

Curriculum Vitae

Matthew Charles Posewitz

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Employment

- 2008-2013 Assistant Professor, Department of Chemistry and Geochemistry, Colorado School of Mines, Golden, CO.
Visiting Senior Research Scientist, National Renewable Energy Laboratory, Golden, CO.
- 2002-2008 Research Assistant Professor, Environmental Science and Engineering Division, Colorado School of Mines, Golden, CO.
Visiting Senior Research Scientist, National Renewable Energy Laboratory, Golden, CO.
- 1999-2002 Research Associate, National Renewable Energy Laboratory, Golden, CO; advisers: Michael Seibert and Maria Ghirardi.
- 1997-1999 Research Associate, Memorial Sloan Kettering Cancer Center, New York, NY; adviser: Paul Tempst.
- 1995-1997 Postdoctoral Research Scientist, University of Utah, Biochemistry Department, Salt Lake City, UT; adviser: Dennis Winge.

Education

- 1989-1995 Ph.D., chemistry; Dartmouth College, Hanover, NH; adviser: Dean Wilcox.
- 1984-1988 B.A., chemistry; Willamette University, Salem, OR.

Honors and Service

- 2012 - present Associate Editor, *Journal of Phycology*.
- 2012 - present Assistant Editor, *Frontiers in Microbiology*
- 2009 - 2013 Assistant Editor, *The Eukaryotic Cell*.
- 2008 - present Associate Editor, *Biofuels*.
- 2013 Outstanding Faculty of the Year, Department of Chemistry and Geochemistry – voted by the senior undergraduate class.
- 2012 Outstanding Faculty of the Year, Department of Chemistry and Geochemistry – voted by the senior undergraduate class.
- 1995 Admitted to the Sigma Xi National Scientific Honor Society.

- 1994 Recipient of the John H. Wolfenden Teaching Prize, an award granted to a matriculating Dartmouth graduate student for exceptional contributions to undergraduate teaching.
- 1988 Admitted to the Omicron Delta Kappa National Honor Society, an organization that recognizes students who have successfully combined athletics, academics and extracurricular collegiate service.
- 1987 Recipient of the Florian Von Eschen Chemistry Scholarship, an award granted to Willamette's most promising junior chemistry major.
- 1986 Recipient of the William Lear Scholarship, a competitive award based on academic achievement.

Publications

1. D'Adamo, S., Jinkerson, R.E., Boyd, E.S., Brown, S., Baxter, B., Peters, J.W., **Posewitz, M.C.** (2013) Evolutionary and Biotechnological Implications of Robust Hydrogenase Activity in a Halophilic Species of Tetraselmis from Great Salt Lake *PLOS ONE*, submitted.
2. Work, V.H., Bentley, F.K., Scholz, M., D'Adamo, S., Gu, H., Vogler, B.W., Franks, D.T., Stanish, L.F., Jinkerson, R.E, **Posewitz, M.C.** (2013) Directing Photosynthetic Metabolism toward Biocommodities *Environmental Progress*, in press.
3. Catalanotti, C., Yang, W., **Posewitz, M.C.** and Grossman, A.R. (2013) Fermentation metabolism and its evolution in algae. *Frontiers in Plant Science* **4**, 150; 1-17.
4. Meuser, J.E., Baxter, B.K., Spear, J.R., Peters, J.W., **Posewitz, M.C.**, and Boyd, E.S. (2013) Contrasting patterns of community assembly in the stratified water column of Great Salt Lake, Utah. *Microbial Ecology* **66**, 268-280.
5. Jinkerson, R.J., Radakovits, R., **Posewitz, M.C.** (2013) Genomic insights from the oleaginous model alga *Nannochloropsis gaditana*. *Bioengineered* **4**, 1-7.
6. Peters, J.W., Boyd, E.S., D'Adamo, S., Mulder, D.W., Therien, J., and **Posewitz, M.C.** (2013) Hydrogenases, Nitrogenases, Anoxia, and H₂ Production in water-oxidizing phototrophs. In: *Algae for Biofuels and Energy; Developments in Applied Phycology*, Vol. 5. M.A. Borowitzka and N.R. Moheimani (eds.), Springer, Dordrecht, Netherlands, pp. 37-75.
7. Narayana, M.U.M., Wecker, M. S., **Posewitz, M.C.**, Gilles-Gonzalez M.A., Ghirardi, M.L. (2012) Novel FixL homologues in *Chlamydomonas reinhardtii* bind heme and O₂. *FEBS Letters* **586**, 4282-4288.
8. Elliott, L.E., Feehan, C., Laurens, L.M., Pienkos, P.T., Darzins, A., **Posewitz, M.C.** (2012) Establishment of a bioenergy-focused microalgal culture collection. *Algal Research* **1**, 102-113.

9. Radakovits, R., Jinkerson, R.E., Fuerstenberg, S.I., Tae, H., Settlage, R.E., Boore, J.L., and **Posewitz, M.C.** (2012) Draft genome sequence and genome transformation of the oleaginous alga *Nannochloropsis gaditana*. *Nature Communications*, **3**:686. doi: 10.1038/ncomms1688.
10. Price, D.C., Chan, C.X., Yoon, H.S., Yang, E.C., Qiu, H., Weber, A.P.M., Schwacke, R., Gross, J., Blouin, N.A., Lane, C., Reyes-Prieto, A., Durnford, D.G., Neilson, J.A.D., Lang, B.F., Burger, G., Steiner, J.M., Löffelhardt, W., Meuser, J.E., **Posewitz, M.C.**, Ball, S., Arias, M.C., Henrissat, B., Coutinho, P.M., Rensing, S.A., Symeonidi, A., Doddapaneni, H., Green, B.R., Rajah, V.D., Boore, J., and Bhattacharya, D. (2012) *Cyanophora paradoxa* genome elucidates origin of photosynthesis in algae and plants. *Science* **335**, 843-847.
11. Catalanotti, C., Dubini, A., Subramanian, V., Yang, W., Magneschi, L., Mus F., Michael Seibert, M., **Posewitz, M.C.** and Grossman, A.R. (2012) Altered fermentative metabolisms in *Chlamydomonas reinhardtii* mutants lacking PFL1 and both PFL1 and ADH1. *Plant Cell* **24**, 692-707.
12. Magneschi, L., Catalanotti, C., Subramanian, V., Dubini, A., Yang, W., **Posewitz, M.C.**, Seibert, M., Perata, P., and Grossman A.R. (2012) A mutant in *ADH1* of *Chlamydomonas reinhardtii* elicits metabolic restructuring during anaerobiosis. *Plant Physiology* **158**, 1293-1305.
13. Work, V.H., Beliaev, A.S., Konopka, A.E., and **Posewitz, M.C.** (2012) Microbial hydrocarbons: back to the future. *Biofuels* **3**, 103-105.
14. Work, V.H., D'Adamo, S., Radakovits, R., Jinkerson, R.E., and **Posewitz, M.C.** (2012) Improving photosynthesis and metabolic networks for the competitive production of phototroph-derived biofuels. *Current Opinion in Biotechnology* **23**, 290-297.
15. Meuser, J.E., D'Adamo, S., Jinkerson, R.E., Mus, R., Yang, W., Ghirardi, M.L., Seibert, M., Grossman, A.R., and **Posewitz, M.C.** (2012) Genetic disruption of both *Chlamydomonas reinhardtii* [FeFe]-hydrogenases: insight into the role of HYDA2 in H₂ production. *Biochemical and Biophysical Research Communications* **417**, 704-709.
16. Cendron, L., Berto, P., D'Adamo, S., Vallese, F., Govoni, C., **Posewitz, M.C.**, Giacometti, G.M., Costantini, P., Zanotti, G. (2011) Crystal structure of HydF scaffold protein provides insights into [FeFe]-hydrogenase maturation. *Journal of Biological Chemistry* **286**, 43944-43950.
17. Elliott, L.G., Work, V. H., Eduafo, P., Radakovits, R., Jinkerson, R.E., Darzins, A., and **Posewitz, M.C.** (2011) Microalgae as a feedstock for the production of biofuels: Microalgal Biochemistry, Analytical Tools, and Targeted Bioprospecting. In: *Bioprocess Sciences and Technology* (M-T. Liong, editor), Nova Science Publishers, New York, N.Y, pp. 85-115.
18. Mulder, D. W., Shepard, E.M., Meuser, J.E., Joshi, N., King, P.W., **Posewitz, M.C.**, Broderick, J.B., and Peters, J.W. (2011) Structural insights into hydrogenase maturation. *Structure* **19**, 1038-1052.

19. Wecker, M.S.A., Meuser, J.E., **Posewitz M.C.** and Ghirardi, M.L. (2011) Design of a new biosensor for algal H₂ production based on the H₂-sensing system of *R. Capsulatus*. *International Journal of Hydrogen Energy* **36**, 11229-11237.
20. Meuser, J. E., Boyd, E.B., Ananyev, G., Karns, D., Radakovits, R., Murthy N.U.M., Ghirardi, M.L., Dismukes, G.C., Peters, J. W., and **Posewitz M.C.** (2011) Presence and evolutionary significance of accessory FeS clusters in *Chlorella variabilis* NC64A [FeFe]-hydrogenase. *Planta* **234**, 829-843.
21. Jinkerson, R.E., Subramanian, V., and **Posewitz, M. C.** (2011) Improving biofuel production in phototrophic microorganisms with systems biology tools. *Biofuels* **2**, 125-144.
22. Reinsvold, R. E., Jinkerson, R.E., Radakovits, R., **Posewitz, M.C.**, Basu, C. (2011) Expression of the *Artemisia annua* β-caryophyllene synthase in *Synechocystis* sp. strain PCC6803 results in cyanobacterial sesquiterpenoid accumulation. *Journal of Plant Physiology* **168**, 848-852.
23. Grossman, A.R., Catalanotti, C., Yang, W., Dubini, A., Magneschi, L., Subramanian, V., **Posewitz, M.C.**, Seibert, M. (2011) Multiple facets of anoxic metabolism and hydrogen production in the unicellular green alga *Chlamydomonas reinhardtii*. *New Phytologist* **190**, 279-288.
24. Radakovits, R., Eduafo, P., and **Posewitz, M.C.** (2011) Genetic engineering of fatty acid chain length in *Phaeodactylum tricorutum*. *Metabolic Engineering* **13**, 89-95.
25. Work, V.H., Radakovits, R., Jinkerson, R.E., Meuser, J.E., Elliott, L.G., Vinyard, D.J., Laurens, L. M., Dismukes, G.C., and **Posewitz M.C.** (2010) Increased lipid accumulation in the *sta7-10* isoamylase mutant and increased carbohydrate accumulation in complemented strains. *Eukaryotic Cell* **9**, 1251-1261.
26. Radakovits, R., Jinkerson, R.E., Darzins, A., and **Posewitz, M.C.** (2010) Genetic engineering of algae for enhanced biofuel production. *Eukaryotic Cell* **9**, 486-501.
27. Beer, L.L, Boyd, E., Peters, J.W., and **Posewitz M.C.** (2009) Engineering algae for biohydrogen and biofuels. *Current Opinion in Biotechnology* **20**, 264-271.
28. Meuser, J.E., Ananyev, G., Wittig, L.E., Ghirardi, M.L., Seibert, S., Dismukes, G.C., and **Posewitz, M.C.** (2009) Phenotypic diversity of hydrogen production in Chlorophycean algae reflects distinct anaerobic metabolisms. *Journal of Biotechnology* **142**, 21-30.
29. Dubini, A., Mus, F., Seibert, M., Grossman, A.R., and **Posewitz, M.C.** (2009) Flexibility in anaerobic metabolism as revealed in a mutant of *Chlamydomonas reinhardtii* lacking hydrogenase activity. *Journal of Biological Chemistry* **284**, 7201-7213.
30. **Posewitz, M.C.**, Dubini, A., Meuser, J., Seibert, M., and Ghirardi, M.L. (2009) Hydrogenases, hydrogen production and anoxia in *Chlamydomonas reinhardtii*. In: *The Chlamydomonas Source Book*, Volume 2. David Stern and Elizabeth Harris (Eds.), Elsevier, 217-255.

31. Dismukes, G.C., Carrieri, D., Bennette, N., Ananyev, G.M., and **Posewitz, M.C.** (2008) Aquatic phototrophs: efficient alternatives to land-based crops for biofuels. *Current Opinion in Biotechnology* **19**, 235-240.
32. McGlynn, S.E., Shepard, E.M., Winslow, M.A., Naumov, A.V., Duschene, K.S., **Posewitz, M.C.**, Broderick, W., Broderick, J.B., and Peters, J.W. (2008) HydF as a scaffold/carrier in [FeFe]-hydrogenase H-cluster biosynthesis. *FEBS Letters* **582**, 2183-2187.
33. Nicolet, Y., Rubach, J.K., **Posewitz, M.C.**, Amara, P., Mathevon, C., Atta, M., Fontecave, M., and Fontecilla-Camps, J.C. (2008) X-ray structure of the [FeFe]-hydrogenase maturase HydE from *Thermotoga maritima*. *Journal of Biological Chemistry* **283**, 18861-18872.
34. **Posewitz, M.C.**, Mulder, D.W., and Peters, J.W. (2008) New frontiers in hydrogenase structure and biosynthesis. *Current Chemical Biology* **2**, 178-199.
35. Hu, Q., Sommerfeld, M., Jarvis, E., Seibert, M., Ghirardi, M., **Posewitz, M.**, and Darzins, A. (2008) Microalgal triacylglycerols as feedstocks for biofuel production: perspectives and advances. *The Plant Journal* **54**, 621-639.
36. Seibert, M., King, P., **Posewitz, M.C.**, Melis, A., and Ghirardi M.L. (2008) Photosynthetic Water-Splitting for Hydrogen Production. In: Bioenergy (J. Wall, C. Harwood, and A. Demain, Eds.) ASM Press, Washington DC, pp. 273-291.
37. Mus, F., Dubini, A., Seibert, M., **Posewitz, M.C.**, and Grossman, A.R. (2007) Anaerobic adaptation in *Chlamydomonas reinhardtii*: anoxic gene expression, hydrogenase induction and metabolic pathways. *Journal of Biological Chemistry* **282**, 25475-25486.
38. McGlynn, S., Ruebush, S.S., Naumov, A., Nagy, L.E., Dubini, A., King, P.W., Broderick, J.B., **Posewitz, M.C.**, and Peters, J.W. (2007) *In vitro* activation of [FeFe] hydrogenase: new insights into hydrogenase maturation. *Journal Biological Inorganic Chemistry* **12**, 443-447.
39. Ghirardi, M.L., **Posewitz, M.C.**, Dubini, A., Maness, P.C., and Seibert, M. (2007) Algal hydrogenases and hydrogen photoproduction. *Annual Review of Plant Biology* **58**, 71-91.
40. Grossman, A.R., Croft, M., Gladyshev, V.N., Merchant, S., **Posewitz, M.C.**, Prochnik, S., and Spalding, M. (2007) Novel metabolism in *Chlamydomonas* through the lens of genomics. *Current Opinion in Plant Biology* **10**, 190-198.
41. Nagy, L.E., Meuser, J., Plummer, S., Seibert, M., Ghirardi, M.L., King, P.W., Ahmann, D. and **Posewitz, M.C.** (2007) Application of gene shuffling for the rapid generation of novel [FeFe]-hydrogenase libraries. *Biotechnology Letters* **29**, 421-430.
42. Bock, A., King, P.W., Blokesch, M., and **Posewitz, M.C.** (2006) Maturation of hydrogenases. *Advances in Microbial Physiology* **51**, 1-72.

43. King, P.W., **Posewitz, M.C.**, Ghirardi, M.L., and Seibert, M. (2006) Functional studies of [FeFe] hydrogenase maturation in an *Escherichia coli* biosynthetic system. *Journal of Bacteriology* **188**, 2163-2172.
44. **Posewitz, M.C.**, King, P.W., Smolinski, S.L., Smith, R.D., Ginley, A.R., Ghirardi, M.L., and Seibert, M. (2005) Identification of genes required for hydrogenase activity in *Chlamydomonas reinhardtii*. *Biochemical Society Transactions* **33**, 102-104.
45. Ghirardi, M.L., King, P.W., **Posewitz, M.C.**, Maness, P.-C., Fedorov, A., Kim, K., Cohen, J., Schulten, K., and Seibert, M. (2005) Approaches to developing biological H₂-photoproducing organisms and processes. *Biochemical Society Transactions* **33**, 70-72.
46. Cohen, J., Kim, K., **Posewitz, M.**, Ghirardi, M.L., Schulten, K., Seibert, M., and King, P. (2005) Molecular dynamics and experimental investigation of H₂ and O₂ diffusion in [Fe]-hydrogenase. *Biochemical Society Transactions* **33**, 80-82.
47. **Posewitz, M.C.**, Smolinski, S.L., Melis, A., Kanakagiri, S., Seibert, M., and Ghirardi, M.L. (2004) Hydrogen photoproduction is attenuated by disruption of an isoamylase gene in *Chlamydomonas reinhardtii*. *Plant Cell* **16**, 2151-2163.
48. **Posewitz, M.C.**, King, P., Smolinski, S.L., Zhang, L., Seibert, M., and Ghirardi, M.L. (2004) Discovery of two novel radical S-adenosylmethionine proteins required for the assembly of an active [Fe]-hydrogenase. *Journal of Biological Chemistry* **279**, 25711-25720.
49. Forestier, M., King P., Zhang, L., **Posewitz, M.**, Schwarzer S., Happe, T., Ghirardi, M.L., and Seibert M. (2003) Expression of two [Fe]-hydrogenases in *Chlamydomonas reinhardtii* under anaerobic conditions. *European Journal of Biochemistry* **270**, 2750-2758.
50. Wilcox, D.E., Bennett, L.L., Cox, E.H., Haleblan, G., Hill, B.T., Kowack, E.P., Liu, X., Merkel, J.S., Palmer, A.E., **Posewitz, M.C.**, Roy, J.E., and Wetterhahn, K.E. (1999) Interaction of metallothionein with the carcinogenic metals Ni(II), Cr(VI) and As(III). In *Metallothionein IV*, C. D. Klaassen (Ed.); Birkhäuser, Basel; pp. 585-594.
51. **Posewitz, M.C.**, and Tempst, P. (1999) Selective purification of phosphorylated peptides from complex protein digests using Ga(III) immobilized metal ion affinity chromatography. *Analytical Chemistry* **71**, 2883-2892.
52. Tempst, P., Erdjument-Bromage, H., **Posewitz, M.C.**, Geromanos, S., Freckleton, G., Grewal, A., Lacomis, L., Lui, M., and Philip, J. (1999) Protein micro-characterization by mass spectrometry: sample handling and data flow. In: *Mass Spectrometry in Biology and Medicine*. A.L. Burlingame (Ed.); Humana Press, Totowa, N.J.; pp. 121-142.
53. Jensen, L.T., **Posewitz, M.C.**, Srinivasan, C., and Winge, D.R. (1998) Mapping of the DNA binding domain of the copper-responsive transcription factor Mac1 from *Saccharomyces cerevisiae* and possible synergism between binding sites. *Journal of Biological Chemistry* **273**, 23805-23811.

54. Turner, R.B., Smith, D.L., Zawrotny, M.E., Summers, M.F., **Posewitz, M.C.**, and Winge, D.R. (1998) Solution structure of a unique zinc domain conserved in yeast copper-regulated transcription factors. *Nature Structural Biology* **5**, 515-518.
55. Srinivasan, C., **Posewitz, M.C.**, George, G.N., and Winge, D.R. (1998) Characterization of the copper chaperone cox17 of *Saccharomyces cerevisiae*. *Biochemistry* **37**, 7572-7577.
56. Winge, D.R., Graden, J.A., **Posewitz, M.C.**, Martin, L.J., Jensen, L.T., and Simon, J.S. (1997) Sensors that mediate copper-specific activation and repression of gene expression. *Journal of Biological Inorganic Chemistry* **2**, 2-10.
57. **Posewitz, M.C.**, Simon, J.S., Farrell, R.A., and Winge, D.R. (1996) Role of the conserved histidines in the Zn module of the copper-activated transcription factors in yeast. *Journal of Biological Inorganic Chemistry* **1**, 560-566.
58. Graden, J.A., **Posewitz, M.C.**, Simon, J.R., George, G.N., Pickering, I.J., and Winge, D.R. (1996) The presence of a Cu(I)-thiolate regulatory domain in the copper-activated transcription factor Amt1. *Biochemistry* **35**, 14583-14589.
59. **Posewitz, M.C.**, and Wilcox, D.E. (1995) Properties of the Sp1 zinc finger 3 peptide: coordination chemistry, redox reactions, and metal binding competition with metallothionein. *Chemical Research in Toxicology* **8**, 1020-1028.

(Over 3000 ISI Web of Science Citations; ISI h-index: 26)

Invited Conference Presentations

Posewitz, M.C.

Posewitz, M.C. Photons to Fuels: Metabolic Pathway Manipulation for Starch, Oils or Hydrogen in Photosynthetic Microorganisms. 2013 Annual Society for Industrial Microbiology and Biotechnology Meeting, San Diego, CA. August 2013.

Posewitz, M.C. Identifying Biofuel modules within the Palette of Algal Diversity. World Algal Biomass Organization Summit. Denver, CO. October, 2012.

Posewitz, M.C. Photons to fuels: manipulating metabolic partitioning to improve bioenergy carrier yields in algae. Rocky Mountain Regional ACS Meeting. October 2012.

Posewitz, M.C. Pathway and enzyme engineering to improve algal biofuels production. NSF-German Workshop on Algal Biotechnology. Frankfurt, Germany. August 2012.

Posewitz, M.C. Novel mechanism of lipid accumulation in *Nannochloropsis gaditana*. 2nd International Conference of Algal Biomass, Biofuels and Bioproducts. San Diego CA. June 2012.

Posewitz, M.C. Next generation algal biofuels. Algal Carbon Conversion: A Workshop. Canadian National Research Center Institute for Marine Biosciences. Halifax, Nova Scotia. February, 2012.

Posewitz, M.C., Starch and lipid synthesis in microalgae. World Algal Biomass Organization Summit. Minneapolis, MN. October, 2011.

Posewitz, M.C., From Water Oxidation to Starch, Oils, or Hydrogen: pathway engineering in Phototrophic Microorganisms. 1st International Conference of Algal Biomass, Biofuels and Bioproducts. St. Louis, MO. July 2011.

Posewitz, M.C., From Water Oxidation to Starch, Oils, or Hydrogen: pathway engineering in Phototrophic Microorganisms. Phycological Society of America 65th Annual Meeting Seattle, WA. July, 2011.

Posewitz, M. C., Oils, Carbohydrates, Osmolytes and Hydrogen: metabolic interplay of a biofuel portfolio. Padua University-Biofuels Lecture Series. Padua, Italy. November, 2010.

Posewitz, M. C., Partitioning of Photosynthate in Water Oxidizing Algae. World Algal Biomass Organization Summit. Phoenix, AZ. September, 2010.

Posewitz, M.C., Algal Carbohydrates, lipids and hydrogen: metabolic interplay of a biofuels portfolio. Organic Geochemistry Gordon Research Conference. Holderness, NH. August 2010.

Posewitz, M.C. Algal Hydrogen Production: enzymes, organisms, metabolism and pathway engineering. The 9th International Hydrogenase Conference. Uppsala, Sweden. June, 2010

Posewitz, M.C., Hydrogen, carbohydrates, and lipids: the metabolic interplay of bioenergy carriers in algae. Biological Processes as a Possible Source for Renewable Energy. Accademia Nazionale Dei Lincei. Rome, Italy. November, 2009.

Posewitz, M.C., Systems Biology to Probe Renewable Biofuels Production in Photosynthetic Microorganisms. The Sixth Annual World Congress on Industrial Biotechnology and Bioprocessing. Montreal, Quebec Canada, July, 2009.

Posewitz, M.C., Metabolic Networks in Microalgae: pathways to H₂ and a portfolio of bioenergy carriers. Pacific Rim Biotechnology Summit. Vancouver, BC Canada. September, 2008.

Posewitz, M.C., Biofuels from algae: examination of the metabolic pathways in diverse organisms. 3rd CeBiTec Symposium Solar Bio-Fuels. Bielefeld University, Germany. August, 2008.

Posewitz, M.C., New Sources of Fuel from Algae. ACS Summer School on Sustainability and Green Chemistry. Golden, CO. July, 2008.

Posewitz, M.C., Hydrogen production in water-oxidizing, phototrophic organisms: examination of the metabolic pathways. Photosynthesis Gordon Research Conference. South Hadley, MA. June, 2008.

Posewitz, M.C., Hydrogen production in phototrophic microorganisms. NASA workshop: Cyanobacteria in a Lunar Environment. Moffett Field, CA. January, 2008.

Posewitz, M.C., Hydrogen Production in water-oxidizing, photosynthetic organisms: characterization of the proteins and pathways. Hydrogenase and Hydrogen Production 2007: The 8th International Conference on Hydrogenase. Breckenridge, CO. August, 2007.

Posewitz, M.C., Hydrogen photoproduction in photosynthetic organisms: characterization of the proteins and pathways. Leopoldina Workshop: Molecular Function of Catalysts Involved in BioH₂ Production. Berlin, Germany. February, 2007.

Posewitz, M.C., Dubini, A., Mus, F., Nagy, L.E., Meuser, J.E., Dismukes, G.C., Grossman, A.R., Seibert, M. and Ghirardi, M.L. Hydrogen production and anoxic gene expression in photosynthetic microorganisms. 16th Western Photosynthesis Conference. Pacific Grove, CA. January, 2007.

Posewitz, M.C., Identification of novel maturation proteins required for [FeFe]-hydrogenase activity. Fe-S Enzymes Gordon Research Conference. New London, N.H. June, 2006.

Posewitz, M.C., Smolinski, S.L., King, P., Wecker, M., Dubini, A., Seibert, M., Ghirardi, M.L. Identification of genes required for sustained H₂ production in *Chlamydomonas reinhardtii*. 12th International Conference on the Cell and Molecular Biology of Chlamydomonas. Portland, OR. May, 2006.

Posewitz, M.C., Meuser, J., Nagy, L., King P., Smolinski, S.L., Seibert, M., Ghirardi, M.L. Identification of genes required for sustained H₂ production in phototrophic organisms using chemochromic sensors. 15th Western Photosynthesis Conference. Pacific Grove, CA. January, 2006.

Posewitz, M.C., King, P., Smolinski, S.L., Zhang, L., Seibert, M., Ghirardi, M.L. Identification of two novel radical SAM proteins required for the assembly of an active [Fe]-hydrogenase. 7th International Conference on the Molecular Biology of Hydrogenases. University of Reading, UK. August, 2004.

Posewitz, M.C., Smolinski, S.L., Melis, A., Seibert, M., Ghirardi, M.L. Characterization of *Chlamydomonas reinhardtii* mutants deficient in H₂ photoproduction activity. 10th International Conference on the Cell and Molecular Biology of Chlamydomonas. Vancouver, BC. June, 2002.

Posewitz, M.C., Smolinski, S.L., Melis, A., Seibert, M., Ghirardi, M.L. Identification of a *Chlamydomonas reinhardtii* isoamylase mutant compromised in hydrogen production. 11th Western Photosynthesis Conference. Pacific Grove, CA. December, 2002.

Posewitz, M.C., Tempst P. Selective purification of phosphorylated peptides for mass spectrometric analysis. Association of Biomolecular Resource Facilities Conference. Raleigh, NC. March, 1999.

Posewitz, M.C., Winge D.R. Biophysical characterization of the copper activated transcription factor Amt1. Metals in Biology Gordon Research Conference. Ventura, CA. January, 1998.

Invited Institution Presentations

Lafayette College Photons to fuels: manipulating metabolic partitioning to improve bioenergy carrier yields in algae. May 2013.

University of Nebraska, Lincoln Metabolic Pathway Manipulation in Phototrophic Microorganisms: Water Oxidation to Starch, Oils or Hydrogen. October, 2012.

Colorado State University Organism, enzyme and pathway discovery for the legos to build better biofuel phenotypes. September 2012.

University of Tennessee From Water Oxidation to Starch, Oils or Hydrogen: pathway engineering in phototrophic microorganisms. April, 2012.

University of Padua, Italy Biofuels Lecture: Metabolic interplay of a biofuel portfolio. Series. Padua, Italy. December, 2011.

Arizona State University – Polytechnic Campus From Water Oxidation to Starch, Oils or Hydrogen: pathway engineering in phototrophic microorganisms. May 2011.

Arizona State University From Water Oxidation to Starch, Oils or Hydrogen: pathway engineering in phototrophic microorganisms. March 2011.

Colorado State University. Lipids, Carbohydrates, Osmolytes and Hydrogen: Metabolic Interplay of a Biofuel Portfolio. February, 2010.

Michigan State University. Lipids, Carbohydrates, Osmolytes and Hydrogen: Metabolic Interplay of a Biofuel Portfolio. October, 2009.

Rutgers University. Oils, Carbohydrates, Osmolytes and Hydrogen: metabolic interplay of a biofuel portfolio. February, 2009.

Utah State University. Lipids, Carbohydrates, Osmolytes and Hydrogen: metabolic interplay of a biofuel portfolio. February, 2009.

Pacific Northwest National Laboratory. Oils, Carbohydrates, Osmolytes and Hydrogen: metabolic interplay of a biofuel portfolio. January, 2009.

University of Arkansas-Little Rock. Diverse Portfolio of Biofuels from Algae: Investigation of the Metabolic Pathways. October, 2008.

Carnegie Institution, Stanford University. Anoxia, hydrogenase activity, and renewable energy prospects in phototrophic microorganisms. January, 2008.

Pennsylvania State University. Hydrogen production in phototrophic microorganisms. March, 2007.

University of California at Davis. Bioenergy production in photosynthetic microorganisms: characterization of the proteins and pathways. January, 2007.

Princeton University. Renewable Energy from Phototrophic Microbes: Prospects and Challenges. October, 2006.

Princeton University. Identification of genes and pathways facilitating hydrogen production in algae. BioSolar H₂ meeting. July, 2006.

University of Montana. Studies of photosynthetic microorganisms for bioenergy production. February, 2006.

Colorado State University. Genes required for H₂ production in phototrophic algae. October, 2005.

Montana State University. Identification of genes required for sustained H₂ production in phototrophic organisms using chemochromic sensors. September, 2005.

The J. Craig Venter Institute. Screening mutant and native microalgae for improved H₂ photoproduction using chemochromic sensors. September, 2005.

Princeton University. Screening mutant and native microalgae for improved H₂ photoproduction using chemochromic sensors. BioSolar H₂ meeting. June, 2005.

University of Utah. Renewable hydrogen production from photosynthetic algae. June, 2005.

University of Montana. Hydrogen production from the green alga *Chlamydomonas reinhardtii*: The hunt for proteins influencing hydrogen production. October, 2002.

Research Training

Knowledgeable in the genetic manipulation and metabolism of photosynthetic microalgae, particularly H₂ production. Expertise in the microbiology, genomes and metabolisms of phototrophic and anaerobic microorganisms. Experienced in the culturing techniques of bacteria, algae and yeast. Personally cultured and isolated several unique strains of cyanobacteria, eukaryotic green algae, and diatoms. Expertise is using cDNA microarray technology for analysis of global gene transcription. Knowledgeable in anaerobic fermentative and the bioinformatic tools used to analyze metabolic pathways. Experienced in the purification of DNA and proteins. Expertise in Northern, Western and Southern blotting. Extensive experience using absorption, fluorescence, atomic absorption, circular dichroism, nuclear magnetic resonance, electron paramagnetic resonance and mass spectrometers. Expertise in determining affinities of biological substrates for metal ions and knowledgeable in metal ion biochemistry. Experienced in the use of HPLC, FPLC, ion exchange, hydrophobic interaction and size exclusion chromatographies for the purification of proteins and peptides. Knowledge of molecular biology, performing PCR, site directed mutagenesis, plasmid rescue, genome walking, reverse transcription, quantitative PCR, microarray technology and cloning. Experience in the preparation of proteins for structural determination using NMR and crystallization experiments. Experience in the purification and identification of proteins and phosphopeptides from complex proteolytic digests for analysis using both MALDI and ESI mass spectrometry. Experience detecting free radicals using EPR spin trapping techniques.

Research Grants

Biochemical Integration of Metabolic Networks Critical for Energy Transformation in *Chlamydomonas reinhardtii*. Department of Energy. Posewitz-PI. Collaboration with Arthur Grossman Carnegie Institute at Stanford University. Start date August 2012, ends August 2015. \$590K in total funding. \$225K in total funding to the Posewitz laboratory.

Opening up the bioalgae black box: Are polycultures more stable than monocultures when faced with environmental challenges? Colorado Center for Biorefining and Biofuels. Posewitz-PI. Start date January 2012, ends December 2013. \$35K in total funding to the Posewitz laboratory.

Retrievable and Reusable Nanoparticle-Pinched Polymer Brushes Enable Highly Efficient Microalgae Dewatering for Cost-Effective Biofuel Production. National Science Foundation. Posewitz coI (PI-Hongjun Liang, CSM). Start date August 2012. Ends July 2015. \$299K in total funding (~15K to Posewitz laboratory).

Acquisition of a High-Resolution Tandem MALDI-MS. National Science Foundation MRI. Posewitz coI (PI- Kent Voorhees, CSM). Start date September 2012. Ends August 2015. \$295K in sponsor funding with 30% cost share. Departmental Instrument.

Biochemical Conversion of Algal Biomass and Fuel Testing. Colorado Renewable Energy Collaboratory. Start date September, 2010. Ends September 2012. \$150 K in total funding. All funds to Posewitz laboratory.

Development of Starch-Accumulating Algae. ConocoPhillips. Start date January, 2011. Ends January 2014. PI-Posewitz. \$450 K in total funding. All funds to Posewitz laboratory.

Genome-Enabled Studies of Photosynthetic Microorganisms for Bioenergy Applications. DOE collaboration with Pacific Northwest National Laboratory. coI- Posewitz. Start date August, 2010. End date September, 2013. \$ 192 K in total funding to Posewitz laboratory.

Renewable Bio-solar Hydrogen Production from Robust Oxygenic Phototrophs – the next generation. United States Air Force Office of Scientific Research award. Posewitz- PI. Anticipated start May 2011 through May 2014. Collaborating institutions Colorado School of Mines, Rutgers University, Montana State University and Pennsylvania State University. \$ 715 K in total funding to Posewitz laboratory.

Characterization and optimization of lipid accumulation in oleaginous algae from the C2B2 culture collection. C2B2; Al Darzins-PI, Posewitz coI. \$100 K. Start Jan 2010. Ended May 2012. \$100K, \$72K in total funding to Posewitz laboratory.

Demonstrate Hydrogen Production via Fermentation in Scale-Up Bioreactors. NREL subcontract. PI-Posewitz. Initiated October 2011. Ends December 2012. \$103 K in total funding.

Demonstrate Hydrogen Production via Fermentation in Scale-Up Bioreactors. NREL subcontract. PI-Posewitz. Initiated October 2010. Ends October 2011. \$106 K in total funding.

Demonstrate Hydrogen Production via Fermentation in Scale-Up Bioreactors. NREL subcontract. PI-Posewitz. Initiated October 2009. Ended October 2010. \$106K in total funding.

Demonstrate Hydrogen Production via Fermentation in Scale-Up Bioreactors. NREL subcontract. PI-Posewitz. Initiated September 2008. Ended October 2009. \$106K in total funding.

Algal Molecular Biology and Microarray Studies. NREL subcontract; PI-Posewitz; \$85K received in 2010.

Identification and Characterization of Robust Strains of Phototrophic Algae for Biofuel Production. ConocoPhillips. PI-Posewitz; Co-Is, Kent Voorhees (CSM) and Kim Williams (CSM). Initiated October 2008. Ended September 2011. \$600K in total funding to Posewitz laboratory.

Establishment of a Bioenergy-Focused Microalgal Strain Collection Using Rapid High-Throughput Methodologies. C2B2; Al Darzins-PI, Posewitz coI. Started Jan 2008. Ended Jan 2009. \$75K in total funding, \$35K to the Posewitz laboratory.

Filling Knowledge Gaps in Biological Networks: Integrated Global Approaches to Understand H₂ Metabolism in *Chlamydomonas reinhardtii*. Office of Science, BER:GTL program, U.S. Department of Energy. PI; Michael Seibert, National Renewable Energy Laboratory. Initiated September 2007. Ended May 2011. \$2.1M among three collaborating institutions (National Renewable Energy Laboratory, Carnegie Institution and Colorado School of Mines). \$600K to the Posewitz laboratory.

Renewable Bio-solar Hydrogen Production from Robust Oxygenic Phototrophs. United States Air Force Office of Scientific Research award FA9550-05-01-0365. Co-I 5% of time (PI; G. Charles Dismukes, Princeton University). Initiated May 2005. Ended May 2010. \$5.5M total among six collaborating institutions (Colorado School of Mines, Princeton University, University of Utah, University of Hawaii, Montana State University and Pennsylvania State University). \$1.75 M to the Posewitz laboratory.

Application of Large Scale Genomic Analysis for Understanding Algal Hydrogen Metabolism. Office of Science, Basic Energy Sciences, U.S. Department of Energy award KP110201. Co-I 5% of time (PI; Michael Seibert, National Renewable Energy Laboratory). Initiated September 2003. Ended August 2007. \$1.46M among three collaborating institutions (National Renewable Energy Laboratory, Stanford University and Colorado School of Mines).

Algal Molecular Biology and Micro Array Analysis. NREL subcontract. November 2003-November 2007. \$611,127 to Posewitz laboratory.

Functional and Structural Analysis of Algal Hydrogenase Combinatorial Mutants. National Science Foundation award BES-0328187. Co-I (PI; Dianne Ahmann, Colorado School of Mines). (9/1/02-8/31/05); \$246K total.

Journal Manuscript Reviews

Analytical Chemistry; Analytical Biochemistry; Applied and Environmental Microbiology; Applied Microbiology and Biotechnology; BBA-proteins and proteomics; Biofuels; BioMed Central; Biotechniques; Biotechnology Advances; Current Biotechnology; Current Reviews in Biotechnology; Energy and Fuels; Environmental Science and Technology; Eukaryotic Cell; FEBS Letters; Genetics; International Journal of Hydrogen Energy; Journal of the American Chemical Society, Journal of Bacteriology, Journal of Biological Chemistry, Journal of Biotechnology; Journal of the International Society of Microbial Ecology, Journal of Phycology, Journal of Renewable and Sustainable Energy; Magnetic Resonance in Chemistry; Molecular Microbiology; Molecular Biology and Evolution; Molecular Plant; Nature; The Plant Journal; Photochemistry and Photobiology, PLoS ONE, Rapid Communications in Mass Spectrometry, Trends in Biotechnology, Trends in Plant Science.

Grant Reviews

National Renewable Energy Laboratory, Laboratory Director's Research and Development (LDRD) program; Department of Energy, Small Business Innovation Research (SBIR) grants; Air Force Office of Scientific Research (AFOSR), grant applications; Department of Energy, Office of Science grant review panels; Army Research Office, grant applications; National Science Foundation, grant applications; Stanford Global Climate and Energy Project.

Ph.D. Students and Postdoctoral Scientists Supervised

Laura L. Beer	Postdoctoral scientist 2008-2009. Currently a research scientist at the Colorado School of Mines.
Sarah D'Adamo	Presently a postdoctoral scientist at the Colorado School of Mines.
Alexander Dubini	Postdoctoral scientist 2005-2007. Currently a staff scientist at the National Renewable Energy Laboratory.
Patrick Eduafo	M.S., Colorado School of Mines (2011).
Lee G. Elliott	Presently a Ph.D. student at the Colorado School of Mines.
Hiuya Gu	Presently a Ph.D. student at the Colorado School of Mines.
Robert E. Jinkerson	Presently a Ph.D. student at the Colorado School of Mines.
Devin Karns	M.S., Colorado School of Mines (2010).
Jonathan E. Meuser	Ph.D., Colorado School of Mines (2011). Currently with Synthetic Genomics.
Randor Radakovits	Postdoctoral scientist 2010-2012. Currently with Synthetic Genomics.
Venkat Submanranian	Postdoctoral scientist 2009-2011. Currently a staff scientist at the National Renewable Energy Laboratory.

Matthew S. A. Wecker Postdoctoral scientist 2004-2006. Currently a consulting scientist at the National Renewable Energy Laboratory – founder GeneBiologics.

Lauren Wittig M.S., Colorado School of Mines (2007). Currently with Camco International Group, Inc.

Victoria H. Work Presently a Ph.D. student at the Colorado School of Mines.

Ph.D. Theses Advised

Jonathan E. Meuser. .Ph.D., Colorado School of Mines (2012).

M.S. Theses Advised

Patrick Eduafo. . M.S. Colorado School of Mines (2011).

Devin Karns. . M.S., Colorado School of Mines (2010).

Lauren E. Wittig (Nagy). . M.S., Colorado School of Mines (2007).

Undergraduate Senior Research Theses Advised:

Sarah Tudor
Shelby Hollameir
Chris Gallahar
Joshua Kast
Gabriel Rubenstein
Dylan Franks
Neil Lloyd
Erin Stephens
Stephanie Ives
Hannah Schuster
Hannah Lewis
Ashley Moore

Ph.D. Thesis Committees

Charles Pene-Ranney. Microbial Diversity of a Modern Stromatolite Analog in Yellowstone National Park, Wyoming in the Context of Microbial Alpha and Beta Diversity Along Yellowstone Geothermal Outfalls. Ph.D., Department of Civil and Environmental Engineering, Colorado School of Mines (2012).

Stephanie A. Carr. Characterization of Microbial Communities and Carbon Flow Pathways Within Antarctic Marine Sediments. Ph.D., Department of Chemistry and Geochemistry, Colorado School of Mines (2012).

Rebecca Shircliff. Characterization of Organosilane-Modified Silicon/Silicon Dioxide Systems for Biological and Nanotechnology Applications. Ph.D., Department of Chemistry and Geochemistry, Colorado School of Mines (2012).

Benjamin T. Smith. Process Improvements for Biofuels from Lignocellulosic and Algal Biomass. Ph.D., Department of Chemical and Biological Engineering, University of Colorado, Boulder (2012).

Jackson Z. Lee. A Molecular Biology Approach to the Study of Single Cell Protein Produced from Brewery Wastewater. Ph.D., Department of Civil and Environmental Engineering, Colorado School of Mines (2012).

M.S. Thesis Committees

Collaborators

Bonnie Baxter, Westminster College. Participating in the sampling of the Great Salt Lake for unique phototrophs. DOE JGI metagenome and biodiversity sequencing project.

Donald Bryant, Pennsylvania State University. Investigating the ability of mutants of the cyanobacterium *Synechococcus* sp. PCC 7002 to photoproduce hydrogen.

G. Charles Dismukes, Rutgers University. Analyzing a diversity of phototrophs from extreme environments for enhanced photosynthetic and hydrogen production characteristics. Using metabolomic approaches to better understand the physiology of hydrogen production in select species.

Arthur Grossman, Stanford University. Using microarray analysis to analyze the differential expression of genes in *Chlamydomonas reinhardtii* under conditions that facilitate hydrogen production.

Eric Hegg, Michigan State University. Characterizing hydrogenase enzymes from halophiles found in the Great Salt Lake. These enzymes must function in the presence of high intracellular concentrations of an internal osmotic stabilizer (4 M KCl, 7 M glycerol).

John Peters, Montana State University. Biochemical and biophysical studies of the maturation of [FeFe]-hydrogenase catalytic sites.

Patents

Michael Seibert, Matthew C. Posewitz, Paul W. King, Sharon L. Smolinski, Maria L. Ghirardi, **Process and genes for expression and overexpression of active [Fe] hydrogenases.** Provisional Patent. 2005.

Matt Wecker, Matthew Posewitz and Maria L. Ghirardi. **In vivo evolution of hydrogenases using a hydrogen-sensing system.** Provisional Patent. 2011.

Jonathan E. Meuser, Devin Karns, Edward Dempsey and Matthew C. Posewitz. **A Polarographic Instrument System For Oxygen And Hydrogen Measurement.** Provisional Patent 2011.

Victoria H. Work, Randor Radakovits, Robert E. Jinkerson, Lee Elliott, Jonathan Meuser and Matthew C. Posewitz. **Modified Algae for improved biofuel productivity.** Provisional Patent 2012.

Randor Radakovits, Robert E. Jinkerson and Matthew C. Posewitz. **Use of endogenous promoters in genetic engineering of *Nannochloropsis gaditana*.** Provisional Patent 2012.