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Professor and Richard and Bonnie Robbins Endowed Chair

Department of Chemical Engineering

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HIGHLIGHTS

RESEARCH ACCOMPLISHMENTS

My research interests are in wood-based biofuel conversion processes, including torrefaction, pyrolysis, reaction engineering, and catalytic hydrotreatment of pyrolysis biooil and plant oils, and environmental life cycle assessments of advanced biofuels and bioproducts.

Administrative:	Director of the Sustainable Futures Institute, a campus-wide research institute focusing on multidisciplinary sustainability research (\$18,000,000 in new funding since 2010) with participation of 70 faculty.
Funding:	57 grants, (total projects \$28,050,000; as PI \$8,350,000; to DRS \$6,150,000)
Publications:	95 peer-reviewed articles and book chapters
Ph.D. Mentored:	as advisor 12 graduated, 4 current as sole adviser (2) and co-adviser (2)
M.S. Mentored:	15 graduated
B.S. Mentored:	120 undergraduate researchers
Postdocs Mentored:	2 graduated (one is SFI Operations Manager, one at CA EPA), 1 current
Research Reports:	33 reports to research sponsors
Proceedings Papers:	35 proceedings papers and extended abstracts
Presentations:	125 presentations at conferences
Invited Seminars:	36 presentations by invitation
Keynote Addresses:	4
Edited Books:	2, one edited book and one 3-volume handbook on bioenergy crop plants
Awards:	Outstanding Undergraduate Research Mentor Award (AIChE Student Chapter, Michigan Technological University, 2011, 2012, 2016, 2017) <i>NSF/Lucent Technologies Foundation</i> Industrial Ecology Research Fellowship, 1998
Biofuels Pilot Plant:	Set up a 1 kg/hr forest-based pyrolysis biofuels pilot plant at Michigan Tech

EDUCATION ACCOMPLISHMENTS

My education interests are in chemical engineering transport phenomena, unit operations, environmental fate and transport processes, green engineering in the chemical engineering curriculum, sustainability in engineering education, and sustainable engineering in secondary education.

Awards:	<i>Ray Fahien Award</i> , ASEE Chemical Engineering Division, 2003
Textbooks:	2 textbooks (Green Engineering; Sustainable Engineering), 2 solution manuals
Workshops:	14 national workshops on Green Engineering education and other topics
Grants:	NSF Research Experience for Teachers (RET) award (2009-2014), education is imbedded into NSF-funded research grants through undergraduate student involvement and course development
Certificate:	Developed-manage a multidisciplinary Graduate Certificate in Sustainability
Sustainability:	Created multi-disciplinary graduate-level courses in Sustainability
Green Engineering:	Incorporating green engineering education materials into the chemical engineering curriculum at multiple points, including a required course

SERVICE ACCOMPLISHMENTS

AIChE:	leadership on technical programming in the Environmental Division and the Sustainable Engineering forum
Committees:	Ph.D. committees; 8 graduated, 6 current: M.S.; 13 graduated, 1 current
ABET:	led and organized MTU's Chem. Eng. Dept. ABET accreditation 2003-2004.

EDUCATION

Ph.D., Chemical Engineering, University of California, Davis; 1991.

Dissertation: "An experimental and theoretical study of the effects of environmental conditions and nonlinear adsorption on the emission rates of volatile organic compounds from contaminated soils". Advisor: Dr. Richard L. Bell.

M.S., Chemical Engineering, University of California, Davis; 1985.

Thesis: "Experimental determinations of unit cell effective thermal conductivities for point contact". Advisor: Dr. Stephen Whitaker.

B.S., Chemical/Metallurgical Engineering, University of Nevada, Reno; 1983.

PROFESSIONAL EXPERIENCE

2009-present	Director, Sustainable Futures Institute, MTU (~\$28,000,000 portfolio)
2008-present	Richard and Bonnie Robbins Endowed Chair in Sustainable use of Materials
2007-2009	Deputy Director, Sustainable Futures Institute, MTU
2005-present	Professor, Department of Chemical Engineering, MTU
1999-2005	Associate Professor, Department of Chemical Engineering, MTU
2002-2003	Visiting Professor, BASF-AG, Ecoefficiency, Ludwigshafen, Germany
1993-1999	Assistant Professor, Department of Chemical Engineering, MTU
Spring 1993	Visiting Lecturer, Department of Chemical Engineering, University of California at Berkeley, Berkeley, CA, USA.
1990-1992	Postdoctoral Researcher, Lawrence Livermore National Laboratory, Livermore, CA, USA.
1983-1990	Research and Teaching Assistant, Department of Chemical Engineering, University of California, Davis, CA, USA.
1989 Summer	Visiting Scholar, Universität Karlsruhe, Karlsruhe, Germany; German Academic Exchange Program.

RESEARCH/TEACHING PUBLICATIONS

In Print Articles/Book Chapters

1. Handler, R., Shi, R., Shonnard, D.R., 2017, Land-use Change Implications for Large-scale Cultivation of Algae Feedstocks in the United States Gulf Coast, *Journal of Cleaner Production*, 153, 15-25.
2. Shi, R., Ukaew, S., Archer, D.W., Pearlson, M., Lewis, K.C., Shonnard, D.R., 2017, Life Cycle Water Footprint Analysis for Rapeseed Derived Jet Fuel in North Dakota, *ACS Sustainable Chemistry and Engineering*, 5, 3845-3854.
3. Klemetsrud, B., Eatherton, D., Shonnard, D.R., 2017, Effects of lignin content and temperature on the properties of hybrid poplar bio-oil, char, and gas obtained by fast pyrolysis, *Energy & Fuels*, 31, 2879-2886.
4. Winjobi, O., Zhou, W., Kulas, D., Nowicki, J., Shonnard, D.R., (2017) Production of hydrocarbon fuel using two-step torrefaction and fast pyrolysis of pine. Part 2: Life-cycle carbon footprint, *ACS Sustainable Chemistry and Engineering*, 5 (6), pp 4541–4551
DOI: 10.1021/acssuschemeng.7b00373.
5. Winjobi, O., Shonnard, D.R., Zhou, W., (2017) Production of hydrocarbon fuel using two-step torrefaction and fast pyrolysis of pine. Part 1: Techno-economic analysis, *ACS Sustainable Chemistry and Engineering*, 5 (6), pp 4529–4540 **DOI:** 10.1021/acssuschemeng.7b00372.
6. Allen, D.T., Shonnard, D.R., Huang, Y., Schuster, D. 2016, Green Engineering Education in Chemical Engineering Curricula: A Quarter Century of Progress and Prospects for Future

- Transformations, *ACS Sustainable Chemistry and Engineering*, 4 (11), pp 5850–5854
10.1021/acssuschemeng.6b01443.
7. Klemetsrud, B., Ukaew, S., Thompson, V.C., Thompson, D.N., Klinger, J., Li, L., Eatherton, D., Puengprasert, P., Shonnard, D.R., (2016) Characterization of products from fast micro-pyrolysis of municipal solid waste (MSW) biomass, *ACS Sustainable Chemistry and Engineering*, 4 (10), pp 5415–5423, DOI: 10.1021/acssuschemeng.6b00610.
 8. Brooks, K.P., Snowden-Swan, L.J., Jones, S.B., Butcher, M.G., Lee, G.-S.J., Anderson, D.M., Frye, J.G., Halladay, J.G., Owen, J., Harmon, L., Burton, F. Palou-Rivera, I., Handler, R.M., Shonnard, D.R. (2016) Chapter 6: Low Carbon Aviation Fuel Through the Alcohol to Jet Pathway: Feedstocks, Technology, and Implementation, Editor Christopher Chuck, Academic Press, pg. 390.
 9. Gracida-Alvarez, U.R., Keenan, L.M., Sacramento-Rivero, J.C., Shonnard, D.R., (2016) Resource and Greenhouse Gas Assessments of the Thermochemical Conversion of Municipal Solid Waste in Mexico, *ACS Sustainable Chemistry & Engineering*, 4 (11), pp 5972–5978 DOI: [10.1021/acssuschemeng.6b01143](https://doi.org/10.1021/acssuschemeng.6b01143),
 10. Winjobi, O., Shonnard, D.R., Bar Ziv, E., Zhou, W., (2016) Life cycle assessment for greenhouse gas emissions of two-step torrefaction and fast pyrolysis of pine, *BioFPR*, 10(5), 576–588 DOI: 10.1002/bbb.1660.
 11. Ukaew, S; Shi, R; Lee, JH; Archer, D; Pearlson, M; Lewis, K; Bregni, L; Shonnard, D; Full Chain Life Cycle Assessment of Greenhouse Gases and Energy Demand for Canola-Derived Jet Fuel in North Dakota, United States, *ACS Sustainable Chemistry and Engineering*, in print April, 2016, DOI: [10.1021/acssuschemeng.6b00276](https://doi.org/10.1021/acssuschemeng.6b00276).
 12. Rui Shi, Robert Handler, David Shonnard. "Life-cycle Assessment of Algae Renewable Diesel: Influence of Alternative Uses for Lipid-extracted Algae." *Current Biotechnology* 5 (2016): 11-14. DOI: [10.2174/2211550105666160204000201](https://doi.org/10.2174/2211550105666160204000201)
 13. Winjobi, O., Shonnard, D.R., Bar Ziv, E., Zhou, W., (2016) Techno-economic assessment of the effect of torrefaction on fast pyrolysis of pine, *Biofuels, Bioprod. Bioref.* 10(2), 117–128; DOI: 10.1002/bbb .
 14. Fan, J., Gephart, J., Marker, T., Stover, D., Updike, B., Shonnard, D.R., (2016) Carbon Footprint Analysis of Gasoline and Diesel from Forest Residues and Corn Stover using Integrated Hydropyrolysis and Hydroconversion, *ACS Sustainable Chemistry and Engineering*, 4, 284-290, DOI: 10.1021/acssuschemeng.5b01173.
 15. Klinger, J., Bar-Ziv, E., Shonnard, D.R., Westover, T., Emerson, R., (2015) Predicting Properties of Gas and Solid Streams by Intrinsic Kinetics of Fast Pyrolysis of Wood, *Energy & Fuels*, 30 (1), pp 318–325, DOI: 10.1021/acs.energyfuels.5b01877
 16. Handler, R.M., Shonnard, D.R., Griffing, E.M., Lai, A., Palou-Rivera, I. Life Cycle Assessments of LanzaTech Ethanol Production: Anticipated Greenhouse Gas Emissions for Cellulosic and Waste Gas Feedstocks, *I&ECR* (Special Issue), submitted Sept., 2015, just accepted manuscript; Dec., 2015. DOI: 10.1021/acs.iecr.5b03215
 17. Shonnard, D.R., Solomon, B.D., (2015) Special Issue on Pan American Biofuel and Bioenergy Sustainability, *Environmental Management*, December 2015, Volume 56, [Issue 6](#), pp 1273–1275.
 18. Shonnard, D.R., Klemetsrud, B., Sacramento-Rivera, J., Navarro, F., Hilbert, J., Handler, R., Suppen, N. Donovan, R.P., (2015) A Review of Environmental Life Cycle Assessments of Liquid Transportation Biofuels in the Pan American Region, *Environmental Management*, December 2015, Volume 56, [Issue 6](#), pp 1356–1376.
 19. Klinger, J., Bar-Ziv, E., & Shonnard, D. (2015). Unified kinetic model for torrefaction–pyrolysis. *Fuel Processing Technology*, **138**, 175-183. doi: <http://dx.doi.org/10.1016/j.fuproc.2015.05.010>
 20. Shonnard, D.R., Fogliatti, D., Kalnes, T., (2015), Response to Comment on “Life Cycle Carbon Footprint of Linear Alkylbenzene Sulfonate from Coconut Oil, Palm Kernel Oil, and Petroleum

Based Paraffins”, *ACS Sustainable Chemistry and Engineering*, **3** (8), DOI: 10.1021/acssuschemeng.5b00158.

21. Canter, C., Blowers, P., Handler, R., Shonnard, D.R., (2015), Implications of widespread algal biofuels production on macronutrient fertilizer supplies: nutrient demand and evaluation of potential alternate nutrient sources, *Applied Energy*, 143(April 1, 2015), 71-80.
22. Klinger, J., Bar Ziv, E., Shonnard, D.R., (2015) "Predicting Properties of Torrefied Biomass by Intrinsic Kinetics, *Energy & Fuels*, **29**, 171-176.
23. Ukaew, S., Beck, E., Archer, D.W., Shonnard, D.R., (2015) Estimation of soil carbon change from rotation cropping of rapeseed with wheat in the hydrotreated renewable jet life cycle, *International Journal of Life Cycle Assessment*, **20**(5), p608.
24. Klinger, J., Klemetsrud, B., Bar-Ziv, E., Shonnard, D., (2014) Temperature Dependence of Aspen Torrefaction Kinetics, *Journal of Analytical and Applied Pyrolysis*, **110**, 424-429.
25. Groves S, Lui J, Shonnard D, Bagley S (2014) Evaluation of hardboard manufacturing process wastewater as a feedstream for ethanol production. *J Ind Microbiol Biotechnol* **40**(7):671-677.
26. Ukaew, S., Beck, E., Meki, M.N., Shonnard, D.R., (2014), Application of the RSB and IPCC Methods to Regional Differences in N₂O Emissions for the Rapeseed Hydrotreated Renewable Jet Life Cycle, *Journal of Cleaner Production*, **83**:220–227.
27. Liu, J., Shonnard, D.R., (2014) Life Cycle Carbon Footprint of Ethanol and Potassium Acetate Produced from a Forest Product Wastewater Stream by a Co-located Biorefinery, *ACS Sustainable Chemistry and Engineering*, 2014, **2** (8), pp 1951–1958.
28. Adom, F.K., Fan, J., Davis, J., Dunn, P., Shonnard, D.R., (2014) Compositional Analysis of Defatted Syrup from a Corn Ethanol Dry- Grind Process as a Feedstock for Biobased Products, *ACS Sustainable Chem. Eng.*, 2014, **2** (5), pp 1139–1146.
29. Fogliatti, D., Kemppainen, S., Kalnes, T, Fan, J., Shonnard, D.R., (2014), Life Cycle Carbon Footprint of Linear Alkylbenzene Sulfonate from Coconut Oil, Palm Kernel Oil, and Petroleum Based Paraffins, *ACS Sustainable Chemistry and Engineering*, **2** (7), pp 1828–1834.
30. Handler, R.M., Shonnard, D.R., Lautala, P., Abbas, D., Srivastava, A., (2014), Environmental impacts of roundwood supply chain options in Michigan: Life-cycle assessment of harvest and transport stages, *Journal of Cleaner Production*, **76**, 1 August, Pages 64–73.
31. Handler, R., Shonnard, D.R., Kalnes, T., Lupton, S., (2014), Life cycle assessment of algal biofuels: Influence of feedstock cultivation systems and conversion platforms, *Algal Research*, **4**, 105-115.
32. Klinger, J., E. Bar-Ziv and D. Shonnard (2013). "Kinetic study of aspen during torrefaction." *Journal of Analytical and Applied Pyrolysis* **104**: 146-152.
33. Fan, J., Shonnard, D.R., Kalnes, T., Streff, M., Hopkins, G., (2013), Emission reduction using RTP™ green fuel in industry facilities: A life cycle study, *Energy and Fuels*, **27**, 5260–5267.
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37. Adom, F., Workman, C, Thoma, G., Shonnard, D., Carbon footprint of dairy feed from a mill in Michigan, USA, (2013) *International Dairy Journal*, 31 (April), S21-S28.

38. Fan, J., Shonnard, D.R., Kalnes, T.N., Johnson, P., Rao, S., (2013) A life cycle assessment of pennycress-based green diesel and green jet, *Biomass and Bioenergy*, 55, 87-100,
39. Kreiger, M.A., Shonnard, D.R., Pearce, J.M., (2013), Life Cycle Analysis of Silane Recycling in Amorphous Silicon-Based Photovoltaic Manufacturing, *Resources Conservation & Recycling*, 70, 44-49.
40. Fan, J., Handler, R.M., Shonnard, D.R., Kalnes, T.N., (2012), A review of life cycle greenhouse gas emissions of hydroprocessed jet fuels from renewable oil and fats, *International Journal of Environmental Science and Engineering Research (IJESER)*, 3(3):114-138.
41. Allen, D.T., Shonnard, D.R., (2012), Sustainability in chemical engineering education: Identifying a core body of knowledge, *AIChE Journal*, 58(8), 2296-2302, August 2012.
42. Brodeur-Campbell, M., Klinger, J., and Shonnard, D., (2012), Feedstock Mixture Effects on Sugar Monomer Recovery Following Dilute Acid Pretreatment and Enzymatic Hydrolysis, *Bioresource Technology*, 116, 320-326.
43. Handler, R.H., Canter, C.E., Kalnes, T.N., Lupton, F.S., Kholiqov, O., Shonnard, D.R., Blowers, P. (2012) Evaluation of environmental impacts from microalgae cultivation in open-air raceway ponds: Analysis of the prior literature and investigation of wide variance in predicted impacts, *Algal Research*, 1(1), 83-92.
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48. Fan, J., Kalnes, T.N., Alward, M., Klinger, J., Sadehvandi, A., Shonnard, D.R., (2011) Life Cycle Assessment of Electricity Generation using Fast Pyrolysis Bio-Oil, *Renewable Energy*, 36, 632-641.
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51. Froese, R.F., Shonnard, D.R., Miller, C.A., Koers, K.P., Johnson, D.M., (2010) An Evaluation of Greenhouse Gas Mitigation Options for Coal-Fired Power Plants in the US Great Lakes States, *Biomass & Bioenergy*, 34, 251-262.
52. Jensen, J.R., Brodeur-Campbell, M., Morinelly, J., Gosson, K., Shonnard, D.R., (2010), Effects of Dilute Acid Hydrolysis Conditions on Enzymatic Hydrolysis of Aspen, Balsam, and Switchgrass, *Bioresource Technology*, 101(7), 2317-2325.
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 124. P. Patgaonkar, P. Chatkun Na Ayuttaya, T.N. Rogers, H. Chen, D.R. Shonnard, B.R. O'Donnell, and B.A. Barna, "Optimizing chemical process performance with a reduced set of tuning variables", *2000 Annual Meeting of the American Institute of Chemical Engineers*, Los Angeles, CA, November 12 – November 17, 2000.
 125. Hui Chen, Brendan R. O'Donnell, David R. Shonnard, Tony N. Rogers, Bruce A. Barna, Eric J. Oman and Andrew A. Kline, "Defining an analytic hierarchy process (AHP)-based approach for simultaneous consideration of environmental and economic process attributes", *Life Cycle Impact Assessment Workshop: Midpoints versus Endpoints: The Sacrifices and Benefits*, May 25 & 26, 2000, Stakis Metropole, Brighton, U.K.
 126. D.R. Shonnard and S.P. Beaudoin, "P2Workshop: An internet-based workshop for pollution prevention curriculum development", *United Engineering Foundation Conference , "Clean Products and Processes II"*, November 14-19, 1999, Lake Arrowhead, CA.

127. Hui Chen, D.J. Wiegand, E. Oman, A.A. Kline, D.R. Shonnard, T.N. Rogers, B.A. Barna, and D.A. Crowl, "Integrated assessment tools as process simulator enhancements for chemical engineering education", *the 1999 Annual Meeting of the American Institute of Chemical Engineers*, Dallas, TX, October 31 – November 5, 1999, Session 205f and 206f.
128. D.S. Hiew and D.R. Shonnard, "Development and applications of a software tool for assessing environmental and health impacts of chemical process designs", *American Institute of Chemical Engineers National Meeting*, New Orleans, LA, March 1998.
129. P.A. Deshpande and D.R. Shonnard, "Effects of salt type and concentration on the kinetics of bacterial attachment in saturated porous media", *American Institute of Chemical Engineers National Meeting*, New Orleans, LA, March 1998.\
130. D.R. Shonnard, J.S. Gierke and A.S. Mayer; "*In situ* subsurface remediation technologies: Integration into an interdisciplinary engineering curriculum", *ASEE Summer School for Chemical Engineering*, Snowbird, Utah, August 1997.
131. P.A. Deshpande and D.R. Shonnard; "Evaluation of first- and second-order attachment behavior during microbial transport through uniform saturated sand columns", *American Institute of Chemical Engineers Annual Meeting*, Chicago, Ill., November 1996.
132. D.R. Shonnard, J.S. Gierke and A.S. Mayer; "Experience with integrating *in situ* subsurface remediation technologies courses into an interdisciplinary engineering curricula", *American Institute of Chemical Engineers Annual Meeting*, Chicago, Ill., November 1996.
133. J.S. Gierke, D.R. Shonnard, and A.S. Mayer, "*In Situ* subsurface remediation technologies: Integration into an interdisciplinary engineering curriculum", *AAEE/AEEP Environmental Engineering and Education and Practice Conference*, Orono, Maine, August 3-6, 1996.
134. D.R. Shonnard and B.A. Barna; "Pollution Prevention Education in Chemical Engineering at Michigan Technological University (MTU)", *the DOE Pollution Prevention in the 21st Century Conference XII*, Chicago, Ill, July 1996.
135. J.S. Gierke, D.R. Shonnard, and A.S. Mayer, "*In Situ* subsurface remediation technologies: Integration into an interdisciplinary engineering curriculum", *the American Society for Engineering Education (ASEE) Annual Conference*, Washington, D.C., June, 1996.
136. D.R. Shonnard, A.S. Mayer, and J.S. Gierke, "*In situ* subsurface remediation technologies: Integration into an interdisciplinary engineering curriculum", *American Institute of Chemical Engineers Annual Meeting*, Miami Beach, FL, November, 1995.
137. J.M. Markey and D.R. Shonnard, "Microbial biomass detection using Attenuated Total Reflectance (ATR) Spectroscopy", *American Institute of Chemical Engineers Annual Meeting*, Miami Beach, FL, November, 1995.
138. D.R. Shonnard, T. Laurvick, and A.S. Mayer, "Critical evaluations of pollutant fate and risk models for pollution prevention", *American Institute of Chemical Engineers Summer National Meeting*, Boston, Mass., August, 1995.
139. D.R. Shonnard, J.M. Markey, and P.A. Deshpande, "Evaluation of unit operation-specific emission databases", *American Institute of Chemical Engineers Summer National Meeting*, Boston, Mass., August, 1995.
140. D.R. Shonnard, J.S. Gierke, and A.S. Mayer, "*In Situ* subsurface remediation technologies: Integration into an interdisciplinary engineering curriculum", *American Society for Engineering Education (ASEE) Annual Conference*, Anaheim, CA, June, 1995.
141. M Lehning, D.P.Y. Chang, D.R. Shonnard and R.L. Bell. "An inversion algorithm for determining area source strength from downwind concentration measurements", *the 86th Annual Meeting and Exhibition of the Air and Waste Management Association*, Denver, CO. June, 1993.
142. D.R. Shonnard and R.L. Bell, "The effects on nonlinear sorption on the diffusion of benzene and dichloromethane from two air-dry soils", *the American Institute of Chemical Engineers Annual Meeting*, Miami Beach, Florida, **212i**, November, 1992.

143. D.R. Shonnard, M. Lehning, D.P.Y. Chang, and R.L. Bell. 1992. "An inversion algorithm for determination of area source strength from downwind concentration measurements", the *Third Annual Current Issues in Air Toxics, Air and Waste Management Association*, Sacramento, CA, 1992.
144. D.R. Shonnard and R.T Taylor, "Parameters affecting the motility of *Methylosinus trichosporium* OB3b in aqueous suspensions", *Abstracts of the 91st General Meeting of the American Society for Microbiology Annual Meeting*, Dallas TX, N-3, May 1991.
145. D.R. Shonnard and R.L. Bell, "A new experimental method for determining area emission sources at hazardous waste facilities", the *American Institute of Chemical Engineers Annual Meeting*, San Francisco, CA, November 1989.
146. D.R. Shonnard and S. Whitaker, "Effective thermal conductivity for a point-contact porous medium", the *American Institute of Chemical Engineers Annual Meeting*, New York City, NY, November 1987.

INVITED SEMINARS/PRESENTATIONS

1. SS 5350: Environmental Policy Analysis, "Biofuel Life Cycle Assessment and Sustainability: Challenges and Opportunities", March 24, 2016, 204 OAB, Michigan Technological University.
2. Professional Development Series Seminar: "Project Management in Research: Time-Tested Strategies", Graduate School, Michigan Technological University, April 24, 2013.
3. "The Sustainable Futures Institute at Michigan Tech", presentation at the Research Scholars Program students at MTU, February 16, 2010.
4. Michigan Technological University, "Transportation Fuels from Forest Resources: Are They Sustainable?", October 19, 2009, Department of Civil-Environmental Engineering.
5. Grand Valley State University; "Sustainable Transportation Fuels from Forest Resources: Sugars from Wood for Energy and Economic Transition – SWEET!", March 26-27, 2009.
6. University of Arizona; "Sustainable Transportation Fuels from Forest Resources: Sugars from Wood for Energy and Economic Transition – SWEET!", March 9-10, 2009.
7. Popcorn & Policy: Climate Change in the Keweenaw. Campus and community event presented by the Michigan Tech chapter of Engineers Without Borders and the Students for Environmental Sustainability, November 29, 2007, Michigan Technol. University.
8. "A Wood to Wheels Graduate Enterprise: A New Research Program", presentation at the Research Scholars Program students at MTU, September, 2007.
9. "Green Chemistry and Green Engineering: Working Together for a Sustainable Future", American Chemical Society Mid Atlantic Regional Conference, Ursinus College, Collegeville, PA, May 17, 2007.
10. "Wood to Wheels (W2W) Enterprise", presentation to the Cellulosic Biofuels Working Group, Michigan Economic Development Corporation, April 26, 2007.
11. "The Future of Energy from Biomass", Rock the Vote energy information session, Memorial Ballroom A, MTU, Oct. 17, 2006, 7 pm.
12. "A Wood to Wheels Graduate Enterprise: A New Research Program at MTU", Department of Civil/Environmental Engineering, MTU, Sept. 25, 2006.
13. "A Wood to Wheels Graduate Enterprise: A New Research Program", presentation to K. Clark, Chair of MTU Board of Control, ATDC at MTU, August 02, 2006.
14. "A Wood to Wheels Graduate Enterprise: A New Research Program", presentation to Carl Senator Levin, ATDC at MTU, July 03, 2006.
15. "Producing Ethanol from Lignocellulosic Biomass: Challenges and Opportunities", MTU, Xi Sigma Pi Forestry Honor Society Symposium 2006 – Innovative Technologies in Natural Resources, April 7, 2006.
16. "Producing Ethanol from Lignocellulosic Biomass: Challenges and Opportunities", University of Kansas, NSF ERC Center for Environmentally Beneficial Catalysis, Feb. 14, 2006.

17. "Renewable Energy from Forest Resources: An Investigation of the Viability of Large-Scale Production of Sustainable Transportation Fuels From Lignocellulosic Biomass", MTU, Graduate Student Council Luncheon, November 10, 2005.
18. "Environmental Impacts of Energy" and "Energy from Biomass", MTU, League of Women Voters: The People Speak, October 12, 2004.
19. "Green Engineering: Using Life Cycle Assessment to Evaluate Chemical Products and Processes", UOP LLC, Des Plaines, IL, July 29, 2004.
20. "Sustainable Futures Institute at MTU and Discussion of Possible Collaboration", BP Naperville, Naperville, IL, July 28, 2004.
21. "Modes for Eco-Innovation", Dow Corning, Midland, MI, June 11-12, 2004
22. "Eco-efficiency Analysis of Chemical Products and Processes (and other Topics from a Sabbatical at BASF Corporation in Ludwigshafen, Germany)", Chemical Engineering Division, University of Nevada, Reno, September 26, 2003.
23. "Computer-Aided Tools for Environmentally-Conscious Chemical Process Analysis", Chemical Engineering Division, University of Nevada, Reno, September 26, 2003.
24. "Eco-efficiency Analysis of Chemical Products and Processes (and other Topics from a Sabbatical at BASF Corporation in Ludwigshafen, Germany)", Chemistry Department, Michigan Technological University, September 20, 2003, Department of Chemical Engineering, October 3, 2003, Department of Civil and Environmental Engineering, Michigan Technological University, October 17, 2003.
25. "Research into Environmentally-Conscious Design of Chemical Processes at MTU", Product Safety and Ecology Department, BASF Corporation, Wyandotte, MI, April 3, 2002.
26. "Methods and Application of Toxicity Assessment to Chemical Process Design", Pharmaceutical Engineering Program, College of Engineering, University of Michigan, Ann Arbor, MI, Feb. 5, 2002.
27. "Strategies for Including Environmental Impact Assessment into Chemical Process Designs", Department of Chemical Engineering, Oklahoma State University, March 6, 2001.
28. "Strategies for Including Environmental Impact Assessment into Chemical Process Designs", Department of Chemical Engineering, West Virginia University, October 6, 2000.
29. "A Framework for Assessing Environmental and Human Health Impacts of Chemical Process Designs", Department of Chemical/Environmental Engineering, University of Toledo, Toledo, OH, November 12, 1999.
30. "Evaluating the Environmental Performance of a Flowsheet", presented to undergraduate students at the Department of Chemical/Environmental Engineering, University of Toledo, Toledo, OH, November 12, 1999.
31. "Preventing Pollution: Assessing environmental impacts of chemical process designs", Department of Chemical Engineering, Michigan State University, November 1998.
32. "Pursuing a Chemical Engineering graduate degree", presentation to undergraduate students at the Department of Chemical Engineering, Michigan State University, November 12, 1998.
33. "Preventing pollution by assessing environmental impacts of chemical process designs", Department of Environmental Engineering, Michigan Technological University, October 1998.
34. "Microbial transport in subsurface porous media: Effects of salt valence and concentration on kinetics of attachment", Department of Chemical and Metallurgical Engineering, University of Nevada, Reno, April, 1998.
35. "A pollution prevention design tool for the chemical industry", presentation to undergraduate students at the Department of Chemical and Metallurgical Engineering Department, University of Nevada, Reno, April 1998.
36. "Relevance of interfacial properties for environmental biotechnology applications", Department of Biological Sciences, Michigan Technological University, March 1996.
37. "Bacterial population dynamics in a saturated subsurface media", Department of Environmental Engineering, Michigan Technological University, October 1993.

WORKSHOPS ATTENDED / INVITED PRESENTATIONS

1. Invited participant in the GAO's National Academy of Sciences expert meeting on Advanced Biofuels Research and Development on May 26-27th, 2016, Washington, DC.
2. Allen, D.T., Shonnard, D.R., Green Engineering and Sustainability in the ChE Curriculum, ASEE Chemical Engineering Summer School, University of Maine-Orono, July 21-26, 2012
3. Allen, D.T., Shonnard, D.R., Incorporating Green Engineering and Sustainability into Engineering Curricula, 2010 AIChE Annual Meeting, Salt Lake City, UT USA
4. Dairy Management Inc. (DMI), Sustainability Summit: Greenhouse Gas Reduction Opportunities in the Dairy Milk Value Chain, Rogers, AR, June 17-19, 2008.
5. Shonnard, D.R., "Tools and Materials for Green Engineering and Green Chemistry Education", Green Chemistry and Engineering Education – a Workshop Organized by the Chemical Sciences Roundtable of the National Research Council, Nov. 7-8, 2005, The National Academies, 500 5th St. NW, Washington, DC.
6. Shonnard, D.R. and Broadbelt, L., "A Short Course on Nanotechnology, Biotechnology, and Green Manufacturing for Creating Sustainable Technologies", NSF Summer Institute on Nano Mechanics and Materials, Northwestern University, June 20-24, 2005.
7. Shonnard, D.R., Hesketh, R., Slater, S., Nguyen, N., "Green Engineering Education Training for University Professors and Graduate Students", ASEE Annual Meeting, Portland, OR, June 12, 2005.
8. Shonnard, D.R. and Allen, D.T., "Green Engineering Short Course ", Center for Environmentally Beneficial Catalysis, University of Kansas, Lawrence, KS, June 21-22, 2004
9. Shonnard, D.R. and Allen, D.T., "Green Engineering Workshop", University of Florida, Gainesville, FL, June 1-2, 2003.
10. Allen, D.T., Shonnard, D.R., and Hesketh, R., "Green Engineering Educators Workshop", ASEE Chemical Engineering Summer School, University of Colorado, Boulder, July 27-August 2, 2002.
11. Shonnard, D.R., Allen, D.T. and Austin, S., "Green Engineering Educators Regional Workshops", Michigan Technological University – July 6, University of Maryland – July 18, University of Nevada at Reno – July 25, 2000, American Society for Engineering Education (ASEE).
12. D.T. Allen, D.R. Shonnard, S. Weil, D. Dorland, "Green Engineering Educators Workshop", American Society for Engineering Education (ASEE) Annual Meeting and Expo, Charlotte, NC, June 20, 1999.
13. S. Weil, N. Nguyen, D.T. Allen, and D.R. Shonnard, "Development of a Green Engineering Textbook for the Chemical Engineering Curriculum", the *American Institute of Chemical Engineers Annual Meeting*, Miami Beach, FL, November, 1998.
14. D.R. Shonnard, J.S. Gierke, and A.S. Mayer, *In Situ* subsurface remediation technologies: Integration into an interdisciplinary engineering curriculum, the *International Workshop on Environmental Chemical Engineering*, University of Sydney, Australia, December 1995.
15. D.R. Shonnard and R.L. Bell, Diffusion experiments in soils and their implications on modeling transport. *National Center for Intermedia Transport Research*, UCLA, 1988.

KEYNOTE AND PLENARY ADDRESSES

1. Shonnard, D.R., Evaluation of Sustainable Biofuels Pathways Using Life Cycle Assessment, 4th International Conference on Sustainable Chemical Product and Process Engineering (SCPPE 2016), Nanjing, China. May 31-June 3, 2016. Invited keynote address.
2. Shonnard, D.R., Biofuel Sustainability: Challenges and Opportunities, Sustainability@Wayne Seminar Series, Office of the Vice President for Research, Wayne State University, Detroit, MI, October 20, 2015.

3. Shonnard, D.R., Sustainability of Transportation Biofuels, Symposium on Thermal and Catalytic Sciences for Biofuels and Biobased Products, September 2-5, 2014, Denver, Colorado.
4. Shonnard, D.R., Evaluating Forest Biomaterials with Environmental Life Cycle Assessment, Michigan Biomaterials Conference, Michigan Society of American Foresters, October 3-4, 2013.

CONFERENCE/WORKSHOP ORGANIZING

1. 2nd Pan American Biofuel and Bioenergy Sustainability Research Coordination Network Conference, Sept. 13-16, 2016, in Buenos Aires, Argentina.
2. Pan American Biofuel and Bioenergy Sustainability Research Coordination Network Workshop 3, June 3-5, 2015, Michigan Technological University, Houghton, MI USA.
3. Pan American Biofuel and Bioenergy Sustainability Research Coordination Network Conference, July 22-25, 2014, Golden Tulip Recife Palace Hotel in Recife, Brazil.
4. Pan American Biofuel and Bioenergy Sustainability Research Coordination Network Workshop 2, May 28-30 2013, Buenos Aires, Argentina, Savoy Hotel.
5. Pan American Biofuel and Bioenergy Sustainability Research Coordination Network Workshop 1, May 29-31, 2012, Merida, Mexico, Universidad Nacional Autónoma de México.

FUNDING HISTORY - 58 GRANTS, (TOTAL PROJECTS \$28,216,000; AS PI \$8,516,000; TO DRS \$6,316,000)

Gas Technology Institute / Department of Energy: SUBCONTRACT NO. S549

“Life Cycle Assessments of Drop in Hydrocarbon Fuels and Chemicals using Methane / Hydroropyrolysis”, (DE-EE0007009-GTI Project No. 21767)”

Principal Investigator (Shonnard), (\$165,845+\$46,376 MTU Cost Share; 06/01/15 - 05/31/16).

LanzaTech LLC: MTU AGMT # DE-AR0000438TDD

“Life cycle assessments of advanced transportation fuels produced from remote natural gas: ARPA-E REMOTE”

Principal Investigator (Shonnard), Robert Handler (co-PI); \$150,000, 1/01/14 - 2/28/17

Gas Technology Institute / Department of Energy: SUBCONTRACT #S435

“Refinery Upgrading of Hydroropyrolysis Oil from Biomass (DE-EE0005992-GTI Project No. 21416)”

Principal Investigator (Shonnard), \$198,654+49,664 MTU Cost Share; 03/04/2013 – 8/31/2017.

National Science Foundation: MPS/CHE - ENG/ECCS – 1230803

“SEP: Sustainable Forest-Based Biofuel Pathways to Hydrocarbon Transportation Fuels: Biomass Production, Torrefaction, Pyrolysis, Catalytic Upgrading, and Combustion”

Principal Investigator (Shonnard), \$1,800,000, (\$250,000 to Shonnard), 09/01/2012 – 8/31/2017

National Science Foundation: OISE-PIRE – 1243444

“OISE-PIRE Sustainability, Ecosystem Services, and Bioenergy Development across the Americas”

Co-principal Investigator (Shonnard), \$4,981,749, (\$293,756 to Shonnard), 01/01/2013 – 12/31/2017

USDA NIFA – BRDI (subaward from USDA-ARS) Agreement No. 59-3620-3-002 on USDA-ARS Interagency Agreement No. 60-3620-2-361/ USDA NIFA BRDI # 2012-10008-19727.

“Accelerated Development of Commercial Hydrotreated Renewable Jet (HRJ) Fuel from Redesigned Oil Seed Feedstock Supply Chains: MTU LCA Support”

Co-principal Investigator, \$6,998,779 (\$300,000 to Shonnard), 08/01/2012 – 07/30/2017

LanzaTech LLC: MTU AGMT # DOE DE-FOA-0000467

“Life cycle assessments to support LanzaTech: Department of Energy DE-FOA-0000467”

Principal Investigator (Shonnard), Robert Handler (co-PI); \$149,961, 10/01/12 - 09/30/14

LanzaTech LLC: MTU AGMT # USDOT-FAA DTRT57-12C-10

“LanzaTech Proposal to Federal Aviation Administration: Integrated Life Cycle and Techno-economic Assessments of Industrial Waste Gas to Jet Fuel Conversion”

Principal Investigator (Shonnard), Robert Handler (co-PI); \$150,018, 04/01/12 - 03/31/14

National Science Foundation: CBET-1140152

“RCN-SEES: A Research Coordination Network on Pan American Biofuels and Bioenergy Sustainability”

Principal Investigator (Shonnard), \$749,996 + \$8,000 supplement (\$671,767 to Shonnard); 01/01/12 - 12/31/15.

National Science Foundation: CBET-1159763

“Nano and Microprinting Equipment for Novel Bioparticle Separations”

Co-principal Investigator (Shonnard) \$100,000, Principal Investigator (Minerick); 09/01/12 - 8/31/13.

National Science Foundation: EEC-1009617

“RET Site: “Wood-to-Wheels” – Research Experiences for High School Teachers in Sustainable Transportation Technologies”

Principal Investigator (Shonnard), \$358,942 + \$45,000 supplement (\$155,178 to Shonnard); 04/01/11 – 03/31/14.

Gerstacker and Strosacker Foundations

A Forest-Based Biofuels Pilot Plant for Wood-to-Wheels at Michigan Tech

Principal Investigator (Shonnard), \$125,000; 1/01/2011 – 12/31/2013

UOP LLC: MTU AGMT: PO4500357352

“Life Cycle Assessments (LCAs) in Support of UOP and Envergent Renewable Energy and Chemicals Projects in 2010-2013”

Principal Investigator (Shonnard), \$204,711; 05/01/2010 – 12/31/2013.

Gas Technology Institute / Department of Energy : SUBCONTRACT #S162

“Carbon Footprint Analysis of IH² Biofuels: Analysis for Year 1”

Principal Investigator (Shonnard), \$50,000; 04/01/2010 – 12/31/2011.

LanzaTech LLC: MTU AGMT # 1009013

“Life cycle Greenhouse Gas (GHG) and Fossil Energy Analysis of Ethanol Production from an Industrial Waste Stream”

Principal Investigator (Shonnard), Robert Handler (co-PI); \$18,944, 11/01/10 - 10/31/11

KUO Sol (Mexico): MTU AGMT #100673

“Life Cycle Assessments of Hydro-Renewable Jet from Jatropha Grown in Mexico: Greenhouse Gas Emissions and Cumulative Energy Demand”

Principal Investigator (Shonnard), \$18,063; 06/01/2010 – 12/31/2010.

LanzaTech LLC: MTU AGMT #1010069

“Life Cycle Assessments of LanzaTech Conversion Technologies: Greenhouse Gases, Energy and Water Impacts”

Principal Investigator (Shonnard), \$75,300; 01/01/2011 – 12/31/2012.

NSF IUCRC :IIP-1034699

“Planning Grant: IUCRC for Joining the Center for Bioenergy Research and Development”

Principal Investigator (Shonnard), \$12,999; 10/01/10 - 09/31/11.

UOP LLC / NAABB :#1009062

“Life Cycle Assessments to Support Sustainable Algae-Based Biofuels Production for the National Alliance for Advanced Biofuels and Bioproducts”

Principal Investigator (Shonnard), Robert Handler (co-PI); \$90,000 + \$45,000; 10/01/10 - 06/30/12.

Envergent (UOP LLC / Ensyn) / Department of Energy: MTU AGMT #090655

“Life Cycle Assessments (LCAs) of PyGasoline and PyDiesel From Different Regional Feedstocks: Corn Stover, Switchgrass, Sugar Corn Bagasse, Waste Wood, and Forest Residues: Phase 1: Preliminary LCAs”

Principal Investigator (Shonnard), \$125,000; 05/01/2010 – 12/31/2011.

Working Bugs LLC / Michigan Economic Development Corporation: MTU #091099

“Center of Energy Excellence: Hydrolysis Research to Produce Sugars and Amino Acids from Defatted Dry Mill Syrup and other Renewable Resources”

Principal Investigator (Shonnard), \$120,000; 02/15/2009 – 01/14/2012.

Michigan Economic Development Corporation and American Process, Inc.: SUBGRANT #090156

“Center of Energy Excellence-Alpena Prototype Biorefinery: Conversion of Operational Effluent to Cellulosic Ethanol and Ethyl Acetate”

Principal Investigator (Shonnard), \$310,000 (\$180,000 to Shonnard); 4/01/2009 – 12/31/2011.

Michigan Economic Development Corporation and US DOE DE-EE-0000280: # 090622

“Michigan Forestry Biofuels Statewide Collaboration Center (MI FBSCC)”

Principal Investigators (Shonnard), \$646,370 (\$214,987 to Shonnard); 03/11/2009-12/31/2011.

Michigan Economic Development Corporation and Frontier Renewable Resources: # 090134P2

“Center of Energy Excellence-Frontier Renewable Resources: Improving Forest Feedstock Harvesting, Processing, and Hauling Efficiencies”

Principal Investigators (Shonnard and Miller), \$1,000,000 (MTU) of \$2,000,000 (\$274,837 to Shonnard); 10/01/2009-4/30/2012.

UOP LLC (Sustainability Related)

"Expanded Life Cycle Assessments of Biofuels, Petroleum Diesel, and Synthetic Diesel: Screening and Detailed Assessments "

Principal Investigator (Shonnard). \$79,448; 01/01/08 – 12/31/08.

Wolverine Power (Sustainability Related)

"Biomass Co-Firing for the Wolverine Clean Energy Venture".

Co-Principal Investigator (Shonnard). \$83,949 (\$24,036); 08/18/07 05/31/08.

General Motors (Sustainability Related)

"A Systems Approach to Improve Processing Efficiency of Forestry Biomass for Co-Production of Biofuels and Biopolymers "

Principal Investigator (Shonnard). \$275,027 (\$80,502 to Shonnard); 05/14/07 – 05/13/09.

UOP LLC (Sustainability Related)

"An Updated Life Cycle Assessment Comparing Green Diesel to Biodiesel: Expanded System Boundaries and Allocation".

Principal Investigator (Shonnard). \$22,923; 03/15/07 – 08/15/07.

American Process, Inc. (Sustainability Related)

"Testing Program for Pretreatment of Woody Biomass Using the Ethanol/SO₂ Process and Fermentation Yielding Ethanol".

Principal Investigator (Shonnard). \$10,296 grant; 7/10/2006-8/10/2006.

Caterpillar (Sustainability Related)

"Evaluation of Low Greenhouse Gas Bio-based Energy Technologies".

Principal Investigator (Shonnard), \$180,000 grant (\$34,205 to DRS); 2/01/2006-11/15/2006.

DARPA

"Reversible Barriers: Development of Environmentally-Benign Functional Foams".

Co-Principal Investigator (Shonnard). \$1,670,000 (\$465,000 to DRS) grant; 3/2006-6/2007.

NSF MUSES – Biocomplexity BES-0524872; (Sustainability Related)

"MUSES - Renewable Energy from Forest Resources: An Investigation of the Viability of Large-Scale Production of Sustainable Transportation Fuels From Lignocellulosic Biomass".

Co-Principal Investigator (Shonnard), \$1,700,000 grant (\$293,000 to DRS); 9/2005-9/2010.

UOP LLC (Sustainability Related)

"Training in Life Cycle Assessment for UOP LLC".

Principal Investigator (Shonnard), \$20,435; 12/15/2004-2/15/2005.

Michigan Research Excellence Fund (REF) (Sustainability Related)

"REF Infrastructure Enhancement for Sustainable Futures Institute (SFI)".

Co-Principal Investigator (Shonnard). \$50,000; 6/2004-6/2005.

ADM Foundation

"Faculty, Staff, and Student Development in Chemical Engineering at MTU".

Co-principal Investigator (Shonnard). \$400,000 (departmental support-fund raising); 6/2004-6/2014.

NSF MUSES – Biocomplexity (Sustainability Related)

"Renewable Energy from Forest Resources: An Investigation of the Complex Interrelated Issues Associated with Generating Automotive Fuels From Lignocellulosic Biomass".

Co-Principal Investigator (Shonnard). \$115,000 planning grant (\$18,000 to DRS); 6/2004-6/2005.

NSF IGERT DGE-0333401 (Sustainability Related)

"IGERT: Achieving Environmental, Industrial, and Societal Sustainability via the Sustainable Futures Model". John Sutherland (PI)

Senior Personnel (Shonnard)- Education Coordinator at MTU. \$3,500,000 (\$250,000 to DRS); 6/2004-12/2008.

Membrane Process & Controls

"Identification, Purification, and Recovery of Medicinal Proteins From Cheese Whey Concentrates, Milk, and Bovine Colostrum.",

Principal Investigator (Shonnard); \$17,500; 6/2002 – 8/ 2003.

BASF Corporation (Sustainability Related)

“An MTU-BASF Collaboration to Enhance Eco-efficiency Analysis of Chemical Processes and Products”

Principal Investigator (Shonnard); \$54,000; 8/2002 – 8/2003.

Cambrex Corporation

“Bioluminescence Applications for *In-Vitro* Toxicology Testing of High Production Volume (HPV) Chemicals”,

Principal Investigator (Shonnard); \$102,909; 1/2002 – 12/2003

National Science Foundation/Lucent Technologies (Sustainability Related)

“Environmental and Human Health Assessment Software for the Chemical Industry”,

Principal Investigator (Shonnard); \$117,918; BES-9814504 ; 10/98 – 10/2002

U.S. Environmental Protection Agency/CenCITT (Sustainability Related)

“Integrated Applications of the Clean Process Advisory System to P2-Conscious Process Analysis and Improvement”

Principal Investigator (Shonnard); \$188,400 (\$75,000 to DRS); 10/98 – 05/2001

National Science Foundation (Sustainability Related)

“Research Experience for Undergraduates Supplement to BES-9814504”

Principal Investigator (Shonnard); \$11,760; 8/99 – 8/2000

National Science Foundation (Sustainability Related)

“Research Experience for Undergraduates Supplement to BES-9727651”

Principal Investigator (Shonnard); \$16,200; 7/99 – 7/2000

Michigan Technological University

“Visiting Women and Minority Lecturers”

Principal Investigator (Shonnard); \$500; 10/98 – 10/99

Michigan Technological University

“Super-speed Centrifuge for Biological Research”

Co-Principal Investigator (Shonnard); \$14,000 (\$5,000 to DRS); 6/98 – 5/99

National Science Foundation (Sustainability Related)

“An Open Internet-Based Workshop on Pollution Prevention: Research and Teaching in Higher Education”

Principal Investigator (Shonnard); \$190,003 (\$150,000 to DRS); BES-9727651 ; 9/97 – 12/2001

Gage Products / Blue Planet Technologies

“Multiscale Investigations of Chlorinated and Nonchlorinated Hydrocarbon Biodegradation: Toluene and Trichloroethylene Mixtures”

Co-Principal Investigator; \$13,477 (\$6,000 to DRS); 7/1/97 - 2/27/98

National Science Foundation ; ILLI-IP

“Integrated Bioprocess Experiments for the Undergraduate Chemical Engineering Curriculum”

Principal Investigator (Shonnard); \$42,572; 6/97 – 5/99

National Science Foundation – CR/CD Program (Sustainability Related)

“Research Experience for Undergraduates Supplement to EEC-9420526”

Principal Investigator (Shonnard); \$11,760; 11/1/96 to 3/31/98

Michigan Technological University

“New Engineering Educator Travel Award”, \$2,000; 1996

US EPA National Risk Management Research Laboratory / DOE (Sustainability Related)

“Pollution Assessment and Prevention Software for Chemical Industry Process Simulators (P2SCIPS)”

Co-Principal Investigator (Shonnard); \$500,000 (\$150,000 to DRS); 9/1/95 - 2/27/99

National Science Foundation – CR/CD Program (Sustainability Related)

“Research Experience for Undergraduates Supplement to EEC-9420526”

Principal Investigator (Shonnard); \$5,880; 6/5/95 to 3/1/96

National Science Foundation – CR/CD Program (Sustainability Related)

“Research Experience for Undergraduates Supplement to EEC-9420526”

Principal Investigator (Shonnard); \$5,880; 3/5/96 to 11/1/96

U.S. EPA Risk Reduction Engineering Laboratory/CenCITT (Sustainability Related)

“Waste Inventory Factors for the Chemical Processing Industry”

Principal Investigator (Shonnard); \$93,750 (\$40,000 to DRS); 6/1/94 – 2/28/97

U.S. Environmental Protection Agency/CenCITT (Sustainability Related)

“Supplement: Environmental Fate and Risk Assessment Tool (EFRAT)”

Principal Investigator (Shonnard); \$136,354 (\$70,000 to DRS); 5/1/95 - 12/96

Michigan Research Excellence Fund

“Infrastructure Grant for the Subsurface Remediation Laboratory”

Co-Principal Investigator (Shonnard); \$107,000 (\$35,000 to DRS); 12/94 to 12/95

U.S. Environmental Protection Agency/CenCITT (Sustainability Related)

“Environmental Fate and Risk Assessment Tool (EFRAT)”

Principal Investigator (Shonnard); \$24,184 (\$12,000 to DRS); 6/1/94 to 5/1/95

National Science Foundation – Combined Research/Curriculum Development Program (Sustainability Related)

“*In Situ* Subsurface Remediation Technologies: Integration into an Interdisciplinary Engineering Curriculum”

Principal Investigator (Shonnard); \$357,609 (\$150,000 to DRS); EEC-9420526, 9/15/94 to 2/31/98

STUDENTS ADVISED

PhD

Prasanna A. Deshpande, 1999, “Measurement and Modeling of Bacteria Transport, Attachment Kinetics, and Toluene Biodegradation in Saturated Sandy Media”. (Pfizer)

Hui Chen, 2002, “Optimization of Chemical Process Designs Using Environmental and Economic Objective Functions”. (AZ Dept. Envir. Quality)

Eileen Kim-Choi, PhD 2004, “Development and Characterization of an Improved Luciferase with Applications to *In Vitro* Toxicity Testing of High Production Volume Chemicals”. (Goodwin Biotech, Inc)

Abraham Martin, December 2006, “Enzyme Engineering of Aminotransferases for Improved Activity and Thermostability”. (U. Sonora, Hermosillo)

Jill R. Jensen, 2009, “Cellulosic Ethanol: Optimization of Dilute Acid and Enzymatic Hydrolysis Processing of Forest Resources and Switchgrass ” (INL then UOP LLC)

Michael B. Campbell, 2012, “Heterologous Expression and Mutagenesis of Cellulose Hydrolases for Improved Performance”. (UOP LLC/Honeywell)

Felix Adom, 2012, “The Potential of Industrial Waste and Agricultural Feedstock towards Sustainable Biofuels Production: Techno-Economic and Environmental Impact Perspectives” (ANL postdoc, Shell Oil)

Jiqing Fan, 2013, “Sustainable Energy Production in the United States: Life Cycle Assessment of Biofuels and Bioenergy” (CARB)

Jifei Liu, 2014, “Characterizing and Improving Production of Fermentable Sugar and Co-Products from a Forest Product Industry Wastewater Stream”.

Klinger, Jordan Lee, 2015, “Thermochemical Degradation Mechanisms and Kinetics of Fast Pyrolysis and Torrefaction Processing of Woody Feedstocks”, co-adviser with Ezra Bar Ziv, (INL posdoc)

Suchada Ukaew, 2015, “Life Cycle Assessments of Hydrocarbon Jet Fuels Produced from Rapeseed (*Brassica napus*)” (Naresuan University, Thailand).

Bethany Klemestrud, 2016, “Experimental and Theoretical Investigation of Sustainable Fast Pyrolysis Biofuels from Woody Biomass” (SFI postdoc).

Olumide Winjobi, expected 2016, “Techno-economic and Life Cycle Environmental Assessments of Pyrolysis-Based Hydrocarbon Biofuels”, co-adviser with Wen Zhou.

Shi, Rui (Lynn), expected 2017, “Life Cycle Assessments of Biofuels from Rotation-Cropping of Rapeseed, Canola, and Camelina with Winter Wheat in the USA”.

Gracida-Alvarez, Ulises, expected 2018, “Pyrolysis Processing of Municipal Solid Waste into Biofuels and Biochemicals”, co-advisor with Julio Sacramento, UADY, Merida, Mx.

Ankathi, Sharath, expected 2019, “ Techno-economic and Environmental Life Cycle Assessments of Anaerobic Digestion of Food Waste and Manure” ,

MS

Joseph M. Markey, 1996, “Microbial Biomass Detection Using Attenuated Total Reflectance Fourier Transform Infrared Spectroscopy (ATR/FT-IR)” (Hemlock Semiconductor).

Dennis S. Hiew, 1998, “Development of the Environmental Fate and Risk Assessment Tool (EFRAT) and Application to Solvent Recovery From a Gaseous Waste Stream”.

Douglas E. Stark, pending thesis submission, “A Study of Pilot-Scale Distillation Condenser Vent Emissions and Safety Concerns Under Transient and Steady-State Operation”. (US Army)

Geoffery Roelant, 2002, “Life-Cycle Environmental and Economic Evaluation of Waste Energy Recovery Options for Automotive Paint Operations”. (U. Maryland Medical School)

Amber Kemppainen, 2003, “Comparative Life Cycle Assessments for Biomass to Ethanol Production from Different Regional Feedstocks”. (Michigan Tech Fundamentals of Engineering)

Renu Chandrashekar, 2003, “Microfiltration of Skim Milk to Optimize Process Conditions to Achieve a Desired Casein to Fat Ratio”. (?)

Ya Wen, 2003, “Integration of Environmental Impact Assessment with Process Integration Methods for Pollution Prevention”. (Sanofi-Aventis)

Shu Chiang Yat, 2006 “Kinetic Characterization for Pretreatment of Timber Varieties and Switchgrass Using Dilute Acid Hydrolysis”. (Malaysia Engineering Firm)

Juan Morinelly, expected 2009, “Numerical Experiments for Increasing Efficiency of Dilute Acid Hydrolysis for Woody Biomass”. (NETL)

Ken Koers, 2008, “Life Cycle Assessment of Biofuels from Forest Resources: Effects of Study Assumptions”. (UOP LLC)

Klinger, Jordan Lee, 2011, “Production of Biofuel Intermediates from Woody Feedstocks Via Fast Pyrolysis and Torrefaction”. (MTU Ph.D. candidate)

Maleche, Edwin, 2012, “Life Cycle Assessments of Integrated Hydrolysis / Hydrotreatment (IH²) of Woody Biomass” (Archer Daniels Midland)

- Mihalek, Matt, 2014, “Life Cycle Assessments (LCAs) of Pyrolysis-Based Gasoline and Diesel From Different Regional Feedstocks: Corn Stover, Switchgrass, Sugar Cane Bagasse, Waste Wood, Guinea Grass, Algae, and Albizia, (Environmental Resource Management, Inc.)
- Alshoug, Zainab, 2013, “Effects of Media Composition and Scale on Production of Recombinant Endogluconase from *K. lactis*”, (MTU Ph.D. candidate)
- Shi, Rui (Lynn), 2013, “Life Cycle Assessment of Biofuel Produced from Algae” (MTU Ph.D. candidate)
- Fogliatti, Daniel, 2015, coursework MS in Chemical Engineering
- Kulas, Daniel, 2018, “Techno-economic and Environmental Life Cycle Assessments of Pyrolysis-Based Biofuels from Poplar”,

Undergraduate

- | | |
|-----------------------------|---|
| Joseph Charles Napier, 1995 | Graduate Student at UW, Madison. |
| Jeff Cottrell, 1996 | Ely Lilly and Company, Lafayette, Indiana |
| Kyle M. Bartholomew, 1996 | Institute of Paper Sci. & Technology, Atlanta, GA |
| Mark S. Erickson, 1996 | Geological Engineering and Sciences Dept., MTU |
| Brian M. Gillis, 1997 | BASF Corporation |
| Brian A. Grimes, 1997 | Dept. of Chemical Eng., Univ. of Missouri-Rolla |
| Brian Boyd, 1998 | Dept. of Chemical Engineering, MIT |
| Jon Sepalla, 1999 | Department of Chemical Engineering, MTU |
| William Blanchard, 2000 | Praxair, New York |
| Montravius Quarles, 2001 | Oscar Meyer, Madison, WI |
| Ryan Pritchard, 2001 | Dow Corning, MI |
| Rosanne Essiambre, 2001 | TRW, Sacramento, CA |
| Jason Kasak, 2001 | Department of Chemical Engineering, MTU |
| Michelle Waters, 2002 | Department of Envir. Engineering, MTU |
| Amie Swartwood, 2002 | Department of Chemical Engineering, MTU |
| Patrick Downey, 2002 | Kimberley-Clark, Neenah, WI. |
| Ken Heng See, 2002 | Department of Chemical Engineering, MTU |
| Justin Ceterski, 2002 | Shell Oil Company, Houston, TX |
| Shanon Badenschier, 2002 | Department of Mechanical Engineering, MTU |
| Brian Hassler, 2002 | Department of Chemical Engineering, MSU |
| Ryan Miller, 2002 | Department of Chemical Engineering, MTU |
| Yii-Wen Choong, 2002 | Department of Chemical Engineering, MTU |
| Lyle Lash III, 2002 | Graduate Student, University of Michigan |
| Patrick M. Quiney, 2005 | Department of Chemical Engineering, MTU |
| Jeffrey Voorhies, 2006 Sp | Department of Chemical Engineering, MTU |
| Jon VanRegenmorter, 2006 Su | Department of Chemical Engineering, MTU |
| Amanda Kudwa, 2006 | Department of Chemical Engineering, MTU |
| Katie Lindahl, 2006 | Department of Chemical Engineering, MTU |
| Tyler Soehnen, 2007 Sp | Department of Chemical Engineering, MTU |
| Amanda Kudwa, 2007 Sp | Department of Chemical Engineering, MTU |
| Charles Stutz, 2007 Su | Department of Chemical Engineering, MTU |
| Anwar Aglan, 2007 Su, F | Department of Chemical Engineering, MTU |
| Adam Mix, 2007 Su | Department of Chemical Engineering, MTU |
| Matthew Browne, 2008 Sp | Department of Chemical Engineering, MTU |
| Katie Lindahl, 2008 Sp | Department of Chemical Engineering, MTU |
| Joyanne Schneider, 2008 Su | Department of Chemical Engineering, MTU |
| Kelsey Gossen, 2008 F | Department of Chemical Engineering, MTU |
| Stens Schuler, 2008 F | Department of Chemical Engineering, MTU |
| Ashley Maes, 2009 Sp | Department of Chemical Engineering, MTU |

Matthew Bergman, 2009 Sp	Department of Chemical Engineering, MTU
Charles Workman	Department of Chemical Engineering, MTU
Jordan Klinger, 2009 Su	Department of Chemical Engineering, MTU
Adam Sadevendi, 2009 Su	Department of Chemical Engineering, MTU
Matt Alward, 2009 Su	Department of Chemical Engineering, MTU
Boeve, Rebecca, 2010 Sp	Department of Chemical Engineering, MTU
Keller, Helena, 2010 Sp, 2011 F	Department of Chemical Engineering, MTU
Koepke, Ross, 2010 Sp	Department of Chemical Engineering, MTU
Kusibab, Kelsey, 2010 Sp	Department of Chemical Engineering, MTU
Woldring, Daniel, 2010 Sp, 2010 F, 2011 Sp	Department of Chemical Engineering, MTU
Andrews, Andrew, 2010 Su	Department of Chemical Engineering, MTU
Docsa, Scott, 2010 Su, 2011 Sp	Department of Chemical Engineering, MTU
Maes, Ashley, 2010 Su	Department of Chemical Engineering, MTU
Sandholm, Hans, 2010 Su, 2011 Sp	Department of Chemical Engineering, MTU
Sherally, Aliabbas, 2010 Su	Department of Chemical Engineering, MTU
Talla, Lillian, 2010 Su	Department of Chemical Engineering, MTU
Bhardwaj, Gaurav, 2010 F	Department of Chemical Engineering, MTU
Davis, Jamie, 2010 F	Department of Chemical Engineering, MTU
Feldhauser, Brian, 2010 F, 2011 Sp, Su	Department of Chemical Engineering, MTU
Reque, Derek, 2010 F	Department of Chemical Engineering, MTU
Catterson, Chris, 2011 Sp	Department of Chemical Engineering, MTU
Taylor, Amanda, 2011 Sp, 2012 F	Department of Chemical Engineering, MTU
Glaser, Ryan, 2011 Su, F	Department of Chemical Engineering, MTU
Liimatainen, Aaron, 2011 Su	Department of Chemical Engineering, MTU
Rucins, Stefan, 2011 Su, F	Department of Chemical Engineering, MTU
Boes, Jacob, 2011 F	Department of Chemical Engineering, MTU
Stawicki, Daniel, 2011 F, 2012 Sp	Department of Chemical Engineering, MTU
Beck, Emily, 2013 Sp	Department of Chemical Engineering, MTU
Duda, Edward, 2013 Sp	Department of Chemical Engineering, MTU
Michaelson, Andy, 2013 Su, 2014 Sp Su	Department of Chemical Engineering, MTU
Wimmer, Nicholas, 2013 Su, F	Department of Chemical Engineering, MTU
Bregni, Leanne, 2014 Sp Su, 2015 Su	Department of Chemical Engineering, MTU
Mager, Alexander, 2014 Sp	Department of Chemical Engineering, MTU
Massucci, Michael, 2014 Sp	Department of Chemical Engineering, MTU
Steinhurst, Adrien, 2014 Sp Su, 2015 F	Department of Chemical Engineering, MTU
Wallace, Cicilia, 2014 Su	
Coel, Matthew, 2014 F	Department of Chemical Engineering, MTU
Ezinga, Tyler, 2014 F	Department of Chemical Engineering, MTU
Fumbanks, Alesha, 2014 F, 2015 Sp	Department of Chemical Engineering, MTU
Patton, Joshua, 2014 F	Department of Chemical Engineering, MTU
Eatherton, Dominic, 2015 Sp, F, 2016 Sp	Department of Chemical Engineering, MTU
Keenan, Lauren, 2015 F, 2016 Sp	Department of Chemical Engineering, MTU
Langford, Paul, 2015 F, 2016 Su	Department of Chemical Engineering, MTU
Schoenborn, Jacob, 2015 F	Department of Chemical Engineering, MTU
Anderson-Justice, Che, 2015 Su	Northwestern University
Castellic, Courtney, 2015 Su	Department of Chemical Engineering, MTU
Hughes, Cheyenne, 2015 Su	Department of Chemical Engineering, MTU
Li, Lucia, 2015 Su	Department of Chemical Engineering, MTU
Parin, P, 2015 Su	Department of Chemical Engineering, MTU
Plumer, Col, 2015 Su	Department of Chemical Engineering, MTU
Tran, Thaovy, 2015	Central Michigan University

Updike, Benjamin, 2015 Su	Department of Chemical Engineering, MTU
Hammond, Tyler, 2015 F, 2016 Su	Department of Chemical Engineering, MTU
Nitz, Laura, 2016 Su	Department of Chemical Engineering, MTU
Nowicki, Jakob, 2016 Su	Department of Chemical Engineering, MTU
Koerner, Adeline, 2016 Su	Department of Chemical Engineering, MTU
Conn, Austin, 2016 Su, F	Department of Chemical Engineering, MTU
Parra Alvarez, Natalia, 2016 Su	Department of Chemical Engineering, MTU
Kulas, Daniel, 2016 F, 2017 Su	Department of Chemical Engineering, MTU
Mitchell, M.K., 2016 F, 2017 Sp	Department of Chemical Engineering, MTU
Evans, M., 2016 F	Department of Chemical Engineering, MTU
Heydrich, Eva, 2016 F	Department of Chemical Engineering, MTU
Christianson, A., 2016 F, 2017 Sp	Department of Chemical Engineering, MTU
Lemmen, Chad, 2016 F, 2017 Sp	Department of Chemical Engineering, MTU
Ballou, Derek, 2016 F	Department of Chemical Engineering, MTU
Gronseth, Dillon, 2017 Sp	Department of Chemical Engineering, MTU

COURSES TAUGHT (all at MTU except where noted)

Ch152	Junior	Separation Processes (1993 at UC Berkeley, visiting)
CM205	Sophomore	Fundamentals of Chemical Engineering II
CM220	Sophomore	Stagewise Operations
CM404	Junior/Senior	Special Problems in Chemical Engineering
CM450	Senior/graduate	Biochemical Processes
CM496	Senior/graduate	Fundamentals of Subsurface Remediation
CM497	Senior/graduate	Remediation Laboratory
CM498	Senior/graduate	Pollution Assessment and Prevention
CM3120	Junior	Transport II / Unit Operations
CM4000	Sr./Jr./Soph./Fr.	Chemical Engineering Research
CM4120	Senior	Chemical Plant Operations Laboratory
CM4125	Senior	Bioprocess Engineering Laboratory
CM4310	Senior	Chemical Process Safety/Environment (Green Engineering)
CM4710	Senior	Biochemical Processes
CM5300	Graduate	Advanced Transport Phenomena
CM5000	Graduate	MS Research
CM6000	Graduate	PhD Research
ENG5510	Graduate	Sustainable Futures I
ENG5520	Graduate	Sustainable Futures II

TEACHING AWARDS/HONORS

ENG5520	Sp 2016	Teaching evaluation score in the top 10% at Michigan Tech based on the "Average of 7 Dimensions" ranking system based on Provost letter
	<i>Ray Fahien Award</i>	ASEE Chemical Engineering Division, 2003

PROFESSIONAL SERVICE

Editorial Board Member; ACS Sustainable Chemistry and Engineering; 2012 – present
 Chair; Technical Programming, Sustainable Engineering Forum, area 23B, AIChE; 2011-2013
 Vice Chair; Technical Programming, Sustainable Engineering Forum, area 23B, AIChE; 2009-2011
 Co-Chair; Michigan Forest-Based Bioeconomy Summit, Feb. 25, 2008; 2007 – 2008
 Editorial Board Member; International Journal of Sustainable Engineering; 2008 – present
 Chaired 4 technical sessions at the 2008 Annual AIChE Meeting.

Chaired 4 technical sessions at the 2007 Annual AIChE Meeting.
 Chaired 5 technical sessions at the 2006 Annual AIChE Meeting.
 Chair for Technical Programming, Environmental Division of AIChE, 2003 - 2006.
 Vice Chair for Technical Programming, Environmental Division of AIChE, 2000 - 2003.
 Chair of sessions “[377] – Poster Session: Chemical Engineering and the Environment” and “[386] – Green Engineering in the Chemical Engineering Curriculum”, *AIChE Annual Meeting*, Austin, TX, Nov. 7-12, 2004.
 Chair of sessions “[404] - Biotechnology Applications for Toxicity Screening” and “[408] - Industrial Ecology and Life-Cycle assessment Applications in Chemical Manufacturing”, *AIChE Annual Meeting*, San Francisco, CA, Nov. 17-21, 2003.
 Chair of sessions, “[222] - Green Bioprocessing I: Value-Added Conversions of Waste Streams”, “[223] - Poster Session: Advances in Environmental Technology”, “[170] - Incorporating Environmental Sustainability into ChE Education”, “[19] - Sustainable Design Methods I”, *AIChE Annual Meeting*, Indianapolis, IN, Nov. 2-8, 2002.
 Chair of sessions, “Sustainable Processes and Products, I and II”, *AIChE Annual Meeting*, Reno, NV, November 5-9, 2001.
 Chair of session, “Environmental, Health and Safety”, *6th World Congress of Chemical Engineering*, Melbourne, Vic. Australia, September 23-27, 2001.
 Chair of session, “Integrated Life Cycle Analysis and Material Accounting for Pollution Prevention”, *AIChE Annual Meeting*, Los Angeles, CA, Nov. 2000.
 Chair of session, “Pollution Prevention in the Chemical Engineering Curriculum”, Chemical Engineering Education in the New Millennium Topical Conference, *AIChE Annual Meeting*, Los Angeles, CA, Nov. 2000.
 Technical Program Chair for the Environmental Division of AIChE, 17 sessions for the *American Institute of Chemical Engineers Annual Meeting*, Dallas TX, Nov. 1999.
 Chair of session, “Current Environmental Issues Associated with Supercritical Fluids”, Session 48, *AIChE Annual Meeting*, Dallas, TX, Nov. 1999.
 Chair of session, “Life Cycle Analysis for Pollution Prevention in Chemical Processes”, Session 167, *AIChE Annual Meeting*, Dallas, TX, Nov. 1999.
 Chair for session, “Engineering Fundamentals in Life Sciences Poster Session”, *American Institute of Chemical Engineers Annual Meeting*, Miami Beach, FL, Nov. 1998.
 Block Coordinator for 10 sessions in the Environmental Division at AIChE, *American Institute of Chemical Engineers National Meeting*, New Orleans, LA, March 1998.
 Chair of session, “Current Research in Environmental Technology”, *American Institute of Chemical Engineers National Meeting*, New Orleans, LA, March 1998.
 Chair of session, “Environmental Biotechnology Applications for Soil and Ground Water Remediation and Industrial Waste Water Treatment”, *American Institute of Chemical Engineers National Meeting*, New Orleans, LA, March 1998.
 Chair of session, “21st Century Chemical Engineering-Pollution Preventers by Design”, *American Institute of Chemical Engineers National Meeting*, New Orleans, LA, March 1998.
 Facilitator, “National Workshop on Process Waste Reduction via Separation Technologies and Separative Reactors”, *AIChE*, New Orleans, LA, February 1998.
 Facilitator, “Clean Process Advisory System (CPAS™) Planning Workshop”, *Center for Clean Industrial and Treatment Technologies*, Dallas, TX, October 1994.

Reviewer

Research Journals: *Environmental Science and Technology*, *Water Resources Research*, *Industrial and Engineering Chemistry Research*, *Journal of Industrial Ecology*, *International Journal of Life Cycle Assessment*, *Sustainable Chemistry and Engineering*
Research Proposals: *Environmental Protection Agency*, *National Science Foundation*, *US Department of Agriculture*

UNIVERSITY SERVICE (Michigan Technological University)

- Representative from Chemical Engineering to the University Senator, 1/96 - 9/97.
- Graduate Student Tuition Task Force; 1/96 - 1/97.
- Research Committee, the University Senate; 1/96 - 9/97.
- Graduate Council representative from Chemical Engineering; 1/97 - 9/97.
- Chair of the Graduate Committee in Chemical Engineering; 9/96 - 9/97
- Member of the Graduate Committee in Chemical Engineering; 9/94 - 9/97
- Departmental Assessment Committee, 9/97 - 1999.
- Chair, Curriculum Committee, the Chemical Engineering Department, 9/98 – 2002.
- Chair, Faculty Search Committee, the Chemical Engineering Department, 9/99 – 2002.
- First Year Engineering Program Oversight Committee, 9/99 – 2002.
- **Chair, ABET/Assessment Committee during accreditation process, 2003-2004**
- ABET/Assessment Committee member, 2004-2005
- Chair, Executive Committee, Department of Chemical Engineering, 2004-2005
- Executive Committee, Department of Chemical Engineering, 2005-2006
- Dean of Engineering Search Committee, 2006-2007
- Charter Committee, Department of Chemical Engineering, 2006-2007
- Promotion and Tenure Committee, Department of Chemical Engineering, 2006-2007
- Accreditation/ABET Assessment Committee, Dept. of Chemical Engineering, 2006-2007
- Tenure/Promotion: external member, Biomedical Engineering Department, 2007-2008
- Faculty Search Committee, external member, School of Forest Resources and Environmental Sciences, 2007-2008.
- Curriculum Committee, Promotion / Tenure Committee, Assessment Committee (Chemical Engineering) 2007-2008.
- Tenure/Promotion: external member, Biomedical Engineering Department, 2008-2009
- MTU Alumni Relations and Development, Presentations on Wood-to-Wheels research program to Alumni in Tampa Bay and Orlando, FL, Feb. 24-25, 2009.
- Curriculum Committee, ABET Committee (Chemical Engineering) 2008-2013.
- Tenure/Promotion: external member, Chemistry Department, 2012-2013

PHD THESIS COMMITTEES SERVED ON (Michigan Technological University)

Ernst Martin Billing, Ph.D. in Chemical Engineering, Advisor Dr. M.E. Mullins. I read and suggested improvements to his dissertation, in particular to his mathematical model of an advanced oxidation reactor.

Daniel McNally, PhD in Environmental Engineering, Advisors Drs. Mihelcic and Leuking. I read and suggested improvements to his dissertation on Naphthalene biodegradation kinetics.

Brian Whitman, PhD in Environmental Engineering, Advisors Drs. Mihelcic and Leuking. I read and suggested improvements to his dissertation on mass transfer limited biodegradation kinetics.

Joseph Fass, Ph.D. candidate in Chemical Engineering, Advisor Dr. Odde, I am working with Joe and Dr. Odde on Engineered Neural Networks.

Christopher Wojick, Ph.D. in Environmental Engineering, Advisor Dr. Gierke, I read and suggested improvements to his dissertation. 2000.

Quiong Zhang, Ph.D. candidate in Environmental Engineering, Advisor Dr. Crittenden, " Development of environmental indices for pollution prevention and green design". 2002.

Srisuda Dhamwichukorn, Ph.D. candidate in Biological Sciences, Advisor Dr. Bagley, "Biodegradation of methanol and α -pinene using thermophilic bacteria and its application using thermophilic biofiltration systems". 2002.

Hebi Li, Ph.D. PhD candidate in Civil & Environmental Engineering, Advisor Dr. Crittenden, "Modeling and Optimization of Biofiltration for Odor Control", 2002.

Kenneth L. Gunter, PhD candidate in Mechanical Engineering-Engineering Mechanics, Advisor Dr. Sutherland, "Inventory and Value Management in Demanufacturing Facilities". 2005.

James R. Baker, PhD Civil/Environmental Engineering, Advisor, Jim Mihelcic, "Assessment and development of methods for estimating soil/water partition coefficient and biodegradation potential of synthetic organic chemicals", expected 2005.

Helen Muga, PhD candidate in Civil/Environmental Engineering, Advisor Jim Mihelcic, "Life Cycle Assessments of Wastewater Treatment Processes", expected 2007.

Rui Chen, PhD candidate in Chemical Engineering, Advisor Tony Rogers, expected 2007.

Abbie Clarke, PhD candidate in Mechanical Engineering-Engineering Mechanics, Advisor John Gershenson, "Life Cycle Assessment Comparison of Distributed Versus Centralized Production Systems", expected Su 2009.

Margot Hutchins, PhD candidate in Mechanical Engineering/Engineering Mechanics, "Incorporating the Social Dimension of Sustainability in Decision-Making: Indicators and Methods", Advisor, John Sutherland, expected 2010.

Jaclyn Nesbitt, PhD candidate in MEEM, Advisor Jeff Naber, "Study of Diesel Combustion Characteristics of Alternative Diesel Fuels Including Soy Methyl Ester Blends under Diesel Engine Conditions", expected 2011.

Li Xin, PhD candidate in ECM, Advisor Wenzhen Li, "Non-Pt Multi-Metallic Catalytic Systems for Cogeneration of Electricity and Chemicals from Biomass-derived Alcohols Based on Solid Anion Exchange Membrane Fuel Cells", expected 2014.

Ji Qi, PhD candidate in ECM, Advisor Wenzhen Li, "Electrocatalytic Biorefinery of Biomass-derived Compounds over Novel Metal Catalysts", expected 2014.

Jiesheng Wang, PhD candidate in ECM, Advisory Ching-An Peng, "Development of Multifunctional Nanomaterials for Anticancer Treatment", expected 2014.

Maryam Khaksari, PhD candidate in ECM, Adviser Adrienne Minerick, "Rapid Nutritional Analysis from Infant Tears", expected Spring 2015.

Yang Qiu, PhD candidate in ECM, Adviser Wenzhen Li, "Electro-catalytic Reduction of Biomass-derived Compounds to Biofuel/Intermediates over Nanostructured Catalysts in Advanced Electrochemical Flow Reactors" expected summer 2015.

David Chadderdon, PhD candidate in ECM, Adviser Wenzhen Li, "Synthesis, Characterization, and Application of Bimetallic Nanoparticles on Advanced Carbon Supporting Materials for Electrocatalytic Oxidation of Biorenewable Chemical Intermediates" expected summer 2015.

Qhang, Yang, PhD candidate in ECM, adviser Wen Zhou, "Mechanistic Models on Enzymatic Hydrolysis and Anaerobic Digestion", Dec. 2015.

Tang, Meng, PhD candidate in MEEM, adviser Jeff Naber, Development and Validation of Fuel Surrogates for Diesel Spray and Combustion Investigations, August 2017.

Zinchik, Stas, PhD candidate in MEEM, adviser Ezra Bar-Ziv, "Fast Pyrolysis with a Mixing Paddle Reactor", expected Dec. 2018.

Alshoug, Zainab, PhD candidate in ECM, advisor Adrienne Minerick, "Analysis of Lipemia Levels from Human Blood Samples Using Microchips", expected Aug. 2019.

MS THESIS COMMITTEES SERVED ON (Michigan Technological University)

Jennifer Muraski, MS in Geological Engineering and Sciences, Advisor Dr. John Gierke, I read and suggested improvements to her thesis.

Timothy Toth, MS in Chemical Engineering, Advisor Dr. Bruce Barna, I read and suggested improvements to his thesis.

Robert Aho, MS in Geological Engineering and Sciences, Advisor Dr. John Gierke, I read and suggested improvements to his thesis.

Todd Sandmann, MS in Geological Engineering and Sciences, Advisor Dr. Alex Mayer, I read and suggested improvements to his thesis.

Wipawee Dechapanya, MS in Chemical Engineering, Advisor Dr. Rogers, I helped guide her research project and read/suggested improvements to her thesis.

Chayanoot Sangwichien, MS in Chemical Engineering, Advisor Dr. Rogers, I helped guide her research project and read/suggested improvements to her thesis.

Ryan Bosio, MS in Chemical Engineering, Advisor Dr. Rogers, I read and made suggested improvements to his thesis.

Michael Labeau, MS candidate in Biological Sciences, Advisor Dr. Bagley, I have helped advise courses to take to enhance research program. I will read thesis later on.

Yeqing Cao, MS in Chemical Engineering, Advisor Dr. Odde, I read and made suggested improvements to her thesis.

Pariyachat Chatkun Na Ayuttaya, MS in Chemical Engineering, Advisor Dr. M. Mullins, "Evaluation of the temperature and pressure dependence of aqueous Henry's law constant", 2000.

Richard H. Sawall, MS in Geological Engineering, advisor Dr. John Gierke, "A Laboratory Evaluation of Conductive Heating for Enhancing Soil Vapor Extraction Performance", 2000.

Steve Behm, MS in Mechanical Engineering- Engineering Mechanics, Advisor Dr. John Sutherland, "An Investigation into the Effects of Processing conditions on Airborne Emissions from the Lost Foam Casting Process", 2001.

Ping Huo, MS in Computational Science and Engineering, advisor Dr. David C. Miller, "", expected 2001.

Brendan O'Donnell, MS in Chemical Engineering, Advisor Dr. Bruce Barna, "Automatic process diagnostic summaries for process design and improvement", 2001.

Prasad Patgaonkar, MS in Chemical Engineering, advisor Dr. Tony Rogers, "Multi-criteria chemical process improvement", 2001.

Anup P. Bandivadekar, MS in Mechanical Engineering, Advisor Dr. John W. Sutherland, "Development of a Model for Material Flows and Economic Exchanges Within the U.S. Automotive Life-Cycle Chain", 2001.

Gordon A. Bekkala, MS in Mechanical Engineering, Advisor Dr. John W. Sutherland, "Assessing the Impact of Product Design Decisions Across the Life-Cycle", 2001.

Parag Manohar Borkar, MS in Chemical Engineering, advisor Dr. Bruce A. Barna, "Application of Mass Exchange Networks in Process Integration", 2002.

Luis R. Garcilaso, MS in Civil/Environmental Engineering, Advisor Dr. Neil Hutzler, "The True Cost of Water in the Automobile Industry", expected 2006.

Daryll K. Yarger, MS in Biological Sciences, Advisor Dr. Susan T. Bagley, "Characterization of a Plasmid for Methanol Utilization from Thermophile", expected 2006.

Daniel Collins, MS in Chemical Engineering, Advisor Dr. Carl Nesbitt, "The Kinetics of the Dissolution of Scrap Metal Using Ferric Iron to Produce Ferrous Ions", 2005.

Daniel Adler, MS in Mechanical Engineering/Engineering Mechanics, Advisor Dr. John Sutherland, "Measuring the Environmental Benefits of Engine Remanufacturing from the Original Equipment Manufacturer Perspective", 2007.

Heather Wright, MS in Environmental Engineering, Advisor Dr. Qiong Zhang, "Life Cycle Assessment of a Brominated Organic Flame Retardent", Fall 2008.

Stephanie Groves, MS in Biological Sciences, Advisor Dr. Susan Bagley, "Optimization of the fermentation of lignocellulosic material for the production of ethanol", Sp 2009.

Louis Podila, MS Project in Biological Sciences, Advisor Susan Bagley, “Bioplastics and Optimization of PHA Production”, Sp 2009.

Max Henschell, MS in SFRES, Advisor Dr. David Flaspohler, “The Relationship of Grassland Community Diversity to Grassland Bird Demographics”, expected Fall 2009.

Lucas Spaete, MS in SFRES, Advisor Dr. Ann Maclean, “Aspen Biomass Assessment for MI, WI, and MN: A GIS and Regression Approach for Quantifying Biomass for Ethanol Production”, expected August 2009.

Christopher DeDene, MS in Civil Engineering, Advisor Dr. Zhanping You, Investigation of Using Waste Engine Oil Blended with Reclaimed Asphalt Materials to Improve Pavement Recyclability, December, 2011.

Beaster, Tristan, MS in Environmental Engineering, Advisor Dr. Jennifer Becker, Design, operation, and assessment of a two stage reactor system to convert solid organic waste to electricity using a flow-through, air cathode microbial fuel cell. August 2012.

Kreiger, Megan, MS in Electrical Engineering, Advisor Dr. Joshua Pearce, Life Cycle Analysis of Silane Recycling in Amorphous Silicon-Based Solar Photovoltaic Manufacturing, August, 2012.

Pebler, Paul, MS in Civil Engineering, Advisor Dr. Brien Barkdol, Double Vault Compositng Latrines in Rural Paraguay: Faesible construction and Optimal Use, December 2014.

Chintan Kaushik Desai, MS in Mechanical Engineering-Engineering Mechanics, Advisor Dr. Ezra Bar Ziv, “fast pyrolysis of biomass for bio-oil production in an auger reactor”, Summer 2016.

Ankith Ullal, MS in Mechanical Engineering-Engineering Mechanics, Advisors Drs. Ezra Bar Ziv and Jordan Klinger, “Heat Transfer Analysis in a Paddle Reactor for Biomass Fast Pyrolysis”, Spring 2017.

Kalluri, Sumanth, “Comparative Life Cycle Assessments of Road and Multimodal Transportation Options-A Case Study of Copperwood Project”, Spring 2016.

Saksham Gupta, “An Experimental Investigation into the Effect of Particulate Matter on NOx Reduction in a SCR Catalyst on a DPF”, Advisors Dr. John Johnson and Jeffrey Naber, Summer 2016.

Kadam, Vaibhav, “An Experimental Investigation of the Effect of Temperature and Space Velocity on the Performance of a Cu-Zeolite Flow-Through SCR and a SCR Catalyst on a DPF with and Without PM Loading”, Advisors Dr. John Johnson and Jeffrey Naber, Summer 2016

Oduru, Soumith Kumar, “Life Cycle Assessment (LCA) of Ore Transportation Route Alternatives for Eagle Mine”, Advisor Pasi T. Lautala, Summer 2017.

CAMPUS/COMMUNITY/PUBLIC SERVICE/OUTREACH

- Summer Youth Program 2013: “Are Biofuels Good? Sustainability Issues”, July 18, 2013
- Leading Scholar Finalist Evaluator; met with visiting student candidates for a full scholarship to MTU and their parents, discussed MTU’s distinctive programs, and evaluated the candidates. Michigan Forest Biofuels Research, outreach program for Forestry Biofuels Statewide Collaboration Center grant from the United States Department of Energy, grant number DE-EE-0000280, <http://michiganforestbiofuels.org/>.
- Tech Talks; presentation on the Sustainable Futures Institute and discussion with faculty on collaborations to increase sustainability research at Michigan Tech, Feb, 10, 2010.
- UP High School Tours; Future Fuels from Forests. Lectures and laboratory tours for local UP high school students on producing biofuels from forest resources – NSF MUSES project. March 18, 20, 25, 27, 2009.
- Michigan Tech Alumni Association: “Wood-to-Wheels” seminar to alums in Tampa Bay and Orlando, FL; Feb. 23-25, 2009.
- Northern Center for Lifelong Learning, Marquette, MI: Organized presentations and tour of Wood-to-Wheels laboratories at MTU during Winter Carnival, February 5, 2009.
- Summer Youth Program 2008: “Sustainability of Biofuels from Forest Resources”, July 22, 2008.
- Summer Teacher Institute: ED5642/FW5642 Future Fuels from Forests: An Investigations into the Sustainability of Biofuels Production, July 7-11, 2008

- Women in Engineering/Explorations in Engineering – Summer Youth Programs
 - + Summer 2008, June 23-27; 15 students, “Biofuels Production from Forest Resources”
- Government relations: research presentations and laboratory tours to MI state and federal government officials (2006 – present)
 - + US Senator Carl Levin, July 03, 2006
 - + MI Representatives M. Lahti and G. Cushingberry, July 21, 2007
 - + Representative M. Lahti and Senator T. Stamas, May 11, 2007
 - + Governor J. Granholm, Alternative Energy Roundtable Discussion, December 3, 2007
 - + Senator Debbie Stabenow, February 09, 2008
- Cellulosic Biofuels Working Group, Michigan Economic Development Corporation, January 1, 2007 – present.
- Northern Center for Lifelong Learning, Marquette, MI: Organized a presentation and tour of Wood-to-Wheels laboratories at MTU, April, 2007.
- League of Women Voters: The People Speak. Organized a faculty/citizen discussion forum on "Energy and the Environment", October 12, 2004, MTU.
- Fund raising for the Michigan Technological University Preschool, 1997 – 2000.
- Snow statue and skits judging for MTU Winter Carnival, 1995 – 2002.
- Faculty Advisor, Omega Chi Epsilon Chemical Engineering Honor Society, 1999 - present
- MTU Summer Youth Program, laboratory demonstrations, 1994 – present.

HONORS/AWARDS/RECOGNITIONS

- Excellence and Service as Conference Chair, 2nd RCN Conference on Pan American Biofuels & Bioenergy Sustainability, September 13-16, 2016, Institute for Sustainability, American Institute of Chemical Engineers, 2016
- Outstanding Research Mentor Award, AIChE Student Chapter, Michigan Technological University, 2016
- Outstanding Research Mentor Award, AIChE Student Chapter, Michigan Technological University, 2012
- Outstanding Research Mentor Award, AIChE Student Chapter, Michigan Technological University, 2011
- Best Presentation Award, First-Year Programs Division, ASEE 2008 Conference, (Kemppainen, Hein, and Shonnard).
- MTU Graduate Student Council Student Poster Competition, 1st place, Sp 2006. (S. Yat)
- Citation for role as Programming Chair from 2003 – 2005, Environmental Division, American Institute of Chemical Engineers, 2005
- *Ray Fahien Award*, ASEE Chemical Engineering Division, 2003
- Graduate Student Paper Award, AIChE Environmental Division, 2002 Annual Meeting
- ASEE Green Engineering Poster, 1st Place, AIChE Annual Mtg., Los Angeles, 2000
- AIChE CAST Director’s Award, Honorable Mention, AIChE Annual Mtg., LA, 2000
- *NSF/Lucent Technologies Foundation Industrial Ecology Research Fellowship*, 1998
- *MTU New Engineering Educator Travel Award*, 1996
- German Academic Exchange Program, 1989
- Knights Templar Scholarship, 1982

CONSULTING

- American Process Inc., 2006-present.
- BASF Corporation, Eco-efficiency Analysis Group, Mt. Olive, NJ, 2004; Wyandotte, MI, 2007.
- Dow Chemical Company, 2010-2011
- Dow Corning, Midland Michigan, 2004-2009.
- Sandia National Laboratory, Livermore, CA, 1993-1994.

- University of Kansas, Engineering Research Center in Environmentally Beneficial Catalysis, Lawrence, KS, 2004.
- UOP, LLC, 2004-present
- U.S. EPA Office of Pollution Prevention and Toxics, Washington, DC, 6/98-Present.
- Verso Paper, 2012-present
- Pepsico, 2012
- Argonne National Laboratory, 2013-2014
- CRI Catalyst Company, 2013-2014

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- software tool to provide environmental assessment of process designs - the Environmental Fate and Risk Assessment Tool (EFRAT), 2000.
- software tool to calculate energy consumption in automobile paint operations, calculate energy efficiency targets, and optimize heat exchanger network design - (PaintHEX), 2002.
- Improving Luciferase, U.S. Provisional Application No. 60/508,458, 2003
- Patent 7,183,092 Modified Luciferase, issued February 27, 2007.

PROFESSIONAL SOCIETIES

American Institute of Chemical Engineers, American Society for Engineering Education, American Chemical Society

PROFESSIONAL DEVELOPMENT

NACME Diversity Seminar, February 23-24, 1999, Michigan Technological University

COLLABORATORS

G. Caneba (MTU), S. Bagley (MTU), N. Hutzler (MTU), J. Sutherland (MTU), J. Gershenson (MTU), J. Mihelcic (MTU), J. Keith (MTU), J. Gierke (MTU), A. Mayer (MTU), B. Solomon (MTU), K. Halverson (MTU), C. Webster (MTU), A. Maclean (MTU), D. Flaspohler (MTU), J. Chadde (MTU), Q. Zhang (MTU), J. Naber (MTU), E. Bar Ziv (MTU), K. Kawatra (MTU), Mullins (MTU), P. Gale (MTU), D. Allen (UTAustin), R. Hesketh (Rowan U.), I. Rybina (Cambrex), R. Carroll (Cambrex), S. Pannuri (Cambrex), E. Kerfoot (BASF), P. Saling (BASF), S. Sikdar (US EPA), S. Austin (US EPA), Nhan Nguyen (US EPA), R. Miller (MSU), S. Pueppke (MSU), T. Kalnes (UOP), S. Lupton (UOP), T. Brandvoldt (UOP), T. Isbell (USDA), J. Holmgren (LanzaTech), D. Griffin (LanzaTech), T. Marker (GTI), C. Gosling (UOP), A. Lindner (U. Florida), C. Wheeler (GM)