

# JUSTIN M. NOTESTEIN

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## EDUCATION

Princeton University	Chemical Engineering, <i>magna cum laude</i> Certificate in Materials Science and Engineering	B.S.E. 2001
University of California, Berkeley	Chemical Engineering	Ph.D. 2006
Univ. Illinois, Urbana-Champaign	Chemistry Postdoctoral Fellow	2006-2007

## PROFESSIONAL EXPERIENCE

2018-present Professor, Chemical and Biological Engineering, *Northwestern University*  
The Notestein group researches engineering approaches to atom-precise materials for heterogeneous catalysis and adsorption. Our group focuses on reactions and processes essential to the development of sustainable fuels and chemicals.

2017-present Member, Northwestern Argonne Institute for Science and Engineering, *Northwestern University*

2009-present Affiliate, International Institute of Nanotechnology, *Northwestern University*

2007-present Member, Center for Catalysis and Surface Science, *Northwestern University*

2013-2018 Associate Professor, Chemical and Biological Engineering, *Northwestern University*

2007-2013 Assistant Professor, Chemical and Biological Engineering, *Northwestern University*

2006-2007 Post-Doctoral Research Associate, Chemistry, *University of Illinois, Urbana Champaign*  
Grafted oligomers were developed for switchable porous surfaces in sensing and separations.

2001-2006 Doctoral Student, Chemical Engineering, *University of California, Berkeley*  
A new class of hybrid organic-inorganic materials based on grafted calixarenes was synthesized and characterized for host-guest adsorption and oxidation catalysis.

2000-2001 Undergraduate Researcher, Chemical Engineering, *Princeton University*  
Ring-opening metathesis and anionic polymerization were combined to synthesize diblock copolymers.

## RECOGNITION

Associated Student Government Faculty Honor Roll, Northwestern University, 2013, 2010, 2008

DuPont Young Professor Award, national recognition, 2011, 2012, 2013

“Mover and Shaker”, *Catalysis Review* magazine, 2011

3M Non-Tenured Faculty Award, national recognition, 2010, 2011, 2012

McCormick (School of Engineering) Advisor of the Year, Northwestern University, 2009-2010

Young Investigator Award, International Catalysis Congress, 2008

Camille and Henry Dreyfus New Faculty Award, national recognition, 2007

Phi Beta Kappa Fellowship, California alpha chapter, 2006

Dow Outstanding Teaching Assistant Award, UC Berkeley, 2002

National Science Foundation Graduate Student Fellowship, 2001-2004

## PUBLICATIONS \* corresponding author % undergraduate or high school author

1. Z. Bo, L.R. McCullough, S. Dull%, M.A. Ardagh, J. Wang, J.M. Notestein\*, “Strong Electrostatic Adsorption of Pt onto SiO<sub>2</sub> partially Overcoated Al<sub>2</sub>O<sub>3</sub> – Towards Single Atom Catalysts,” *J. Chem. Phys.*, **2019**, in press
2. P.A. Ignacio-de Leon, M. Ferrandon, L.M. Savereide, S.L. Nauert, J. Moncada, R. Klet, K. Chapman, M. Delferro, J. Camacho-Bunquin, C.A. Carrero, J.M. Notestein\*, “Promoter Effects on Catalyst Selectivity and Stability for Propylene Partial Oxidation to Acrolein,” *Catal. Lett.* **2019**. (DOI: 10.1007/s10562-019-02969-3)
3. A.R. Kim, S. Ahn, T.U. Yoon, J.M. Notestein\*, O.K. Farha\*, Y.S. Bae\*, “Fast Cyclohexane Oxidation under Mild Reaction Conditions through a Controlled Creation of Redox-active Fe (II/III) Sites in a Metal-organic Framework,” *ChemCatChem* **2019**. (DOI: 10.1002/cctc.201901050)
4. L. Savereide, A. Gosavi, K.E. Hicks, J.M. Notestein\*, “Identifying properties of low-loaded CoO<sub>x</sub>/CeO<sub>2</sub> via X-ray absorption spectroscopy for NO reduction by CO,” *J. Catal.* **2020**, *381*, 355-362.
5. Z. Bo, N.E. Thornburg, L. Peng, J.J. Gutierrez-Moreno, M. Nolan, L.D. Marks, J.M. Notestein\*, “Direct Visualization of Independent Ta Centers Supported on Two-Dimensional TiO<sub>2</sub> Nanosheets,” *Nano Lett.* **2019**, *19*, 8103-8108. (DOI: 10.1021/acs.nanolett.9b03305)
6. A. S. Rosen, J. M. Notestein, R. Q. Snurr\*, “Structure–Activity Relationships that Identify Metal–Organic Framework Catalysts for Methane Activation,” *ACS Catal.*, **2019**. (DOI: 10.1021/acscatal.8b05178)
7. C. Liu, S. L. Nauert, M. A. Alsina, D. Wang, A. Grant, K. He, E. Weitz, M. Nolan, K. A. Gray, J. M. Notestein\*, “Role of surface reconstruction on Cu/TiO<sub>2</sub> nanotubes for CO<sub>2</sub> conversion,” *Appl. Catal. B*, **2019**. (DOI: 10.1016/j.apcatb.2019.117754)
8. A. A. Gosavi, J. L. Hedrick, P-C Chen, J. M. Notestein, C. Mirkin\*, “A Tri-layer Approach to Controlling Nanopore Formation in Oxide Supports,” *Nano Res.* **2019**. (DOI: 10.1007/s12274-019-2332-9)
9. A. S. Rosen, J. M. Notestein, R. Q. Snurr\*, “Identifying Promising Metal–Organic Frameworks for Heterogeneous Catalysis via High-Throughput Periodic Density Functional Theory,” *J. Comput. Chem.* **2019**, *40*, 1305-1318.
10. C.K. Bennett, M.N. Bhagat, Y. Zhu, Y. Yu, A. Raghuraman, M.E. Belowich, S.T. Nguyen J.M. Notestein, L.J. Broadbelt\*, “Strong Influence of the Nucleophile on the Rate and Selectivity of 1,2-Epoxyoctane Ring-Opening Catalyzed by Tris(pentafluorophenyl)borane,” *ACS Catal.* **2019**. (DOI: 10.1021/acscatal.9b02607)
11. M.N. Bhagat, C.K. Bennett, Y. Zhu, A. Raghuraman, M.E. Belowich, S.T. Nguyen, L.J. Broadbelt, J.M. Notestein\*, “Enhancing the regioselectivity of B(C<sub>6</sub>F<sub>5</sub>)<sub>3</sub>-catalyzed epoxide alcoholysis reactions using hydrogen bond acceptors,” *ACS Catal.* **2019**. (DOI:10.1021/acscatal.9b03089)

12. Y. Yu, Y. Zhu, M. N. Bhagat, A. Raghuraman, K. Hirsekorn, J. M. Notestein\*, S. T. Nguyen\*, L. J. Broadbelt\* "Mechanistic study of regioselective ring-opening reactions of 1,2-epoxyoctane catalyzed by tris(pentafluorophenyl)borane," *ACS Catal.* **2018**, *8*, 11119-11133.
13. S. L. Nauert, A. S. Rosen, H. Kim, R. Q. Snurr, P. C. Stair, J. M. Notestein\* "Evidence for copper dimers in low-loaded CuOx/SiO2 catalysts for cyclohexane oxidative dehydrogenation," *ACS Catal.* **2018**, *8*, 9775-9789. (DOI: 10.1021/acscatal.8b02532)
14. L. McCullough, E. Cheng, A. Gosavi, B. Kilos, D. Barton, E. Weitz, J. Notestein\*. "Gas Phase Acceptorless Dehydrogenative Coupling of Ethanol over Bulk MoS<sub>2</sub> and Spectroscopic Measurement of Structural Disorder," *J. Catal.* **2018**, *366*, 159-166. (DOI: 10.1016/j.jcat.2018.07.039)
15. L. M. Savereide, S. L. Nauert, C. A. Roberts, J. M. Notestein\* "The effect of support morphology on CoOx/CeO<sub>2</sub> catalysts for the reduction of NO by CO," *J. Catal.* **2018**, *366*, 150-158. (DOI: 10.1016/j.jcat.2018.08.005)
16. S. L. Nauert, L. Savereide, J. M. Notestein\*, "Role of support Lewis acid strength in copper oxide catalyzed oxidative dehydrogenation of cyclohexane," *ACS Catal.* **2018**, *8*, 7598-7607. (DOI: 10.1021/acscatal.8b00935)
17. S. Ahn, S. L. Nauert, C. T. Buru, M. Rimoldi, H. Choi, N. M. Schweitzer, J. T. Hupp, O. K. Farha\*, J. M. Notestein\*. "Pushing the Limits on Metal–Organic Frameworks as a Catalyst Support: NU-1000 Supported Tungsten Catalysts for o-Xylene Isomerization and Disproportionation,". *J. Am. Chem. Soc.* **2018**, *140*, 8535-8543. (DOI: 10.1021/jacs.8b04059)
18. A. S. Rosen, J. M. Notestein\*, R. Q. Snurr\*, "Comprehensive Phase Diagrams of MoS<sub>2</sub> Edge Sites Using Dispersion-Corrected DFT Free Energy Calculations," *J. Phys. Chem. C* **2018**, *122*, 15318-15329. (DOI: 10.1021/acs.jpcc.8b02524)
19. W. Wu, L. M. Savereide, J. Notestein, E. Weitz\*, "In-situ IR spectroscopy as a probe of oxidation/reduction of Ce in nanostructured CeO<sub>2</sub>," *Applied Surface Science*, **2018**, *445*, 548-554. (DOI: 10.1016/j.apsusc.2018.03.083)
20. Z. Bo, S. Ahn, M. A. Ardagh, N. M. Schweitzer, C.P. Canlas, O.K. Farha, J.M. Notestein\*, "Synthesis and Stabilization of Small Pt Nanoparticles on TiO<sub>2</sub> partially Masked by SiO<sub>2</sub>," *Appl. Catal. A* **2018**, *551*, 122-128. (DOI: 10.1016/j.apcata.2017.11.017)
21. C. Liu, M. E. Weitz, J. M. Notestein, K. A. Gray\*, "Photo-initiated Reduction of CO<sub>2</sub> by H<sub>2</sub> on a silica surface," *ChemSusChem*. **2018**, *11*, 1163-1168. (DOI: 10.1002/cssc.201702341)
22. J. Griffin, E. Taw\*, A. Gosavi, N. Thornburg, I. Pramanda, H. S. Lee, K. Gray, J. M. Notestein, G. Wells\*, "Hybrid Approach for Selective Sulfoxidation via Bioelectrochemically Derived Hydrogen Peroxide over a Niobium(V)-silica Catalyst," *ACS Sustainable Chem. & Eng.*, **2018**, *6*, 7880-7889. (DOI: 10.1021/acssuschemeng.7b04641)
23. D. Bregante, N. Thornburg, J.M. Notestein, D. Flaherty\*, "Consequences of Confinement for Alkene Epoxidation with Hydrogen Peroxide on Highly Dispersed Group IV and V Metal Oxide Catalysts," *ACS Catal.*, **2018**, *8*, 2995-3010. (DOI: 10.1021/acscatal.7b03986)
24. V. K., Paidi, L. Savereide, D.J. Childers, J.M. Notestein, C.A. Roberts\*, J. van Lierop\*, "Predicting NOx Catalysis by Quantifying Ce<sup>3+</sup> from Surface and Lattice Oxygen," *ACS Appl. Mater. & Interfaces*, **2017**, *9*, 30670-30678. (DOI: 10.1021/acscami.7b08719)
25. N.E. Thornburg, J.M. Notestein\*, "Rate and selectivity control in thioether and alkene oxidation with H<sub>2</sub>O<sub>2</sub> over phosphonate-modified niobium(V)-silica catalysts," *ChemCatChem*, **2017**, *9*, 3714-3724. (DOI: 10.1002/cctc.201700526)
26. M. J. Kim, S. Ahn, J. Yi, J. T. Hupp, J. M. Notestein, O. K. Farha\*, S. J. Lee\*, "Ni(II) complex on a bispyridine-based porous organic polymer as a heterogeneous catalyst for ethylene oligomerization," *Catal. Sci. Technol.*, **2017**, *7*, 4351, 4354. (DOI: 10.1039/C7CY01274H)

27. L.R. McCullough, D.J. Childers, R.A. Watson, B.A. Kilos, D. Barton, E. Weitz, H.H. Kung, J.M. Notestein\*, "Acceptorless dehydrogenative coupling of neat alcohols using Group VI sulfide catalysts," *ACS Sustainable Chem. & Eng.* **2017**, *5*, 4890-4896.
28. K.C. Schwartzenberg, J.W.J. Hamilton, A.K. Lucid, E. Weitz, J. Notestein, M. Nolan\*, J.A. Byrne\*, K.A. Gray\*, "Multifunctional photo/thermal catalysis for the reduction of carbon dioxide," *Catal. Today*, **2017**, *280*, 65-73.
29. S. Ahn, N. Thornburg, Z. Li, T. Wang, L. Gallington, K. Chapman, J. Notestein, J. Hupp, O. Farha\*, "Stable Metal–Organic Framework Supported Niobium Catalysts," *Inorg. Chem.* **2016**, *55*, 11954-11961.
30. M. A. Ardagh, Z. Bo, S. L. Nauert, J. M. Notestein\*, "Depositing SiO<sub>2</sub> on Al<sub>2</sub>O<sub>3</sub>: a route to tunable Bronsted acid catalysts," *ACS Catal.*, **2016**, *6*, 6156-6164.
31. N. E. Thornburg, S. L. Nauert, A. B. Thompson, J. M. Notestein, "Synthesis-structure-function relationships of silica-supported niobium(V) catalysts for alkene epoxidation with H<sub>2</sub>O<sub>2</sub>," *ACS Catal.*, **2016**, *6*, 6124-6134.
32. M. Bachrach, T. Marks\*, J.M. Notestein\*, "Understanding the Hydrodenitrogenation of Heteroaromatics on a Molecular Level," *ACS Catal.*, **2016**, *6*, 1455-1476.
33. S. L. Nauert, F. Schax, C. Limberg, J. M. Notestein\*, "Cyclohexane oxidative dehydrogenation over copper oxide catalysts," *J. Catal.*, **2016**, *341*, 180-190.
34. C.C. Yang, B.A. Kilos, D.G. Barton, E. Weitz, J.M. Notestein\*, "Increased Productivity in Ethylene Carbonylation by Zeolite-Supported Molybdenum Carbonyls," *J. Catal.*, **2016**, *338*, 313-320.
35. M. Bachrach, T. Marks\*, J. M. Notestein\*, "C-N bond hydrogenolysis of aniline and cyclohexylamine over TaOx-Al<sub>2</sub>O<sub>3</sub>," *New J. Chem.*, **2016**, *7*, 6001-6004.
36. C. A. Roberts\*, L. Savereide, D. J. Childers, T. C. Peck, J. M. Notestein, "In situ FTIR spectroscopy of highly dispersed FeOx catalysts for NO reduction: Role of Na promoter," *Catal. Today*, **2016**, *267*, 56-64.
37. N. E. Thornburg, Y. Liu, P. Li, J. T. Hupp, O. K. Farha, J. M. Notestein\*, "MOFs and their grafted analogues: regioselective epoxide ring-opening with Zr<sub>6</sub> nodes," *Catal. Sci. Technol.*, **2016**, *6*, 6480-6484.
38. S. Yacob, B.A. Kilos, D. G. Barton, J.M. Notestein\*, "Vapor Phase Ethanol Carbonylation Over Rh Supported on Zeolite 13X," *Appl. Catal. A.*, **2016**, *520*, 122-131.
39. P. A. Ignacio de Leon, C.A. Contreras, N.E. Thornburg, A.B. Thompson, J.M. Notestein\*, "Catalyst structure and substituent effects on epoxidation of styrenics with immobilized Mn(tmtacn) complexes," *Appl. Catal. A.*, **2016**, *511*, 78-86.
40. N.A. Grosso-Giordano%, T. Eaton, Z. Bo, S. Yacob, C.C. Yang, J.M. Notestein\*, "Silica Support Modifications to Enhance Pd-catalyzed Deoxygenation of Stearic Acid," *Appl. Catal. B.*, **2016**, *192*, 93-100.
41. C.A. Contreras, P.A. Ignacio de Leon, J.M. Notestein\*, "Synthesis of a family of peracid-silica materials and their use as alkene epoxidation reagents," *Microporous Mesoporous Mater.*, **2016**, *225*, 289-295.
42. N.E. Thornburg, A.B. Thompson, J.M. Notestein\*, "Periodic Trends in Highly Dispersed Groups IV and V Supported Metal Oxide Catalysts for Alkene Epoxidation with H<sub>2</sub>O<sub>2</sub>," *ACS Catal.* **2015**, *5*, 5077-5088.
43. D. Prieto-Centurion, T. R. Eaton, C.A. Roberts, P.T. Fanson, J.M. Notestein\*, "Catalytic reduction of NO with H<sub>2</sub> over redox-cycling Fe on CeO<sub>2</sub>," *Appl. Catal. B*, **2015**, *168*, 68-76.
44. C.A. Roberts\*, D. Prieto-Centurion, Y. Nagai, Y. F. Nishimura, R. Desautels, J. van Lierop, P.T. Fanson, J. M. Notestein\*, In Situ Characterization of highly dispersed, ceria-supported Fe sites for NO reduction by CO. *J. Phys. Chem. C* **2015**, *119*, 4334-4234.
45. Z. Bo, T. R. Eaton, J. R. Gallagher, C.P. Canlas, J. T. Miller, J. M. Notestein\*, Size-selective synthesis and stabilization of small Ag nanoparticles on TiO<sub>2</sub> partially masked by SiO<sub>2</sub>. *Chem. Mater.* **2015**, *27*, 1269-1277.

46. S. Yacob, S. Park, B.A. Kilos, D. G. Barton, J.M. Notestein\*, "Vapor phase ethanol carbonylation with heteropolyacid-supported Rh," *J. Catal.* **2015**, *325*, 1-8.
47. M. Bachrach, N. Morlanes, C. P. Canlas, J. T. Miller, T. J. Marks, J. M. Notestein\*, "Increasing the Aromatic Selectivity of Quinoline Hydrogenolysis Using Pd/MOx–Al<sub>2</sub>O<sub>3</sub>," *Catal. Lett.* **2014**, *144*, 1832-1838.
48. C-C Yang, B. A. Kilos, D. G. Barton, E. Weitz, J. M. Notestein\*, "The role of iodide promoters and the mechanism of ethylene carbonylation catalyzed by molybdenum hexacarbonyl," *J. Catal.* **2014**, *319*, 211-219.
49. T. R. Eaton, A. M. Boston,<sup>‡</sup> A. B. Thompson, K. A. Gray, J. M. Notestein\*, "Counting Active Sites on Titanium Oxide–Silica Catalysts for Hydrogen Peroxide Activation through In Situ Poisoning with Phenylphosphonic Acid," *ChemCatChem* **2014**, *6*, 3215-3222.
50. A. B. Thompson, R. C. Scholes<sup>‡</sup>, J. M. Notestein\*, "Recovery of Dilute Aqueous Acetone, Butanol, and Ethanol with Immobilized Calixarene Cavities," *ACS Appl. Mater. & Interfaces*, **2014**, *6*, 289-297.
51. T. R. Eaton, M. P. Campos,<sup>‡</sup> K. A. Gray, J. M. Notestein\*, "Quantifying accessible sites and reactivity on titania-silica (photo)catalysis: Refining TOF calculations," *J. Catal.* **2014**, *309*, 156-165.
52. C. P. Canlas, J. Lu, N. A. Ray, N. A. Grosso-Giordano<sup>‡</sup>, J. W. Elam, S. Lee, R. E. Winans, P. C. Stair, R. P. Van Duyne, and J. M. Notestein\*, "Shape-Selective Sieving Layers on an Oxide Catalyst Surface," *Nature Chem.*, **2012**, *4*, 1030-1036.
53. D. Prieto-Centurion, A. M. Boston<sup>‡</sup>, J. M. Notestein\*, "Structural and electronic promotion with alkali cations of silica-supported Fe(III) sites for alkane oxidation," *J. Catal.*, **2012**, *296*, 77-85.
54. K. R. Bjorkman, N. J. Schoenfeldt, J. M. Notestein, L. J. Broadbelt\*, "Microkinetic modeling of cis-cyclooctene oxidation on heterogeneous Mn–tmtacn complexes," *J. Catal.*, **2012**, *291*, 17-25.
55. J. M. Notestein\*, "Review: R. Sebesta (ed): Enantioselective Homogeneous Supported Catalysis," *Catal. Lett.*, **2012**, *142*, 1150-1151.
56. P. Young, J. M. Notestein\*, "The Role of Amine Surface Density on Carbon Dioxide Adsorption on Functionalized Mixed Oxide Surfaces," *ChemSusChem*, **2011**, *4*, 1671-1678.
57. N. J. Schoenfeldt, Z. Ni, A. W. Korinda, R. J. Meyer, J. M. Notestein\*, "Manganese Triazacyclononane Oxidation Catalysts Grafted under Reaction Conditions on Solid Co-Catalytic Supports," *J. Am. Chem. Soc.*, **2011**, *133*, 18684-18695.
58. N. J. Schoenfeldt, J. M. Notestein\*, "Solid Co-catalysts for Immobilizing and Activating Manganese Triazacyclononane Oxidation Catalysts," *ACS Catal.*, **2011**, *1*, 1691-1701.
59. A. B. Thompson, S. Cope<sup>‡</sup>, T. D. Swift<sup>‡</sup>, J. M. Notestein\*, "Adsorption of n-Butanol from Dilute Aqueous Solution with Grafted Calixarenes," *Langmuir*, **2011**, *27*, 11990-11998.
60. D. Prieto-Centurion, J. M. Notestein\*, "Surface speciation and alkane oxidation with isolated Fe sites on silica," *J. Catal.*, **2011**, *279*, 103-110.
61. N. J. Schoenfeldt, A. W. Korinda, J. M. Notestein\*, "A heterogeneous, selective oxidation catalyst based on Mn triazacyclononane grafted under reaction conditions," *Chem. Commun*, **2010**, *46*, 1640-1642.
62. N. Morlanes, J. M. Notestein\*, "Grafted Ta-calixarenes: tunable, selective catalysts for direct olefin epoxidation with aqueous H<sub>2</sub>O<sub>2</sub>," *J. Catal.*, **2010**, *275*, 191-201.
63. N. Morlanes, J. M. Notestein\*, "Kinetic Study of cyclooctene epoxidation with aqueous hydrogen peroxide over silica-supported calixarene Ta(V)," *Appl. Catal. A-General*, **2010**, *22*, 5319-5327.
64. J. M. Notestein\*, C. Canlas, J. Siegfried<sup>‡</sup>, J. S. Moore, "Covalent grafting of m-phenylene-ethynylene oligomers to oxide surfaces," *Chem. Mater.* **2010**, *22*, 5319-5327.
65. A. Solovyov, J. M. Notestein, K. A. Durkin, A. Katz\*, "Graftable chiral ligands for surface organometallic materials: calixarenes bearing asymmetric centers directly attached to the lower rim," *New J. Chem.* **2008**, *32*, 1314-1325.

66. J. M. Notestein, L. R. Andrini, A. Solovyov, F. G. Requejo, A. Katz\*, E. Iglesia\*, "The role of outer-sphere surface acidity in alkene epoxidation catalyzed by calixarene-Ti(IV) complexes," *J. Am. Chem. Soc.* **2007**, *129*, 15585-15595.
67. J. M. Notestein, A. Katz\*, E. Iglesia\*, "Photoluminescence and charge transfer complexes of calixarenes grafted on TiO<sub>2</sub> nanoparticles," *Chem. Mater.* **2007**, *19*, 4998-5005.
68. J. M. Notestein, L. R. Andrini, V. I. Kalchenko, F. G. Requejo\*, A. Katz\*, E. Iglesia\*, "Structural assessment and catalytic consequences of the oxygen coordination environment in grafted Ti-calixarenes," *J. Am. Chem. Soc.* **2007**, *129*, 1122-1131.
69. J. M. Notestein, A. Katz\*, "Enhancing heterogeneous catalysis through cooperative hybrid organic-inorganic interfaces," *Chem. Eur. J.* **2006**, *12*, 3954-3965.
70. J. M. Notestein, A. Katz\*, E. Iglesia\*, "Energetics of small molecule and water complexation in hydrophobic calixarene cavities," *Langmuir* **2006**, *22*, 4004-4014.
71. J. M. Notestein, E. Iglesia, A. Katz\*, "Grafted metallocalixarenes as single-site surface organometallic catalysts," *J. Am. Chem. Soc.* **2004**, *126*, 16478-16486.
72. A. Katz\*, P. DaCosta, A. C. P. Lam%, J. M. Notestein, "The first single-step immobilization of a calix[4]arene onto the surface of silica," *Chem. Mater.* **2002**, *14*, 3364-3368.
73. J. M. Notestein%, L. B. W. Lee, R. Register\*, "Well-defined diblock copolymers via termination of living ROMP with anionically polymerized macromolecular aldehydes," *Macromolecules* **2002**, *35*, 1985.

## PATENTS

74. "Dow Patent Disclosure 5" Feb 2019
75. "Dow Patent Disclosure 4" Sept 2017
76. "Dow Patent Disclosure 3" Sept 2017
77. "Dow Patent Disclosure 2" Dec 2016
78. "Dow Patent Disclosure 1" May 2016
79. "Catalysts and Related Methods for Photocatalytic Production of H<sub>2</sub>O<sub>2</sub> and Thermocatalytic Reactant Oxidation," Gray, K. A.; Notestein, J. M.; Eaton, T. R., Application US2016023044, **2016**.
80. "Fabrication of catalyst used in catalytic converter of automotive vehicle, involves contacting substrate containing with transition/post transition metal, and contacting substrate with alkali/alkaline earth metal cations", J. M. Notestein, D. Prieto-Centurion, P. T. Fanson, C. A. Roberts, US Patents 9,815,044 and 9,283,548, **2017**.
81. "New catalyst for useful for oxidizing alkane e.g. ethane to acetaldehyde, ethanol, methanol, and formaldehyde comprises support modified with carboxylate group which is functionalized with manganese complex", J. M. Notestein, N. J. Schoenfeldt, A. W. Korinda, US Patent 9,024,076, **2015**.
82. "Immobilized Calixarenes and Related Compounds and Process for their Production" A. Katz, E. Iglesia, J. M. Notestein, US Patent 6,951,690, **2005**.

## SELECTED INVITED EXTERNAL PRESENTATIONS

Departmental Seminar, Chemical Engineering, IIT, November 2019

Departmental Seminar, Chemical Engineering, California Institute of Technology, October 2018

Invited talks (2), Div. of Catalysis Science and Technology, ACS Spring National Meeting, New Orleans, LA, March 2018

Invited talk, Department of Energy Contractors Meeting, Gaithersburg MD, July 2017

Annual Graduate Seminar, Chemical Engineering, Purdue University, March 2017

Invited Talk, Division of Catalysis and Reaction Engineering, AIChE Fall National Meeting, San Francisco, CA, Nov 2016

Invited Talk, Division of Catalysis Science and Technology, ACS Spring National Meeting, San Diego, CA, March 2016

Departmental Seminar, Chemical Engineering, California Institute of Technology, October 2015

Keynote, "Catalytic Materials and Technologies for Upgrading of CO<sub>x</sub>," ACS National Meeting, Denver, March 2015.

Emerging Leaders Lecture Series, University of Toronto, March 2015

External Speaker Series, Exxon-Mobil, May 2014

Departmental Seminar, Chemical Engineering, Penn State, April 2014

Department Seminar, Chemical Engineering, University of Oklahoma, April 2014

Invited Lecture, Michigan Catalysis Society, March 2014

Keynote Lecture, Calixarenes 12, St. Johns, Newfoundland, Canada, July 2013

Department Seminar, Chemistry, University of Wisconsin Madison, February 2013.

Department Seminar, Chemical and Biological Engineering, Northwestern University, October 2012

Invited Talk, Catalysis and Reaction Engineering Division, AIChE National Meeting, Pittsburgh, October 2012

Keynote Lecture, Catalysis Gordon Conference, Colby Sawyer College, NH, June 2012

Invited Talk, Division of Catalysis Science and Technology, ACS Fall National Meeting, San Diego, CA, March 2012

Department Seminar, Chemical and Biological Engineering, Princeton University, March 2012

Award lecture, DuPont, Wilmington DE, October 2011

Corporate meeting, 3M, St. Paul MN, October 2011

Invited Talk, Materials Engineering and Sciences Division, AIChE National Meeting, Minneapolis MN, October 2011

Invited Poster, Department of Energy Contractors Meeting, 'Heterogeneous Catalysis,' Annapolis MD, October 2011

Keynote Lecture. 15<sup>th</sup> Int. Symp. on Relation between Homogeneous and Heterogeneous Catalysis, Berlin, Sept. 2011

Corporate meeting, The Dow Chemical Company, Midland MI, August 2011

Invited Talk, Hydrotreating Symposium, Energy and Fuels Division, ACS National Meeting, Denver CO, August 2011

Invited Talk, Division of Catalysis Science and Technology, ACS National Meeting, Anaheim CA, March 2011

Invited poster, Department of Energy Contractors Meeting, 'Homogeneous Catalysis,' Annapolis MD, June 2010

Invited Talk, Division of Catalysis Science and Technology, ACS National Meeting, San Francisco, March 2010

Department Seminar, Chemical Engineering, University of Illinois at Chicago, January 2010

Invited poster, Department of Energy Contractors Meeting, 'Heterogeneous Catalysis,' Annapolis MD, June 2009

Annual Meeting, UNICAT, Fritz Haber Institute, Berlin, Germany, May 2009

Annual Meeting, Institute for Catalysis in Energy Processes, Northwestern University, April 2009

Department Seminar, Environmental Engineering, Northwestern University, February 2009

Workshop, 2<sup>nd</sup> Northwestern-Berkeley-Heidelberg Workshop on Catalysis, Heidelberg Germany, September 2008

Department Seminar, Center for Catalysis and Surface Science, Northwestern University, January 2008

Departmental Colloquium, Chemical Engineering, MIT, 2006

Departmental Colloquium, Chemical and Biological Engineering, Northwestern University, 2006

Departmental Colloquium, Chemical Engineering, Stanford University, 2006

**TEACHING and EDUCATION** \*indicates course developed wholly or in part by Notestein

Process Economics, Design & Evaluation (undergraduate required course), F07, F08, W10, W14, F18, W20

Analysis of Chemical Process Systems (undergraduate required course), W08, W09, F09, F10, F11, F12, S20

Kinetics and Reactor Design (graduate required course), F09, F12, F13, F14, F15, F16

\*Chemical Product Design (undergraduate elective), W12, W13, W14, W15, W16, S17, S18, S19, S20

\*Modern Techniques in Heterogeneous Catalysis Research (graduate elective, with Prof. Schweitzer) W18, S18

\*Introduction to the Light Hydrocarbon Economy (graduate elective) W18, S18

Northwestern Library Exhibit, *"Two Degrees and You: An NU Approach to Climate Change"*, 2014

Participation in NSF-funded educational study, "Critical Thinking Initiative in STEM," 2011-2013

Invited lecturer, "Reconceptualizing the Research Paper," for the Teaching, Learning, & Technology series of workshops at Northwestern University, Spring 2010, 2011

Searle Teaching Fellow, a selective program at Northwestern University that develops teaching strategies, assessment methods, and project-based learning, 2008-2009.

Grant recipient, "Chemical Product Design: A New Course and a Theme for Independent Undergraduate Research," Alumnae Association of Northwestern," 4/2011-6/2012

Grant recipient, "Chemical Product Design at Northwestern: A new course and a new approach to chemical engineering education," P&G Fund of The Greater Cincinnati Foundation, 2/2013

**DEPARTMENT and UNIVERSITY SERVICE**

Advisory Board, The Graduate School, 2019-

University Office of Safety Board, 2015-

Synchrotron Research Facility board, 2015-

Chemical and Biological Engineering Director of Graduate Studies, 2014-

Executive committee, Center for Catalysis and Surface Science, 2014-

University Library Committee, 2014-

McCormick Teaching and Mentorship Award Committee, 2012-2014

British and Selective Fellowships Committee, 2008-2014

American Institute of Chemical Engineers Advisor, 2008-2014

Omega Chi Epsilon Student Chapter Advisor, 2008-

**PROFESSIONAL SERVICE**

Publications Chair, 17<sup>th</sup> International Congress on Catalysis, 2020, San Diego

Meeting Chair, 26<sup>th</sup> Meeting of the North American Catalysis Society, 2019, Chicago.



Panelist, Basic Research Needs workshop, DOE BES catalysis program, 2017.

Member, Roundtable on Industrial Catalysis Revitalization, American Chemical Council, 2015

Organizing committee, Meeting on *Interfaces of Heterogeneous and Homogeneous Catalysis*, Utrecht, 2105.

Organizing committee, ACS Division of Catalysis, 2010-

Steering committee, Midwest Regional AIChE Conference, 2013, 2014, 2015

Academic liaison, Chicago section of the AIChE, 2009-

Organic Reactions Catalysis Society Editorial Board, 2012

Session Chair or Co-Chair at AIChE: Fundamentals of Oxide Catalysis, Fundamentals of Supported Catalysis, Reaction Engineering in Pharmaceuticals and Fine Chemicals, Catalyst Preparation; ACS, NAM, 2007-current

Symposium Organizer: 2013 Spring National ACS, Frustrated Acid-Base Pairs, Division of Catalysis; 2011 Midwest Regional AIChE, Student Poster Session; 2011 Spring National AIChE, Student Poster Session; 2010 National ACS, Photocatalysis; 2010 Midwest Regional AIChE, 2009 Chicago Regional AIChE.

Reviewer for NSF panels, ACS PRF, DOE, UK Catalysis Science Program, North American Catalysis Meeting, International Catalysis Congress, *Science*, *Nature Chemical Biology*, *Catal. Lett.*, *Chem. Eng. J.*, *Fuel*, *J. Am. Chem. Soc.*, *Appl. Catal., Org. Proc. Res. Dev.*, *J. Catal.*, *Energy and Fuels*, *Ind. Eng. Chem. Res.*, *J. Phys. Chem.*, *Organometallics*, *Int. J. Hydrogen Energy*, *Langmuir*, *ACS Nano*, *ACS Catal.*, *Green Chem.*, *ChemSusChem*, and others.

## RESEARCH ADVISING

PhD and THESIS MS STUDENTS ADVISED:

1. Mr. Jordy Ramos-Yataco (2019-2020, MS)
2. Ms. Qining Wang (2018-2023, PhD Chemistry, with Joe Hupp)
3. Mr. Mark Taylor (2018-2023, PhD Chemistry, with Joe Hupp)
4. Ms. Brianna Ruggiero (2018-2023, PhD, with Linsey Seitz)
5. Andrew Wolek 2017-2022 (PhD)
6. Joshua Kirkham 2017-2022 (PhD)
7. Kenton Hicks 2017-2022 (PhD, Chemistry, with Omar Farha)
8. Christian Contreras 2016-2021 (PhD, Chemistry, with Peter Stair)
9. Emily Cheng 2016-2021 (PhD)
10. Charmaine Bennett 2016-2021 (PhD, co-advisor Linda Broadbelt)
11. Mihir Bhagat 2016-2021 (PhD, co-advisor Linda Broadbelt)
12. Andrew Rosen 2016-2021 (PhD, with Randy Snurr)
13. Abhinav Bhandari 2015-2017 (MS)
14. Alex Grant 2015-2017 (MS, 50% supported by Dick Co, now at Lilac Solutions)
15. Sol Ahn 2014-2019 (PhD, 50% supported by Omar Farha)
16. Abha Ghosavi 2014-2019 (PhD, 50% supported by Chad Mirkin)
17. Scott Nauert 2013-2018 (PhD, now at UOP)
18. M. Alexander Ardagh, 2013-2018 (PhD, now postdoc at U. Minnesota)
19. Louisa Savereide, 2013-2018 (PhD)
20. Bo Zhenyu, 2012-2017 (PhD, MSE, now at Micron Semiconductors)
21. Nicholas Thornburg, 2012-2017 (PhD, now at NREL)
22. Rachel Watson, 2012-2017 (PhD, co-advisor Harold Kung, now at BASF)
23. Lauren McCullough, 2012-2017 (PhD, co-advisor Harold Kung, now at Dow)
24. Christian Contreras, 2011-2013 (MS, now PhD in Chemistry, Northwestern)

25. Sara Yacob, 2011-2016 (PhD, now at Exxon-Mobil)
26. Todd Eaton, 2010-2015 (PhD, co-advisor Kimberley Gray, now at Chemours)
27. Kevin Schwartzenberg, 2010-2015 (PhD, EnvE, 50% supported by Kimberley Gray, now at Tradewater, LLC)
28. Mark Bachrach, 2010-2014 (PhD Chem, 50% supported by Tobin Marks, now at Dana Farber Institute)
29. Anthony Thompson, 2009-2014 (PhD, now at Savannah River)
30. Dario Prieto-Centurion, 2008-2013 (PhD, now Assist. Prof at Montana Tech)
31. Pria Young, 2008-2013 (PhD, now at BP)
32. Andrew Korinda, 2007-2012 (PhD, now at Hemlock Semiconductor)

**POSTDOCTORAL SCHOLARS SPONSORED:**

1. Gao-Fong Chang (with Prof. Nguyen, 2018-)
2. Huan Yan (with Prof. Stair, 2018-)
3. Youlong Zhu, 2017-2018 (with Prof. Nguyen, now Prof at Sun Yat-Sen University, China)
4. Chao Liu, 2016-2018 (with Prof. Weitz and Prof. Gray, now at Exxon Mobil)
5. Corinna Raimondo, 2015-2016 (now at Northwestern Office of Research Integrity)
6. Sherzod Madrahimov (co-advisor Prof. Nguyen), 2014-2015 (now Assist. Prof. at Texas A&M at Qatar)
7. David Childers, 2014-2017 (now at Nalco)
8. Chieh-Chao Yang (co-advisor Prof. Weitz), 2012-2016 (now at DuPont)
9. Sergio Garibay (co-advisor Prof. Nguyen), 2012-2017
10. Patricia Ignacio-deLeon, 2012-2014 (now at the Donaldson Company)
11. Sunyoung Park, 2012-2013 (now at KRICT)
12. Christian Canlas, 2010-2012 (now at W.R. Grace)
13. Natalia Morlanés-Sánchez, 2009-2011 (now at KAUST)
14. Nicholas Schoenfeldt, 2008-2011 (now at UOP)

**UNDERGRADUATE AND HIGH SCHOOL STUDENT RESEARCH MENTORING** %indicates published or submitted manuscript

UNDERGRADUATE: Ms. Kenzie Sanroman, 2019-; Mr. Rossoneri Jing, 2019-; Mr. Vincent Cheng, 2018-2019; Mr. Yang Xia, 2017; Mr. Sam Dull, 2016-2017 (Stanford PhD); Mr. Eric Taw%, 2016-2018 (Berkeley PhD); Mr. Reed Kolbe, 2015; Mr. Chi Hun Choi, 2013-2015; Mr. Andrew Boston%, 2011, 2013-2014 (Colorado PhD); Ms. Yuanxi Zhao, 2013, Mr. Mitchell Kirshner, 2013; Mr. Michael P. Campos (Chem, Columbia PhD),% Mr. PJ Santos%, 2012; Ms. Rachel Scholes% (Berkeley, PhD, NSF), 2011-2013; Mr. Nicolas Grosso% (Berkeley PhD) 2011-2013; Mr. Joshua Kaplan, 2011; Ms. Sydney Cope%, 2010; Ms. Lisa Felberg, 2009-2010 (Berkeley PhD); Mr. Theodore D. Swift% (Delaware PhD), 2009; Mr. John Siegfried%, 2008-2009; Mr. David Gabriel, 2008-2009

Research Experience for Undergraduates (administered through the Materials Research Science and Engineering Center): Ms. Awa Porgo (Stevens Institute of Technology), 2018; Ms. Megan Raysor (Fayetteville State University), 2015; Ms. Ludmilla Sorokina (Harold Washington Community College, Chicago), 2014; Ms. Hannah Hinton (Cerritos Community College (CA)), 2013; Ms. Amen Eloramen (Illinois Institute of Technology), 2013; Mr. Andrew Karas (Polytechnic University of NY), 2012; Mr. Stephen Brand (NU, now CalTech PhD), 2011; Mr. Alex Baron (University of Miami at Ohio), 2009.

Summer Research Opportunity Program (administered by the Graduate School with an emphasis on underrepresented groups): Ms. Yeilyn Colon (University of Notre Dame), 2014; Mr. Justin Swaney (University of Wisconsin, Madison), 2013.

HIGH SCHOOL: Ms. Greta Brablec 2019, Ms. Macy Nanda (New Trier High School) 2018, Ms. Fiona O'Brien (Walter Peyton College Prep) 2018, Mr. Ryan Franks (Illinois Math and Science Academy, IMSA) 2014-2015; Ms. Nishida Kumar (IMSA) 2011-2012, Ms. Ashley Radee (IMSA) 2011-2012, Ms. Elizabeth Ott (IMSA) 2010-11; Mr. Samir Mishra (IMSA) 2009-10; Ms. Jessie Salter (Evanston Township High School) 2010.

## **CURRENT AND COMPLETED SUPPORT.**

Institute for Catalysis and Energy Processes. (Lead PI 2018-2020, co-lead with P. Stair 2015-2018), DOE/BES/Catalysis, 09/01/2015 to 08/31/2020.

DOE EFRC: Inorganometallic Catalyst Design Center (L. Gagliardi, PI), 08/01/2016 to 07/31/2023.

NSF Engineering Research Center: CISTAR, Center for Innovative and Strategic Transformation of Alkane Resources (F. Ribeiro, director), 10/01/201 to 09/31/2022.

Understanding and controlling epoxide ring opening selectivity (lead PI), The Dow Chemical Company, 01/01/2017 to 12/31/2019. NCE to Spring 2020.

ERC Planning Grant: Engineering Research Center for Accelerated Catalytic Design and Characterization (S. Haile, PI), 09/01/2018 to 08/31/2019

Entrenched metal nanoparticles for 3D-nanostructured oxides, International Institute of Nanotechnology, Northwestern University, 01/01/2017 to 12/31/2018.

SusChEM: Using theory-driven design to tailor novel nanocomposite oxides for solar fuel production (K. Gray, PI), National Science Foundation, CBET, Catalysis and Biocatalysis, 9/1/2014 to 8/31/2018.

Lab-Directed Research and Development: Single Site Catalysts for Selective Alkane Oxidation (S. Nguyen, PI), Argonne National Laboratory subcontract, 01/01/2016 to 12/31/2017

McCormick Research Catalyst Award: Towards Integrated Valorization of Urban Waste Streams: Coupled Processing of Wastewater and Lignin to Hydrogen Peroxide, Aromatic Platform Chemicals, and Clean Water (co-PI w/ G. Wells), McCormick, 09/01/2014 to 12/31/2016.

Booster: Coupling Thermal and Photocatalysis in Novel Metal Oxides for CO<sub>2</sub> to Fuels, Institute for Sustainability and Energy at Northwestern, 09/01/2013 to 08/31/2014.

Novel Catalysts for Epoxidation of Divinylarenes and Allyl Aryl Ethers (lead PI), The Dow Chemical Company, 10/28/2011 to 10/27/2016.

Catalytic Routes to Methyl Methacrylate (MMA) Via Ethanol Carbonylation (lead PI), The Dow Chemical Company, 10/24/2011 to 10/23/2016.

Dispersed Oxide Catalysts for Selective Catalytic Reduction of NO (sole PI), Toyota Motor Engineering and Manufacturing, 09/01/2010 to 2/28/2016.

Templating Routes to Supported Oxide Catalysts by Design (sole PI), DOE/BES/Catalysis (DE-SC0006718), 09/01/2011 to 08/31/2015. Folded into ICEP in 2015.

EFRC: Institute for Atom-Efficient Chemical Transformations (Chris Marshall, PI), Argonne National Laboratory Subcontract/DOE/BES, 08/01/2009 to 07/31/2014.

DuPont Young Professor Grant (sole PI), 09/01/2011 to 08/31/2014.

Atom-precise adsorption sites from grafted, porous oligomers (sole PI), National Science Foundation, CBET, Separations (CBET 0933667), 09/01/2009 to 08/31/2013.

Doctoral New Investigator: Surface organometallic chemistry for improved performance and understanding of hydrodenitrogenation catalysis (sole PI), American Chemical Society Petroleum Research Fund, 09/01/2009 to 08/31/2013.

3M non-tenured faculty grant (sole PI), 04/01/2010 to 03/31/2013.

Booster: Understanding and control of photocatalysts for CO<sub>2</sub> photoreduction to fuels (co-PI w/ K. Gray), Initiative for Sustainability and Energy at Northwestern, 09/01/2011 to 08/31/2012.

Seed: Controlling nanoparticle surface and bulk with graded organic-inorganic interfaces (sole PI), NSF MRSEC at Northwestern (DMR 0520513), 01/01/2010 to 02/29/2012.

Booster: Hybrid materials for binding and activating CO<sub>2</sub> in artificial photosynthesis (sole PI), Initiative for Sustainability and Energy at Northwestern, 06/01/2009 to 05/31/2010.

Dow Methane Challenge: Methane conversion by nanoengineered catalyst environments and soft oxidants (Tobin Marks, PI), The Dow Chemical Company, 02/01/2008 to 12/02/2011.

Camille and Henry Dreyfus New Faculty Award: Novel oxidation catalysts from surface-grafted organometallics to form cooperative organic-inorganic interfaces for energy needs and sustainability (sole PI), Camille and Henry Dreyfus Foundation, 09/01/07 to 08/31/2012.