- A.A. Verma, J.W. Harris, J. Arvay, **A.J. Shih**, W.N. Delgass, F.H. Ribeiro, "Quantitative measurement of kinetic parameters in spite of product inhibition," *Submitted* (2019)
- **A.J. Shih**, I. Khurana, H. Li, J.M. González, A. Kumar, C. Paolucci, T.M. Lardinois, C.B. Jones, J.D. Albarracin Caballero, K. Kamasamudram, A. Yezerets, W.N. Delgass, J.T. Miller, A.L. Villa, W.F. Schneider, R. Gounder, and F.H. Ribeiro, "Spectroscopic and Kinetic Responses of Cu-SSZ-13 to SO_2 Exposure and Implications for NO_x Selective Catalytic Reduction," *Applied Catalysis A: General* (2019)
- H. Li, C. Paolucci, I. Khurana, J. D. Albarracin-Caballero, **A. J. Shih**, L. N. Wilcox, F. Göttl, F. H. Ribeiro, R. Gounder, W. F. Schneider, "Consequences of Exchange-Site Heterogeneity and Dynamics on the UV-Visible Spectrum of Cu-Exchanged SSZ-13," *Chemical Science* (2019)
- **A.J. Shih**, "Synthesis and Characterization of Copper-Exchanged Zeolite Catalysts and Kinetic Studies on NO_x Selective Catalytic Reduction with Ammonia," *Purdue University* (2018)
- C. Paolucci, I. Khurana, A.A. Parekh, S. Li, **A.J. Shih**, H. Li, J.R. Di Iorio, J.D. Albarracin-Caballero, A. Yezerets, J.T. Miller, W.N. Delgass, F.H. Ribeiro, W.F. Schneider, R. Gounder, "Dynamic multinuclear sites formed by mobilized copper ions in NO_x selective catalytic reduction," *Science*, 357 (6354) 898 (2017)
- **A.J. Shih**, "Demonstrating Macroscopic Momentum Balances in a Fluid Mechanics Course," *Chemical Engineering*

Education, Chemical Engineering Education, 51 (4) 176 (2017)

- J.D. Albarracin-Caballero, I. Khurana, J.R. Di Iorio, **A.J. Shih**, J.E. Schmidt, M. Dusselier, M.E. Davis, A. Yezerets, J.T. Miller, F.H. Ribeiro, R. Gounder, "Structural and Kinetic Changes to Small-Pore Cu-Zeolites After Hydrothermal Aging Treatments and Selective Catalytic Reduction of NO_x with Ammonia," *Reaction Chemistry & Engineering*, 2, 169 (2017)
- C. Paolucci, A.A. Parekh, I. Khurana, J.R. Di Iorio, H. Li, J.D. Albarracin Caballero, **A.J. Shih**, T. Anggara, W.N. Delgass, J.T. Miller, F.H. Ribeiro, R. Gounder, W.F. Schneider, "Catalysis in a Cage: Condition-Dependent Speciation and Dynamics of Exchanged Cu Cations in SSZ-13 Zeolites," *J. Am. Chem. Soc.*, 138, 18 (2016)
- C. Yin, L. Wang, S. Rivillon, **A.J. Shih**, R.T. Yang, "SCR of Nitric Oxide by Hydrogen over Pd and Ir based Catalysts with Different Supports," *Catalysis Letters*, 145 (7) 1491 - 1499 (2015)

Oral Presentations

- **A.J. Shih**, "Synthesis and Characterization of Copper-Exchanged Zeolite Catalysts and Kinetic Studies on NO_x Selective Catalytic Reduction with Ammonia", *Thesis Defense - Purdue University*, West Lafayette, IN, November 26, 2018
- A.J. Shih, J.M. González, I. Khurana, L. Pérez Ramírez, A. Peña L., A. Yezerets, R. Gounder, A.L. Villa, and F.H. Ribeiro, "Speciation of Liquid Ion-Exchanged Cu into SSZ-13, ZSM-5, and Beta Zeolites," *2018 American Institute of Chemical Engineers (AIChE) Meeting*, Pittsburgh, PA, October 30, 2018
- **A.J. Shih**, H. Li, A. Kumar, J.M. Gonzalez, I. Khurana, K. Kamasamudram, A.L. Villa, W.N. Delgass, J.T. Miller, R. Gounder, A. Yezerets, W.F. Schneider, and F.H. Ribeiro, "Nature of SO₂-poisoned Cu-SSZ-13 Catalysts under Ammonia Selective Catalytic Reduction (NH₃-SCR)," *2018 Cross-Cut Lean Exhaust Emissions Reduction Simulations (CLEERS) Workshop*, Ann Arbor, MI, September 18, 2018
- **A.J. Shih**, H. Li, A. Kumar, J.M. Gonzalez, I. Khurana, K. Kamasamudram, A.L. Villa, W.N. Delgass, J.T. Miller, R. Gounder, A. Yezerets, W.F. Schneider, and F.H. Ribeiro, "SO₂-poisoning of Copper Sites in Cu-SSZ-13 and its Kinetic Effects on NO_x Selective Catalytic Reduction with Ammonia," *27th Annual Chemical Engineering Graduate Research Symposium*, West Lafayette, IN, August 16, 2018
- **A.J. Shih**, F.H. Ribeiro, "Nature Cu-SSZ-13 Catalysts during the Ammonia Selective Catalytic Reduction (NH₃-SCR) of NO_x," *Universidad de Antioquia - Environmental Catalysis Seminar*, Medellín, Colombia, March 5, 2018
- **A.J. Shih**, H. Li, A. Kumar, J.M. Gonzalez, I. Khurana, C. Paolucci, A.L. Villa, W.N. Delgass, R. Gounder, A. Yezerets, W.F. Schneider, J.T. Miller, and F.H. Ribeiro, "Nature of SO₂-poisoned Cu-SSZ-13 Catalysts under Ammonia Selective Catalytic Reduction (NH₃-SCR)," *2017 American Institute of Chemical Engineers (AIChE) Meeting*, Minneapolis, MN, November 1, 2017
- **A.J. Shih**, F.H. Ribeiro, "Cleaning Dirty Diesel: A Tango between Two Copper Ions," *Dawn or Doom Symposium: Three Minute Thesis*, West Lafayette, IN, September 26, 2017
- **A.J. Shih**, F.H. Ribeiro, "Cleaning Dirty Diesel: the Copper Catalyst," *21st Annual Great Lakes Chinese American Chemical Society*, Evanston, IL, June 10, 2017
- **A.J. Shih**, F.H. Ribeiro, "Nature of SO₂-poisoned Cu-SSZ-13 Catalysts under Ammonia Selective Catalytic Reduction (NH₃-SCR)," *Purdue Catalysis Center Seminar*, West Lafayette, IN, May 24, 2017
- **A.J. Shih**, I. Khurana, A.A. Parekh, J.D. Albarracin Caballero, C. Paolucci, J.R. Di Iorio, H. Li, W.N. Delgass, A. Yezerets, J.T. Miller, W.F. Schneider, R. Gounder, F.H. Ribeiro, "Understanding the Nature and Speciation of the Active Sites on Cu-SSZ-13 During the Selective Catalytic Reduction of NO_x," *24th International Symposium on Chemical Reaction Engineering (ISCRE)*, Minneapolis, MN, June 13, 2016
- **A.J. Shih**, F.H. Ribeiro, "Synthesis of Cu-zeolite Catalysts: Three Synthesis Regimes during the Liquid Ion Exchange of Copper into SSZ-13 and ZSM-5 Zeolites," *Purdue Catalysis Center Seminar*, West Lafayette, IN, September 30, 2015

Poster Presentations

- A.J. Shih, J.M. González, I. Khurana, L. Pérez Ramírez, A. Peña L., A. Yezerets, R. Gounder, A.L. Villa, and F.H. Ribeiro, "Speciation of Liquid Ion-Exchanged Cu into SSZ-13, ZSM-5, and Beta Zeolites," *2018 Cross-Cut Lean Exhaust Emissions Reduction Simulations (CLEERS) Workshop*, Ann Arbor, MI, September 18, 2018
- J. Schmitz, S. Bandy, J. Djana-Mann, J. Cronin, A.J. Shih, J. Arvay, P. Ghanekar, F.H. Ribeiro, "Environmental Catalysis: Synthesis and Performance of Cu-ZSM-5 Catalyst for Reduction of NO_x Emissions from Automotive Diesel Engines," *Center for Innovative and Strategic Transformation of Alkane Resources (CISTAR) Research Experience for Teachers, Undergraduate Fellows & Young Scholars Poster Session*, West Lafayette, IN, July 26, 2018
- A.J. Shih, J.M. González, I. Khurana, L. Pérez Ramírez, A. Peña L., A. Yezerets, R. Gounder, A.L. Villa, and F.H. Ribeiro, "Speciation of Liquid Ion-Exchanged Cu into SSZ-13, ZSM-5, and Beta Zeolites," *Catalysis Club of Chicago (CCC) 2018 Spring Symposium*, Naperville, IL, May 11, 2018
- A.J. Shih, J.M. González, I. Khurana, L. Pérez Ramírez, A. Peña L., A. Yezerets, R. Gounder, A.L. Villa, and F.H. Ribeiro, "Speciation of Liquid Ion-Exchanged Cu into SSZ-13, ZSM-5, and Beta Zeolites," *39th Annual Michigan Catalysis Society (MCS) Spring Symposium*, Midland, MI, May 3, 2018
- A.J. Shih, "Eggstraordinary Eggsperiments: Exposing K-12 Students to STEM Fields," *American Society for Engineering Education (ASEE) IL-IN Section Conference*, West Lafayette, IN, April 7, 2018
- A.J. Shih, Fabio H. Ribeiro, "A Molecular Dance to Cleaner Air: An Intersection between Enzymatic, Homogeneous, and Heterogeneous Catalysis," *37th Midwest Enzyme Chemistry Conference (MECC)*, Chicago, IL, October 14, 2017
- A.J. Shih, H. Li, A. Kumar, J.M. Gonzalez, I. Khurana, C. Paolucci, A.L. Villa, W.N. Delgass, R. Gounder, A. Yezerets, W.F. Schneider, J.T. Miller, and F.H. Ribeiro, "Nature of SO₂-poisoned Cu-SSZ-13 Catalysts under Ammonia Selective Catalytic Reduction (NH₃-SCR)," *2017 Cross-Cut Lean Exhaust Emissions Reduction Simulations (CLEERS) Workshop*, Ann Arbor, MI, October 4, 2017
- A.J. Shih, H. Li, A. Kumar, J.M. Gonzalez, I. Khurana, C. Paolucci, A.L. Villa, W.N. Delgass, R. Gounder, A. Yezerets, W.F. Schneider, J.T. Miller, and F.H. Ribeiro, "Nature of SO₂-poisoned Cu-SSZ-13 Catalysts under Ammonia Selective Catalytic Reduction (NH₃-SCR)," *Stanford Catalysis Center Summer Institute*, Palo Alto, CA, August 15, 2017
- A.J. Shih, H. Li, A. Kumar, J.M. Gonzalez, I. Khurana, C. Paolucci, A.L. Villa, W.N. Delgass, R. Gounder, A. Yezerets, W.F. Schneider, J.T. Miller, and F.H. Ribeiro, "Nature of SO₂-poisoned Cu-SSZ-13 Catalysts under Ammonia Selective Catalytic Reduction (NH₃-SCR)," *Catalysis Club of Chicago (CCC) 2017 Spring Symposium*, Naperville, IL, May 16, 2017
- A.J. Shih, H. Li, A. Kumar, J.M. Gonzalez, I. Khurana, C. Paolucci, A.L. Villa, W.N. Delgass, R. Gounder, A. Yezerets, W.F. Schneider, J.T. Miller, F.H. Ribeiro, "Nature of SO₂-poisoned Cu-SSZ-13 Catalysts under Ammonia Selective Catalytic Reduction (NH₃-SCR) Conditions," *38th Annual Michigan Catalysis Society (MCS) Spring Symposium*, Ann Arbor, MI, May 2, 2017
- A.J. Shih, I. Khurana, A.A. Parekh, C. Paolucci, J.R. Di Iorio, H. Li, W.N. Delgass, A. Yezerets, J.T. Miller, W.F. Schneider, R. Gounder, F.H. Ribeiro, "Reduction of NO_x Emissions from Automotive Diesel Engines," *Big Ten+ Graduate School Exposition*, West Lafayette, IN, September 25, 2016
- A.J. Shih, I. Khurana, A.A. Parekh, C. Paolucci, J.R. Di Iorio, H. Li, W.N. Delgass, A. Yezerets, J.T. Miller, W.F. Schneider, R. Gounder, F.H. Ribeiro, "Reduction of NO_x Emissions from Automotive Diesel Engines," *2016 Chemical Engineering Industrial Advisory Council (IAC) Meeting*, West Lafayette, IN, September 9, 2016
- A.J. Shih, J.D. Albarracin Caballero, I. Khurana, A.A. Parekh, W.F. Schneider, J.T. Miller, A. Yezerets, R. Gounder, W.N. Delgass, F.H. Ribeiro, "Automotive NO_x Abatement by NH₃ Selective Catalytic Reduction on Copper-Exchanged Zeolites," *24th Purdue Chemical Engineering Research Symposium*, West Lafayette, IN, August 20, 2015

Professional Development

- Purdue Graduate School Workshops: Grant Proposal Writing Series (2015 - 2017), Future Faculty and Professionals Workshops (2015 - 2018), Communications Workshops (2014 - 2018), Responsible Conduct of Research (2015), Engaging Research Presentations Series (2017)
- NSF Proposal Workshop with CBET Program Directors (2017)

Teaching/Mentoring Experience

- **Teaching Fellow:** Fluid Mechanics (Fall 2014, 100 students, and Spring 2016, 50 students)
- **Teaching Development:**
 - Webmaster - H. Scott Fogler (2011 - 2013)
 - Educational Methods in Engineering Course - Phillip Wankat and Matthew Ohland (2017)
 - Effective College Teaching Workshop - Richard Felder and Rebecca Brent (2018)
- **Undergraduate Students Mentored (Research):**
 - Andres Peña Lozano (2015, Chemical Engineering, Univ. Nacional de Colombia)
 - Lucía Pérez Ramírez (2014, Chemical Engineering, Univ. Nacional de Colombia)
- **High School Teachers Mentored (Research):**
 - Shannon Bandy (2018, Gary, Indiana)
 - Dominique Djanal-Mann (2018, Indianapolis, Indiana)
 - Jerry Cronin (2018, Gallup, New Mexico)
 - Jeffrey Schmitz (2018, Lafayette, Indiana)

Professional Service and Outreach

- **Member:**
 - American Institute of Chemical Engineers (AIChE)
 - American Chemical Society (ACS)
 - North American Catalysis Society (NACS)
 - Chicago Catalysis Club (CCC)
 - Michigan Catalysis Society (MCS)
- **Manuscript Reviewer:**
 - Journal of Catalysis
- **Purdue Catalysis Center:**
 - Ribeiro Research Group Safety Officer (2014 - 2018)
 - Purdue Catalysis Center Webmaster (2013 - 2018)
- **Professional Service:**
 - Purdue Future Engineering Faculty Workshop Series - Obtaining a Post-Doc Position, Panelist (2018)
 - 2018 AIChE North Central Regional Conference, Young Professionals Representative (2018)
 - 2018 AIChE North Central Regional Conference, ChE Car Poster Judge (2018)
 - Chemical Engineers for Safety Seminars (ChESS), Panelist (2017)
 - Purdue ChE Graduate Student Organization, Publications Chair (2015 - 2016)
 - 23rd Annual Graduate Research Symposium, Catalysis Session Chair (2015)
 - Purdue ChE Graduate Student Organization, Co-curricular Chair (2014 - 2015)
 - 22nd Annual Graduate Research Symposium, Catalysis Session Chair (2014)

- **Outreach Activities (K-12):**
 - Summer STEAM for Girls (3rd - 8th grade) (Summer 2018)
 - Gifted Education Resource Institute (Kindergarten) (Summer 2018)
 - Murdock After School Science Club (4th grade) (2014 - 2018)
 - Solar Rollars Day (8th grade) (Spring 2018)
 - Innovation-to-Reality Program (6th - 8th grade) (Summer 2015)
 - Tau Beta Pi MindSET Program (6th to 8th grade) (2011 - 2013)
 - University of Michigan Tech Day (11th - 12th grade) (2008 - 2012)
- **Outreach Activities (Community):**
 - Highway Cleanup (2018)
 - Food Finders Food Bank (2017 - 2018)
 - Natural Area Preservation Volunteering (2011 - 2013)

Honors and Awards

Chicago Catalysis Club Outstanding Poster Presentation Award	2018
Ecological Sciences & Engineering Symposium - Three Minute Thesis Finalist (Purdue University)	2017
Eastman Chemical Company Travel Award (Purdue University)	2017
College of Engineering Travel Grant (Purdue University)	2017
Great Lakes Chinese American Chemical Society - 2 nd Place Oral Presentation	2017
Dow Chemical Company Travel Award (International Symposia on Chemical Reaction Engineering)	2016
George M. Landes Prize for Technical Communication (University of Michigan)	2013
A.H. White Chemical Engineering Scholarship (University of Michigan)	2012
College of Engineering Dean's List (University of Michigan)	2009 - 2013