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EDUCATION/TRAINING

INSTITUTION AND LOCATION	DEGREE	YEAR(s)	FIELD OF STUDY
University of Idaho, Moscow, ID	B.S.	1976	Zoology
Portland State University, Portland, OR	Ph.D.	1982	Environmental Science-Chemistry
University of Chicago	Postdoctoral	1982-1985	Molecular Biology

PROFESSIONAL EXPERIENCE

2015-present	Research Professor, FSE-SSEBE	Arizona State University
2010-2014	Research Professor	New Mexico State University
2010-2013	Cultivation Team Co-Leader	DOE - National Alliance for Advanced Biofuels and Bioproducts
2009-2010	Vice President for Biotechnology	Solix Biofuels, Fort Collins, CO
2007-2008	NMSU Leader, Institute for Advanced Studies, (State- wide technical project development and grant writing coordinator)	NMSU-Los Alamos National Laboratory-UNM-NMTech
2003-2013	Co-Founder & Consultant	The Genetic Testing Laboratories, Las Cruces, NM
2004-2009	Professor, Department of Chemistry & Biochemistry	New Mexico State University
1999-2006	Director, Molecular Biology Graduate Program	New Mexico State University
1997-2009	Director, NMSU DNA Sequencing Facility	New Mexico State University
1992-2003	Associate Professor, Plant Genetic Engineering Laboratory and Department of Chemistry and Biochemistry	New Mexico State University
1985-1991	Assistant Professor, Plant Genetic Engineering Laboratory and Department of Chemistry and Biochemistry	New Mexico State University

PROFESSIONAL ACTIVITIES

- Associate Editor, Algal Research, 2014-present
- Chief Scientist, DOE-ATP3 Cultivation Network, Arizona State University, 2015-present
- Editorial Board, Algal Research, 2012-2014.
- Principal Investigator, 2013-2016 \$5M DOE-ABY Award: Realization of Algae Potential. A collaboration between New Mexico State, Washington State and Michigan State Universities, Algenol Biofuels, Pan Pacific Tech., Los Alamos, Argonne and Pacific Northwest National Laboratories.
- Co-Lead "Bioalgal Energy Project", New Mexico NSF-EPSCoR Grant "Energize New Mexico". (2013-2015). www.nmepscor.org/science/algal-biofuels
- Cultivation Science Leader, DOE-Regional Algal Feedstock Testbed Partnership 2013-2015 with University of Arizona, Texas A&M, Pacific Northwest National Laboratory and New Mexico State University
- Director Algal Bioenergy Program at NMSU (2010-2014)
- Co-Lead for Algae Cultivation, National Alliance for Advance Biofuels and Bioproducts (NAABB), 2010-2013.
- Vice President for Biotechnology at Solix Biofuels, Fort Collins, CO 2009-2010.
- Contributor: Cultivation section of the DOE-EERE Algal Roadmap (2008-2009)

- 40 years experience in the biochemistry and molecular biology of photosynthetic and agriculturally relevant microorganisms
- Consultant: algae growth, metabolism and biochemistry in open raceway ponds operated at the NMSU Agricultural Science Center (Artesia, NM) from 2007-2009

AREAS OF EXPERTISE

- Nitrogen nutrition in cyanobacteria, algae and higher plants
- Large scale algae cultivation and nutrient logistics at the energy/water/environment nexus
- Wastewater treatment process development for hot arid environments with photosynthetic algae
- Hydrothermal liquefaction with reclamation of sugars, nitrogen and phosphate from algal biomass
- Biochemistry and molecular biology of nutrient exchange between arbuscular mycorrhizal fungi and higher plants

INDUSTRIAL EXPERIENCE

- Founder and part time Lab Director of the Genetic Testing Laboratories (gtldna.com); 2001-2010.
- Vice President for Biotechnology, Solix BioSystems, 2009-2010. Responsible for diversification of the business plan to include bio-products and laid the foundations for the current Solix focus on high-value products.
- Patent Pending: Lammers, P.J., Van Voorhies, W., Nirmalakhandan, N., Unc, A., and S. Deng. “Photosynthetically oxygenated waste to energy apparatus and method of use” January 8, 2013.

INVITED PRESENTATIONS (Last 6 years)

1. Invited Speaker: A Mixotrophic Platform for Valorizing Multiple Waste Streams. **Society for Industrial Microbiology and Biotechnology**. Annual Meeting. Denver, CO. July 31-Aug. 3, 2017.
2. Keynote Speaker: **Korean Society for Biotechnology and Bioengineering**: Algae-based treatment of urban and industrial wastewater. Oct. 13-14, 2016.
3. Invited Plenary Lecture: Algae in Hot Water: Cultivation Studies for Hot Arid Environments. **Asia-Oceania Algae Innovation Summit. Wuhan, China**, Sept 18-21, 2016.
4. Invited Lecture: Algae in Hot Water: Mixotrophic Cultivation of Red Algae Extremophiles, **Heinrich Henne University**, Dusseldorf, Germany, April 22, 2016
5. Invited Lecture: Algae in Hot Water, **Pacific Northwest National Laboratory**, June 29, 2015
6. Invited Lecture: Municipal Wastewater Treatment with a Red Algal Extremophile, *Galdieria sulphuraria*. **Algal Biomass, Biofuels and Bioproducts, San Diego, CA**, June 7-10, 2015.
7. Invited Lecture: Algal-based System for Energy-Positive Wastewater Treatment, **Asia-Oceania Algae Innovation Summit, Nov. 17-20, Daejeon, South Korea**
8. Invited Lecture: Quality Control Systems Reveal the Yin and Yang of Outdoor Algae Cultivation, **Algal Biomass, Biofuels and Bioproducts, Santa Fe, NM, June 16-18, 2014**
9. Invited Lecture: Algal Platforms for Energy Positive Ecosystem Services: 21st Century System Design for Hot Arid Climates. **Arizona State University**. May 13, 2014
10. Invited Lecture: **University of Nebraska, Lincoln**. “A Route to Algal Biofuels via EcoSystem Services: The Case for an Extremophile, *Galdieria sulphuraria*”. Feb. 25, 2014.
11. Invited Lecture: “Multiple Pathways for University-Industry Innovation” **23rd National Science Foundation EPSCoR Conference**. Nashville, TN November 3-6, 2013.
12. Invited Lecture: **Algal Biomass Summit 2013** September 30-October 3, 2013 (Orlando, FL) “Review of Photobioreactor Designs”
13. Cultivation and lipid profiles of thermo-tolerant, mixotrophic red algae *Galdieria sulfuraria* in inexpensive closed photobioreactors. **Algal Biomass, Biofuels and Bioproducts, Toronto, Canada, June 16-19, 2013**
14. Plenary Lecture: “Culture Practices to Improve the Growth Rate of *Nannochloropsis salina*”. 8th

- Annual Meeting and Symposium Korean Society of Marine Biotechnology.** Nov. 15, 2012
15. "Algal Taxonomic Diversity Applied to Multi-Scale, Waste-To-Energy Process Development" **Biology Department, New Mexico State University. September 20, 2012**
 16. Repeated nutrient additions enhance growth rate and reduce invader populations during outdoor photobioreactor cultivation of *Nannochloropsis salina*. **Algal Biomass, Biofuels and Bioproducts, San Diego, CA June 10-13, 2012**
 17. The Lipidome of *Nannochloropsis salina* CCMP1776 Revealed by Fourier Transform – Ion Cyclotron Resonance Mass Spectrometry of Axenic Culture. **Algal Biomass, Biofuels and Bioproducts, St Louis, MO July 17-20, 2011**
 18. "Algal Biomass and Lipidomics Research at New Mexico State University" **Arizona State University, Mesa AZ.** October 18, 2011
 19. "Algal Biomass and Lipidomics Research at New Mexico State University" Department of Biochemistry, **Indian Institute of Science, Bangalore, India.** March 7, 2011
 20. "Growth and Lipidomics Characterization of *Nannochloropsis salina* for Biofuels" **East China University of Science and Technology, Shanghai, China.** Oct 11, 2010
 21. "Lipid analysis of oil-producing microalgae" 2010 QIBEBT Symposium on Algae for Energy. **Chinese Academy of Sciences, Qingdao, China.** Oct. 8, 2010.
 22. "Microalgae Production in Photobioreactors", **PTT-Chem Corporation, Bangkok, Thailand.** March 22, 2010.

PEER REVIEWED PUBLICATIONS (54)

h-index = 29 with 2,427 total citations on 11-11-2016; Average citation = 44.9

1. T. Muppaneni, H.K. Reddy, T. Selvaratnam, K. P. Dandamudi, B. Dungan, N. Nirmalakhandan, T. Schaub, F.O. Holguin, W. Voorhies, **Peter J. Lammers**, S. Deng (2017) "Hydrothermal liquefaction of *Cyanidioschyzon merolae* and the influence of catalysts on products" Bioresour Technol **223**: 91-97.
2. Henkanatte-Gedera, S. M., Selvaratnam T., Karbakhshravari, M., Myint, M. Nirmalakhandan, N., Van Voorhies W. and **Peter J. Lammers**. (2017). Removal of dissolved organic carbon and nutrients from urban wastewaters by *Galdieria sulphuraria*: Laboratory to field scale demonstration. Algal Research **24** 450–456.
3. Reddy, H.R, Muppaneni, T., Ponnusamy, S., Sudasinghe, N., Pegallapati, A., Selvaratnam, T., Seger, M., Dungan, B., Nirmalakhandan, N., Schaub, T., Holguin, F.O. **Lammers, Peter J.**, VanVoorhies, W., and S. Deng (2016) Temperature effect on hydrothermal liquefaction of *Nannochloropsis gaditana* and *Chlorella sp.* Applied Energy **165**, 943-951.
4. T. Selvaratnam, S. M. Henkanatte-Gedera, T. Muppaneni, N. Nirmalakhandan, S. Deng, **P. J. Lammers** (2016). Maximizing Recovery of Energy and Nutrients from Urban Wastewaters. Energy **104**: 16-23.
5. Selvaratnam, T., Reddy, H., Muppaneni, T., Holguin, F.O., Nirmalakhandan, N., S. Deng and **P.J. Lammers** (2015) Optimizing Energy Yields from Nutrient Recycling Using Sequential Hydrothermal Liquefaction with *Galdieria sulphuraria*. Algal Research, **12**: 74-79
6. Sudasinghe, N., Reddy, H., Csakan, N., Deng, S., **Lammers, P.J.**, Schaub, T. (2015) Temperature-Dependent Lipid Conversion and Non-Lipid Composition of Microalgal Hydrothermal Liquefaction Oils Monitored by Fourier Transform Ion Cyclotron Resonance Mass Spectrometry. Bioenergy Research DOI 10.1007/s12155-015-9635-9
7. Henkanatte-Gedera, S.M., T. Selvaratnam, N. Caskan, N. Nirmalakhandan, W. Van Voorhies, **Peter J. Lammers** (2015). Algal-based, Single-step Treatment of Urban Wastewaters. Bioresour Technol **189**: 273-278.
8. Selvaratnam, T., Pegallapati, A.K., Montelya, F., Rodriguez, G., Khandan, N. N., **Lammers, P.J.**, Van Voorhies, W. (2015) Feasibility of algal systems for sustainable wastewater treatment. Renewable Energy **82**: 71-76.

9. Selvaratnam, T., A.K. Pegallapati, H. Reddy, N. Kanapathipillai, N. Nirmalakhandan, S. Deng, **P.J. Lammers (2015)**. Algal biofuels from urban wastewaters: Maximizing biomass yield using nutrients recycled from hydrothermal processing of biomass. *Bioresourc Technol* **182**: 232-238.
10. Archambault, S., Starbuck Downes, C. M., Van Voorhies, W., Erickson, C. A., and **Lammers, P. J. (2014)** *Nannochloropsis* sp. algae for use as biofuel: Analyzing a translog production function using data from multiple sites in the southwestern United States, *Algal Research* **6**, 124-131.
11. Reddy, H.K., Muppaneni, T., Sun, Y., Li, Y., Ponnusamy, S., Prafulla, P.D., Dailey, P., Schaub, T., Holguin, F.O. Dungan, B., Cooke, P., **Lammers, P.J.**, VanVoorhies, W., Lu, X., and S. Deng **(2014)** Subcritical water extraction of lipids from wet algae for biodiesel production. *Fuel* **115**: 720-726
12. Selvaratnam, T., Pegallapati, A. K., Montelya, F., Rodriguez, G., Nirmalakhandan, N., Van Voorhies, W., and **Lammers, P. J. (2014)** Evaluation of a thermo-tolerant acidophilic alga, *Galdieria sulphuraria*, for nutrient removal from urban wastewaters, *Bioresource Technol* **156**: 395-399.
13. Sudasinghe, N., Dungan, B., **Lammers, P. J.**, Albrecht, K., Elliott, D., Hallen, R., and Schaub, T. **(2014)** High Resolution FT-ICR Mass Spectral Analysis of Bio-oil and Residual Water Soluble Organics Produced by Hydrothermal Liquefaction of the Marine Microalga *Nannochloropsis salina*., *Fuel* **119**: 47-56.
14. Fulbright, S., Dean, M. K., Wardle, G., **Lammers, P. J.**, and Chisholm, S. **(2014)** Molecular diagnostics for monitoring contaminants in algal cultivation, *Algal Research* **4**: 41-51.
15. E. Tisserant, M. Malbreil, A. Kuo, A. Kohler, A. Symeonidi, R. Balestrini, P. Charron, N. Duensing, N. Frei dit Frey, V. Gianinazzi-Pearson, L.B. Gilbert, Y. Handa, J.R. Herr, M. Hijri, R. Koul, M. Kawaguchi, F. Krajinski, **P.J. Lammers**, F.G. Masclaux, C. Murat, E. Morin, S. Ndikumana, M. Pagni, D. Petitpierre, N. Requena, P. Rosikiewicz, R. Riley, K. Saito, H. San Clemente, H. Shapiro, D. van Tuinen, G. Bécard, P. Bonfante, U. Paszkowski, Y. Shachar-Hill, G.A. Tuskan, P.W. Young, I.R. Sanders, B. Henrissat, S.A. Rensing, I.V. Grigoriev, N. Corradi, C. Roux, and F. Martin. **(2013)** Genome of an arbuscular mycorrhizal fungus provides insight into the oldest plant symbiosis. *Proc. Natl. Acad. Sci USA*. **110**: 20117-20122.
16. Patil, P, Reddy, H., Muppaneni, T., Schaub, T., Holguin, F.O., Cooke, P., **Lammers, P.J.**, Nirmalakhandan, N., Li, Y., Lu, X., Deng, S. (2013) In-Situ Ethyl Ester Production from Wet Algal Biomass under Microwave-Mediated Supercritical Ethanol Conditions. *Bioresource. Technol.* **139**: 308-315.
17. Quinn, J., Yates, T., Douglass, N., Weyer, K., Butler, J., Bradley, T.H. and **P.J. Lammers (2012)**. *Nannochloropsis* Production Metrics in a Scalable Outdoor Photobioreactor for Commercial Applications. *Bioresource Technology* **117**: 164-171.
18. Patil PD, Gude VG, Mannarswamy A, Cooke P, Nirmalakhandan N, **Lammers P**, Deng SG **(2012)** Comparison of direct transesterification of algal biomass under supercritical methanol and microwave irradiation conditions. *Fuel* **97**: 822-831
19. Patil, PD, H Reddy, T Muppaneni, A. Mannarswamy, T Schuab, **PJ Lammers**, N Nirmalakhandan, P Cooke and S Deng. **(2012)** Power Dissipation in Microwave-Enhanced In-Situ Transesterification of Algal Biomass. *Green Chemistry* **14**: 809-817.
20. Tisserant, E., Kohler, A., Dozolme-Seddas, P., Balestrini, R., Benabdellah, K., Colard, A., Croll, D., Da Silva, C., Gomez, S. K., Koul, R., Ferrol, N., Fiorilli, V., Formey, D., Franken, P., Helber, N., Hijri, M., Lanfranco, L., Lindquist, E., Liu, Y., Malbreil, M., Morin, E., Poulain, J., Shapiro, H., van Tuinen, D., Waschke, A., Azcon-Aguilar, C., Becard, G., Bonfante, P., Harrison, M. J., Kuster, H., **Lammers, P.**, Paszkowski, U., Requena, N., Rensing, S. A., Roux, C., Sanders, I. R., Shachar-Hill, Y., Tuskan, G., Young, J. P. W., Gianinazzi-Pearson, V., and Martin, F. **(2012)**. The transcriptome of the arbuscular mycorrhizal fungus *Glomus intraradices* (DAOM 197198) reveals functional tradeoffs in an obligate symbiont. *New Phytologist* **193**(3): 755-769.
21. P.D. Patil, V.G. Gude, A.Mannarswamy, S. Deng, P.Cooke, S. Munson-McGee, I.Rhodes, **P.J.Lammers**, N. Nirmalakhandan, **(2011)**. "Optimization of Direct Conversion of Wet Algae to Biodiesel under Supercritical Methanol Conditions" *Bioresource Technology* **102**: 118-122

22. Tian, C. J., B. Kasiborski, R. Koul, **P. J. Lammers**, H. Bucking and Y. Shachar-Hill. (2010). Regulation of the Nitrogen Transfer Pathway in the Arbuscular Mycorrhizal Symbiosis: Gene Characterization and the Coordination of Expression with Nitrogen Flux. *Plant Physiology* **153**(3): 1175-1187
23. Patil, P., S. G. Deng, J. I. Rhodes and **P. J. Lammers**. (2010). Conversion of waste cooking oil to biodiesel using ferric sulfate and supercritical methanol processes. *Fuel* **89**(2): 360-364.
24. Angeles, J. G. C., Z. Ouyang, A. M. Aguirre, **P. J. Lammers** and M. Song (2009). "Identification of gene interactions in fungal-plant symbiosis through discrete dynamical system modeling." *IET Systems Biology* **3**(5): 414-428.
25. Gachomo, E., J. W. Allen, P. E. Pfeffer, M. Govindarajulu, D. D. Douds, H. R. Jin, G. Nagahashi, **P. J. Lammers**, Y. Shachar-Hill and H. Bucking (2009). "Germinating spores of *Glomus intraradices* can use internal and exogenous nitrogen sources for de novo biosynthesis of amino acids." *New Phytologist* **184**(2): 399-411.
26. Croll, D., M. Giovannetti, A.M. Koch, C. Sbrana, M. Ehinger, **P.J. Lammers** & I.R. Sanders. (2009). Non-self vegetative fusion and genetic exchange in the arbuscular mycorrhizal fungus *Glomus intraradices*. *New Phytologist* **181**: 924-937.
27. Martin, F., V Gianinazzi-Pearson, M Hijri, **PJ Lammers**, I R Sanders, Y Shachar-Hill, H Shapiro, GA Tuskan and P Young. (2008). The long hard road to a completed *Glomus intraradices* genome. *New Phytologist* **180**(4): 13-16.
28. Croll, D., L. Wille, H.A. Gamper, N. Mathimaran, **P.J. Lammers**, N. Corradi, I.R. Sanders. (2008). Genetic diversity and host plant preferences revealed by simple sequence repeat and mitochondrial markers in a population of the arbuscular mycorrhizal fungus *Glomus intraradices*. *New Phytologist*, **178**: 672-687
29. Bücking, H, J. Abubaker, M. Govindarajulu, M. Tala, P.E. Pfeffer, G. Nagahashi, **P.J. Lammers**, Y. Shachar-Hill. (2008). Nutrient uptake and metabolism during presymbiotic growth of *Glomus intraradices*. I. The uptake and metabolism of carbon. *New Phytologist* **180**: 684-695
30. Govindarajulu, M., P.E. Pfeffer, H. Jin, J. Abubaker, D.D. Douds, J.W. Allen, H. Bücking, **P.J. Lammers** and Y. Shachar-Hill (2005) Nitrogen transfer in the arbuscular mycorrhizal symbiosis. *Nature* **435**: 819-823
31. Jin, H., P.E. Pfeffer, D.D. Douds, E. Piotrowski, **P.J. Lammers**, and Y. Shachar-Hill (2005). Nitrogen assimilation, transport and transfer in an arbuscular mycorrhizal symbiosis. *New Phytologist* **168**: 687-696
32. Torres, S., C.R. Fjetland, **P.J. Lammers** (2005) Alkane-induced expression, substrate binding profile, and immunolocalization of a cytochrome P450 encoded on the *nifD* excision element of *Anabaena* 7120 *BMC Microbiology* **5**:16
33. **Lammers, P.J.**; Abubaker, J.; Govindarajulu, M.; Jun, J.; Krijgsman, O.; de Jong, M. (2004). Quantitative analysis of gene expression in the arbuscular mycorrhizal symbiosis. In: Basic Research and Applications of Mycorrhizae. Eds. Podila, G.K. and Varma, A. I.K. International, New Delhi
34. J.B. Spalding¹ and **P.J. Lammers** (2004). BLAST Filter and GraphAlign: rule-based formation and analysis of sets of related DNA and protein sequences. *Nucleic Acids Research* **32**: W26-W32.
35. Martin, F., G.A. Tuskan, S.P. DiFazio, **P. Lammers**, G. Newcombe, & G.K. Podila (2004). In the Wake of the Poplar Genome Sequence - Whole Genome Sequencing of the Endomycorrhizal *Glomus intraradices* and the Ectomycorrhizal *Laccaria bicolor* for 2004. *New Phytologist* **161**: 330-335.
36. Mori, S., A. Castoreno, M.E. Mulligan, and **P.J. Lammers**. (2003). Nitrogen status modulates the expression of RNA-binding proteins in cyanobacteria. *FEMS Microbiology Letters* **227**: 203-210.
37. B. Bago, P. E Pfeffer, J. Abubaker, J. Jun, J.W. Allen, J. Brouillette, D.D Douds, **P.J. Lammers**, Y. Shachar-Hill. (2003). Carbon export from arbuscular mycorrhizal roots involves the translocation of carbohydrate as well as lipid. *Plant Physiol.* **131**: 1496-1507
38. Jun, J., J. Abubaker, C. Rehrer, P. E Pfeffer, Y. Shachar-Hill, **P. J. Lammers**. (2002) Expression in an arbuscular mycorrhizal fungus of genes involved in metabolism, transport, the cytoskeleton and the cell cycle. *Plant & Soil*. **244**: 141-148

39. Bago, B. W. Zipfel, R. Williams, J. Jun, R. Arreola, **P. J. Lammers**, P. E Pfeffer, Y. Shachar-Hill (2002) Translocation and utilization of fungal storage lipid in the arbuscular mycorrhizal symbiosis. Plant Physiology **128**: 108-124
40. Bago B, Pfeffer PE, Zipfel W, **Lammers P.J.**, Shachar-Hill Y (2002). Tracking metabolism and imaging transport in arbuscular mycorrhizal fungi. Metabolism and transport in AM fungi Plant & Soil **244**: 189-197.
41. Mori, S, A. Castoreno, and **P.J. Lammers (2002)**. Transcript levels of *rbcR1*, *ntcA*, and *rbcL/S* genes in the cyanobacterium *Anabaena* sp. PCC 7120 are downregulated in response to cold and osmotic stress. FEMS Microbiology Letters **213**: 167-173.
42. **Lammers, P. J.**, J. Jun, J. Abubaker, R. Arreola, A. Gopalan, B. Bago, C. Hernandez-Sebastia, J.W. Allen, D.D Douds, P.E Pfeffer, Y. Shachar-Hill. (2001). The glyoxylate cycle in an arbuscular mycorrhizal fungus: gene expression and carbon flow. Plant Physiology, **127**: 1287-1298
43. **Lammers, P.J. (2001)**. Consensus Builder. Science **292**: 519.
44. **Lammers, P.J.**, J.B. Spalding, S.P. Duran and N.B. Garcia. (1998). Orphan protein identification through comparisons of predicted versus experimental secondary structures. Microbiol. & Comparative Genomics **3**: C76-77.
45. Close, T.J. and **P.J. Lammers**. An osmotic stress protein of cyanobacteria is immunologically related to plant dehydrins. (1993). Plant Physiol. **101**: 773-779.
46. Spence, M.J., M.T. Henzl, and **P.J. Lammers (1991)**. The structure of a *Phaseolus vulgaris* cDNA encoding the iron storage protein ferritin. Plant Mol. Biol. **17**: 499-504.
47. **Lammers, P.J.**, S. McLaughlin, S. Papin, C. Trujillo-Provencio, and A. J. Ryncarz II. (1990). Developmental Rearrangement of Cyanobacterial *nif* Genes: Nucleotide Sequence, Open Reading Frames, and Cytochrome P-450 Homology from the *Anabaena* 7120 *nifD* Element. J. Bacteriol. **172**: 6981-6990.
48. Hapak, R.C., **P.J. Lammers**, W.A.Palmisano, E.R.Birnbaum, and M.T.Henzl (1989). Site-specific substitution of glutamate for aspartate at position 59 of rat oncomodulin. J. Biol. Chem. **264**: 18751-18760.
49. Haselkorn, R., Golden, J., **Lammers, P.J.** and M. Mulligan (1987). Rearrangement of *nif* genes during cyanobacterial heterocyst differentiation. Phil. Trans. Roy. Soc. B. **317**: 173-181.
50. **Lammers, P.J.**, Golden, J. and R. Haselkorn. (1986). Identification and sequence of a gene required for a developmentally regulated DNA excision in *Anabaena*. Cell **44**: 905-911.
51. **Lammers, P.J.** and R. Haselkorn. (1983). Sequence of the *nifD* gene coding for the alpha subunit of dinitrogenase from the cyanobacterium *Anabaena*. Proc. Natl. Acad. Sci. (USA) **80**: 4723-4727.
52. Goldman SJ, **Lammers PJ**, Berman MS, Sanders-Loehr J. (1983) Siderophore-mediated iron uptake in different strains of *Anabaena* sp. J Bacteriol. **156**: 1144-1150.
53. **Lammers PJ**, Sanders-Loehr J. (1982) Active transport of ferric schizokinen in *Anabaena* sp. J. Bacteriol. **151**: 288-294
54. Loehr JS, **Lammers PJ**, Brimhall B, Hermodson MA. (1978) Amino acid sequence of hemerythrin from *Thermite dyscritum*. J. Biol. Chem. **253**: 5726-5731

CONFERENCE PRESENTATIONS (Last 3 Years)

1. T. Selvaratnam, M. Seger, **P.J. Lammers**, Ammonium uptake kinetics of *Galdieria sulphuraria*. Algae Biomass Summit, Phoenix, Arizona, USA, October 2016
2. M. Seger, T. Selvaratnam, N. Csakan, M. Green, and **P.J. Lammers**. Annual biomass productivity utilizing a crop rotation strategy in photobioreactor systems at the Arizona Center for Algae Technology and Innovation. Algae Biomass Summit, Phoenix, Arizona, USA, October 2016
3. T. Selvaratnam, M. Seger, **P.J. Lammers**. Nutrient uptake kinetics of *Galdieria sulphuraria*. The 6th International Conference on Algal Biomass, Biofuels & Bioproducts, San Diego, USA, June 2016
4. M. Seger, M.F. Green, T. Selvaratnam, N. Csakan, P.J. Lammers. Molecular Diagnostic Tools (PCR and CAPS-analysis) of Red and Green Algae, an important step in Quality Control of Strain Stocks.

- The 6th International Conference on Algal Biomass, Biofuels & Bioproducts, San Diego, USA, June 2016
5. T. Selvaratnam, N. Nagamany, F.O. Holguin, **P.J. Lammers**. Maximizing nutrient and energy recovery from urban wastewaters using algal based systems. The 5th International Conference on Algal Biomass, Biofuels & Bioproducts, San Diego, USA, June 2015
 6. **P.J. Lammers**, T. Selvaratnam, S.M. Henkanatte-Gedera, M. Seger, S. Deng, T. Muppaneni, N. Nirmalakhandan. Municipal wastewater treatment with a red algal extremophile, *Galdieria sulphuraria*. 5th International Conference on Algal Biomass, Biofuels & Bioproducts, San Diego, USA. June 2015
 7. S.M. Henkanatte-Gedera, T. Selvaratnam, N. Nirmalakhandan, W.V. Voorhies, **P.J. Lammers**. Algal system for BOD and nutrient removal from urban wastewater. The 5th International Conference on Algal Biomass, Biofuels & Bioproducts, San Diego, USA, June 2015 (Poster)
 8. T. Selvaratnam*, N. Nirmalakhandan, **Peter J. Lammers**. Energy efficient urban wastewater treatment using *Galdieria sulphuraria*. 249th ACS Denver National Meeting. Denver, Colorado, USA, 22-26, 2015
 9. Tapaswy Muppaneni, Kodanda Phani Raj Dandamudi, Thinesh Selvaratnam, Nirmala Khandan, Tanner Schaub, Barry Dungan, Francisco Holguin, **Peter J. Lammers**, Wayne Voorhies and Shuguang Deng. Sequential Hydrothermal Liquefaction of *Galdieria sulphuraria* Algal Biomass to Enhance Biocrude Oil Yield. AIChE Annual Meeting, Salt Lake City, UT, 2015.
 10. T. Selvaratnam*, A. Pegallapati, N. Khandan, **P. Lammers**. Algal system for net energy generation and nutrient recovery from urban wastewaters. 4th International Conference on Algal Biomass, Biofuels and Bioproducts, Santa Fe, NM, USA, June 15-18, 2014
 11. M. Seger, W. Van Voorhies, T. Selvaratnam, F. Montoya, N. Khandan, A. Unc, **P.J. Lammers**. Genetic diversity in *Galdieria sulphuraria* strains and survivability of wastewater coliform bacteria under different pH, temperature, and CO₂ conditions. 4th International Conference on Algal Biomass, Biofuels and Bioproducts, Santa Fe, NM, USA, June 15-18, 2014 (Poster)
 12. T. Selvaratnam*, Pegallapati, A.K., Montelya, F., Rodriguez, G., Nirmalakhandan, N., Van Voorhies, W., **Lammers, P.J.** Feasibility of Algal Systems for Sustainable Wastewater Treatment. 3rd International Conference of Renewable Energy: Generation and Applications, Al Ain, UAE, March 2-5, 2014
 13. Harvind Kumar Reddy, Tapaswy Muppaneni, Sundaravadivelnathan Ponnusamy, Thinesh Selvaratnam, Barry Dungan, Nagamany Nirmalakhandan, Tanner Schaub, Francisco Holguin, **Peter Lammers**, Wayne Voorhies and Shuguang Deng. Kinetic Modeling of Hydrothermal Liquefaction of Algal Biomass. AIChE Annual Meeting, Atlanta, GA, 2014
 14. Pegallapati, T. Selvaratnam, N. Khandan, **P. J. Lammers**. Sustainable Urban Development: Options for Maximizing Energy Extraction from Domestic Wastewater. 8th Conference on Sustainable Development of Energy, Water and Environment Systems, Dubrovnik, Croatia, Sept. 22-27, 2013
 15. Harvind Kumar Reddy, Thinesh Selvaratnam, Tapaswy Muppaneni, Nagamany Nirmalakhandan, Tanner Schaub, Barry Dungen, Nilusha Sudasinghe Appuhamilage, **Peter Lammers**, Wayne Voorhies and Shuguang Deng. Algal Biorefinery: Production of Biocrude Oil & Byproducts. AIChE Annual Meeting, San Francisco, CA, 2013

CURRENT GRANTS – Arizona State University

1. 2016-2018 DOE-EERE Bioenergy Technology Incubator 2. “**A Novel Platform for Algal Biomass Production Using Cellulosic Mixotrophy**”. Role – Principal Investigator. Amount \$2M Partner Institutions: Colorado State and New Mexico State Universities, National Renewable Energy Laboratory, Heliae.

2. 2013-2016 DOE-EERE Algal Biomass Yield 1 – “**REAP- Realization of Algae Potential**”
Role- Principal Investigator. Amount: \$5M Partner Institutions: Los Alamos, Pacific Northwest, Argonne National Laboratories, Washington State, Michigan State and New Mexico State Universities, Algenol Biofuels, UOP-Honeywell, Pan Pacific Technology.
3. 2015-2016 Arizona State University “An Electrochemical Process for pH Control without adding salts” Role- Principal Investigator. Collaborators: Bruce Rittmann, Cesar Torres, Justin Flory. \$35,000.
4. 2015-2016 Arizona State University. Mixotrophic metabolism of *G. sulphuraria*. Role, Principal Investigator. Collaborators: Rosa Krajmalnik-Brown, David Nielsen, Shuguang Deng. \$75,000
5. 2016-2017 Arizona State University. Datu Buyung Agusdinata, Ellen Stechel, and Peter Lammers. Food-Energy-Water Life Cycle Impact Assessment of Algal Aviation Fuels. \$35,000 total funds (\$5,000 to PJL).

GRANT PROPOSALS

Pending –

1. DOE BETO Productivity Enhanced Algae and Toolkits (PEAK) \$3M over 3 years. Systems for Improved Winter Productivity via Iterative Functional Testing (SWIFT)
2. DOE Office of Science FOA 0001650 Biosystems Design to Enable Next-Generation Biofuels and Bioproducts. Requesting ~\$10M over 5 years. “Genetic, metabolic and ecological engineering for biofuels and bio-products: enhanced mixotrophic metabolism on cellulosic sugars using acidophilic extremophiles”. Peter J. Lammers (ASU), Andreas Weber (Heinrich Henne University) Roles: Co-principal investigators.

Planned –

1. Freeport McMoRan “Microbial Mine Leachate Treatment System”. \$350,000 2017-2018.
2. USDA/DOE Biomass Research and Development “Sustainable Urban Metabolism”. \$2M; January 2018-January 2020.

SUBMITTED NOT FUNDED

1. 2016-2019 Department of Energy. Algal Biomass Yield 2, “**Realization of Algae Potential**”
Role, Principal Investigator. Collaborators: Argonne National Laboratory, Heliae, Utah State University, New Mexico State University. Amount: \$5M
2. 2015-2017 Defense Advanced Research Projects Agency. Towards an Industrial Scale Synthetic Biology Platform. Role, Principal Investigator. Collaborators: Rosa Krajmalnik-Brown \$993,450.

TEACHING AT ARIZONA STATE UNIVERSITY

- List courses taught
 - none
- New courses developed
 - none
- Student Advising
 - In Progress
 - Nicholas Csakan, M.S. SEMTE

- Matthew Green, M.S. SSEBE
 - Graduated
 - None from ASU
- Financial Support for Graduate Students
 - Nicholas Csakan, graduation date May, 2017, Supported as technical staff
 - Matthew Green, graduate assistant, August 2106 - present
- Teaching Awards
 - none

SERVICE

- Associate Editor, Algal Research
- ASU NSF-IGERT External Advisory Council 2015-present
- SSEBE Laboratory Committee
- Faculty Search Committees (
 - Polytechnic School 2015/2016;
 - Polytechnic School 2016/2017
 - SSEBE 2016/2017 (Chair)
- Editorial Service, U.S. DOE Algal Biofuel Roadmap, 2016
- *Ad hoc* reviewing for Journals: Process Biochemistry, Bioresource Technology, Chemosphere.

- **Professional Memberships**
American Association for the Advancement of Science, 1986-Present.