

Gregory L. Rorrer

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Department of Chemical Engineering

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EDUCATION

Ph.D. Chemical Engineering, Michigan State University, 1989

M.S. Chemical Engineering, Michigan State University, 1985

B.S. Chemical Engineering, University of Michigan, 1983

ACADEMIC POSITIONS

Professor, Oregon State University, 2005-present

Associate Professor, Oregon State University, 1995-2005

Assistant Professor, Oregon State University, 1989-1995

NON-ACADEMIC POSITIONS

Research Engineer, General Motors Research Laboratories, 1985

FIELDS OF SPECIALIZATION

Biochemical engineering

PUBLICATIONS

Journal and Refereed Publications (reverse chronological order)

48. Jeffryes, C., Gutu, T., Jiao, J., and Rorrer, G.L. "Two-Stage Photobioreactor Process for the Metabolic Insertion of Nanostructured Germanium into the Silica Microstructure of the Diatom *Pinnularia sp.*" Submitted to *Materials Science and Engineering C: Biomimetic and Supramolecular Systems* (in review 2006).
47. Cruz-Uribe, O., Cheney, D.P., and Rorrer, G.L. "Comparison of TNT Removal from Seawater by Tissue Cultures of Three Marine Macroalgae." Submitted to *Chemosphere* (in review 2006).
46. Lotufo, G.R., Lydy, M.J., Cruz-Uribe, O., Cheney, D.P., and Rorrer, G.L. "Bioconcentration, bioaccumulation, and biotransformation of explosives and related compounds in aquatic organisms." In: *Ecotoxicology of Explosives*, G.I. Sunahara, J.A. Hawari, G.R. Lotufo, R.G. Kuperman, Eds., CRC Press, Boca Raton, FL (in press 2006).
45. Cruz-Uribe, O., and Rorrer, G.L. "Uptake and Transformation of 2,4,6-Trinitrotoluene (TNT) from Seawater by Microplantlet Suspension Cultures of the Marine Red Macroalga *Portieria hornemannii*." *Biotechnology & Bioengineering*, 93, 401-412 (2006).

44. Rorrer, G.L., Chang, C.-H., Jiao, J., Liu, S.-H., Hedberg, A., and Jeffryes, C. "Biosynthesis of Silicon-Germanium Oxide Nanocomposites by the Marine Diatom *Nitzschia frustulum*." *Journal of Nanoscience and Nanotechnology*, 5, 41-49 (2005).
43. Rorrer, G.L., and Cheney, D.P. "Bioprocess Engineering of Cell and Tissue Cultures for Marine Seaweeds." *Aquacultural Engineering*, 32, 11-41 (2004).
42. Tramper, J., Battershill, C., Brandenburg, W., Burgess, G., Hill, R., Luiten, E., Müller, W., Osinga, R., Rorrer, G., Tredici, M., Uriz, M., Wright, P., and Wijffels, R. "What to do in Marine Biotechnology?" *Biomolecular Engineering*, 20, 467-471 (2003).
41. Rorrer, G.L., and Polzin, J.J. "Metabolic Flux Analysis of Halogenated Monoterpene Biosynthesis in Microplantlets of the Macrophytic Red Alga *Ochtodes secundiramea*." *Biomolecular Engineering*, 20, 205-215 (2003).
40. Barahona, L.F., and Rorrer, G.L. "Isolation of Halogenated Monoterpenes from Bioreactor Cultured Microplantlets of the Macrophytic Red Algae *Ochtodes secundiramea* and *Portieria hornemannii*." *Journal of Natural Products*, 66, 743-751 (2003).
39. Huang, Y.M., and Rorrer, G.L. "Cultivation of Microplantlets Derived from the Marine Red Alga *Agardhiella subulata* in a Stirred Tank Photobioreactor." *Biotechnology Progress*, 19, 418-427 (2003).
38. Polzin, J.J., and Rorrer, G.L. "Halogenated Monoterpene Production by Microplantlets of the Marine Red Alga *Ochtodes secundiramea* within an Airlift Photobioreactor under Nutrient Medium Perfusion." *Biotechnology and Bioengineering*, 82, 415-428 (2003).
37. Yantasee, W., and Rorrer, G.L. "Comparison of Ion Exchange and Donnan Equilibrium Models for the pH-Dependent Adsorption of Sodium and Calcium Ions onto Kraft Wood Pulp Fibers." *Journal of Wood Chemistry and Technology*, 22, 157-185 (2002).
36. Wise, M.L., Rorrer, G.L., Polzin, J.J., and Croteau, R. "Biosynthesis of Marine Natural Products: Isolation and Characterization of a Myrcene Synthase from Cultured Tissues of the Marine Red Alga *Ochtodes secundiramea*." *Archives of Biochemistry and Biophysics*, 400, 125-132 (2002).
35. Huang, Y.M., and Rorrer, G.L. "Optimal Temperature and Photoperiod for Cultivation of *Agardhiella subulata* Microplantlets in a Bubble-Column Photobioreactor." *Biotechnology & Bioengineering*, 79, 135-144 (2002).
34. Huang, Y.M., and Rorrer, G.L. "Dynamics of Oxygen Evolution and Biomass Production During Cultivation of *Agardhiella subulata* Microplantlets in a Bubble-Column Photobioreactor under Medium Perfusion." *Biotechnology Progress*, 18, 62-71 (2002).
33. Maliakal, S., Cheney, D.P., and Rorrer, G.L. "Halogenated Monoterpene Production in Regenerated Plantlet Suspension Cultures of the Macrophytic Red Alga *Ochtodes secundiramea*." *Journal of Phycology*, 37, 1010-1019 (2001).
32. Rorrer, G.L., Tucker, M.P., Cheney, D.P., and Maliakal, S. "Bromoperoxidase Activity in Microplantlet Suspension Cultures of the Macrophytic Red Alga *Ochtodes secundiramea*." *Biotechnology & Bioengineering*, 74, 389-395 (2001).

31. Rudie, A., Puckett, A., and Rorrer, G.L. "NPE Modeling of a Laboratory Bleach Filtrate Recycle Experiment." In: *Fundamentals and Numerical Modeling of Unit Operations in the Forest Products Industries*, B.N. Brogdon, S.J. Severtson and C.C. Walker, Eds. *AIChE Symposium Series 324, Vol. 96*, American Institute of Chemical Engineers, New York (2000) pp. 53-65.
30. Rorrer, G.L. "Cell and Tissue Cultures of Marine Seaweeds." In: *Encyclopedia of Cell Technology*, R.E. Spier, Ed., John Wiley & Sons, Inc. (2000), pp. 1105-1116.
29. Rorrer, G.L., and Mullikin, R.K. "Modeling and Simulation of a Tubular Recycle Photobioreactor for Macroalgal Suspension Cultures." *Chemical Engineering Science*, 54, 3153-3162 (1999).
28. Rorrer, G.L., Mullikin, R.K., Huang, B., Gerwick, W.H., Maliakal, S., and Cheney, D.P. "Production of Bioactive Metabolites by Cell and Tissue Cultures of Marine Macroalgae in Bioreactor Systems." In: *Plant Cell and Tissue Culture for the Production of Food Ingredients*, T.-J. Fu, G. Singh, and W.R. Curtis, Eds., Kluwer Academic / Plenum Publishing, New York (1999), pp. 165-184.
27. Mullikin, R.K., and Rorrer, G.L. "A Tubular Recycle Photobioreactor for Macroalgal Suspension Cultures." In: *BioHydrogen*, O.R. Zaborsky, Ed., Plenum Press, New York (1998), pp. 403-414.
26. Huang, Y.M., Maliakal, S., Cheney, D.P., and Rorrer, G.L. "Comparison of Development and Photosynthetic Growth for Filament Clump and Regenerated Microplantlet Cultures of *Agardhiella subulata* (Rhodophyta, Gigartinales)." *Journal of Phycology*, 34, 893-901 (1998).
25. Rorrer, G.L. "Removal of Heavy Metal Ions from Waste Water." In: *Encyclopedia of Environmental Analysis and Remediation, Vol. 4*, R.A. Meyers, Ed., John Wiley & Sons, Inc. (1998), pp. 2102-2125.
24. Rorrer, G.L., Yoo, H.D., Huang, B., Hayden, C., and Gerwick, W.H. "Production of Hydroxy Fatty Acids by Cell Suspension Cultures of the Marine Brown Alga *Laminaria saccharina*." *Phytochemistry*, 46, 871-877 (1997).
23. Hsien, T.Y., and Rorrer, G.L. "Heterogeneous Crosslinking of Chitosan Beads: Kinetics, Modeling, and Influence on Cadmium Ion Adsorption Capacity." *Industrial and Engineering Chemistry Research*, 36, 3631-3638 (1997).
22. Lourvanij, K., and Rorrer, G.L. "Reaction Rates for the Partial Dehydration of Glucose to Organic Acids in Molecular Sieve Catalyst Powders." *Journal of Chemical Technology and Biotechnology*, 69, 35-44 (1997).
21. Rorrer, G.L. "An Ode to Distillation and other Poetry - A Creative Writing Assignment for Chemical Engineering Undergraduates." *Chemical Engineering Education*, 30, 180-183 (1996).
20. Zhi, C., and Rorrer, G.L. "Photolithotrophic Cultivation of *Laminaria saccharina* Gametophyte Cells in a Bubble-Column Bioreactor." *Enzyme and Microbial Technology*, 18, 291-299 (1996).
19. Rorrer, G.L., Polne-Fuller, M., and Zhi, C. "Development and Bioreactor Cultivation of a Novel Semi-Differentiated Tissue Suspension Derived from the Marine Plant *Acrosiphonia coalita*." *Biotechnology and Bioengineering*, 49, 559-567 (1996).
18. Netrabukkana, R., Lourvanij, K., and Rorrer, G.L. "The Diffusion of Glucose and Glucitol in Microporous and Mesoporous Silicate Catalysts." *Industrial and Engineering Chemistry Research*, 35, 458-464 (1996).

17. Hsien, T.Y., and Rorrer, G.L. "Effects of Acylation and Crosslinking on the Material Properties and Cadmium Ion Adsorption Capacity of Porous Chitosan Beads." *Separation Science and Technology*, 30, 2455-2475 (1995).
16. Rorrer, G.L., Zhi, C., Modrell, J., and Gerwick, W.H. "Bioreactor Seaweed Cell Culture for Production of Bioactive Oxylipins." *Journal of Applied Phycology*, 7, 187-198 (1995).
15. Qi, H., Jiang, Z.D., and Rorrer, G.L. "Kinetics of Nonphotosynthetic Callus Induction from the Brown Alga *Laminaria setchellii*." *Phycological Research*, 43, 179-182 (1995).
14. Qi, H., and Rorrer, G.L. "Photolithotrophic Cultivation of *Laminaria saccharina* Gametophyte Cells in a Stirred-Tank Bioreactor." *Biotechnology and Bioengineering*, 45, 251-260 (1995).
13. Ho, C., Henderson, K.A., and Rorrer, G.L. "Cell Damage and Oxygen Mass Transfer During Cultivation of *Nicotiana tabacum* in a Stirred Tank Bioreactor." *Biotechnology Progress*, 11, 140-145 (1995).
12. Lourvanij, K., and Rorrer, G.L. "Dehydration of Glucose to Organic Acids in Microporous Pillared Clay Catalysts." *Applied Catalysis*, 109A, 147-165 (1994).
11. Rorrer, G.L., Hsien, T.Y., and Way, J.D. "Synthesis of Porous-Magnetic Chitosan Beads for Removal of Cadmium Ions from Waste Water." *Industrial and Engineering Chemistry Research*, 32, 2170-2178 (1993).
10. Lourvanij, K., and Rorrer, G.L. "Reactions of Aqueous Glucose Solutions with Y-zeolite Catalysts at 110 to 160 °C." *Industrial and Engineering Chemistry Research*, 32, 11-19 (1993).
9. Rorrer, G.L., and Hawley, M.C. "Vapor-Phase HF Solvolysis of Cellulose: Modification of the Reversion Oligosaccharide Distribution by *in situ* Methanolysis." *Carbohydrate Polymers*, 22, 9-13 (1993).
8. Rorrer, G.L., and Hawley, M.C. "Solvolysis of Lignocellulose by Anhydrous Hydrogen Fluoride Vapor: Yield Comparisons from Four Lignocellulosic Substrates." *Bioresource Technology*, 43, 185-193 (1993).
7. Rorrer, G.L., and Hawley, M.C. "Solvolysis of a Single Lignocellulose Particle by Anhydrous Hydrogen Fluoride Vapor: Effect of Temperature on HF Adsorption, Glucose Production Rate, and Reversion Kinetics." *Applied Biochemistry & Biotechnology*, 28/29, 43-58 (1991).
6. Rorrer, G.L., Hawley, M.C., Lamport, D.T.A., and Dey, P.M. "Anhydrous Hydrogen Fluoride in Polysaccharide Solvolysis and Glycoprotein Deglycosylation." In: *Methods in Plant Biochemistry*, Vol. 2: *Carbohydrates*, P.M. Dey and J.B. Harborne, Eds., Academic Press, London (1990), pp. 581-606.
5. Mort, A.J., Komalivilas, P., Rorrer, G.L., and Lamport, D.T.A. "Anhydrous Hydrogen Fluoride and Cell Wall Analysis." In: *Modern Methods of Plant Analysis*, Vol. 10: *Plant Fibers*, H.F. Linskens and J. F. Jackson, Eds., Springer Verlag, Berlin (1989), pp. 37-69.
4. Rorrer, G.L., Mohring, W.R., Hawley, M.C., and Lamport, D.T.A. "A Detailed Kinetic and Heat Transport Model for the Hydrolysis of Lignocellulose by Anhydrous Hydrogen Fluoride Vapor." *Chemical Engineering Science*, 43, 1831-1836 (1988).

Curriculum Vitae for Gregory L. Rorrer

3. Rorrer, G.L., Mohring, W. R., Hawley, M.C., and Lamport, D.T.A. "Adsorption and Reaction Processes of the Solvolysis of Wood and Pure Cellulose by Anhydrous Hydrogen Fluoride Vapor." *Energy & Fuels*, 2, 556-566 (1988).
2. Rorrer, G.L., Ashour, S.A., Hawley, M.C., and Lamport, D.T.A. "Solvolysis of Wood and Pure Cellulose by Anhydrous Hydrogen Fluoride Vapor." *Biomass*, 12, 227-246 (1987).
1. Rorrer, G.L., Hawley, M.C., and Lamport, D.T.A. "Reaction Rates for Gas-Phase Hydrogen Fluoride Saccharification of Wood." *I & EC Research and Development*, 25, 589-595 (1986).

Textbooks (G.L. Rorrer as co-author)

Welty, J.R., Wilson, R.E., Wicks, C.E., Rorrer, G.L. *Fundamentals of Momentum, Heat and Mass Transfer* (4th Edition), John Wiley & Sons (2000).

Non-Refereed Publications (Conference Proceedings, Reports, Articles)

11. Gutu, T., Jiao, J., Jeffryes, C., Qin, T., Chang, C.-H., Rorrer, G.L. "Biosynthesis and Electron Microscopy Characterization of Diatom Nanocomposites." *Materials Research Society (MRS) Symposium Proceedings*, 901E, 0901-Ra05-14-Rb05-14.1-6 (2006).
10. Gutu, T., Dong, L., Jiao, J., Rorrer, G.L., Chang, C.-H., Jeffryes, C., Qin, T. "Characterization of Silicon-Germanium Oxide Nanocomposites Fabricated by the Marine Diatom *Nitzschia frustulum*." *Microscopy & Microanalysis*, 11(Sup. 2), 1958-1959 (2005).
9. Liu, S., Jeffryes, C., Rorrer, G.L., Chang, C.-H., Jiao, J., Gutu, T. "Blue Luminescent Biogenic Silicon-Germanium Oxide Nanocomposites." *Materials Research Society (MRS) Symposium Proceedings*, 873E, K1.4.1-6 (2005).
8. Rorrer, G.L. "Use of WIC Activities to Address ABET 2000 Accreditation Needs within the Chemical Engineering Curriculum." *Teaching with Writing (The Oregon State University Writing Intensive Curriculum Newsletter)*, 11(1), 3 (2001).
7. Rorrer, G.L., Rudie, A., Frederick, W.J. "Modeling and Simulation of NPE Metal Ion Adsorption and Precipitation in a Single-Stage Drum Washer." *Proceedings of the 2000 TAPPI International Environmental Conference and Exhibit*, TAPPI Press, Atlanta GA, 2000, pp. 907-923.
6. Yantasse, W., and Rorrer, G.L. "A Site-Specific Equilibrium Model for the Adsorption of NPE Metal Ions onto Wood Pulp." *Proceedings of the 2000 TAPPI International Environmental Conference and Exhibit*, TAPPI Press, Atlanta GA, 2000, pp. 903-906.
5. Rorrer, G.L., Yantasee, W. "Adsorption Isotherms for Divalent Metal Ions on Brownstock Wood Pulp." *NCASI Technical Bulletin no. 792*, September 1999, 16 pp.
4. Rorrer, G.L., Gerwick, W.H., Cheney, D.P. "Production of Bioactive Compounds by Cell and Tissue Cultures of Marine Seaweeds in Bioreactor Systems." In: *New Developments in Marine Biotechnology*, Y. Le Gal and H.O. Halvorson (Eds.) Plenum Press, New York, 1998, pp. 65-68.
3. Rorrer, G.L., Yantasee, W. "Adsorption Isotherms for Divalent Metal Ions on Unbleached Wood Pulp." In: *Proceedings of 1997 TAPPI Minimum Effluent Mills Symposium*, TAPPI Press, Atlanta GA, 1997, pp. 31-43.

2. Rorrer, G.L., Hsien, T.Y. "Development of Biopolymer Adsorbents for Heavy Metal Ion Separations." In: *Proceedings of 1996 TAPPI Minimum Effluent Mills Symposium*, TAPPI Press, Atlanta GA, 1996, pp. 261-267.
1. Rorrer, G.L., Ashour, S.S., Hawley, M.C., Lamport, D.T.A. "Glucose Yields from the Solvolysis of Wood and Pure Cellulose by Anhydrous Hydrogen Fluoride Vapor." In: *Energy from Biomass and Wastes XI*, D.L. Klass (Ed.), Institute of Gas Technology, Chicago, 1988, pp. 953-980.

PRESENTATIONS

Invited and Peer-Selected Conference Presentations

3 keynote, 13 invited, 30 contributed; G.L.Rorrer was the speaker on all presentations listed.

46. Rorrer, G.L. (speaker), Jeffryes, C., Qin, T., Gutu, T., Jiao, J., Chang, C.-H. "Two Stage Diatom Cell Culture for the Fabrication of Optoelectronic Materials Ordered at the Submicron and Nanoscale." *Society of Biological Engineering (SBE) Second International Conference on Bioengineering and Nanotechnology*, Session on Supramolecular and Self-Assembly, Sept. 5, 2006, Santa Barbara, CA.
45. Rorrer, G.L. (invited speaker). "Whole-Cell Biosynthesis of Nanostructured Silicon-Germanium Oxide Photoluminescent Semiconductor Materials Possessing Defined Microstructure." *2006 Gordon Conference on Biomineralization*, Session on Biosilicification Mechanisms, July 31, 2006, Colby-Sawyer College, New London, NH.
44. Rorrer, G.L. (invited speaker). "Biological Fabrication of Nanostructured Metal Oxide Optoelectronic Materials." *France-US Workshop on NanoBio Technologies*, March 2, 2006, Washington, D.C.
43. Rorrer, G.L. (invited speaker), Chang, C.-H., Jiao, J. "Whole-Cell Biosynthesis of Nanostructured Metal Oxide Semiconductors." *2005 Nanoscale Science and Technology Grantee Conference*, National Science Foundation, Dec. 12, 2005, Washington, D.C.
42. Rorrer, G.L. (keynote speaker), Chang, C.-H., Jeffryes, C., Liu, S.-H., Qin, T., and Jiao, J. "Whole-cell Biosynthesis of Nanostructured Semiconductor Materials by Marine Diatoms." *7th International Marine Biotechnology Conference (IMBC 2005)*, Session on Biomineralization, June 10, 2005, St. Johns, NL, Canada.
41. Rorrer, G.L. (invited speaker), Chang, C.-H., Jeffryes, C., Liu, S.H., Qin, T., and Jiao, J. "Cellular Biosynthesis of Nanostructured Semiconductor Materials." *229th National Meeting of the American Chemical Society (ACS)*, Division of Industrial & Engineering Chemistry (I&EC), Session on Nanotechnology and the Environment, March 17, 2005, San Diego, CA.
40. Rorrer, G.L. (invited speaker), Cruz-Uribe, O, and Cheney, D.P. "Detoxification of Organic Pollutants by Marine Seaweeds." *2005 Annual Meeting of the American Association for the Advancement of Science (AAAS)*, Symposium on Phytoremediation: New Solutions to Pollution Remediation on Land and in the Sea, Feb. 18, 2005, Washington, DC.
39. Polzin, J., Barahona, L.F., Cheney, D.P., and Rorrer, G.L. (speaker). "Comparison of Halogenated Monoterpene Biosynthesis in *Ochtodes secundiramea* and *Portieria hornemannii*." *Fall 2004 National Meeting of the American Institute of Chemical Engineers (AIChE)*, Paper #479d, Session on Advances in Agricultural Biotechnology and Plant Cell Culture, Nov. 8, 2004, Austin, TX.

38. Rorrer, G.L. (*invited speaker*), Cruz-Uribe, O., Cheney, D.P. "Metabolic Engineering of Seaweeds for the Detoxification of TNT-Contaminated Marine Waters." *Joint Interagency Phytoremediation Research Program, Principal Investigators Meeting*. National Science Foundation, Jan. 20, 2004, Washington, DC.
37. Rorrer, G.L. (speaker), Chang, C.-H., Jiao, J., Liu, S.-H., Hedberg, A., and Jeffryes, C. "Biosynthesis of Silicon Germanium Oxide Nanocomposites by Marine Diatoms." *Fall 2003 National Meeting of the American Institute of Chemical Engineers (AIChE)*, Paper #392a, Session on Biomimetics III, Nov. 21, 2003, San Francisco, CA.
36. Cruz-Uribe, O., and Rorrer, G.L. (speaker). "Biotransformation of TNT in Seawater by Microplantlet Tissue Cultures of the Marine Red Alga *Portieria hornemannii*." *Fall 2003 National Meeting of the American Institute of Chemical Engineers (AIChE)*, Paper #411e, Session on Advances in Environmental Biotechnology I: Remediation, Nov. 19, 2003, San Francisco, CA.
35. Rorrer, G.L. (*invited speaker*). "Bioprocess Engineering of Cell & Tissue Cultures of Marine Seaweeds." *2003 Aquacultural Engineering (AE) Issues Forum*, Session on Design of Algae / Abalone Culture Systems, Nov. 4, 2003, Seattle, WA.
34. Rorrer, G.L. (speaker), and Polzin, J.J. "Metabolic Flux Analysis of Halogenated Monoterpene Biosynthesis in Microplantlets of the Red Algae *Ochtodes secundiramea* and *Portieria hornemannii*." *2003 Annual Meeting of the Phycological Society of America (PSA)*, Session on Applied Phycology / Physiology, June 18, 2003, Gleneden Beach, OR.
33. Polzin, J.J., and Rorrer, G.L. (speaker). "Metabolic Flux Analysis of Halogenated Monoterpene Biosynthesis in Microplantlets of Red Algae." *225th National Meeting of the American Chemical Society (ACS)*, Division of Biochemical Technology (BIOT), Paper 381, Session on Advances in Plant Biotechnology, March 27, 2003, New Orleans, LA.
32. Rorrer, G.L. (*keynote speaker*). "New Process Biotechnologies for Marine Seaweeds." *Marine Biotechnology: Basics and Applications*, European Society for Marine Biotechnology, February 26, 2003, Matalascanas, Spain.
31. Rorrer, G.L. (speaker), Polzin, J.P., and Cheney, D.P. "Kinetics of Halogenated Monoterpene Production by Microplantlet Suspension Cultures of the Red Alga *Ochtodes secundiramea*." *Fall 2001 National Meeting of the American Institute of Chemical Engineers (AIChE)*, Paper 304d, Session on Advances in Plant Cell Culture, Nov. 5, 2001, Reno, N.V.
30. Rorrer, G.L. (*keynote speaker*). "From Cell Culture to Metabolic Engineering in Photobioreactors: New Process Biotechnologies for Marine Seaweeds." *Marine Microbial Biotechnology Workshop 2001 (MMBW 2001)*, European Society for Marine Biotechnology, Heriot-Watt University, August 18, 2001, Edinburgh, Scotland.
29. Rorrer, G.L. (speaker), Rudie, A., and Frederick, W.J. "Modeling and Simulation of NPE Metal Ion Adsorption and Precipitation in a Single-Stage Drum Washer." *2000 TAPPI International Environmental Conference and Exhibit*, Paper 47-2, Session 47, Closed Mill Issues, May 10, 2000, Denver, CO.
28. Rorrer, G.L. (speaker), Huang, Y.-M., Maliakal, S., and Cheney, D.P. "Cultivation of Cell and Tissue Suspensions of the Macrophytic Red Alga *Agardhiella subulata* in Bubble-Column and Stirred-Tank Photobioreactors." *Marine Bioprocess Engineering First International Symposium*, Session on Cultivation of Marine Organisms I, Nov. 9, 1998, Noordwijkerhout, the Netherlands.

27. Rorrer, G.L. (speaker), and Mullikin, R.K. "Modeling and Simulation of a Tubular Recycle Photobioreactor for Macroalgal Suspension Cultures." *15th International Symposium on Chemical Reaction Engineering (ISCRE-15)*, Paper 17-c, Session on Biochemical Processing, Sept. 16, 1998, Newport Beach, CA.
26. Rorrer, G.L. (invited speaker), and Cheney, D.P. "Cell and Tissue Cultures of Marine Macroalgae: Culture Development, Bioreactor Scale-Up, and Production of Bioactive Compounds." *1998 Meeting of the World Aquaculture Society*, Session on Macroalgal Cultivation, Feb. 18, 1998, Las Vegas, NV.
25. Rorrer, G.L. (speaker), and Hsien, T.Y. "Heterogeneous Crosslinking of Chitosan Gel Beads: Modeling, Kinetics, and Influence on Cadmium Ion Adsorption Capacity." *1997 Fall National Meeting of the American Institute of Chemical Engineers (AIChE)*, Paper 30a, Session on Synthesis and Characterization of Novel, Selective Ion Exchangers, Nov. 20, 1997, Los Angeles, CA.
24. Rorrer, G.L. (speaker), Huang, Y.M., Maliakal, S., and Cheney, D.P. "Development, Characterization, and Bioreactor Cultivation of Novel Cell and Microplantlet Cultures of the Red Alga *Agardhiella subulata*." *Fall 1997 National Meeting of the American Institute of Chemical Engineers (AIChE)*, Paper 222h, Session on Advances in Plant Cell Culture, Nov. 19, 1997, Los Angeles, CA.
23. Rorrer, G.L. (speaker), and Yantasee, W. "Adsorption Isotherms for Divalent Metal Ions on Unbleached Wood Pulp." *1997 TAPPI Minimum Effluent Mills Symposium*, Paper 2-1, Session 2, Fiberline Behavior, Oct. 23, 1997, San Francisco, CA.
22. Rorrer, G.L. (invited speaker), Gerwick, W.H., and Cheney, D.P. "Production of Bioactive Compounds by Cell and Tissue Cultures of Marine Seaweeds in Bioreactor Systems." *4th International Marine Biotechnology Conference (IMBC '97)*, Session O2, Natural Products and Processes, Sept. 23, 1997, Sorrento, Italy.
21. Rorrer, G.L. (invited speaker), and Mullikin, R.K. "Photobioreactor Design Considerations for Macroalgal Suspension Cultures." *Biohydrogen '97*, Young Investigator Session, June 24, 1997, Kona, HI.
20. Rorrer, G.L. (invited speaker), Gerwick, W.H., and Cheney, D.P. "Production of Bioactive Metabolites by Cell and Tissue Cultures of Marine Macroalgae in Bioreactor Systems." *213th National Meeting of the American Chemical Society (ACS)*, Paper AGFD-41, Symposium on Plant Cell and Tissue Culture for Food Ingredient Production, April 14, 1997, San Francisco, CA.
19. Rorrer, G.L. (speaker), Hayden, C., Yoo, H.-D., and Gerwick, W.H. "Stimulation of 15-Lipoxygenase Metabolism in Liquid Suspension Cultures of *Laminaria saccharina*." *1996 Annual Meeting of the Phycological Society of America (PSA)*, Session 5, Applied Phycology, July 16, 1996, Santa Cruz, CA.
18. Rorrer, G.L. (invited speaker). "15-Lipoxygenase Metabolism in Liquid Cell Suspension Cultures of the Macrophytic Brown Alga *Laminaria saccharina*." *1996 Gordon Conference on Marine Natural Products*, Feb. 29, 1996, Ventura, CA.
17. Rorrer, G.L. (speaker), and Hsien, T.Y. "Development of Biopolymer Adsorbents for Heavy Metal Ion Separations." *1996 TAPPI Minimum Effluent Mills Symposium*, Paper 8-4, Session 4, Bleach Evaporation, Jan. 23, 1996, Atlanta, GA.

16. Rorrer, G.L (speaker), Zhi, C., and Polne-Fuller, M. "Cultivation of a Novel Tissue Suspension Derived from the Green Alga *Acrosiphonia coalita* in a 3 L Stirred Tank Bioreactor." *1995 Annual Meeting of the Phycological Society of America (PSA)*, Symposium on Applied Phycology, Aug. 10, 1995, Breckenridge, CO.
15. Rorrer, G.L. (speaker), Zhi, C., Qi, H., Gerwick, W.H. and Polne-Fuller, M. "Photolithotrophic Bioreactor Cultivation of Marine Plant Cells for Production of Lipxygenase Metabolites." *Fall 1994 National Meeting of the American Institute of Chemical Engineers (AIChE)*, Paper 35a, Session on Plant Cell, Tissue, and Organ Culture: From Cellular Processes to Bioreactors, Nov. 15, 1994, San Francisco, CA.
14. Rorrer, G.L. (speaker), and Hsien, T.Y. "Development of Chemically Modified Biopolymer Beads for Heavy Metal Ion Separations." *1994 Annual Pacific Northwest Pollution Control Association (PNPCA) Meeting*, Session 6, Industrial Waste Minimization, Sept. 20, 1994, Spokane, WA.
13. Rorrer, G.L. (invited speaker), Zhi, C., Qi, H., Modrell, J., and Gerwick, W.H. "Bioreactor Seaweed Cell Culture for Production of Biomedicinals." *Fifth International Phycological Congress (IPC-5)*, Symposium 10, Microalgal & Macroalgal Biotechnology, July 1, 1994, Qingdao, PR China.
12. Rorrer, G.L. (speaker), Zhi, C., Qi, H., and Modrell, J. "Bioreactor Studies of *Laminaria saccharina* Cell Suspension Cultures." *Fall 1993 National Meeting of the American Institute of Chemical Engineers (AIChE)*, Paper 110c, Session on Advances in Plant Cell Culture II, Nov. 8, 1993, St. Louis, MO.
11. Rorrer, G.L. (speaker), and Lourvanij, K. "Selective Dehydration of Glucose to Organic Acids in Microporous Pillared Clay Catalysts." *15th Symposium on Biotechnology for Fuels and Chemicals*, Session 1, Thermal, Chemical and Biological Processing, May 11, 1993, Colorado Springs, CO.
10. Rorrer, G.L. (speaker), Qi, H., Modrell, J., Gerwick, W.H. "Development of Cell Cultures from Marine Plants for Production of Eicosanoid Biopharmaceuticals." *205th National Meeting of the American Chemical Society (ACS)*, Symposium on New Developments in Plant Cell Culture, April 1, 1993, Denver, CO.
9. Rorrer, G.L. (speaker), Qi, H., Modrell, J., and Gerwick, W.H. "Development of Liquid Cell Cultures from Oregon Macroalgae." *73rd Annual Meeting of the Western Society of Naturalists (WSN)*, Symposium on Phycology, Jan. 8, 1993, Otter Rock, OR.
8. Rorrer, G.L. (speaker), J.D. Way, and Hsien, T.Y. "Removal of Heavy Metal Ions from Waste Water Using Porous-Magnetic Chitosan Beads." *Summer 1992 National Meeting of the American Institute of Chemical Engineers (AIChE)*, Paper 80f, Session on Advanced Separation Processes for Waste Water Treatment, Aug. 10, 1992, Minneapolis, MN.
7. Rorrer, G.L. (speaker), Way, J.D., and Hsien, T.Y. "Use of Chitosan Beads to Remove Heavy Metals from Wastewater." *DOE Waste Stream Minimization/Utilization Technology Fair*, April 25, 1991, Vienna, VA.
6. Rorrer, G.L. (speaker), Mohring, W.R., and Hawley, M.C. "Two Milligram-Scale Reactors for Measuring Gravimetric Vapor Sorption and Conversion Kinetics of Non-Catalytic Vapor-Solid Reactions." *Fall 1990 National Meeting of the American Institute of Chemical Engineers (AIChE)*, Paper 126f, Session on Novel Reactor Techniques for Heterogeneous Systems, Nov. 16, 1990, Chicago, IL.

Curriculum Vitae for Gregory L. Rorrer

5. Rorrer, G.L. (speaker), and Hawley, M.C. "Solvolysis of a Single Lignocellulose Particle by Anhydrous Hydrogen Fluoride Vapor: Effect of Temperature on HF Adsorption, Glucose Production Rate, and Reversion Kinetics." *12th Symposium on Biotechnology for Fuels and Chemicals*, Session 1, Thermal, Chemical, and Biological Processing, May 7, 1990, Gatlinburg, TN.
4. Rorrer, G.L. (speaker), Mohring, W.R., Hawley, M.C., and Lamport, D.T.A. "A Detailed Kinetic and Heat Transport Model for the Hydrolysis of Lignocellulose by Anhydrous Hydrogen Fluoride Vapor." *10th International Symposium on Chemical Reaction Engineering (ISCRE-10)*, Aug. 29, 1988, Basle, Switzerland.
3. Rorrer, G.L. (speaker), Mohring, W.R., Hawley, M.C., and Lamport, D.T.A. "A Reaction Model for the Solvolysis of Lignocellulose by Anhydrous Hydrogen Fluoride Vapor." *Summer 1987 National Meeting of the American Institute of Chemical Engineers (AIChE)*, Paper 32a, Symposium on Lignocellulosic Reactions II, Aug. 17, 1987, Minneapolis, MN.
2. Rorrer, G.L. (speaker), Hawley, M.C., and Lamport, D.T.A. "Glucose Yields from the Solvolysis of Wood and Pure Cellulose by Anhydrous Hydrogen Fluoride Vapor." *Energy from Biomass and Wastes XI*, Symposium on Alcohol Fuels, March 19, 1987, Orlando, FL.
1. Rorrer, G.L. (speaker), Hawley, M.C., and Lamport, D.T.A. "Reaction Rates for Gas-Phase Hydrogen Fluoride Saccharification of Wood." *190th National Meeting of the American Chemical Society (ACS)*, Symposium on Pretreatment and Hydrolysis of Lignocellulosic Materials, Sept. 12, 1985, Chicago, IL.

Conference Poster Presentations (G.L. Rorrer, Presenter)

1. Rorrer, G.L. (presenter), Henderson, K.A., and Ho, C. "Oxygen Mass Transfer and Shear Sensitivity in Stirred Tank Culture of *Nicotiana tabacum* at High Cell Density." *Fall 1993 National Meeting of the American Institute of Chemical Engineers (AIChE)*, Paper 100a2, Area 15c Poster Session, Nov. 8, 1993, St. Louis, MO.
2. Rorrer, G.L. (presenter), and Netrabukkana, R. "Diffusion of Glucose and Glucitol in Molecular Sieving Catalysts." *1995 Fall National Meeting of the American Institute of Chemical Engineers (AIChE)*, Paper 59n, Poster Session on Experimental Developments in Kinetics, Catalysis, and Reaction Engineering, Nov. 13, 1995, Miami Beach, FL.
3. Rorrer, G.L. (presenter), Huang, Y.M. "Photoperiod Growth Model for Microplantlets of the Marine Red Alga *Agardhiella subulata*." *2001 Fall National Meeting of the American Institute of Chemical Engineers (AIChE)*, Paper 300e, Poster Session for Area 15c: Food, Pharmaceutical, and Bioengineering Division. Nov. 6, 2001, Reno, N.V.
4. Cheney, D.P. (co-presenter), Rorrer, G.L. (co-presenter), Bernasconi, P.G., Cruz-Uribe, O., Bruce, N. "Metabolic Engineering of Seaweeds for the Detoxification of TNT in Marine Waters." *Workshop on Tools for Environmental Cleanup: Engineered Plants for Phytoremediation*, Jan. 27, 2003, Seattle, WA.
5. Rorrer, G.L. (presenter), Jeffryes, C., Liu, S-H., Chang, C.-H. "Biosynthesis of Germanium Oxide by Marine Diatoms." *225th National Meeting of the American Chemical Society (ACS)*, Paper 265, Division of Biochemical Technology (BIOT) Poster Session, March 25, 2003, New Orleans, LA.

Invited International Teaching Assignments

Instituto Tecnológico Durango (ITD), Durango, Mexico, Department of Chemical Engineering. "Mass Transfer in Emerging Process Technologies." Short Course, May 25-29, 1998.

Invited Workshops & Program Reviews

1. Rorrer, G.L. (*invited speaker*). "Uptake and Metabolism of Trinitrotoluene from Seawater by Tissue Cultures of Native and Transgenic Marine Seaweeds." *Annual Technical Review, U.S. Navy Project on UXO/MC in the Marine Environment*, Feb. 6, 2004, US Army ERDC Environmental Research Laboratory, Vicksburg, MS.
2. Rorrer, G.L. (*invited speaker*). "Marine Biotechnology: Biopharmaceuticals from Cell and Tissue Cultures of Red Algae." *Oregon Sea Grant Program Assessment Team Visit*, May 17, 2005, Oregon State University.

Invited Seminars (non Conference)

1. Hoechst A.G., Biotechnology Corporate Research/Carbohydrate Chemistry Research Group, Hauptlaboratorium G 830, Frankfurt, West Germany, Sept. 9, 1988.
2. Department of Chemical Engineering, Michigan State University, Nov. 3, 1988.
3. Department of Agricultural Engineering, Oregon State University, Oct. 4, 1989.
4. Department of Chemical Engineering, Washington State University, Pullman, WA, March 23, 1992.
5. AIChE-Oregon Section Meeting, Eugene, OR, May 13, 1992.
6. OSU Center for Gene Research and Biotechnology Annual Retreat, Hatfield Marine Science Center, Newport, OR, Sept. 26, 1992.
7. Western Oregon State College, Division of Natural Sciences, Monmouth, OR, April 27, 1994.
8. Department of Chemical Engineering, University of Idaho, Moscow, ID, Oct. 10, 1996.
9. Department of Biology, Northeastern University, Boston, MA, Oct. 7, 1998.
10. Marine Science Center, Northeastern University, Nahant, MA, Oct. 21, 1998.
11. Department of Chemical Engineering, Northeastern University, Boston, MA, Nov. 5, 1998.
12. Phytera, Inc., Worcester, MA, Dec. 2, 1998.
13. Institute of Paper Science and Technology, Atlanta, GA, April 23, 1999.
14. Department of Chemical Engineering, Louisiana State University, Baton Rouge, LA, April 7, 2000.
15. U.S. Office of Naval Research (ONR), Biomolecular and Bioscience Technology Division, Arlington, VA, June 5, 2000.
16. Department of Energy Pacific Northwest National Laboratory, Richland, WA, June 21, 2002.
17. Excelixis Plant Sciences, Portland, OR, May 17, 2004.
18. College of Oceanographic & Atmospheric Sciences, Oregon State University, May 12, 2005.
19. Sequim Marine Sciences Laboratory, Department of Energy Pacific Northwest National Laboratory, Jan. 12, 2006.
20. Department of Physics, Portland State University, Jan. 30, 2006.
21. Department of Physics, Oregon State University, Feb. 1, 2006.
22. Society of Biological Engineers, Student Chapter, Oregon State University, April 11, 2006.

News Media & Press Releases

1. OSU Press Release 5-13-92, David Stauth. Toxic Waste Process Shows Promise.
2. *The New York Times*, June 2, 1992, p. B-9. Toxic Cleanup Tool.
3. KPTV-12, Portland television station, broadcast June 11, 1992. Story re-broadcast on *Cable New Network (CNN)*, Science & Technology Today.
4. *The Oregonian* (Portland, OR major newspaper circ. 500,000), June 11, 1992 (front page, section E). Old crab shells work wonders on toxic waste.
5. *Chemical Engineering Progress* (major chemical engineering trade journal), September 1992, 24. Chitin gobbles up toxic waste.
6. OSU Press Release 1-26-93, Jen Ellison. Seaweed Cells Could Yield Valuable Drugs.
7. *The Oregon Scientist* (circ. 32,000), Vol. VI, No. 1, Spring 1993, front page. New drugs from seaweed.

8. OSU Press Release 1-14-94, Carmel Finley. Sea Research May Yield Clues to New Medicinal Compounds.
9. *The Oregonian* (Portland, OR major newspaper circ. 500,000), Feb. 16, 1994, p. E-11 with photo. Gathering sufficient quantity for analysis can be a challenge.
10. OSU Press Release 7-29-04, David Stauth. Ancient Life Form May Help Create Newest Technologies. Picked up by United Press International (UPI), Ancient Algae Weaves Electronics Material. *Washington Times* (Washington DC, newspaper), Aug. 2, 2004.
11. OSU Press Release 7-28-04, Gregg Kleiner. OSU, PSU Receive 1.3 Million for ONAMI Research. Printed in *The Business Journal* (Portland), July 28, 2004.
12. *National Public Radio* (NPR), three feature stories for *Pulse of the Planet: Diatoms & Nanotechnology: Think Future, Think Small* (March 24, 2005); *Diatoms & Nanotechnology: Redefining "Man Made"* (March 28, 2005); *Nanotechnology: Shell Game* (March 29, 2005).
13. OSU Press Release 2-18-05, David Stauth. Marine Seaweed Detoxify Organic Pollutants.
14. *Chemical & Engineering News*, Feb. 28, 2005, Louisa Dalton, Vol. 83(9), p. 14 with photo. Seaweeds have an Appetite for TNT.
15. *The Oregonian*, Feb. 23, 2005, p. A-15. Red seaweed detoxifies TNT lurking in ocean.
16. *Scientific American*, Netherlands Edition, May-June, 2005, Aschwin Tenfelde, p. 12 with photo. Zeeweir eet chemicaliën.
17. *National Geographic News*, March 29, 2005, John Roach. Nanotech Gadgets to be Built by Algae?

GRANTS AND CONTRACTS

Competitive & External Grant Awards (\$3.26 million total)

G.L. Rorrer was the Principal Investigator (PI) on all competitive awards listed below. Awards are listed in reverse chronological order.

1. U.S. Office of Naval Research. G.L. Rorrer, PI, \$122,485. Metabolism of the Explosive Compounds TNT and RDX by Tissue Cultures of Marine Seaweeds. Jan. 1, 2006 to Dec. 31, 2007.
2. ATI/Teledyne Wah Chang. G.L. Rorrer, PI, \$47,000 (50% co-funding Oregon Metals Initiative). Development of a Process for Co-Production of Aqueous Ammonia and Calcium Chloride. Oct. 1, 2005 to Sept. 30, 2006.
3. U.S. Army. G.L. Rorrer, PI, \$80,310. Tactical Energy Systems Development, Task 5.2: Conversion of Soldier Food Waste to Fuel Cell Hydrogen by Supercritical Water in a Microchannel Reactor. June 15, 2005 to June 14, 2006.
4. NOAA / Oregon Sea Grant Program. G.L. Rorrer, PI, \$90,757. Uptake and Metabolism of Polycyclic Aromatic Hydrocarbons by Tissue Cultures of Marine Seaweeds. Aug. 1, 2005 to July 31, 2007.
5. USDA, subcontract from Northeastern University. G.L. Rorrer, PI, \$27,000. Removal of PCB and PAH Compounds from Seawater by Marine Seaweeds – A Preliminary Study. March 1, 2005 to September 1, 2005.
6. National Science Foundation (NSF). G.L. Rorrer, PI; C.-H. Chang, co-PI; J. Jiao, co-PI. \$1,300,000. NIRT: Whole-Cell Biosynthesis of Nanostructured Metal Oxide Semiconductors. Aug. 1, 2004 to July 31, 2008.
7. U.S. Office of Naval Research (ONR). G.L. Rorrer, PI. \$98,862. Metabolic Engineering of Seaweeds for the Detoxification of TNT-Contaminated Marine Waters. Oct. 1, 2002 to Sept. 30, 2004.

Curriculum Vitae for Gregory L. Rorrer

8. National Science Foundation (NSF), \$100,000. G.L. Rorrer, PI; C.-H. Chang, Co-PI. Biosynthesis of Germanium Oxide Nanoparticles. Aug. 1, 2002 to July 31, 2003.
9. National Science Foundation (NSF), \$190,574. G.L. Rorrer, PI. Production of Secondary Metabolites by Suspension Cultures of Red Macroalgae in Bioreactor Systems. Sept. 1, 1998 to Aug. 31, 2002 (includes REU supplement for Summer 2000).
10. National Council for Air and Stream Improvement (NCASI), \$10,541. G.L. Rorrer, PI. Heavy Metal Ion Adsorption on Wood Pulp. March 1, 1997, to Feb. 28, 1998.
11. U.S. Department of Energy, Office of Industrial Technologies, \$265,000. G.L. Rorrer (PI at OSU), W.J. Frederick (PI at IPST). Control of the Accumulation of Non-Process Elements and Organic Compounds in Pulp Mills with Effluent Wash Water Reuse. July 1, 1996 to June 30, 2000.
12. NOAA/National Sea Grant Marine Biotechnology Initiative, \$53,116. G.L. Rorrer, PI; D.P. Cheney, co-PI. Biopharmaceuticals from Cell Cultures of Red Macroalgae. Continuation Award. Aug. 1, 1997 to Oct. 1, 1999.
13. NOAA/National Sea Grant Marine Biotechnology Initiative, \$417,514. G.L. Rorrer, PI; D.P. Cheney and W.H. Gerwick, Co-PIs. Biopharmaceuticals from Cell Cultures of Red Macroalgae. Aug. 1, 1994 to Oct. 31, 1998.
14. NOAA/Oregon Sea Grant Program, \$137,600. G.L. Rorrer, PI; W.H. Gerwick, Co-Investigator. New Bioprocesses for Production of Medicinals from Marine Plant Cell Culture. Aug. 1, 1993 to July 31, 1995.
15. Hewlett-Packard Company Foundation, \$22,500. G.L. Rorrer, PI. Analytical Equipment for the Chemical Engineering Undergraduate Laboratory and Graduate Research. Feb. 11, 1993.
16. Petroleum Research Fund (ACS-PRF Type-G), \$21,000. G.L. Rorrer, PI. Diffusion and Reaction of Glucose in Y-Zeolite Catalysts. Sept. 1, 1991 to August 31, 1993.
17. U.S. Environmental Protection Agency, Exploratory Research Grants Program, \$199,334. G.L. Rorrer, PI; J.D. Way, Co-PI. Removal of Heavy Metals from Groundwater using Magnetic Chitosan Beads. Oct. 1, 1991, to Sept. 31, 1994.
18. NOAA/Oregon Sea Grant Program, \$79,900. G.L. Rorrer, PI, W.H. Gerwick, Co-Investigator. Bioreactor Studies of Marine Plant Cells in Liquid Culture for Production of Valued Natural Products. Aug. 1, 1991 to July 31, 1993.
19. U.S. Department of Energy, Pacific Northwest Laboratory Innovative Concepts Program, \$20,000. G.L. Rorrer and J.D. Way, Co-PIs. Removal of Heavy Metals from Dilute Aqueous Waste Streams using Chemically Modified Chitosan Beads. Dec. 15, 1990 to Dec. 15, 1991.
20. Biofine, Inc. (Framingham, Mass.), \$24,072. G.L. Rorrer, PI. Highly-Selective Conversion of Glucose and Maltose to Levulinic Acid by Y-Zeolite Catalysts. July 15, 1990 to July 14, 1991.
21. Hopton Technologies, Inc. (Albany, Oregon), \$6424. G.L. Rorrer, PI. Synthesis and Characterization of an Ammonium-Titanium-Carbonate Resin in Aqueous Solution. July 15, 1990 to Dec. 15, 1990.

Curriculum Vitae for Gregory L. Rorrer

Faculty Development Grants

ARCO Foundation, \$15,500. G.L. Rorrer, PI. Untenured Faculty Grant. Feb. 25, 1991.

OSU Internal Awards for Research

1. OSU-URISC, \$1800. Undergraduate Research, Summer 1997.
2. OSU Research Council, \$4000. G.L. Rorrer, PI. Selective Conversion of Glucose to Propyl Alcohols in Molecular Sieving Hydrogenation Catalysts. Oct. 1, 1993 to Sept. 31, 1994.
3. OSU Research Council, \$4000. G.L. Rorrer, PI. Bioreactor Studies of Plant Cells in Liquid Culture for Production of Valued Natural Products. July 15, 1990 to July 1, 1991.
4. OSU Research Reserves Equipment Fund (RREF), \$15,789.89 (excludes 20% match). G.L. Rorrer, PI. Beckman Z2 Dual Threshold Coulter Counter. Dec. 28, 2005.

Graduate Education Grants as Co-Investigator

U.S. Department of Education, \$501,753. Graduate Assistance in Areas of National Need: Hazardous Waste Management. S.L. Woods, PI. G.L. Rorrer, J. Selker, K. Higley, and G. Wheeler, Co-PIs. Sept. 1, 1995 to August 31, 1998.

Course and Curriculum Development Grants

1. Writing Intensive Curriculum (WIC) Program, OSU, \$2500. Stage One Curriculum Development Grant. "Use of WIC Activities to Address ABET 2000 Accreditation Needs within the Chemical Engineering Curriculum." June 1, 2000 to May 30, 2002.
2. Writing Intensive Curriculum (WIC) Program, OSU, \$1500. Development of Chemical Engineering Laboratory Courses. Feb. 1, 1992 to Jan. 31, 1993.

PROFESSIONAL SERVICE

Conference Leadership

1. Panel Discussion Group Leader, Algal Biotechnology for Fuels and Chemicals, *15th Symposium on Biotechnology for Fuels and Chemicals*, May 13, 1993, Colorado Springs, CO.
2. Co-Chair, Symposium on Toxic Metals Removal from Waste Streams (Session #33), *Summer 1993 National Meeting of the American Institute of Chemical Engineers*, August 17, 1993, Seattle, WA.
3. Chair, Advances in Plant Cell Culture (Session #209), *Fall 1995 National Meeting of the American Institute of Chemical Engineers*, Nov. 16, 1995, Miami Beach, FL.
4. Co-Chair, Advances in Plant Cell & Tissue Culture (Session #222), *Fall 1997 National Meeting of the American Institute of Chemical Engineers*, Nov. 19, 1997, Los Angeles, CA.
5. Co-Chair, Biochemical Processing (Session 17), *15th International Symposium on Chemical Reaction Engineering (ISCRE-15)*, Sept. 16, 1998, Newport Beach, CA.
6. Co-Chair, Advances in Plant Cell Culture (Session #304), *Fall 2001 National Meeting of the American Institute of Chemical Engineers*, Nov. 5, 2001, Reno, NV.
7. Member, Technical Advisory Board; Discussion Leader, Brainstorming Session - Heterotrophic Organisms. *Marine Biotechnology: Basics and Applications*, European Society for Marine Biotechnology, March 1, 2003, Matalascanas, Spain.

External Peer Review: Journals and Proposals

Manuscript Review (31 journals): Adsorption, AIChE Symposium Series, AIChE Journal, Applied Biochemistry & Biotechnology, Aquacultural Engineering, Biochemical Engineering Journal, Biomolecular Engineering, Bioresource Technology, Biotechnology Progress, Biotechnology & Bioengineering, Botanica Marina, Canadian Journal of Chemical Engineering, Carbohydrate Polymers, Carbohydrate Research, Chemical Engineering Science, Environmental Science & Technology, Journal of Applied Phycology, Journal of Biotechnology, Journal of Catalysis, Journal of Colloid and Interface Science, Journal of Nanobiotechnology, Journal of Nanoscience and Nanotechnology, Journal of Natural Products, Journal of Pulp and Paper Science, Industrial and Engineering Chemistry Research, Marine Biotechnology, Process Biochemistry, Phycological Research, Reactive & Functional Polymers, Separation Science & Technology, Water Research.

Proposal Review (10 Government Agencies / Foundations): American Chemical Society Petroleum Research Fund (ACS-PRF), Center for Plant Biotechnology Research (CPBR), DOE-SBIR Program, National Science Foundation (NSF STTR/SBIR program, NSF-BES program), NOAA/California Sea Grant Program, NOAA/Washington Sea Grant Program, NOAA-NMFS Program, USDA-CREES Program, National Research Council Canada/British Council Joint S & T Fund (Biotechnology), Science Foundation Ireland (Biotechnology).

Panel & Site Review

DOE Workshop on Biological Hydrogen Production Systems, April 26-27, 1998, Alexandria, VA.

External Panel Review: NSF/SBIR Biotechnology Program, Aug. 19, 1999; NSF Technologies for a Sustainable Environment, July 17-18, 2000; NSF Technologies for a Sustainable Environment, July 26-27, 2001; NSF Nanoscale Interdisciplinary Research Teams, Feb. 20-21, 2003; NSF Multi-Scale Modeling in Biomedical, Biological, and Behavioral Systems, Panel 1: Cellular Process, Jan. 1-Feb. 1, 2005; NSF BES Large Group Proposals, March 31-April 1, 2005.

Site Visit Team Member, NSF Engineering Research Centers (ERC) Program. Site visits to MarBEC ERC, University of Hawaii, Honolulu, HI, Sept. 23-24, 1999; Nov. 30-Dec. 1, 2000.

Professional Society Memberships (past and present)

American Institute of Chemical Engineers (AIChE), American Chemical Society (ACS), Aquacultural Engineering Society, European Society for Marine Biotechnology (ESMB)

Scientific Advisory Boards, Private Sector

1. Puriponics LCC, Portland, Oregon. 1996 to 2001.
2. Integrin Biosystems, Oban, Scotland, United Kingdom. 2001 to present.

Consulting Assignments

1. CalBioMarine Technologies, Carlsbad, CA, 1994 to 2000
2. Puriponics, Inc., Portland, OR, 1996 to 2000
3. Coastal Plantations International / PhycoGen, Portland, ME, June 1997 to December 1998
4. Willamette Egg Farms, Canby, OR, December 2000 to April 2001

UNIVERSITY SERVICE

Undergraduate Advising

Advisor for chemical engineering (CHE) undergraduate students of senior standing, 1990-2001; advisor for 25 undergraduate students (freshman-senior), 2003-present

Chemical Engineering Department (CHE)

Committees

Chair, CHE Graduate Committee, 2004-present
Member, CHE Graduate Committee, 1993-1997, 2003-2004
Member, CHE Faculty Search Committee, 1993AY, 2000AY
Member, CHE Promotion & Tenure Committee (Adhoc), 1995-1997
Member, CHE Laboratory Curriculum Committee, 2000
Member, CHE Vision Committee, 2000AY
Member, CHE Post-Tenure Review Committee (Adhoc), 2001
Member, ENVE Faculty Search Committee, 2003
Member, BIOE Faculty Search Committee, 2004
Organizer, Chemical Engineering Seminar, Winter 1992
Organizer, Chemical Engineering Department Beaver Open House, 1991, 1992
Departmental Representative to College of Engineering (with K.L. Levien), Jan.-June 1997
CHE undergraduate degree Graduation Auditor, 1991-1998, 2000-2001

College of Engineering (COE)

Committees

Member, COE Research Advisory Committee, 1991-1997
Member, COE Computer Policy Committee, 1991-1994
Member, COE Minority Status Committee, 1995
Bioprocesses Research Thrust Leader, Biological and Environmental Systems Research Cluster

University

Committees

Research Council, 2006-present
Organizing Committee, Sigma Xi Graduate Student Poster Session, April 21, 1993

Outreach

Mentor, Oregon Academy of Science and Engineering (ASE), summers 2004, 2005, 2006
Mentor, SMILE Program Challenge Weekend, April 17, 1993
Institute Professor, High School Engineering Institute, Michigan State University, Summer 1989

AWARDS

1. *Alfred H. White Scholar*, Department of Chemical Engineering, University of Michigan, 1981-1983
2. Graduate Fellowship Supplement, 3M and Union Carbide Corporations, 1985-1989
3. *Outstanding Graduate Student Award*, College of Engineering, Michigan State University, 1988
4. *Loyd Carter Award for Outstanding and Inspirational Teaching*, College of Engineering, Oregon State University, 1993
5. *Superior Paper Award*, Aquacultural Engineering Society, 2006
6. *Research Award*, College of Engineering, Oregon State University, 2006

GRADUATE STUDENTS**Former Graduate Students (15 M.S., 5 Ph.D.)**

Name & Degree	Thesis Title	Completion Date
16. Jason Polzin	Ph.D. Factors Affecting Halogenated Monoterpene Production in Microplantlets Derived from the Red Macroalga <i>Ochtodes secundiramea</i>	4/27/05
15. Clayton Jeffryes	M.S. Silicon and Germanium Uptake and Cellular Growth of the Marine Diatom <i>Nitzschia frustulum</i>	7/22/04
14. Wassana Yantasee	Ph.D. Kinetic and Equilibrium Analysis of Metal Ion Adsorption onto Bleached and Unbleached Kraft Pulps	5/1/01
	M.S. Adsorption of Calcium and Nickel Ions on Wood Pulp	3/4/99
13. Yao-Ming Huang	Ph.D. Photobioreactor Cultivation of the Cell and Tissue Cultures Derived from the Marine Red Alga <i>Agardhiella subulata</i>	3/21/01
12. Mary Tucker	M.S. Enzyme Activity in Cultures of the Marine Algae <i>Laminaria saccharina</i> and <i>Ochtodes secundiramea</i>	3/19/99
11. Ronald K. Mullikin	M.S. Cultivation of Suspension Cultures of <i>Laminaria saccharina</i> Gametophytes in Tubular, Planar, and Stirred-Tank Photobioreactors	7/27/98
10. Sundar Ramanan	M.S. Biomass Productivity Enhancement of <i>Laminaria saccharina</i> Cultures in Stirred-Tank Bioreactor by Batch and Fed-Batch Nutrient Delivery	12/17/96
9. Tzu-Yang Hsien	Ph.D. Removal of Cadmium Ions by Porous Chitosan Beads: Effect of Acylation and Crosslinking on Material Properties and Adsorption Isotherms	4/29/96
	M.S. Synthesis of Porous, Magnetic Chitosan Beads and Application to Cadmium Ion Adsorption	7/27/92
8. Khavinet Lourvanij	Ph.D. Partial Dehydration of Glucose to Oxygenated Hydrocarbons in Molecular Sieving Catalysts	5/8/95
	M.S. Reactions of Glucose in H-Y Zeolite Catalysts	6/26/91
7. Chunxing Zhi	M.S. Cultivation of <i>Laminaria saccharina</i> Gametophyte Cell Cultures and <i>Acrosiphonia coalita</i> Tissue Cultures in Bubble-Column Bioreactors	11/30/94
6. Ratikorn Netrabukkana	M.S. Diffusion of Glucose and Glucitol in Microporous and Mesoporous Molecular Sieving Catalysts	11/4/94
5. Hanshi Qi	M.S. Cultivation of <i>Laminaria saccharina</i> Gametophyte Cell Cultures in a Stirred-Tank Photobioreactor	4/24/94
4. Chung-Han Ho	M.S. Shear Sensitivity and Oxygen Mass Transfer Studies during Cultivation of Tobacco Cells in a Stirred-Tank Bioreactor at Impeller Speeds of 100 to 325 rpm	3/29/94
3. Jason G. Modrell	M.S. Bioreactor Development and Cell Culture of the	10/10/93

Name & Degree	Thesis Title	Completion Date
	Marine Macroalgae <i>Porphyra</i> and <i>Laminaria saccharina</i>	
2. Benjamin J. Quiroz M.S.	Models for Diffusion and Adsorption of Heavy Metal Ions in Porous Chitosan Beads	8/26/91
1. Kelley A. Henderson M.S.	Oxygen Mass Transfer and Shear Sensitivity Studies during Cultivation of <i>Nicotaina tabacum</i> var. Wisconsin 38 in a Stirred Tank Bioreactor	10/3/91

Current Graduate Students (4 Ph.D., 3 M.S.)

Name & Degree	Thesis Topic	Completion Date
1. Octavio Cruz-Uribe Ph.D.	TNT Metabolism in Tissue Cultures of Marine Algae	6/06
2. Clayton Jeffryes Ph.D.	Bioreactor Operating Strategies for Controlling Metal Oxide Nanostructure in Diatom Frustules	6/07
3. Tian Qin Ph.D.	Bioreactor Operating Strategies for Controlling Metal Oxide Nanostructure in Diatom Frustules	6/08
4. Debra Gale Ph.D.	Bioreactor Operating Strategies for Controlling Metal Oxide Nanostructure in Diatom Frustules	6/09
5. Aaron Goodwin M.S.	Conversion of glucose to hydrogen gas by supercritical water in a microchannel reactor	12/06
6. Kristi Christensen M.S.	PAH Metabolism in Tissue Cultures of Marine Algae	6/07
7. Thadeus Ivey M.S.	Co-production of Aqueous Ammonia and Calcium Chloride from Aqueous Ammonium Chloride	12/06

Revised 10/5/06