

# Arthur J. Shih

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## Education

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

## 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**, H. Li, J.M. Gonzalez, I. Khurana, A. Kumar, A.L. Villa, W.N. Delgass, R. Gounder, A. Yezerets, W.F. Schneider, J.T. Miller, and F.H. Ribeiro, "Nature of SO<sub>2</sub>-poisoned Cu-SSZ-13 Catalysts under Ammonia Selective Catalytic Reduction (NH<sub>3</sub>-SCR)," *In Preparation* (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<sub>x</sub> 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<sub>x</sub> 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, 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 SO<sub>2</sub>-poisoned Cu-SSZ-13 Catalysts under Ammonia Selective Catalytic Reduction (NH<sub>3</sub>-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, "SO<sub>2</sub>-poisoning of Copper Sites in Cu-SSZ-13 and its Kinetic Effects on NO<sub>x</sub> Selective Catalytic Reduction with Ammonia," *27<sup>th</sup> 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 (NH<sub>3</sub>-SCR) of NO<sub>x</sub>," *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 SO<sub>2</sub>-poisoned Cu-SSZ-13 Catalysts under Ammonia Selective Catalytic Reduction (NH<sub>3</sub>-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," *21<sup>st</sup> Annual Great Lakes Chinese American Chemical Society*, Evanston, IL, June 10, 2017
- A.J. Shih, F.H. Ribeiro, "Nature of SO<sub>2</sub>-poisoned Cu-SSZ-13 Catalysts under Ammonia Selective Catalytic Reduction (NH<sub>3</sub>-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<sub>x</sub>," *24<sup>th</sup> 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<sub>x</sub> 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," *39<sup>th</sup> 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," *37<sup>th</sup> 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 SO<sub>2</sub>-poisoned Cu-SSZ-13 Catalysts under Ammonia Selective Catalytic Reduction (NH<sub>3</sub>-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 SO<sub>2</sub>-poisoned Cu-SSZ-13 Catalysts under Ammonia Selective Catalytic Reduction (NH<sub>3</sub>-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 SO<sub>2</sub>-poisoned Cu-SSZ-13 Catalysts under Ammonia Selective Catalytic Reduction (NH<sub>3</sub>-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 SO<sub>2</sub>-poisoned Cu-SSZ-13 Catalysts under Ammonia Selective Catalytic Reduction (NH<sub>3</sub>-SCR) Conditions," *38<sup>th</sup> 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<sub>x</sub> 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<sub>x</sub> 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<sub>x</sub> Abatement by NH<sub>3</sub> Selective Catalytic Reduction on Copper-Exchanged Zeolites," *24<sup>th</sup> 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 - 2017), Communications Workshops (2014 - 2017), Responsible Conduct of Research (2015), Engaging Research Presentations Series (2017)
- NSF Proposal Workshop with CBET Program Directors (2017)

## Teaching Experience

- **Teaching Fellow:** Fluid Mechanics (Fall 2014, 100 students and Spring 2016, 50 students)
- **Teaching Development:** Educational Methods in Engineering (2017)
- **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)
- **Manuscript Reviewer:**
  - Journal of Catalysis
- **Purdue Catalysis Center:**
  - Ribeiro Research Group Safety Officer (2014 - 2018)
  - Purdue Catalysis Center Webmaster (2013 - 2018)
- **Professional Service:**
  - 2018 AIChE North Central Regional Conference, Young Professionals Representative (2018)
  - 2018 AIChE North Central Regional Conference, ChE Car Poster Judge (2018)
  - 23<sup>rd</sup> Annual Graduate Research Symposium, Catalysis Session Chair (2015)
  - Purdue ChE Graduate Student Organization, Publications Chair (2015 - 2016)
  - 22<sup>nd</sup> Annual Graduate Research Symposium, Catalysis Session Chair (2014)
  - Purdue ChE Graduate Student Organization, Co-curricular Chair (2014 - 2015)
- **Outreach Activities (K-12):**
  - Summer STEAM for Girls (3<sup>rd</sup> - 8<sup>th</sup> grade) (Summer 2018)
  - Gifted Education Resource Institute (Kindergarten) (Summer 2018)
  - Murdock After School Science Club (4<sup>th</sup> grade) (2014 - 2018)
  - Solar Rollars Day (8<sup>th</sup> grade) (Spring 2018)
  - Innovation-to-Reality Program (6<sup>th</sup> - 8<sup>th</sup> grade) (Summer 2015)
  - Tau Beta Pi MindSET Program (6<sup>th</sup> to 8<sup>th</sup> grade) (2011 - 2013)
  - University of Michigan Tech Day (11<sup>th</sup> - 12<sup>th</sup> grade) (2008 - 2012)
- **Outreach Activities (Community):**
  - Food Finders Food Bank (2017 - 2018)

## 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 <sup>nd</sup> 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