

CURRICULUM VITAE

Andrew Peterson

Assistant Professor
School of Engineering, Brown University
184 Hope Street, Box D
Providence, RI 02912

Phone: 401-863-2153
Email: andrew.peterson@brown.edu
Web: brown.edu/go/catalyst

Education

B.Ch.E., **University of Minnesota–Twin Cities**, Chemical Engineering, 1999.

Minor: Chemistry

M.S., **Massachusetts Institute of Technology**, Chemical Engineering Practice, 2006.

Ph.D., **Massachusetts Institute of Technology**, Chemical Engineering, 2009.

Minor: Quantum & Statistical Mechanics

Professional Appointments

- *Assistant Professor*, **Brown University**, January 2012–present.
- *Postdoctoral Scholar*, **Stanford University**, August 2010–December 2011. Advisor: Jens Nørskov.
- *Postdoctoral Fellow*, **Technical University of Denmark (DTU)**, September 2009–August 2010. Advisor: Jens Nørskov. Hans Christian Ørsted Fellow.
- *Research Assistant*, **Massachusetts Institute of Technology**, September 2003–June 2009. Advisor: Jefferson W. Tester. Martin Family Fellow.
- *Technical Consultant*, **British Petroleum, Inc.**, Fall 2004. Via MIT School of Chemical Engineering Practice.
- *Technical Consultant*, **Cabot Corporation**, Summer 2005. Via MIT School of Chemical Engineering Practice.
- *Research Engineer II*, **General Mills, Inc.**, September 1999–August 2003.

Publications and Research Products

Peer-reviewed Journal Articles

h-index: 22; total citations: 3,519; citations per year (2016): 844.

(29 works with Brown affiliation.)

- [52] Kolsbjerg, E.L.; **Peterson, A.A.**; and Hammer, B. Neural network enhanced evolutionary algorithm applied to supported metal clusters. (Submitted) 2017.
- [51] Xiao, X.; Bergstrom, H.; Saenger, R.; Sun, R.; and **Peterson, A.A.** The role of oxygen vacancies in biomass deoxygenation by reducible zinc/zinc-oxide catalysts. (In revision) 2017.
- [50] Khorshidi, A.; Violet, J.; Hashemi, J.; and **Peterson, A.A.** How strain can break the scaling laws of catalysis. (In review) 2017.
- [49] Kim, S.K.; Qiu, Y.; Zhang, Y.J.; Hurt, R.; and **Peterson, A.A.** Nanocomposites of transition-metal carbides on reduced graphite oxide as catalysts for the hydrogen evolution reaction. (In review) 2017.
- [48] Zhang, Y.J.; Khorshidi, A.; Kastlunger, G.; and **Peterson, A.A.** QM/ML: A simple quantum-mechanics / machine-learning algorithm. (In revision) 2017.

- [47] Yeo, B.S. and **Peterson, A.A.** Electrochemical reduction of carbon dioxide by heterogenous and homogeneous catalysts: experiment and theory. *Catalysis Today*, 288:1, 2017.
- [46] **Peterson, A.A.**; Christensen, R.; and Khorshidi, A. Addressing uncertainty in atomistic machine learning. *Physical Chemistry Chemical Physics*, 19:10978–10985, 2017.
- [45] Wang, Z.; Zhang, Y.J.; Liu, M.; **Peterson, A.A.**; and Hurt, R.H. Oxidation suppression during hydrothermal phase reversion allows synthesis of monolayer semiconducting MoS₂ in stable aqueous suspension. *Nanoscale*, 9:5398–5403, 2017.
- [44] Larsen, A.H.; Mortensen, J.J.; Blomqvist, J.; Castelli, I.E.; Christensen, R.; Dułak, M.; Friis, J.; Groves, M.N.; Hammer, B.; Hargus, C.; Hermes, E.D.; Jennings, P.C.; Jensen, P.B.; Kermode, J.; Kitchin, J.R.; Kolsbjerg, E.L.; Kubal, J.; Kaasbjerg, K.; Lysgaard, S.; Maronsson, J.B.; Maxson, T.; Olsen, T.; Pastewka, L.; **Peterson, A.A.**; Rostgaard, C.; Schiøtz, J.; Schütt, O.; Strange, M.; Thygesen, K.S.; Vegge, T.; Vilhelmsen, L.; Walter, M.; Zeng, Z.; and Jacobsen, K.W. The Atomic Simulation Environment—a python library for working with atoms. *Journal of Physics: Condensed Matter*, 29(27):273002, 2017.
- [43] Yan, K.; Kim, S.K.; Khorshidi, A.; Guduru, P.R.; and **Peterson, A.A.** High elastic strain directly tunes the hydrogen evolution reaction on tungsten carbide. *The Journal of Physical Chemistry C*, 121(11):6177–6183, 2017.
- [42] Deng, Y.; Ting, L.R.L.; Neo, P.H.L.; Zhang, Y.J.; **Peterson, A.A.** A; and Yeo, B.S. Operando Raman spectroscopy of amorphous molybdenum sulfide (MoS_x) during the electrochemical hydrogen evolution reaction: Identification of sulfur atoms as catalytically active sites for H⁺ reduction. *ACS Catalysis*, 6:7790–7798, 2016.
- [41] **Peterson, A.A.** Acceleration of saddle-point searches with machine learning. *The Journal of Chemical Physics*, 145(7):074106, 2016.
- [40] Khorshidi, A. and **Peterson, A.A.** Amp: A modular approach to machine learning in atomistic simulations. *Computer Physics Communications*, 207:310–324, 2016.
- [39] Jovanov, Z.P.; Hansen, H.A.; Varela, A.S.; Malacrida, P.; **Peterson, A.A.**; Nørskov, J.K.; Stephens, I.E.; and Chorkendorff, I. Opportunities and challenges in the electrocatalysis of CO₂ and CO reduction using bifunctional surfaces: A theoretical and experimental study of Au–Cd alloys. *Journal of Catalysis*, 343:215–231, 2016.
- [38] Yan, K.; Adit Maark, T.; Khorshidi, A.; Sethuraman, V.A.; **Peterson, A.A.**; and Guduru, P.R. The influence of elastic strain on catalytic activity in the hydrogen evolution reaction. *Angewandte Chemie International Edition*, 55(21):6175–6181, 2016.
- [37] Hansen, H.A.; Shi, C.; Lausche, A.C.; **Peterson, A.A.**; and Nørskov, J.K. Bifunctional alloys for the electroreduction of CO₂ and CO. *Physical Chemistry Chemical Physics*, 18:9194–9201, 2016.
- [36] Kim, S.K.; Zhang, Y.J.; Bergstrom, H.; Michalsky, R.; and **Peterson, A.A.** Understanding the low-overpotential production of CH₄ from CO₂ on Mo₂C catalysts. *ACS Catalysis*, 6:2003–2013, 2016.
- [35] Ting, L.R.L.; Deng, Y.; Ma, L.; Zhang, Y.J.; **Peterson, A.A.**; and Yeo, B.S. Catalytic activities of sulfur atoms in amorphous molybdenum sulfide for the electrochemical hydrogen evolution reaction. *ACS Catalysis*, 6:861–867, 2016.

- [34] Sethuraman, V.A.; Vairavapandian, D.; Lafouresse, M.C.; Adit Maark, T.; Karan, N.; Sun, S.; Bertocci, U.; **Peterson, A.A.**; Stafford, G.R.; and Guduru, P.R. Role of elastic strain on electrocatalysis of oxygen reduction reaction on Pt. *The Journal of Physical Chemistry C*, 119(33):19042–19052, 2015.
- [33] Michalsky, R.; Avram, A.M.; Peterson, B.A.; Pfromm, P.H.; and **Peterson, A.A.** Chemical looping of metal nitride catalysts: low-pressure ammonia synthesis for energy storage. *Chemical Science*, 6:3965–3974, 2015.
- [32] **Peterson, A.A.** Optimizing electrocatalyst selectivity for CO₂ reduction over H₂ evolution. *ECS Transactions*, 66(3):41–52, 2015.
- [31] Li, H.J.; Lausche, A.C.; **Peterson, A.A.**; Hansen, H.A.; Studt, F.; and Bligaard, T. Using microkinetic analysis to search for novel anhydrous formaldehyde production catalysts. *Surface Science*, 641:105 – 111, 2015.
- [30] Zhang, Y.J. and **Peterson, A.A.** Oxygen-induced changes to selectivity-determining steps in electrocatalytic CO₂ reduction. *Physical Chemistry Chemical Physics*, 17:4505–4515, 2015.
- [29] Michalsky, R.; Botu, V.; Hargus, C.M.; **Peterson, A.A.**; and Steinfeld, A. Design principles for metal oxide redox materials for solar-driven isothermal fuel production. *Advanced Energy Materials*, 4:1401082, 2014.
- [28] Yang, Y.; Adit Maark, T.; **Peterson, A.A.**; and Kumar, S. Elastic strain effects on catalysis of a PdCuSi metallic glass thin film. *Physical Chemistry Chemical Physics*, 17:1746–1754, 2015.
- [27] Zhu, W.; Zhang, Y.J.; Zhang, H.; Lv, H.; Li, Q.; Michalsky, R.; **Peterson, A.A.**; and Sun, S. Active and selective conversion of CO₂ to CO on ultrathin Au nanowires. *Journal of the American Chemical Society*, 136(46):16132–16135, 2014.
- [26] Zhang, Y.J.; Sethuraman, V.; Michalsky, R.; and **Peterson, A.A.** Competition between CO₂ reduction and H₂ evolution on transition-metal electrocatalysts. *ACS Catalysis*, 4:3742–3748, 2014.
- [25] Hargus, C.; Michalsky, R.; and **Peterson, A.A.** Looped-oxide catalysis: a solar thermal approach to bio-oil deoxygenation. *Energy & Environmental Science*, 7:3122–3134, 2014.
- [24] Michalsky, R.; Zhang, Y.J.; Medford, A.J.; and **Peterson, A.A.** Departures from the adsorption energy scaling relations for metal carbide catalysts. *The Journal of Physical Chemistry C*, 118(24):13026–13034, 2014.
- [23] Michalsky, R.; Zhang, Y.J.; and **Peterson, A.A.** Trends in the hydrogen evolution activity of metal carbide catalysts. *ACS Catalysis*, 4:1274–1278, 2014.
- [22] Adit Maark, T. and **Peterson, A.A.** Understanding strain and ligand effects in hydrogen evolution over Pd(111) surfaces. *The Journal of Physical Chemistry C*, 118(8):4275–4281, 2014.
- [21] Zhu, W.; Michalsky, R.; Metin, Ö.; Lv, H.; Guo, S.; Wright, C.J.; Sun, X.; **Peterson, A.A.**; and Sun, S. Monodisperse Au nanoparticles for selective electrocatalytic reduction of CO₂ to CO. *Journal of the American Chemical Society*, 135(45):16833–16836, 2013.
- [20] **Peterson, A.A.** Global optimization of adsorbate–surface structures while preserving molecular identity. *Topics in Catalysis*, 57(1-4):40–53, 2014.

- [19] Varley, J.B.; Hansen, H.A.; Ammitzbøll, N.L.; Grabow, L.C.; **Peterson, A.A.**; Rossmeisl, J.; and Nørskov, J.K. Ni-Fe-S cubanes in CO₂ reduction electrocatalysis: A DFT study. *ACS Catalysis*, 3:2640–2643, 2013.
- [18] Hansen, H.A.; Montoya, J.H.; Zhang, Y.J.; Shi, C.; **Peterson, A.A.**; and Nørskov, J.K. Electroreduction of methanediol on copper. *Catalysis Letters*, 143(7):631–635, 2013.
- [17] Shi, C.; O’Grady, C.P.; **Peterson, A.A.**; Hansen, H.A.; and Nørskov, J.K. Modeling CO₂ reduction on Pt(111). *Phys. Chem. Chem. Phys.*, 15:7114–7122, 2013.
- [16] Dreher, M.; Johnson, B.; **Peterson, A.A.**; Nachtegaal, M.; Wambach, J.; and Vogel, F. Catalysis in supercritical water: Pathway of the methanation reaction and sulfur poisoning over a Ru/C catalyst during the reforming of biomolecules. *Journal of Catalysis*, 301:38 – 45, 2013.
- [15] Montoya, J.H.; **Peterson, A.A.**; and Nørskov, J.K. Insights into C-C coupling in CO₂ electroreduction on copper electrodes. *ChemCatChem*, 5(3):737–742, 2013.
- [14] Hansen, H.A.; Varley, J.B.; **Peterson, A.A.**; and Nørskov, J.K. Understanding trends in the electrocatalytic activity of metals and enzymes for CO₂ reduction to CO. *The Journal of Physical Chemistry Letters*, 4(3):388–392, 2013.
- [13] **Peterson, A.A.**; Grabow, L.C.; Brennan, T.P.; Shong, B.; Ooi, C.; Wu, D.M.; Li, C.W.; Kushwaha, A.; Medford, A.J.; Mbuga, F.; Li, L.; and Nørskov, J.K. Finite-size effects in O and CO adsorption for the late transition metals. *Topics in Catalysis*, 55:1276–1282, 2012.
- [12] **Peterson, A.A.**; Dreher, M.; Wambach, J.; Nachtegaal, M.; Dahl, S.; Nørskov, J.K.; and Vogel, F. Evidence of scrambling over ruthenium-based catalysts in supercritical-water gasification. *ChemCatChem*, 4(8):1185–1189, 2012.
- [11] **Peterson, A.A.** and Nørskov, J.K. Activity descriptors for CO₂ electroreduction to methane on transition-metal catalysts. *The Journal of Physical Chemistry Letters*, 3(2):251–258, 2012.
- [10] Tang, W.; **Peterson, A.A.**; Varela, A.S.; Jovanov, Z.P.; Bech, L.; Durand, W.J.; Dahl, S.; Nørskov, J.K.; and Chorkendorff, I. The importance of surface morphology in controlling the selectivity of polycrystalline copper for CO₂ electroreduction. *Phys. Chem. Chem. Phys.*, 14:76–81, 2012.
- [9] Durand, W.J.; **Peterson, A.A.**; Studt, F.; Abild-Pedersen, F.; and Nørskov, J.K. Structure effects on the energetics of the electrochemical reduction of CO₂ by copper surfaces. *Surface Science*, 605(15-16):1354–1359, 2011.
- [8] Fischer, C.R.; **Peterson, A.A.**; and Tester, J.W. Production of C₃ hydrocarbons from biomass via hydrothermal carboxylate reforming. *Industrial & Engineering Chemistry Research*, 50(8):4420–4424, 2011.
- [7] **Peterson, A.A.**; Abild-Pedersen, F.; Studt, F.; Rossmeisl, J.; and Nørskov, J.K. How copper catalyzes the electroreduction of carbon dioxide into hydrocarbon fuels. *Energy & Environmental Science*, 3(9):1311–1315, 2010.
- [6] Neltner, B.; Peddie, B.; Xu, A.; Doenlen, W.; Durand, K.; Yun, D.S.; Speakman, S.; **Peterson, A.A.**; and Belcher, A. Production of hydrogen using nanocrystalline protein-templated catalysts on M13 phage. *ACS Nano*, 4(6):3227–3235, 2010.

- [5] **Peterson, A.A.**; Tester, J.W.; and Vogel, F. Water-in-water tracer studies of supercritical-water reversing jets using neutron radiography. *The Journal of Supercritical Fluids*, 54(2):250 – 257, 2010.
- [4] **Peterson, A.A.**; Lachance, R.P.; and Tester, J.W. Kinetic evidence of the Maillard reaction in hydrothermal biomass processing: Glucose-glycine interactions in high-temperature, high-pressure water. *Industrial & Engineering Chemistry Research*, 49(5):2107–2117, 2010.
- [3] **Peterson, A.A.**; Vontobel, P.; Vogel, F.; and Tester, J.W. Normal-phase dynamic imaging of supercritical-water salt precipitation using neutron radiography. *The Journal of Supercritical Fluids*, 49(1):71 – 78, 2009.
- [2] **Peterson, A.A.**; Vogel, F.; Lachance, R.P.; Fröling, M.; Antal Jr., M.J.; and Tester, J.W. Thermochemical biofuel production in hydrothermal media: A review of sub- and supercritical water technologies. *Energy & Environmental Science*, 1(1):32–65, 2008.
- [1] **Peterson, A.A.**; Vontobel, P.; Vogel, F.; and Tester, J.W. In situ visualization of the performance of a supercritical-water salt separator using neutron radiography. *The Journal of Supercritical Fluids*, 43(3):490–499, 2008.

Open-Source Scientific Software

(Permanently archived via DOI.)

- [1] Khorshidi, A.; El Khatib, M.; and **Peterson, A.A.** Amp: The Atomistic Machine-learning Package, v0.6. *Zenodo*, 2017. DOI:10.5281/zenodo.836788.

Invited Lectures

- [39] Gordon Research Conference on Catalysis
New London, NH, June, 2018.
- [38] Technical University of Denmark, Department of Physics
Lyngby, Denmark, January, 2018.
- [37] 3rd International Conference on Proton-Coupled Electron Transfer
Blowing Rock, NC, June, 2018.
- [36] University of California, Los Angeles
Los Angeles, CA, November, 2017.
- [35] Massachusetts Institute of Technology, Electrochemical Energy Lab
Cambridge, MA, September, 2017.
- [34] Penn Conference on Theoretical Chemistry (PCTC)
Philadelphia, August, 2017.
- [33] 7th KOPRC: Fossil fuel decarbonisation for mitigating global warming
The Royal Society, London, July, 2017.
- [32] Computational Chemistry & Materials Science Summer Institute
Lawrence Livermore National Lab, July, 2017.
- [31] Interface Morphology Prediction with Robust and Efficient Structure Search (IMPRESS)
Aalto University, Helsinki, Finland, June, 2017.

- [30] American Chemical Society Invited Session: Designed Catalysis
San Francisco, April, 2017.
- [29] Graduate School in Solvation Science, Ruhr-Universität Bochum
Bochum, Germany, May, 2016.
- [28] Max Planck Institute for Solid State Research, Electronic Structure Theory Seminar
Stuttgart, Germany, May, 2016.
- [27] Karlsruhe Institute of Technology, Chemistry Seminar
Karlsruhe, Germany, May, 2016.
- [26] University of Iceland, Department of Chemistry
Reykjavík, Iceland, May, 2016.
- [25] Cornell University, Materials Science & Engineering Seminar
Ithaca, March, 2016.
- [24] University of Rhode Island, Department of Chemistry Seminar
Kingston, RI, September 2015.
- [23] Electrochemical Society Invited Seminar
Chicago, May, 2015.
- [22] Boston College, Department of Chemistry
Boston, October, 2014.
- [21] Catalysis from first principles (Cat1P): Heterogeneous catalysis meets electrocatalysis
Ulm, Germany, May, 2014.
- [20] Technical University of Denmark, Physics Seminar
Lyngby, Denmark, January 2014.
- [19] Worcester Polytechnic Institute, Chemical Engineering Department Seminar
Worcester, MA, April 2013.
- [18] Symposium in Honor of Nick Delgass's 70th Birthday (at AIChE Annual Meeting)
Pittsburgh, PA, November, 2012.
- [17] Electrocatalysis Tutorial Session (at AIChE Annual Meeting)
Pittsburgh, PA, November, 2012.
- [16] Brown Chemistry Departmental Undergraduate Group Seminar
Providence, November, 2012.
- [15] CECAM (Centre Européen de Calcul Atomique et Moléculaire) Workshop
Bremen, Germany, October, 2012.
- [14] Brown University, Energy Seminar Series
Providence, RI, October, 2012.
- [13] International Society of Electrochemistry Spring Meeting
Washington, DC, May, 2012.

- [12] Fritz Haber Institute of the Max Planck Society
Berlin, Germany, November, 2011.
- [11] Technical University of Denmark, Physics Seminar
Lyngby, Denmark, November, 2011.
- [10] Risø DTU National Laboratory, Seminar
Roskilde, Denmark, November, 2011.
- [9] Stanford, GCEP (Global Climate and Energy Project) Workshop on Carbon Capture
Stanford, CA, May, 2011.
- [8] University of Washington
Seattle, WA, March, 2011.
- [7] Brown University
Providence, RI, February, 2011.
- [6] Imperial College, London
London, UK, February, 2011.
- [5] University of Southern California
Los Angeles, CA, February, 2011.
- [4] Syracuse University
Syracuse, NY, January, 2011.
- [3] Gordon Research Conference, Solar Fuels
Ventura, CA, January, 2011.
- [2] Northeastern Renewable Energy Conference
State College, PA, August, 2008.
- [1] World Biofuels Markets Conference
Amsterdam, Netherlands, October, 2007.

Research Funding

\$5.4 million total research funding.

\$3.8 million as Lead PI, of which \$1.3 million as Sole PI.

Current

- [9] National Science Foundation, Data-Driven Discovery Science in Chemistry (NSF D3SC)
“Addressing uncertainty in atomistic machine-learning to accelerate data-driven discovery”
Sole PI; \$60,000; Award 1553365 (supplement); 1-Sep-2017–31-Aug-2018.
- [8] SK Innovation
“New Catalyst Design for Direct, Non-oxidative Conversion of Methane to Ethylene”
Lead PI; \$392,985; Contract research; 1-Sep-2017–28-Feb-2019. With Goldsmith.
- [7] Salomon Award, Brown University
“Coupling surface reactivity with bulk oxidation to catalytically reform biomolecules”
Sole PI; \$15,000; Internal Award; 1-Jan-2017–31-Dec-2017.

- [6] Department of Energy, Fuel Cell Technologies Office (DOE FCTO)
 “Advanced Electro-Catalysts through Crystallographic Enhancement”
 Co-PI; Peterson share: ~\$264,000; 1-Sep-2016–31-Aug-2019.
 Full award: \$3,000,000 total; Award 1224-1531; Lead PI: Spendelow, LANL.
- [5] National Science Foundation: Faculty Early Career Development Program (CAREER)
 “CAREER: Accurate Electrochemical Barriers Accelerated by Machine-Learning”
Sole PI; \$500,001; Award 1553365; 1-Jan-2016–31-Dec-2020.
- [4] Office of Naval Research, Computer-Aided Materials Design
 “Mechanism-driven discovery of efficient H₂ production electrocatalysts”
Lead PI; \$2,100,000; Award N00014-16-1-2355; 1-May-2016–31-Dec-2018. With MIT, JHU, Emory.
- [3] Office of Naval Research: Computer-Aided Materials Design
 “Development of Heterogeneous Carbide- and Nitride-Based Catalysts for the Hydrogen Evolution Reaction”
Sole PI; \$225,000; Award N00014-15-1-2223; 15-Sep-2015–28-Feb-2017.
- [2] Department of Energy: EPSCoR Implementation Program
 “Fundamental Investigations of Mechanical and Chemical Degradation Mechanisms in Lithium Ion Battery Materials”
 Co-PI; Peterson share: ~\$315,000; 15-Sep-2014–14-Sep-2017.
 Full award: \$12,772,155 total; Award DE-SC0007074; Lead PI: Guduru.
- [1] Army Research Office: Multi-University Research Initiative (MURI)
 “Stress-Controlled Catalysis via Engineered Nanostructures”
 Co-PI; Peterson share: ~\$760,000; 15-Aug-2011–15-Aug-2017.
 Full award: \$6,250,000 total; Award W911NF-11-1-0353; Lead PI: Guduru.

Completed

- [2] National Science Foundation, Center for Chemical Innovation
 “CCI Phase I: CO₂ as a Sustainable Feedstock for Chemical Commodities”
 Co-PI; Peterson share: ~\$192,000; 1-Sep-2012 – 31-Aug-2015.
 Full award: \$1,750,000; Award CHE-1240020; Lead PI: Palmore.
- [1] Office of Naval Research: Young Investigator Award (ONR YIP)
 “Fuels Synthesized from CO₂ using Carbide Electrocatalysts”
Sole PI; \$560,000; Award N000014-12-1-0851; 1-Apr-2012—31-Mar-2016.

Active proposals

- [4] Department of Energy, Basic Energy Sciences (DOE BES)
 “Predictive multiscale simulation of interfacial solid-State chemical reactions”
 Block grant (\$8,000,000 total, Peterson: \$600,000): “Computational Chemical Sciences”
 Lead institution: Lawrence Livermore National Laboratory.
- [3] Air Force Office of Scientific Research (AFOSR)
 “Molecular spectroscopic studies of energy conversion reactions at electrochemical interfaces”
 Block grant (\$7,500,000 total, split TBD): Multidisciplinary University Research Initiative (MURI)
 Lead institution: Johns Hopkins University.

- [2] Air Force Office of Scientific Research (AFOSR)
“Unraveling correlated electrode/electrolyte dynamics during electrocatalytic oxidation reactions”
Block grant (\$6,450,000 total, split TBD): Multidisciplinary University Research Initiative (MURI)
Lead institution: Georgia Institute of Technology.
- [1] Small Business Innovation Research (SBIR)
“Electrochemical Conversion of CO₂ to Fuels for Power-to-Gas Energy Storage: Phase II”
Block grant (\$1,000,000 total, Peterson: \$215,000); SBIR Phase II
Lead institution: Sustainable Innovations, Inc., Hartford, CT.

Academic Honors, Fellowships, Honorary Societies

- Chair, New England Catalysis Society, 2017–2019.
- Vice Chair, New England Catalysis Society, 2015–2017.
- CAREER Award, National Science Foundation, 2016–2020.
- Top Reviewer, *ACS Catalysis*, 2014–2015. (Top 1%)
- ONR YIP Young Investigator Award, Office of Naval Research, 2012–2015.
- Hans Christian Ørsted Fellowship, DTU’s highest postdoctoral fellowship, 2009–2010.
- Grant recipient as graduate student PI, Deshpande Center for Entrepreneurship, MIT, \$50,000, 2008.
- Martin Family Fellow, MIT, 2005–2009.

Service

To the School of Engineering / Brown University

- Concentration Advisor, Chemical & Biochemical Engineering, 2012–2013, 2014–2015, 2015–2016, 2017–2018.
- First-Year Advisor, 2012–2013, 2013–2014, 2014–2015, 2015–2016, 2017–2018.
- Faculty Search Committee, School of Engineering, 2016–2017.
- Faculty Search Committee, School of Engineering, 2013–2014.
- Faculty Search Committee, School of Engineering, 2012–2013.
- Research Computing Advisory Committee, 2016–present.
- Committee on the Core, School of Engineering, 2013–2014.
- Search Committee, Center for Computation & Visualization (CCV) Executive Director, 2014.
- Steering Committee, Center for Computation & Visualization, 2013–2015.

To the Profession

- New England Catalysis Society, member, 2012–present; Chair, 2017–2019; Vice Chair, 2015–2017.
- Editorial Board, *Scientific Reports*, 2014–2016.
- Guest Editor, *Catalysis Today*, (special issue, 2017).
- Open-source software lead author, *Amp: Atomistic Machine-learning Package*, 2014–present.
- Open-source software contributor, *Atomic Simulation Environment*, 2009–present.
- Conference Session Chair/Co-Chair: Catalysis for CO₂ Conversion I, AIChE Annual Meeting 2012, Catalysis for CO₂ Conversion II, AIChE Annual Meeting 2012, Computational Catalysis III, AIChE Annual Meeting 2012, CO Hydrogenation II, AIChE Annual Meeting 2013, Computational Catalysis III, AIChE Annual Meeting 2013, Electrocatalysis II, North American Catalysis Society Meeting 2013, CO₂ Conversion: Thermo-, Photo- and Electro-Catalysis, ACS Fall Meeting 2013, CO Hydrogenation I, AIChE Annual Meeting 2014, Rational Catalyst Design, AIChE Annual Meeting 2014, Solar Fuels, North American Catalysis Society Meeting 2015, CO₂ Conversion, North American Catalysis Society Meeting 2015, Rational Catalyst Design, AIChE Annual Meeting 2015, Rational Catalyst Design, AIChE Annual Meeting 2016.

- Proposal review panelist, National Science Foundation, Spring, 2015, Spring 2016, Fall 2016, Fall 2017.
- Ad-hoc grant proposal reviewer: National Science Foundation, European Commission, Swiss National Science Foundation, ACS Petroleum Research Fund, KAUST, State of Alabama
- Lead Organizer, C₄ (Center for the Capture and Conversion of CO₂) Faculty Tutorial Series, Spring 2014.
- Peer reviewer for >30 journal titles, including the high-impact journals *Angewandte Chemie*, *Energy & Environmental Science*, *Journal of the American Chemical Society*, *Nature*, *Nature Chemistry*, *Science*.

To the Community

- Research host, Leadership Alliance, Summer 2015.
- Chemistry Week exhibitor, Museum of Science, Boston, Spring 2015.
- Science Conference Day presenter, Vartan Gregorian Elementary School, Providence, Summer 2012.

Teaching

Regular Courses

Semester	Course	Co-instructor	Enrollment	Course Effect. ^a	Individual Effect. ^b
Spring 2017	ENGN 0720 Thermodynamics	C. Briant	95	2.13	2.05
Fall 2016	[Junior sabbatical]	-	-	-	-
Spring 2016	[New parent teaching relief]	-	-	-	-
Fall 2015	ENGN 2770 Atomistics ^d	-	15	1.54	1.46
Spring 2015	ENGN 0720 Thermodynamics	C. Briant	132	2.04	1.51
Fall 2014	ENGN 1120 Kinetics ^c	-	27	1.71	1.38
Spring 2014	ENGN 0720 Thermodynamics	A. van de Walle	100	2.62	1.47
Fall 2013	ENGN 2770 Atomistics ^d	-	6	1.25	1.50
Spring 2013	ENGN 0720 Thermodynamics	T. Palmore	99	2.41	2.16
Fall 2012	ENGN 1120 Kinetics ^c	-	18	1.80	1.87

^a "Effectiveness of Course" overall average score. 1="Very effective", 5="Very ineffective".

^b Peterson teaching scores only from "Effectiveness of Instruction". Same scale.

^c Full course name: Chemical and Biochemical Reactor Design

^d Full course name: Catalyst Design and Atomistic Reaction Engineering (2013), Atomistic Reaction Engineering (2015)

Research Advising

PhD theses supervised.

In progress:

5. Sharma, Shubham. (Chemical Engineering)
4. Lindgren, Per. (Chemical Engineering) *Presidential Fellow*.
3. Khorshidi, Alireza. (Solid Mechanics)

Completed:

2. Johnson, Benjamin. (Chemical Engineering). Defended July, 2017.
1. Zhang, Yin-Jia. (Chemistry). Defended May, 2017. *Potter Award for Best Thesis*.

Masters thesis supervised.

1. Xu, Ming. (Chemical Engineering). Awarded May, 2013.

Honors theses supervised (undergraduate).

7. Brauer, Kaley (Physics). May, 2017.
6. Managlia, Alison (Chemical Engineering). May, 2017.
5. Pinals, Rebecca (Chemical Engineering). May, 2016.
4. Sanspeur, Rohan Yuri (Chemical Engineering). May, 2016.
3. Violet, James (Chemical Engineering). May, 2016.
2. Bergstrom, Helen (Chemical Engineering). May, 2015. *Halpin Prize Winner*.
1. Hargus, Cory (Biomedical Engineering). May, 2013. *DiMase Prize Winner*.

Postdoctoral researchers supervised.

8. Dr. Javad Hashemi
7. Dr. Muammar El Khatib
6. Dr. Georg Kastlunger
5. Dr. Kai Yan (Now at USTC, China; co-advised with P. Guduru)
4. Dr. Seok Ki Kim (Now at Korea Research Institute of Chemical Technology.)

3. Dr. Martha Gialampouki (Now at University of Wisconsin.)
2. Dr. Tuhina Adit Maark (Now at the Indian Institute of Technology, IIT-Madras.)
1. Dr. Ronald Michalsky (Now at the Swiss Federal Institute of Technology, ETH Zürich.)

Visiting scholars hosted.

7. Esben Kolsbjerg, Aarhus University, March 2017–June 2017.
6. JuYe Kim, KAIST (Korean Advanced Institute of Science and Technology), Sept 2016–present.
5. Zachary Ulissi, Stanford University, Oct 2016.
4. Xiao Xiao, Beijing School of Forestry, Sept 2015–present.
3. Yaqing Wu, Tianjin University, July–Sept 2015
2. Rune Christensen, Technical University of Denmark, Aug 2015, Aug 2016.
1. Ulrik Grønbjerg Vej-Hansen, Technical University of Denmark, Jan–Mar, 2015.

PhD thesis/defense committee member.

Internal:

10. Hotchhay Tann (Computer Engineering, Advisor: S. Reda)
9. Leonard Sprague (Chemistry, Advisor: B. Rubenstein)
8. Hongxia Hao (Chemistry, Advisor: B. Rubenstein)
7. Taehee Kim (Materials Engineering, Advisor: T. Palmore)
6. Michelle Muzzio (Chemistry, Advisor: S. Sun)
5. Caoyuan Ma (Chemistry: Advisor: S. Sun)
4. Sara Kadkhodaei (Materials Engineering, Advisor: A. van de Walle)

External opponent:

3. Jacob Madsen, Technical University of Denmark. Scheduled January, 2018.
2. Javed Hussain, University of Iceland. May, 2016.
1. Mohammedreza Karamads, Technical University of Denmark. January, 2014.