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## Education

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|---|---|
| 1975-79 | B. S., Chemistry, Oregon State University, Corvallis, OR |
| 1980-82 | M. S., Chemical Engineering, Oregon State University<br>Project: *The Determination of the Concentration Dependence of the Diffusion Coefficient in the Chloroform-Nitrogen System by Gas Chromatography*<br>Advisor: Robert V. Mrazek |
| 1984-89 | Ph. D., Chemical Engineering, University of Houston<br>Thesis: *The Scaleup of Insect Cell Culture: Protective Effects of Pluronic F-68*<br>Advisor: Charles F. Goochee |

## Professional Experience

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|---|---|
| 1981-82 | Teaching Assistant, Oregon State University, Department of Chemical Engineering |
| 1982-84 | Research Engineer, Teledyne Wah Chang Albany, Albany, OR |
| 1984-89 | Research and Teaching Assistant, University of Houston, Department of Chemical Engineering |
| 1989-98 | Assistant Professor, The University of Iowa, Department of Chemical and Biochemical Engineering, Iowa City, IA |
| 1998-2003 | Associate Professor, The University of Iowa, Department of Chemical and Biochemical Engineering, Iowa City, IA |
| 2003-present | Professor, The University of Iowa, Department of Chemical and Biochemical Engineering, Iowa City, IA |
| 2007-2012 | Department Executive Officer (DEO), The University of Iowa, Department of Chemical and Biochemical Engineering, Iowa City, IA |

## Honors and Awards

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| 1984-89 | Fellowship, University of Houston |
| 1990 | Old Gold Summer Fellowship, The University of Iowa |
| 1992-present | AIChE Outstanding Student Chapter Award (1992-2002 & 2004-present) |
| 1996 | AIChE Outstanding Student Chapter Advisor Award |
| 1994-98 | Patents and Literature Review Editor, *Applied Biochemistry and Biotechnology* |
| 2002 | Collegiate Outstanding Teaching Award |
| 2003-2009 | Associate Editor, *Applied Biochemistry and Biotechnology* |
| 2007 | Editor, *Baculovirus and Insect Cell Expression Protocols*, 2nd ed. (published in 2007) |
| 2009-present | Editorial Board, *Applied Biochemistry and Biotechnology* |
| 2012 | Inducted into the Santiam Canyon School District (Mill City, OR) Hall of Fame |

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| 2016 | Editor, *Baculovirus and Insect Cell Expression Protocols*, 3rd ed. (published in 2016) |
| 2019-20 | Outstanding Student Organization Advisor (for AIChE), UI College of Engineering |
| 2022-23 | Outstanding Student Organization Advisor (for AIChE), UI College of Engineering |
| 2022-23 | President and Provost Award for Teaching Excellence |

Professional Affiliations

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| 1989-2023 | Member, American Chemical Society |
| 1989-Present | Member, American Institute of Chemical Engineers |
| 1989-Present | Member, American Association for the Advancement of Science |
| 1989-94 | Member, Sigma Xi Scientific Research Honorary Society |
| 1990-Present | Member, American Society for Engineering Education |
| 1991-Present | Associate Member, Omega Xi Epsilon, Chemical Engineering Honor Society |
| 1992-2001 | Registered Professional Engineer in Iowa |
| 2001-2023 | Member, Society for Redox Biology and Medicine |

## RESEARCH ACTIVITIES

Research Interests

- Continuous viral insecticide production
- Evaluating and overcoming oxidative stresses in virally-infected insect cells
- Using phage (microbial viruses) to control microbial infections (as an alternative to antibiotics)

Publications


Decius, J.C.; Murhammer, D.W. (1980). Absolute i.r. intensities, dipole derivatives and vibrational charge parameters in the perchlorate anion. *Spectrochimica Acta*, **36A:** 965-969.

Murhammer, D.; Davis, D.; Levenspiel, O. (1986). Shrinking core model/reaction control for a wide size distribution of solids. *Chemical Engineering Journal,* **32:** 87-91.

Murhammer, D.W.; Goochee, C.F. (1988). Scaleup of insect cell cultures: protective effects of Pluronic F-68. *Bio/Technology,* **6:** 1411-1418.

Murhammer, D.W.; Goochee, C.F. (1990). Structural features of nonionic polyglycol polymers responsible for the protective effect in sparged animal cell bioreactors. *Biotechnology Progress,* **6:** 142-148.

Murhammer, D.W.; Goochee, C.F. (1990). Sparged animal cell bioreactors: mechanism of cell damage and Pluronic F-68 protection. *Biotechnology Progress,* **6:** 391-397.

Murhammer, D.W. (1991). The use of insect cell cultures for recombinant protein synthesis: engineering aspects. *Applied Biochemistry and Biotechnology,* **31:** 283-310.

Murhammer, D.W.; Pfalzgraf, E.C. (1992). Effects of Pluronic F-68 on oxygen transport in an agitated, sparged bioreactor. *Biotechnology Techniques,* **6:** 199-202.

Pasumarthy, M.K.; Murhammer, D.W. (1994). Clonal variation in the *Spodoptera frugiperda* IPLB-SF21-AE insect cell population. *Biotechnology Progress*, **10:** 314-319.

Pasumarthy, M.K.; Murhammer, D.W. (1995). Variation in recombinant protein expression levels among clones of lepidopteran cell populations. *Enzyme and Microbial Technology,* **17:** 168-174.

Chung, H.; Arnold, M.A.; Rhiel, M.; Murhammer, D.W. (1995). Simultaneous measurement of glucose and glutamine in aqueous solutions by near infrared spectroscopy. *Applied Biochemistry and Biotechnology*, **50:** 109-125.

Rhiel, M.; Murhammer, D.W. (1995). The effect of oscillating dissolved oxygen concentrations on the metabolism of a *Spodoptera frugiperda* IPLB-Sf21-AE Clonal Isolate. *Biotechnology and Bioengineering*, **47:** 640-650.

Zhou, X.; Chung, H.; Arnold, M.A.; Rhiel, M.; Murhammer, D.W. (1995). Selective measurement of glutamine and asparagine in aqueous media by near-infrared spectroscopy. *ACS Symposium Series*, **613:** 116-132.

Matschiner, A.; Dordick, J.S.; Murhammer, D.W. (1995). Isolation of virally-infected insect cells from a population containing infected and uninfected cells. *Biotechnology Techniques*, **9:** 897-900.

Murhammer, D.W. (1996). Use of viral insecticides for pest control and production in cell culture. *Applied Biochemistry and Biotechnology,* **59:** 199-220.

Chung, H.; Arnold, M..A.; Rhiel, M.; Murhammer, D.W. (1996). Simultaneous measurements of glucose, glutamine, ammonia, lactate, and glutamate in aqueous solutions by near-infrared spectroscopy. *Applied Spectroscopy*, **50:** 270-276.

Riley, M.R.; Rhiel, M.; Zhou, X.; Arnold, M.A.; Murhammer, D.W. (1997). Simultaneous measurement of glucose and glutamine in insect cell culture media by near infrared spectroscopy. *Biotechnology and Bioengineering*, **55:** 11-15.

Rhiel, M.; Mitchell-Logean, C.M.; Murhammer, D.W. (1997). Comparison of *Trichoplusia ni* BTI-Tn-5B1-4 (High Five™) and *Spodoptera frugiperda* Sf-9 insect cell line metabolism in suspension cultures. *Biotechnology and Bioengineering*, **55:** 909-920.

Mitchell-Logean, C.M.; Murhammer, D.W. (1997). Bcl-2 expression in Sf-9 and BTI-Tn-5B1-4 insect cells: effect on recombinant protein expression and cell viability. *Biotechnology and Bioengineering*, **56:** 380-390.

Mitchell-Logean, C.M.; Murhammer, D.W. (1997). Bioreactor headspace purging reduces dissolved carbon dioxide accumulation in insect cell cultures and enhances cell growth. *Biotechnology Progress*, **13:** 875-877.

Riley, M.R.; Arnold, M.A.; Murhammer, D.W.; Walls, E.L.; DelaCruz, N. (1998). Adaptive calibration scheme for quantification of nutrients and byproducts in insect cell bioreactors by near infrared spectroscopy. *Biotechnology Progress*, **14:** 527-533.

Spear, S.K.; Rhiel, M.R.; Murhammer, D.W.; Arnold, M.A. (1998) Ammonia measurements in mammalian cell bioreactors with a diffuse reflectance-based fiberoptic ammonia sensor. *Applied Biochemistry and Biotechnology*, **75:** 175-186.

Riley, M.R.; Arnold, M.A.; Murhammer, D.W. (1998). Matrix enhanced buffer calibration procedure for multivariate calibration models with near infrared spectra. *Applied Spectroscopy*, **52:** 1339-1347.

Wolff, M.W.; Linhardt, R.J.; Murhammer, D.W. (1999). Release and preparation of intact and unreduced *N*-linked oligosaccharides from *Spodoptera frugiperda* Sf-9 insect cells. *Preparative Biochemistry and Biotechnology*, **29:** 1-21.

Saarinen, M.A.; Troutner, K.A.; Gladden, S.G.; Mitchell-Logean, C.M.; Murhammer, D.W. (1999). Recombinant protein synthesis in *Trichoplusia ni* BTI-Tn-5B1-4 insect cell aggregates. *Biotechnology and Bioengineering*, **63:** 612-617.

Murhammer, D.W. (1999). Pluronic Polyols, Cell Protection. Chapter in *The Encyclopedia of Bioprocess Technology: Fermentation, Biocatalysis and Bioseparation.* John Wiley & Sons, Inc., pp. 2019-2023.

Wolff, M.W.; Murhammer, D.W.; Jarvis, D.L.; Linhardt, R.J. (1999). Electrophoretic analysis of glycoprotein glycans produced by lepidopteran insect cells infected with an immediate early recombinant baculovirus encoding mammalian β1,4-galactosyltransferase. *Glycoconjugate Journal*, **16:** 753-756.

Riley, M.R.; Arnold, M.A.; Murhammer, D.W. (2000). Effect of sample complexity on quantification of analytes in aqueous samples by near infrared spectroscopy. *Applied Spectroscopy*, **54:** 255-261.

Saarinen, M.A.; Murhammer, D.W. (2000). Culture in the rotating-wall vessel affects recombinant protein production capabilities of two insect cell lines in different manners. *In Vitro Cellular & Developmental Biology – Animal*, **36:** 362-366.

Choe, J.; Zhang, F.; Wolff, M.W.; Murhammer, D.W.; Linhardt, R.J.; Dordick, J.S. (2000). Separation of α-acid glycoprotein glycoforms using affinity-based reverse micellar extraction and separation. *Biotechnology & Bioengineering*, **70:** 484-490.

Dorathy, B. D.; Mooers, J. A.; Warren, M. M.; Mich, J. L.; Murhammer, D. W. (2001). Experiments to Demonstrate Chemical Process Safety Principles. *Chemical Engineering Education,* **35:** 36-44.

Zhang, F.; Wolff, M. W.; Williams, D.; Busch, K.; Lang, S. C.; Murhammer, D. W.; Linhardt, R. J. (2001). Affinity purification of secreted alkaline phosphatase produced by the baculovirus expression vector system. *Applied Biochemistry and Biotechnology*, **90:** 125-136.

Wang, Y.; Oberley, L. W.; Murhammer, D. W. (2001). Antioxidant defense systems of two lepidopteran insect cell lines. *Free Radical Biology & Medicine*, **30:** 1254-1262.

Wolff, M. W.; Zhang, F.; Roberg, J. J.; Caldwell, E. E. O.; Kaul, P. R.; Serrahn, J. N.; Murhammer, D. W.; Linhardt, R. J.; Weiler, J. M. (2001). Expression of C1 esterase inhibitor by the baculovirus expression vector system: preparation, purification, and characterization. *Protein Expression and Purification*, **30:** 414-421.

Wang, Y.; Oberley, L.W.; Murhammer, D.W. (2001). Evidence of oxidative stress following the viral infection of two lepidopteran insect cell lines. *Free Radical Biology & Medicine*, **31:** 1448-1455.

Rhiel, M.; Cohen, M. B.; Murhammer, D. W.; Arnold, M. A. (2002). Nondestructive near-infrared spectroscopic measurement of multiple analytes in undiluted samples of serum-based cell culture media. *Biotechnology & Bioengineering*, **77:** 73-82.

Zhang, F.; Saarinen, M.A.; Itle, L.J.; Lang, S.C.; Murhammer, D.W.; Linhardt, R.J. (2002). ·The effect of dissolved oxygen (DO) concentration on the glycosylation of recombinant protein produced by the insect cell-baculovirus expression system. *Biotechnology & Bioengineering*, **77:** 219-224.

Zhang, F.; Murhammer, D. W.; Linhardt, R. J. (2002). Enzyme kinetics and glycan structural characterization of secreted alkaline phosphatase prepared using the baculovirus expression vector system. *Applied Biochemistry and Biotechnology*, **101:** 197-210.

Saarinen, M.A.; Murhammer, D.W. (2003). The response of virally infected insect cells to dissolved oxygen concentration: recombinant protein production and oxidative damage. *Biotechnology & Bioengineering*, **81:** 106-114.

Winkenwerder, J.J.; Murhammer, D.W.; Reece, J.S.; Palechek, P.L.; Saarinen, M.A.; Arnold, M.A.; Cohen, M.B. (2003). Evaluating prostate cancer cell culturing methods: a comparison of cell morphologies and metabolic activity. *Oncology Reports*, **10:** 783-789.

Saarinen, M.A.; Reece, J.S.; Arnold, M.A.; Murhammer, D.W. (2003). Monitoring and controlling the dissolved oxygen (DO) concentration within the high aspect ratio vessel (HARV). *Biotechnology Progress*, **19:** 1335-1341.

Rhiel, M.H.; Cohen, M.B.; Arnold, M.A.; Murhammer, D.W. (2004). On-line monitoring of human prostate cancer cells in a perfusion rotating wall vessel by near-infrared spectroscopy. *Biotechnology and Bioengineering*, **86:** 852-861.

Arnold, M.A.; Small, G.W.; Xiang, D.; Qui, J.; Murhammer, D.W. (2004). Pure component selectivity analysis of multivariate calibration models from near infrared spectra. *Analytical Chemistry*, **76:** 2583-2590.

Wang, Y.; Oberley, L.W.; Howe, D.; Jarvis, D.L.; Chauhan, G.; Murhammer, D.W. (2004). The effect of manganese superoxide dismutase expression in baculovirus infected insect cells. *Applied Biochemistry and Biotechnology*, **119:** 181-193.

Zhang, F.; Bries, A.D.; Lang, S.C.; Wang, Q.; Murhammer, D.W.; Weiler, J.M.; Linhardt, R.J. (2004). Metabolic alteration of the N-glycan structure of a protein from patients with a heterozygous protein deficiency. *Biochimica et Biophysica Acta*, **1739:** 43-49.

Giri, L.; Li, H.; Sandgren, D.; Feiss, M.; Roller, R.; Bonning, B.C.; Murhammer, D.W. (2010). Removal of transposon target sites from the AcMNPV *fp25k* gene delays, but does not prevent, accumulation of the few polyhedra phenotype. *Journal of General Virology*, **91:** 3053-3064.

Giri, L.; Feiss, M.G.; Bonning, B.C.; Murhammer, D.W. (2012). Production of baculovirus defective interfering particles during serial passage is delayed by removing transposon target sites in fp25k. *Journal of General Virology*, **93:** 389-399.

Qiu, J.; Arnold, M.A.; Murhammer, D.W. (2014). On-line near infrared bioreactor monitoring of cell density and concentrations of glucose and lactate during insect cell cultivation. *Journal of Biotechnology*, **173:** 106-111.

Vajrala, S.G; Murhammer, D.W. (2016). Effect of $CO_2$ on uninfected Sf-9 cell growth and metabolism. *Biotechnology Progress*, **32:** 465-469.

Murhammer, DW (2016) Useful tips, widely used techniques and quantifying cell metabolic behavior. Chapter in *Baculovirus and Insect Cell Expression Protocols*, 3rd ed., Human Press (edited by David W. Murhammer).

Murhammer, DW (2016), Editor. *Baculovirus and Insect Cell Expression Protocols*, 3rd ed., Humana Press.

Saxena, A; Byram, PK; Singh, SK; Chakraborty, J; Murhammer, DW; Giri, L (2018). A structured review of baculovirus infection process: Integration of mathematical models and biomolecular information on cell-virus interaction. *Journal of General Virology*, **99:** 1151-1171.

Saxena, A; Ravutla, S; Upadhyay, V; Jana, S; Murhammer, D; Giri, L (2020). Statistical modeling of cell-to-cell variability in viral infection during passaging in suspension cell culture: application of Monte-Carlo simulation. *Biotechnology and Bioengineering*, **117:** 1483-1501.

Das, A.; Dutta, S.; Sen, M.; Saxena, A.; Kumar, J.; Giri, L.; Murhammer, D.W.; Charkraborty, J. (2021) A detailed model and Monte Carlo simulation for predicting DIP genome length distribution in baculovirus infection of insect cells. *Biotechnology and Bioengineering*, **118:** 238-252.

Saxena, A; Suryateja, R.; Mitra, K; Chakraborty, J; Murhammer, D; Giri, L (2021). Evolution of a single-cell predictive model for packaging and budding of viruses based on TEM based measurements. ***Authorea Preprints***.

Invited Presentations

Murhammer, D.W. Scale-up of insect cell cultures. *Monsanto Company*, St. Louis, MO, 1990.

Murhammer, D.W. Improved protein synthesis using insect cell culture. *Midwest Biotechnology Symposium*, Saint Paul, MN, 1990.

Murhammer, D.W. The Use of insect cell cultures for recombinant protein synthesis: engineering aspects. *Department of Chemical Engineering Seminar Series, Iowa State University*, 1992.

Murhammer, D.W. Engineering aspects of insect cell culture. *ASM Meeting*, Atlanta, GA, 1993.

Murhammer, D.W. Engineering aspects of insect cell cultures. *Fort Dodge Laboratories*, Fort Dodge, IA, 1995.

Murhammer, D.W. Applications of the baculovirus expression vector system. *Biochemistry Seminar, Northern Illinois University*, De Kalb, Illinois, 1996.

Murhammer, D.W. Developing an undergraduate chemical process safety laboratory. *ASEE Summer School For Chemical Engineering Faculty*, Snowbird, UT, 1997.

Murhammer, D.W. Effect of bcl-2 expression on the viral infection process in insect cells. *Iowa Microscopy Society Meeting*, Iowa City, IA, 1997.

Murhammer, D.W. Evaulating and counteracting oxidative stresses in virally-infected insect cells. *Chemical Engineering Seminar, Notre Dame University,* South Bend, IN, 2000.

Murhammer, D.W. The Energy Future. *POLIS Senior Group at Quincy University*, Quincy, IL, 2010.

Murhammer, D.W. Two uses of insect cell culture: producing baculovirus for biopesticide use and investigating oxidative stress in virus infections. *Chemical Engineering Seminar, Missouri University of Science & Technology,* Rolla, MO, 2010.

Murhammer, D.W. Obstacles to Continuous *Baculovirus Production. Department of Biochemistry Research Workshop, Univ. of Iowa,* September 21, 2010.

Murhammer, D.W. Obstacles to Continuous Baculovirus Production. *Chemical and Environmental Engineering Seminar, University of California – Riverside, Riverside,* CA, June 3, 2011.

Murhammer, D.W. Summary of Insect Cell Culture Research. *Novavax, Rockville, MD*, January 24, 2012.

Conference Presentation Abstracts

Murhammer, D.W. Critical literature review of the kinetics of zircon-sand chlorination and related reactions. *Pacific Northwest Metals and Minerals Conference*, 1984, Portland, OR.

Murhammer, D.W.; Goochee, C.F. The scaleup of insect cell cultures. *ACS National Meeting*, 1987, New Orleans, LA.

Murhammer, D.W.; Goochee, C.F. The protective effect of nonionic polyglycol polymers in sparged animal cell bioreactors. *AIChE Annual Meeting*, 1988, Washington, D.C.

Murhammer, D.W.; Goochee, C.F. Cell growth and product formation of an insect cell/virus expression system in sparged environments. *ACS National Meeting*, 1988, Los Angeles, CA.

Murhammer, D.W.; Passini, C.A.; Goochee, C.F. Bubble damage in sparged bioreactors: the protective effect of Pluronic polyols. *Engineering Foundation Conference: Cell Culture Engineering II*, 1989, Santa Barbara, CA.

Murhammer, D.W.; Goochee, C.F. Mechanism of the protective effect of nonionic polyglycol polymers in sparged animal cell bioreactors: chemical and physical considerations. *AIChE Annual Meeting*, 1989, San Francisco, CA.

Murhammer, D.W.; Goochee, C.F. The protection of animal cells from the adverse effects of bubble incorporation via either cavitation or vortexing. *Fall National AIChE Meeting*, 1990, Chicago, IL.

Murhammer, D.W. Improved protein synthesis using insect cell culture. *Midwest Biotechnology Symposium*, 1990, Saint Paul, MN.

Murhammer, D.W.; Pasumarthy, M.K.; Mitchell-Logean, C.M. The use of insect cell cultures for recombinant protein synthesis: engineering aspects. *Second Pan American Chemical Congress*, 1991, San Juan, Puerto Rico.

Pasumarthy, M.K.; Murhammer, D.W. Selection of cell lines for producing recombinant glycoproteins in insect cells. *ACS National Meeting*, 1992, San Francisco, CA.

Mitchell-Logean, C.M.; Murhammer, D.W. Production of fibronectin and actin by insect cells under shear stress and the effect of different media on their attachment. *ACS National Meeting*, 1992, San Francisco, CA.

Pasumarthy, M.K.; Murhammer, D.W. Clonal variations of cellular properties within the *Spodoptera frugiperda* IPLB-Sf-21AE insect cell population. *ACS National Meeting*, 1993, Denver, CO.

Murhammer, D.W. Engineering aspects of insect cell culture. *ASM meeting*, 1993, Atlanta, GA.

Pasumarthy, M.K.; Murhammer, D.W. Clonal variations of cellular properties within the *Spodoptera frugiperda* SF-21AE insect cell population. *AIChE Annual Meeting*, 1993, St. Louis, MO.

Mitchell-Logean, C.M.; Murhammer, D.W. Development of an inducible baculovirus expression system for the study of transient protein glycosylation phenomena in insect cell cultures. *AIChE Annual Meeting*, 1993, St. Louis, MO.

Mitchell-Logean, C.M.; Murhammer, D.W. Investigation of virally-infected insect cell death. *AIChE Annual Meeting*, 1994, San Francisco, CA.

Chung, H.; Rhiel, M.; Murhammer, D.W.; Arnold, M.A. Simultaneous measurement of important cell culture nutrients and waste products by NIR spectroscopy. *The Pittsburgh Conference*, 1995, New Orleans, LA.

Mitchell-Logean, C.M.; Murhammer, D.W. Cell breakddown and death of virally-infected insect cells. *Baculovirus and Insect Cell Gene Expression Conference*, 1995, Pinehurst, NC.

Rhiel, M.; Chung, H.; Zhou, X.; Arnold, M A.; Murhammer, D. W. Determination of 18 amino acids in aqueous solution by near infrared spectroscopy. *Annual Meeting of the Iowa Academy of Sciences*, 1995, Waverly, IA.

Zhou, X.; Arnold, M.A.; Rhiel, M.; Murhammer, D.W. Simultaneous measurement of asparagine and glutamine in aqueous solutions by near infrared spectroscopy. *ACS National Meeting*, 1995, Anaheim, CA.

Rhiel, M.; Mitchell-Logean, C.M.; Murhammer, D.W. Productivity of the *Trichoplusia ni* BTI Tn-5B1-4 (High Five™) insect cell line in suspension cultures. *AIChE Annual Meeting*, 1995, Miami, FL.

Zhou, X.; Chung, H.; Arnold, M.A.; Rhiel, M.; Murhammer, D.W. Feasibility of on-line bioreactor monitoring by near infrared spectroscopy. *Federation of Analytical Chemistry and Spectroscopy Societies*, 1995, Cincinnati, OH.

Rhiel, M.; Murhammer, D.W.; Zhou, X.; Arnold, M.A. Cell culture process monitoring by NIR spectroscopy. *The Pittsburgh Conference*, 1996, Chicago, IL.

Wolff, M.W.; Park, Y.; Finn, E.F.; Linhardt, R.J.; Murhammer, D.W.; Jarvis, D.L. Determining glycan structures producted in insect cells. *AIChE Annual Meeting*, 1996, Chicago, IL.

Rhiel, M.; Riley, M.R.; Zhou, X.; Arnold, M.A.; Murhammer, D.W. Sensitivity and selectivity of near-infrared spectroscopy methods for process monitoring. *AIChE Annual Meeting*, 1996, Chicago, IL.

Rhiel, M.; Palechek, P.; Chuang, H.; Spear, S.; Arnold, M.A.; Cohen, M.B.; Murhammer, D.W. Comparison of metabolism and morphology of prostate cancer cells cultivated in tissue culture flasks and rotating wall vessel bioreactors. *AIChE Annual Meeting*, 1996, Chicago, IL.

Riley, M.R.; Rhiel, M.; Zhou, Z.; Arnold, M.A.; Murhammer, D.W. NIR spectroscopy for monitoring metabolite concentrations in insect cell bioreactors. *AIChE Annual Meeting*, 1996, Chicago, IL.

Weiler, J.M.; Roberg, J.J.; Clarke, J.M.; Mitchell-Logean, C.; Murhammer, D.W.; Serrahn, J.N.; Hanson, G.R.; Caldwell, E.E.O. Characterization of C1 inhibitor expressed by the baculovirus expression vector system. *American Association of Immunologists*, 1997, San Francisco, CA.

Murhammer, D.W.; Riley, M.R.; Rhiel, M.; Arnold, M.R.; Walls, E.L.; DelaCruz, N. Simultaneous monitoring of multiple cellular metabolites in bioreactors by near infrared spectroscopy. *ACS National Meeting*, 1997, San Francisco, CA.

Rhiel, M.; Riley, M.R.; Arnold, M.A.; Murhammer, D.W. Evaluation of near-infrared spectroscopy for bioreactor monitoring. *ACS National Meeting*, 1997, San Francisco, CA.

M. Rhiel, M. R. Riley, H. Chuang, S. Spear, P. Palechek, M. Cohen, M. Arnold, and D. Murhammer. Continuous, noninvasive monitoring of bioreactors. *ACHEMA 97*, 1997, Frankfurt, Germany

M. R. Riley, D. W. Murhammer, M. A. Arnold, E. Walls, and N. DelaCruz. An adaptive calibration scheme for NIR measurements of metabolites in insect cell bioreactor. *AIChE Annual Meeting*, 1997, Los Angeles, CA.

M. Rhiel, M. A. Arnold, and D. W. Murhammer. On-line monitoring of mammalian cell cultures with near-infrared spectroscopy. *AIChE Annual Meeting*, 1997, Los Angeles, CA.

M. Rhiel, M. A. Arnold, and D. W. Murhammer. Simultaneous monitoring of glucose, glutamine, lactate, and ammonia is prostate cancer cell cultures with near-infrared spectroscopy. *ANALYTICA 98*, 1998, Munich, Germany.

Wolff, M.W.; Linhardt, R.J.; Murhammer, D.W. Preparation and characterization of *N*-linked glycans with the baculovirus expression vector system. *Midwestern Medicinal Chemistry Meeting*, 1998, Chicago, IL.

Caldwell, E.E.O.; Wolff, M.W.; Kaul, P.; Serrahn, J.N.; Murhammer, D.W.; Weiler, J.M. Baculovirus expression of human complement C1 esterase inhibitor, *XVII$^{th}$ International Complement Workshop*, 1998, Rhodes, Greece.

Saarinen, M.A.; Murhammer, D.W. Insect Cell Metabolism in Rotating Wall Vessels and Shaker Flasks -- a Comparison, *Institute of Biological Engineering Annual Meeting*, 1998, Orlando, FL.

Murhammer, D.W.; Oberley, L.W.; Darby, C.J.; Schlawin, K.L.; Mooers, J.A. Evaluating and counteracting oxidative stresses in virally-infected insect cells. *AIChE Annual Meeting*, 1998, Miami, FL.

Wolff, M.W.; Linhardt, R.J.; Murhammer, D.W.; Jarvis, J.L. Addition of galactosyltransferase to the insect cell *N*-glycosylation pathway. *AIChE Annual Meeting*, 1998, Miami, FL.

Oberley, L.W.; Saarinen, M.A.; Wang, Y.; Murhammer, D.W. Oxidative stress in virally infected insect cells. *AIChE Annual Meeting*, 1999, Dallas, TX.

Linhardt, R.J.; Wolff, M.W.; Zhang, F.; Murhammer, D.W. Modifying N-linked protein glycosylation in the Spodoptera frugiperda Sf-9 insect cell line. *AIChE Annual Meeting*, 1999, Dallas, TX.

Murhammer, D.W.; Wang, Y.; Oberley, L.W.; Jarvis, D.L. Evaluating and counteracting oxidative stresses in virally infected insect cells. *ACS National Meeting*, 2000, San Francisco, CA.

Saarinen, M.A.; Wang, Y.; Jarvis, D.L.; Oberley, L.W.; Murhammer, D.W. Evaluating the role of oxidative stresses in virally infected insect cells. *AIChE Annual Meeting*, 2000, Los Angeles, CA.

Linhardt, R.J.; Zhang, F.; Lang, S.C; Wang, Q.; Murhammer, D.W.; Weiler, J.M. Metabolic alteration of the N-glycan structure of C1 esterase inhibitor in patients with hereditary angioedema. *ACS National Meeting*, 2001, Chicago, IL.

Qiu, J.; Arnold, M.; Murhammer, D. Using near-infrared spectroscopy for monitoring insect cell cultures in various bioreactors. *AIChE Annual Meeting*, 2001, Reno, NV.

Zhang, F.; Murhammer, D.; Linhardt, R. Effect of dissolved oxygen concentration on protein glycosylation in insect cells. *AIChE Annual Meeting*, 2001, Reno, NV.

Rose, P.; Feiss, M.; Murhammer, D. Expression of the baculovirus 25 kD protein in infected *Spodoptera frugiperda* to overcome the few polyhedra phenotype. *AIChE Annual Meeting*, 2001, Reno, NV.

Wang, Y.; Saarinen, M.; Murhammer, D. Evaluating and counteracting oxidative stress in virally-infected insect cells. *AIChE Annual Meeting*, 2001, Reno, NV.

Murhammer, D.W.; Wang, Y. Counteracting the adverse effects of oxidative stress in baculovirus infected insect cells. *AIChE Annual Meeting*, 2002, Indianapolis, IN.

Rose, P.A.; Murhammer, D.W. Determining the role of viral FP25kD protein in the production of occluded baculovirus. *AIChE Annual Meeting*, 2002, Indianapolis, IN.

Ng, C.F.; Chen, L.D.; Murhammer, D.W.; Rodgers, V.G.J. Three dimensional mass transport modeling of dissolved gases in NASA high aspect ratio rotating wall vessel. *AIChE Annual Meeting*, 2002, Indianapolis, IN.

Rose, P.A.; Murhammer, D.W. Expression of baculovirus FP25K protein at different times during viral infection impacts polyhedra production. *AIChE Annual Meeting*, 2003, San Francisco, CA.

Chauhan, G.; Murhammer, D.W. Determining the intracellular location of reactive oxygen species in baculovirus infected insect cells. *AIChE Annual Meeting*, 2003, San Francisco, CA.

Rose, P.A.; Feiss, M.; Murhammer, D.W. Baculovirus FP25K protein expression at different times during viral infection impacts polyhedra production. *ACS National Meeting*, 2004, Anaheim, CA.

Bond, E.; Chauhan, G.; Thumser, A.; K. Doherty, K.; D. Murhammer. The role of oxidative stress in the baculovirus cytotoxicity of insect cells. *Society for Free Radical Biology and Medicine National Meeting*, 2004, St. Thomas, Virgin Islands

Qiu, J.; Arnold, M.; Murhammer, D. On-line simultaneous cell density, glucose and lactate monitoring of *Trichoplusia ni* BTI-Tn-5B1-4 insect cell cultures with near-infrared spectroscopy. *American Association of Pharmaceutical Scientists Annual Meeting*, 2005, Nashville, Tn.

Bond, E.; Chauhan, G.; Thumser, A.; Doherty, K.; Murhammer, D. Understanding oxidative stress in baculovirus-infected insect cells. *Society for Free Radical Biology and Medicine Meeting*, 2005, Austin, TX.

Bond, E.L.; Chauhan, G.; Doherty, K.; Turner, R.; Murhammer, D.W. Investigating the Mitochondria's Role in the Oxidative Stress of Baculovirus-Infected Cells. *AIChE Annual Meeting*, 2006, San Francisco, CA.

Giri, L.; Murhammer, D.W.; Bonning, B.; Feiss, M. Towards Continuous Biopesticide Production in Insect Cell Culture: Overcoming Mutations in Fp25k Baculovirus Gene. *AIChE Annual Meeting*, 2006, San Francisco, CA.

Bond, E.; Doherty, K.; Murhammer, D. Oxidative stress in bculovirus-infected insect cells with inactive mitochondria. *Society for Free Radical Biology and Medicine Meeting*, 2006, Denver, CO.

Giri, L.; Murhammer, D. Construction of an insect cell line having viral gene FP25K: A potential remedy for FP mutation in large-scale baculovirus production. *SBE's 1st International Conference on Accelerating Biophramaceutical Development*, 2007, Coronado, CA.

Giri, L.; Murhammer, D.; Feiss, M.; Bonning, B. Overcoming mutations in baculovirus FP25 gene. *Baculovirus Technology Conference*, 2007, Boston, MA.

Bond, E.; Jarvis, D.; Murhammer, D. Antioxidant overexpression during baculovirus infection. *Society for Free Radical Biology and Medicine Meeting*, 2007, Washington, D.C.

Giri, L.; Murhammer, D.W.; Bonning, B.C.; Feiss, M.; Roller, R. Removal of transposon target sites from AcMNPV *fp25k* delayed incidence of FP phenotype but had no impact on DIP production in cell culture. *41st Annual Meeting of the Society for Invertebrate Pathology and 9th International Conference on* Bacillus thuringiensis*, Virus Division*, 2008, University of Warwick, Coventry, United Kingdom.

Giri, L. Towards Large-Scale Continuous Baculovirus Production in Insect Cell Culture: Overcoming Mutations in fp25k Baculovirus Gene. *Baculovirus Technology*, 2008, Boston, MA.

Bhakti B.; Sucheta V.; Murhammer, D.W. Carbon dioxide inhibitory effect on uninfected and baculovirus-infected insect cell culture and the role of intracellular pH. *ACS National Meeting*, 2011, Anaheim, CA.

Bhakti B.; Murhammer, D. Role of homolog CuZnSOD in baculovirus infection in insect cells. *ACS National Meeting*, 2013, New Orleans, LA.

Funded Research Grants (Federal)

Research experiences for undergraduates (REU) site, National Science Foundation, David W.Murhammer (PI) and Victor G. J. Rodgers (Co-PI), $76,000, 6/92 - 11/94.

Adaptation of insect cells to suspension growth, National Science Foundation, David W. Murhammer (PI), $166,254, 8/94 - 8/97 (no cost extension to 8/98).

Research experiences for undergraduates (REU) supplement for adapation of insect cells to suspension growth, National Science Foundation, David W. Murhammer (PI), $20,000, 2/95-8/97.

Research experiences for undergraduates (REU) site, National Science Foundation, David W. Murhammer (PI) and Victor G. J. Rodgers (Co-PI), $163,763, 6/95 - 5/98.

Continuous, noninvasive monitoring of rotating wall vessels and application to the study of prostate cancer, NASA, David W. Murhammer (PI), Mark A. Arnold (Co-PI), and Michael B. Cohen (Co-PI), $905,000, 8/95-8/99.

Development of an undergraduate process safety laboratory, National Science Foundation Instrumentation and Laboratory Improvement Program, David W. Murhammer (PI), $37,427, 5/96 - 4/98 (no cost extension to 4/99).

Genetic modifications and environmental factors influencing glycoprotein processing in the baculovirus-insect cell system, National Science Foundation, David W. Murhammer (PI), Robert J. Linhardt (Co-PI), Donald L. Jarvis (Co-PI), and John Weiler (Co-PI), $406,610, 8/98-8/00.

Evaluating oxidative stress in virally-infected cells in simulated microgravity, NASA, Victor G. J. Rodgers (PI), David W. Murhammer (Co-PI), and Larry W. Oberley (Co-PI), $533,000, 3/1/99 – 11/31/02 (no cost extension to 11/31/03).

Monitoring and control of rotating wall vessels and application to the study of prostate cancer [renewal], NASA, David W. Murhammer (PI), Mark A. Arnold (Co-PI), and Michael B. Cohen (Co-PI), $964,460, 8/1/99 – 11/31/02 (no cost extension to 11/31/03).

Research experiences for undergraduates (REU) supplement for Genetic modifications and environmental factors influencing glycoprotein processing in the baculovirus-insect cell system, National Science Foundation, David W. Murhammer (PI), $10,000, 11/98-8/00.

Metabolic engineering: extending the lifespan of baculovirus infected insect cells, NIH (1 RO1 GM067932), David W. Murhammer (PI), Donald L. Jarvis (Univ. of Wyoming, Co-PI), $620,081 (includes UW funds), 5/1/2003 – 4/30/2006.

Cost-effective production of baculovirus insecticides, EPA, David W. Murhammer (PI), Michael Feiss (Co-PI), Bryony Bonning (Iowa State Univ., Co-PI), $320,000 (does not include ISU funds), 12/1/2003 – 11/31/2006.

Funded Research Grants (Industrial)

Production of viral insecticides in plug flow bioreactors, American Cyanamid, David W. Murhammer (PI), $8,000, 11/94 - 11/95.

Monitoring insect cell bioreactors with near-infrared spectroscopy, American Cyanamid, David W. Murhammer (PI) and Mark A. Arnold (Co-PI), $19,500, 8/95 - 8/96.

Developing near-infrared spectroscopy for monitoring glucose, glutamine, and other components in insect cell bioreactors, American Cyanamid, David W. Murhammer (PI) and Mark A. Arnold (Co-PI), $19,500, 1/96-12/97.

Funded Research Grants (Internal at University of Iowa)

Hybridoma protein synthesis, including monoclonal antibody, under anoxic conditions, NIH Through Biomedical Research Support Grant Funds, David W. Murhammer (PI), $10,000, 11/89 - 11/90.

Hybridoma protein synthesis, including monoclonal antibody, under anoxic conditions, Old Gold Summer Fellowship, David W. Murhammer (PI), $3,500, 5/90 - 8/90.

Improving the fidelity of protein glycosylation in a baculovirus/insect cell expression system, NIH Through Biomedical Research Support Grant Funds, David W. Murhammer (PI), $10,000, 12/90 - 12/91.

Use of cell fusion techniques to improve the protein processing capabilities of insect cells, Carver Scientific Research Initiative Grant Program, David W. Murhammer (PI), $7,525, 1/92 - 1/93.

Expression of viral surface proteins for cancer diagnosis and therapy, American Cancer Society Institutional Research Seed Grant, David W. Murhammer (PI), $15,000, 10/92 - 10/93.

Use of perfusion cultures to study the effect of dissolved oxygen concentration on the baculovirus/insect cell expression system, Central Investment Fund For Research Development, David W. Murhammer (PI), $8,175, 2/93 - 7/93.

Altering protein glycosylation in insect cells, Carver Scientific Research Initiative Grant Program, David W. Murhammer (PI), $13,000, 5/95 - 12/96.

Overcoming few polyhedra mutant accumulation in baculovirus production, David W. Murhammer (PI), $15,000, 6/2001-6/2002.

Utilizing Phage to Prevent Biofilm Formation on Medical Devices, Eric Nuxoll and David Murhammer (Co-PIs), $8450, 10/2017-6/2018.

**TEACHING ACTIVITIES (not including Professional Seminar (52:091; CBE:3000) that was taught every semester since Spring 1990)**

Courses Taught

| | |
|---|---|
| Spring 1990 | Advanced Biochemical Engineering (52:146) |
| Fall 1990 | Engineering Biological Science (57:013) |
| Spring 1991 | Process Calculations (52:041) |
| Spring 1991 | Advanced Biochemical Engineering (52:180) |
| Fall 1991 | Introduction to Biochemical Engineering (52:180) |
| Spring 1992 | Engineering Aspects of Animal Cell Culture (52:280) |
| Spring 1992 | Process Calculations (52:041) |
| Fall 1992 | Unit Operations Laboratory I (52:047) |
| Spring 1993 | Unit Operations Laboratory II (52:048) |
| Fall 1993 | Introduction to Biochemical Engineering (52:108) |
| Fall 1993 | Unit Operations Laboratory I (52:047) |
| Spring 1994 | Unit Operations Laboratory II (52:048) |
| Fall 1994 | Momentum Transport (52:042) |
| Spring 1995 | Momentum Transport (52:042) |
| Fall 1995 | Process Calculations (52:041) |
| Fall 1995 | Advanced Thermodynamics (52:117) |
| Spring 1996 | Chemical Process Safety (52:087) |
| Fall 1996 | Process Calculations (52:041) |
| Spring 1997 | Chemical Process Safety (52:087) |
| Spring 1997 | Engineering Aspects of Animal Cell Culture (52:280) |
| Fall 1997 | Introduction to Biochemical Engineering (52:108) |
| Spring 1998 | Momentum Transport (52:042) |
| Spring 1998 | Chemical Process Safety (52:087) |
| Fall 1998 | Engineering I Discussion (57:005) |
| Spring 1999 | Momentum Transport (52:042) |
| Spring 1999 | Chemical Process Safety (52:187) |
| Spring 2000 | Chemical Process Safety (52:187) |
| Fall 2000 | Engineering Aspects of Animal Cell Culture (52:280) |
| Spring 2001 | Momentum Transport (52:042) |
| Spring 2001 | Chemical Process Safety (52:187) |
| Fall 2001 | Intermediate Chemical Reaction Kinetics (52:145) |
| Spring 2002 | Momentum Transport (52:042) |
| Spring 2002 | Chemical Process Safety (52:187) |
| Fall 2002 | Intermediate Chemical Reaction Kinetics (52:145) |
| Spring 2003 | Momentum Transport (52:042) |
| Spring 2003 | Chemical Process Safety (52:187) |
| Fall 2003 | Intermediate Chemical Reaction Kinetics (52:145) |
| Spring 2004 | Engineering Flow and Heat Exchange (52:151) |

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|---|---|
| Spring 2004 | Chemical Process Safety (52:187) |
| Fall 2004 | Process Calculations (52:041) |
| Fall 2004 | Introduction to Biochemical Engineering (52:108) |
| Spring 2005 | Engineering Flow and Heat Exchange (52:151) |
| Fall 2005 | Process Calculations (52:041) |
| Fall 2005 | Introduction to Biochemical Engineering (52:108) |
| Spring 2006 | Chemical Process Safety (52:187) |
| Spring 2006 | First-Year Seminar (52:029) |
| Fall 2006 | Engineering Aspects of Animal Cell Culture (52:226) |
| Fall 2006 | First-Year Seminar (52:029) |
| Fall 2006 | Process Calculations (52:041) |
| Fall 2006 | Introduction to Biochemical Engineering (52:108) |
| Spring 2007 | Chemical Process Safety (52:187 |
| Spring 2007 | First-Year Seminar (52:029) |
| Fall 2007 | First-Year Seminar (52:029) |
| Fall 2007 | Introduction to Biochemical Engineering (52:108) |
| Spring 2008 | First-Year Seminar (52:029) |
| Spring 2008 | Engineering Flow and Heat Exchange (52:151) |
| Fall 2008 | First-Year Seminar (52:029) |
| Fall 2008 | Energy & Society (52:030) |
| Spring 2009 | First-Year Seminar (52:029) |
| Spring 2009 | Engineering Flow and Heat Exchange (52:151) |
| Spring 2009 | Chemical Process Safety (52:187 |
| Fall 2009 | First-Year Seminar (52:029) |
| Fall 2009 | Chemical Engineering Process Design I (52:184) |
| Spring 2010 | Chemical Process Safety (52:187 |
| Fall 2010 | First-Year Seminar (52:029) |
| Fall 2010 | Chemical Engineering Process Design I (52:184) |
| Spring 2011 | Chemical Process Safety (52:187 |
| Fall 2011 | First-Year Seminar (52:029) |
| Fall 2011 | Chemical Engineering Process Design I (52:184) |
| Spring 2012 | Chemical Process Safety (52:1873 |
| Fall 2012 | First-Year Seminar (52:029) |
| Fall 2012 | Thermodynamics/Transport Lab (52:171) |
| Fall 2012 | Chemical Engineering Process Design I (52:184) |
| Spring 2013 | Chemical Process Safety (52:187) |
| Fall 2013 | Chemical Engineering Process Design I (CBE:4109) |
| Fall 2013 | First-Year Seminar (CBE:1180) |
| Fall 2013 | Thermodynamics/Transport Lab (CBE:3150) |
| Spring 2014 | Chemical Process Safety (CBE:3125) |
| Fall 2014 | Biochemical Engineering (CBE:5205) |
| Fall 2014 | First-Year Seminar (HONR:1300) |
| Fall 2014 | Chemical Engineering Process Design I (CBE:4109) |
| Spring 2015 | Chemical Process Safety (CBE:3125) |
| Fall 2015 | Biochemical Engineering (CBE:5205) |
| Fall 2015 | First-Year Seminar (CBE:1180) |

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|---|---|
| Fall 2015 | Thermodynamics/Transport Lab (CBE:3150) |
| Spring 2016 | Chemical Process Safety (CBE:3125) |
| Fall 2016 | Biochemical Engineering (CBE:5205) |
| Fall 2016 | First-Year Seminar (CBE:1180) |
| Fall 2016 | Thermodynamics/Transport Lab (CBE:3150) |
| Spring 2017 | Chemical Process Safety (CBE:3125) |
| Spring 2017 | Engineering Flow & Heat (CBE:3110) |
| Fall 2017 | First-Year Seminar (CBE:1180) |
| Fall 2017 | Thermodynamics/Transport Lab (CBE:3150) |
| Fall 2017 | Biochemical Engineering (CBE:5205) |
| Spring 2018 | Chemical Process Safety (CBE:3125) |
| Spring 2018 | Senior Enriching Activities Seminar (CBE:4195) |
| Fall 2018 | First-Year Seminar (CBE:1180) |
| Fall 2018 | Chemical Process Safety (CBE:3125) |
| Fall 2018 | Biochemical Engineering (CBE:5205) |
| Spring 2019 | Biochemical Engineering (CBE:3205) |
| Spring 2019 | Senior Enriching Activities Seminar (CBE:4195) |
| Fall 2019 | First-Year Seminar (CBE:1180) |
| Fall 2019 | Chemical Process Safety (CBE:3125) |
| Fall 2019 | Chemical Reaction Engineering/Separations Lab (CBE:3155) |
| Spring 2020 | Biochemical Engineering (CBE:3205) |
| Spring 2020 | Senior Enriching Activities Seminar (CBE:4195) |
| Fall 2020 | First-Year Seminar (HONR:1300) |
| Fall 2020 | Chemical Process Safety (CBE:3125) |
| Fall 2020 | Chemical Reaction Engineering/Separations Lab (CBE:3155) |
| Spring 2021 | Biochemical Engineering (CBE:3205) |
| Spring 2021 | Senior Enriching Activities Seminar (CBE:4195) |
| Fall 2021 | First-Year Seminar (HONR:1300) |
| Fall 2021 | Chemical Process Safety (CBE:3125) |
| Fall 2021 | Chemical Reaction Engineering/Separations Lab (CBE:3155) |
| Spring 2022 | Biochemical Engineering (CBE:3205) |
| Spring 2022 | Advanced Chemical Process Safety (CBE:4125) |
| Spring 2022 | Senior Enriching Activities Seminar (CBE:4195) |
| Fall 2022 | First-Year Seminar (CBE:1180) |
| Fall 2022 | Chemical Process Safety (CBE:3125) |
| Spring 2023 | Biochemical Engineering (CBE:3205) |
| Spring 2023 | Senior Enriching Activities Seminar (CBE:4195) |
| Fall 2023 | First-Year Seminar (CBE:1180) |
| Fall 2023 | Chemical Process Safety (CBE:3125) |
| Spring 2024 | Biochemical Engineering (CBE:3205) |
| Spring 2024 | Advanced Chemical Process Safety (CBE:4125) |
| Spring 2024 | Senior Enriching Activities Seminar (CBE:4195) |

<u>Project Lead The Way (PLTW) Courses Taught</u>

Su 2006 Received Training to serve as an Affiliate Professor for the PLTW, Biotechnical Engineering (BE) course, Purdue University, Kokomo, IN campus

Su 2007 Served as Affiliate Professor for BE course for high school teachers
Su 2008 Served as Affiliate Professor for BE course for high school teachers
Su 2009 Served as Affiliate Professor for BE course for high school teachers
Su 2010 Served as Affiliate Professor for BE course for high school teachers
Su 2011 Served as Affiliate Professor for BE course for high school teachers
Su 2012 Served as Affiliate Professor for BE course for high school teachers
Su 2013 Served as Affiliate Professor for BE course for high school teachers
Su 2015 Received Training to serve as Affiliate Professor for the PLTW Environmental Sustainability (ES) course
Su 2015 Served as Affiliate Professor for ES course for high school teachers
Su 2016 Received Training to serve as Affiliate Professor for the PLTW Principles of Biomedical Science (PBS) course

University of Iowa American Institute of Chemical Engineers (AIChE) Student Chapter

- Served as advisor, 1990-present
- Outstanding Student Chapter Advisor (1996)
- Outstanding Student Chapter Award 29 times (1993-2003 & 2005-present); this award is given to the top 10% student chapters in the United States
- Donald F. & Mildred Topp Othmer National Scholarship Award won by University of Iowa students 23 times (1991-1993, 1995, 1996, 1999-2001, 2003-2007, 2009, 2011-2014 & 2016-2020); this award is currently given to 15 students nationally
- Minority Scholarship Award for College Students 2 times (1997 & 2019)
- ChemE Jeopardy National Competition, first place 3 times (2013, 2014 & 2020)
- ChemE Jeopardy National Competition, second place 3 times (2012, 2015 & 2019)
- ChemE Jeopardy Mid-America Regional Competition, first place 8 times (2012-2015, 2018, 2021-2023)
- ChemE Jeopardy Mid-America Regional Competition, second place 6 times (2012, 2016, 2017, 2019-2021)
- Safety & Health Division National Design Competition Award for Inherently Safer Design won 9 times (2012, 2 teams in 2013, 2 teams in 2014, 2016, 2 teams in 2017, 2018); two awards are given annually
- Jack Wehman SAChE Team Design Award (SAChE Team Award for Overall Safety) won 5 times (2012, 2013, 2015, 2017, 2018); only one award is given annually and is given for the best safety in design
- Outstanding Established Student Organization, UI College of Engineering (2015)

Post Doctoral Fellows Supervised

| | |
|---|---|
| Mark Riley | *Monitoring insect cell bioreactors with near-infrared spectroscopy*, 1995-97. |
| Fuming Zhang | *Extending the glycosylation capabilities of the* Spodoptera frugiperda *Sf-9 insect cell line*, 1999-2001 |
| Jiang Qiu | *Monitoring insect cell bioreactors with near-infrared spectroscopy*, 2000-2002. |

Theses and Dissertations Completed

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|---|---|
| Murali Krishna Pasumarthy | *Selection and development of insect cell lines for recombinant protein synthesis*, Ph. D., 1994. |
| Alexander Matschiner | *Development of a method for screening randomly mutated peroxidases using the baculovirus expression system*, M. S., 1994. |
| Christine Mitchell-Logean | *Effects of bcl-2 expression on insect cell viability, productivity and morphology and characterization of Sf-9 and High Five™ cell suspension cultures*, Ph. D., 1997. |
| Martin Rhiel | *Application of near-infrared spectroscopy to bioreactor monitoring*, Ph. D., 1998. |
| Michael Wolff | *Extension of the glycoprotein processing capabilities of the lepidopteran insect cell line* Spodoptera frugiperda *by metabolic engineering,* Ph. D., 1999. |
| Mark Saarinen | *Effects of the culture environment of the high-aspect ratio vessel on recombinant protein production in insect cell lines*, M. S., 1999. |
| Mark Saarinen | *Effects of dissolved oxygen concentration on oxidative stress and recombinant protein production in insect cell cultures*, Ph. D., 2001. |
| Gaurav Chauhan | *Countering the adverse effect of oxidative stress in virally infected insect cells,* M. S., 2004. |
| Chin Ng | *Three dimensional mass transport modeling of the NASA high aspect ratio rotating vessel*, Ph. D., 2004. Co-advised by Victor Rodgers. |
| Patricia Rose | *FP25K and multiplicity of infection impact on* Autographa californica *multiple nucleopolyhedrovirus polyhedral production and gene expression*, Ph. D., 2005. |
| Sybil Hrstka | *Engineering therapeutic proteins*, Ph. D., 2005. Co-advised by Robert Linhardt. |
| Lopamurda Giri | *Effect of genetic modification of the fp25k gene on few polyhedral and defective interfering particle mutations in baculovirus*, Ph. D., 2009. |
| Sucheta Vajrala | *Mechanism of carbon dioxide inhibition in insect cell culture,* M. S., 2010. |
| Bhakti Bapat | *Role of homolog CuZnSOD in baculovirus infection in insect cells*, M. S., 2014. |

<u>Funded Teaching-Related Grants</u>

Research experiences for undergraduates (REU) site, National Science Foundation, David W. Murhammer (PI) and Victor G. J. Rodgers (Co-PI), $76,000, 6/92 - 11/94.

Research experiences for undergraduates (REU) supplement for adaptation of insect cells to suspension growth, National Science Foundation, David W. Murhammer (PI), $20,000, 2/95-8/97.

Research experiences for undergraduates (REU) site, National Science Foundation, David W. Murhammer (PI) and Victor G. J. Rodgers (Co-PI), $163,763, 6/95 - 5/98.

Development of an undergraduate chemical process safety laboratory, National Science Foundation Instrumentation and Laboratory Improvement Program, David W. Murhammer (PI), $37,427, 5/96 - 4/98 (no cost extension to 4/99).

Research experiences for undergraduates (REU) supplement for Genetic modifications and environmental factors influencing glycoprotein processing in the baculovirus-insect cell system, National Science Foundation, David W. Murhammer (PI), $10,000, 11/98-8/00.

Teaching-Related Meetings Attended

American Society for Engineering Education (ASEE) summer school for chemical engineering faculty (Bozeman, MT), August 1992.

Safety and Chemical Engineering Education (SACHE) Faculty Workshop regarding the characterization and control of chemical process hazards (Wyandotte, MI), May 1997.

ASEE summer school for chemical engineering faculty (Snowbird, UT), August 1997.

ABET faculty workshop for program improvement (Baltimore, MD), January 2002.

ASEE North Midwest Section Meeting (Iowa City, IA), October 2014

Teaching-Related Presentations

Murhammer, D.W. Development of an undergraduate chemical process safety laboratory, ASEE summer school for chemical engineering faculty (Snowbird, UT), 1997.

Murhammer, D.W. Thoughts about meeting ABET safety requirements for chemical engineering programs, ASEE North Midwest Section Meeting (Iowa City, IA), 2014.

Murhammer, D.W. Mentorship program for undergraduate chemical engineering students, ASEE North Midwest Section Meeting (Iowa City, IA), 2014.

Teaching-Related Publications

Dorathy, B. D.; Mooers, J. A.; Warren, M. M.; Mich, J. L.; Murhammer, D. W. (2001). Experiments to Demonstrate Chemical Process Safety Principles. *Chemical Engineering Education,* **35:** 36-44.

**SERVICE ACTIVITIES (Partial List)**

| | |
|---|---|
| 1990-Present | Advisor, Undergraduate AIChE Student Chapter, University of Iowa |
| 1992-98 | Membership Committee Chair for the Biochemical Technology Division of the American Chemical Society |
| 1994-98 | Chemical and Biochemical Engineering Representative on the executive committee of the Biocatalysis and Bioprocessing Center at the University of Iowa |
| 1994-96 | Recruitment committee chair for the Biocatalysis and Bioprocessing Center at the University of Iowa |
| 1994-98 | Patents and Literature Review Editor, *Applied Biochemistry and Biotechnology* |
| 1996-98 | Chairman of the subcommittee to formulate the 1999 AIChE National Student Chapter Competition |
| 1998-2001 | Engineering Faculty Council (Univ. of Iowa) |
| 1998-Present | Liaison for the Mid-America Region on the Regional Conference Subcommittee of AIChE |
| 1998-99 | Second Vice-Chair, Student Chapters Committee, AIChE |
| 1999-2000 | First Vice-Chair, Student Chapters Committee, AIChE |
| 2000-2001 | Chair, Student Chapters Committee, AIChE |

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|---|---|
| 2000-2002 | Chair, Chemical and Biochemical Engineering Department ABET Committee |
| 2003-2009 | Associate Editor, *Applied Biochemistry and Biotechnology* |
| 2004-Present | AIChE Awards Subcommittee, Student Chapters Committee, Member |
| 2009-Present | Editorial Board, *Applied Biochemistry and Biotechnology* |
| 2013-Present | AIChE Awards Subcommittee, Student Chapters Committee, Chair |
| 2013-Present | AIChE ChemE Jeopardy Subcommittee, Student Chapters Committee, Chair |
| 2013-Present | ChemE Car Safety Coordinator, AIChE Mid-America Regional Conference |
| 2018-Present | CBE Director of Undergraduate Studies (DUGS) |
| 2018-Present | CBE ABET Coordinator |