

Charles E. Glatz
Curriculum Vitae

CURRENT POSITION/ADDRESS

University Professor of Chemical and Biological Engineering
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EDUCATION

B.S. (Chemical Engineering)	University of Notre Dame	1971
Ph.D. (Chemical Engineering)	University of Wisconsin	1975

ACADEMIC EXPERIENCE

1975	Lecturer, University of Wisconsin, Madison, WI (summer)
1975-1980	Assistant Professor, Iowa State University, Ames, IA
1980-1986	Associate Professor, Iowa State University, Ames, IA
1986-2011	Professor, Iowa State University, Ames, IA
1997- 2005	Chair, Department of Chemical (and Biological) Engineering, Iowa State University, Ames, IA
2004	Interim Dean, College of Engineering, Iowa State University, Ames, IA
2011-	University Professor, Iowa State University, Ames, IA

RESEARCH AND INDUSTRIAL EXPERIENCE

1971	Process Analysis and Control, Humble Oil and Refining Co., (Exxon Corp.), Baytown, TX (summer)
1982-1983	Honorary Research Fellow, University of Hull and University College, London
1994	Visiting Professor, University of Colorado, Boulder, CO
2006	Erskine Fellow, U. of Canterbury (NZ) and Visiting Professor, RPI (Troy)

HONORS AND AWARDS

National Science Foundation Graduate Fellow	1971-1974
Webber Award for Outstanding Teacher in Chemical Engineering	1982
Outstanding Teacher Award, College of Engineering	1990
Separation Science and Technology, Editorial Board	1997-
Iowa Academy of Sciences Distinguished Scientist	1997
Boylan Award for Outstanding Research, ISU College of Engineering	2003
Regents' Award for Faculty Excellence	2007

TEACHING AND RESEARCH AREAS

Biochemical separations; kinetics of protein precipitation; protein crystallization; membrane processing; protein extraction; recovery of organic acids; heat and mass transfer; fermentation; protein recovery from plants.

TECHNICAL PUBLICATIONS (Refereed)

1. C. E. Glatz and T. A. Massaro, *Atherosclerosis*, 25:153-163, 1976. Influence of Glycosaminoglycan Content on Mass Transfer Behavior of Porcine Artery Wall. I. Diffusive Transport of ^{45}Ca and ^3HHO .
2. C. E. Glatz and T. A. Massaro, *Atherosclerosis*, 25:165-173, 1976. Influence of Glycosaminoglycan Content on Mass Transfer Behavior of Porcine Artery Wall. II. Differences in Mass Transfer Rates Related to Variations in GAG Content.
3. T. A. Massaro, C. E. Glatz, N. A. Peppas, G. M. Chisholm, and C. K. Colton, *Artery*, 5:1-13, 1979. Distribution of Glycosaminoglycans in Consecutive Layers of the Rabbit Aorta.
4. C. E. Glatz and J. M. Vislocky, *Biochem. Biophys. Acta*, 573:382-393, 1979. The Kinetics of Binding of Serum Lipoproteins by Immobilized Heparin.
5. A. P. Crowther, L. A. Wilson, and C. E. Glatz, *J. Food Proc. Engr.*, 4:99-115, 1981. Effects of Processing on Adsorption of Off-Flavors onto Soy Protein.
6. K. D. Wiggers, L. S. Walsh, A. D. Julius, M. J. Richard, C. E. Glatz, and M. A. Hauser, Cholesterol Deposition in Swine Fed Various Proteins and Fats. *J. Amer. Oil Chem. Soc.*, 58:608A, 1981.
7. G. C. Grabenbauer and C. E. Glatz, *Chem. Engr. Commun.*, 12:203-219, 1981. Protein Precipitation--Analysis of Particle Size Distribution and Kinetics.
8. R. A. Pollet, C. E. Glatz, D. C. Dyer, and H. J. Barnes, *Amer. J. Vet. Res.*, 44:1718-1721, 1983. Pharmacokinetics of Choretetracycline Potentiation with Citric Acid in the Chicken.
9. A. M. Petenate and C. E. Glatz, *Biotechnol. Bioengr.*, 25:3049-3058, 1983. Isoelectric Precipitation of Soy Protein. I. Factors Affecting Particle Size Distribution.
10. A. M. Petenate and C. E. Glatz, *Biotechnol. Bioengr.*, 25:3059-3078, 1983. Isoelectric Precipitation of Soy Protein. II. Kinetics of Protein Aggregate Growth and Breakage.
11. R. A. Pollet, C. E. Glatz, and D. C. Dyer, *Poultry Science*, 63:1110-1114, 1984. Oral Absorption of Chlorotetracycline in Turkeys: Influence of Citric Acid and *P. Multocida* Infection.
12. C. D. Nelson and C. E. Glatz, *Biotechnol. Bioengr.*, 27:1434-1444, 1985. Primary Particle Formation in Protein Precipitation.

13. R. R. Fisher, C. E. Glatz, and P. A. Murphy, Biotechnol. Bioeng., 28:1056-1063, 1986. The Effects of Mixing During Acid Addition on Fractionally Precipitated Protein.
14. C. E. Glatz, M. Hoare, and J. Landa-Vertiz, AIChE J., 32:1196-1204, 1986. The Formation and Growth of Protein Precipitates in a Continuous Stirred-Tank Reactor.
15. C. E. Glatz and R. R. Fisher in Separations, Recovery, and Purification in Biotechnology, J. A. Asenjo and J. Hong (eds.), ACS Symposium Series No. 314, pp 109-120, 1986. Modelling of Precipitation Phenomena in Protein Recovery.
16. D. L. Brown and C. E. Glatz. Chem. Eng. Sci., 42:1831-1839, 1987. Aggregate Breakage in Protein Precipitation.
17. K. M. Clark and C. E. Glatz. Biotechnol. Progress, 4:241-247, 1987. Polymer Dosage Considerations in Polyelectrolyte Precipitation of Protein.
18. R. R. Fisher and C. E. Glatz. Biotechnol. Bioengr., 32:777-785, 1988. Polyelectrolyte Precipitation of Proteins: The Effects of Reactor Conditions.
19. R. R. Fisher and C. E. Glatz. Biotechnol. Bioengr., 32:786-796, 1988. Polyelectrolyte Precipitation of Proteins: Models of the Particle Size Distributions.
20. J. M. Kaiser and C. E. Glatz. Biotechnol. Progress, 4:242-247, 1988. Use of precipitation to Alter Flux and Fouling Performance in Cheese Whey Ultrafiltration.
21. J. E. Hardwick and C. E. Glatz. J. Agricultural Food Chem., 37:1188-1192, 1989. Enzymatic Hydrolysis of Corn Gluten Proteins.
22. K. C. Clark and C. E. Glatz. Protein Fractionation by Precipitation with Carboxymethyl Cellulose, in Downstream Processing and Bioseparation, J-F. P. Hamel, J. B. Hunter, and S. K. Sikdar (eds), ACS Symposium Series #419, ACS, Washington D.C., 1990.
23. J. Zhao, C. F. Ford, C. E. Glatz, M. A. Rougvie, and S. M. Gendel. J. Biotechnol. 14:273-284, 1990. Polyelectrolyte precipitation of b-galactosidase fusions containing poly(aspartic acid) tails.
24. D. E. Parker, C. E. Glatz, C. F. Ford, S. M. Gendel, M. A. Rougvie, and I. Suominen. Biotechnol. Bioengr., 36:467-475, 1990. Recovery of a Charged-Fusion Protein from Cell Extracts by Polyelectrolyte Precipitation.
25. C. E. Glatz. In Separation Processes in Biotechnology, J. A. Asenjo (ed.), Marcel Dekker, Inc., New York, 1990. Chapter 11. Precipitation.
26. R. M. Cordes, W. B. Sims, and C. E. Glatz. Biotechnol. Prog., 6: 283-285, 1990. Precipitation of Nucleic Acids with Poly(ethyleneimine).
27. M. H. Heng and C. E. Glatz. Biotechnol. Prog. 6: 129-134, 1990. Flux Enhancement in Hollow Fiber Ultrafiltration for the Recovery of Acid Cheese Whey Precipitates.
28. M. H. Heng and C. E. Glatz. J. Dairy Sci. 74: 11-19, 1991. Chemical Pretreatments and Fouling in Acid Cheese Whey Ultrafiltration.

29. A. G. Bozzano and C. E. Glatz. J. Membrane Sci. 55: 181-198, 1991. Separation of Proteins from Polyelectrolytes by Ultrafiltration.
30. J-Y Shieh and C. E. Glatz. Polymer Preprints, 32(1): 606-607, 1991. Polyelectrolyte Precipitation of Proteins - Role of Polymer Molecular Weight.
31. C. F. Ford, I. Suominen, and C. E. Glatz. Protein Expression and Purification 2: 95-107, 1991. Fusion Tails for the Recovery and Purification of Recombinant Proteins.
32. K. C. Clark and C. E. Glatz. Chem. Engrng. Sci. 47: 215-224, 1992. A Binding Model for the Precipitation of Proteins by Carboxymethyl Cellulose.
33. C. E. Glatz. In Stability of Protein Pharmaceuticals, T.J. Ahern and M.C. Manning (eds) Plenum Press, New York, 1992. Chapter 5. Modeling of Aggregation-Precipitation Phenomena .
34. M. Q. Niederauer and C. E. Glatz. Adv. Biochem. Engr./Biotechnol. 47: 159-188, 1992. Selective Precipitation.
35. A. J. Weier, B. A. Glatz, and C. E. Glatz. Biotechnol. Prog. 8: 479-485, 1992. Recovery of Propionic and Acetic Acids from Fermentation Broth by Electrodialysis.
36. I. Suominen, H. Heimo, H. Nurmela, C. Ford, D. Stachon, and C. Glatz. Ann. N.Y. Acad. Sci. 672: 106-113, 1992. Use of Charged Tails in Protein-Purification Fusions: Polyaspartic Acid Tails in *Aspergillus* Glucoamylase Expressed in Yeast.I
37. I. Suominen, C. Ford, D. Stachon, H. Heimo, M. Niederauer, H. Nurmela, and C. Glatz. Enz. Microb. Technol. 15: 593-600, 1993. Enhanced Recovery and Purification of *Aspergillus* Glucoamylase from *Saccharomyces cerevisiae* by the Addition of Poly(Aspartic Acid) Tails.
38. M. H. Heng and C. E. Glatz. Biotechnol. Bioengr. 42:333-338, 1993. Charged Fusions for Selective Recovery of β -Galactosidase from Cell Extract Using Hollow-Fiber Ion Exchange membrane Adsorption.
39. J.-Y. Shieh and C.E. Glatz, pp 273-284 in Macromolecular Complexes in Chemistry and Biology, Edited by P. Dubin et al., Springer-Verlag, Berlin, 1994. Chapter 16. Precipitation of Proteins with Polyelectrolytes: Role of Polymer Molecular Weight.
40. M. Q. Niederauer and C. E. Glatz. J. Macromol. Sci. - Pure Appl. Chem. A31: 127-153, 1994. Model of the Polyelectrolyte Precipitation of Genetically Engineered Enzymes Possessing Charged Polypeptide Tails.
41. M. Q. Niederauer, I. Suominen, M. A. Rougvie, C. F. Ford and C. E. Glatz. Biotechnol. Prog. 10:237-245, 1994. Characterization and Polyelectrolyte Precipitation of β -Galactosidase Containing Genetic Fusions of Charged Polypeptides.
42. J. R. Luther and C. E. Glatz. Biotechnol. Bioengr. 44:147-153, 1994. Genetically Engineered Charge Modifications to Enhance Protein Separation in Aqueous Two-Phase Systems: Electrochemical Partitioning.

43. C. E. Forney and C. E. Glatz. Biotechnol. Prog. 10:499-503, 1994. Reversed Micellar Extraction of Charged Fusion Proteins
44. M. H. Heng and C. E. Glatz. Biotechnol. Bioengr. 44:745-752, 1994. Ion Exchange Immobilization of β -galactosidase Charged Fusions for Lactose Hydrolysis.
45. T.-Y. Hsiao, C. E. Glatz, and B. A. Glatz. Biotechnol. Bioeng. 44: 1228-1234, 1994. Broth Recycle in a Yeast Fermentation.
46. M. H. Heng and C. E. Glatz. J. Chrom. A. 689: 227-234, 1995. Charged Fusions for β -galactosidase Retention in Anion Exchange Chromatography.
47. M. S. Solichien, D. G. O'Brien, E. G. Hammond, and C. E. Glatz. Enz. Microb. Technol. 17:23-31, 1995. Membrane-based extractive fermentation to produce propionic and acetic acids: Toxicity and mass transfer considerations.
48. C. E. Glatz and C. F. Ford. Appl. Biochem. Biophys. 54:173-191, 1995. Genetic Engineering to Enhance the Selectivity of Protein Separations.
49. J. R. Luther and C. E. Glatz. Biotechnol. Bioengr. 46: 62-68, 1995. Genetically Engineered Charge Modifications to Enhance Protein Separation in Aqueous Two-Phase Systems: Charge Directed Partitioning.
50. C. E. Forney and C. E. Glatz. Biotechnol. Progress 11: 260-264, 1995. Extraction of Charged Fusion Proteins in Reversed Micelles: Comparison between Different Surfactant Systems.
51. M. Saikumar, C. E. Glatz, and M. A. Larson. J. Cryst. Growth 151: 173-179, 1995. Crystallization of Lysozyme at High Pressures.
52. T.-Y. Hsiao and C. E. Glatz. Biotechnol. Bioeng. 49: 341-347, 1996. Water Reuse in L-Lysine Fermentation Process.
53. Ozadali, F., B. A. Glatz and C. E. Glatz. Appl. Microbiol. Biotechnol. 44: 710-716, 1996. Fed-Batch Fermentation with and without On-Line Extraction for Propionic and Acetic Acid Production by *Propionibacterium acidipropionici*.
54. Gu, Z., C. E. Glatz, and B. A. Glatz. Enz. Microb. Technol. 22: 13-18, 1998. Effects of Propionic Acid on Propionibacteria Fermentation.
55. Gu, Z., B. A. Glatz, and C. E. Glatz. Biotechnol. Bioengr. 57: 454-461, 1998. Propionic Acid Production by Extractive Fermentation: Part 1. Solvent Considerations.
56. Rickert, D. A., C. E. Glatz, and B. A. Glatz. Enz. Microb. Technol. 22: 409-414, 1998. Improved Organic Acid Production by Calcium Alginate-Immobilized Propionibacteria.
57. Fan, W., U. Bakir, and C. E. Glatz. Biotechnol. Bioengr. 59: 461-470, 1998. Contribution of Charge to Protein Partitioning in Aqueous Two-Phase Systems.
58. Saikumar, M. V., C. E. Glatz, and M. A. Larson. J. Cryst. Growth. 187: 277-288. 1998. Lysozyme Crystal Growth and Nucleation Kinetics.

59. Fan, W. and C. E. Glatz. Sep. Sci. Technol. 34: 423-438, 1999. Charged Protein Partitioning in Aqueous PEG-Dextran Two-Phase Systems: Salt Effects.
60. Gu, Z., D. A. Rickert, B. A. Glatz, and C. E. Glatz. Lait 79: 137-148, 1999. Feasibility of propionic acid production by extractive fermentation.
61. K. Ohmori and C. E. Glatz. J. Membrane Sci. 153: 23-32, 1999. Effects of pH and ionic strength on microfiltration of *C. glutamicum*. (corrigendum 163: 151-152, 1999)
62. C.-M. Zhang and C. E. Glatz. Biotechnol. Prog. 15: 12-18, 1999. Process engineering strategy for recombinant protein recovery from canola by cation exchange chromatography.
63. F. Zaman, A. R. Kusnadi and C. E. Glatz. Biotechnol. Prog. 15: 488-492 1999. Strategies for recombinant protein recovery from canola by precipitation.
64. J. N. Webb, R. Y. Waghmare, J. F. Carpenter, C. E. Glatz, and T. W. Randolph. J. Cryst. Growth. 205: 563-574, 1999. Pressure effect on subtilisin crystallization and solubility.
65. C.-M. Zhang, S. A. Reslewic and C. E. Glatz. Biotechnol. Bioengr. 68: 52-58, 2000. Suitability of immobilized metal affinity chromatography for protein purification from canola.
66. R. Y. Waghmare, J. N. Webb, T. W. Randolph, M. A. Larson, and C. E. Glatz. J. Cryst. Growth. 208: 678-676, 2000. Pressure dependence of subtilisin crystallization kinetics.
67. R. Y. Waghmare, X. J. Pan, and C. E. Glatz. J. Cryst. Growth 210: 746-752, 2000. Pressure and concentration dependence of nucleation kinetics for crystallization of subtilisin.
68. K. Ohmori and C. E. Glatz. J. Membrane Sci. 171: 263-271 (2000). Effects of carbon source on microfiltration of *C. glutamicum*.
69. C.-M. Zhang, R. T. Love, J. M. Jilka, and C. E. Glatz. Biotechnol. Prog. 17: 161-167, 2001. Genetic engineering strategies for purification of recombinant proteins from canola by anion exchange chromatography.
70. S. J. Brewer, C. E. Glatz, and C. Dickerson. Fusion protein purification methods, pp. 1-18 in *Protein Purification Applications* (2nd Ed.) S. J. Roe (Ed.), Oxford University Press, Oxford UK, 2001.
71. Y. Okamoto, K. Ohmori, and C. E. Glatz. J. Membrane Sci. 190: 93-106, 2001. Harvest time effects on membrane cake resistance of *Escherichia coli* broth.
72. T. J. Menkhaus, S. U. Eriksson, P. B. Whitson, and C.E. Glatz. Biotechnol. Bioengr. 77: 148-154 (2002). Host selection as a downstream strategy: Polyelectrolyte precipitation of β -glucuronidase from plant extracts.
73. X. Pan and C. E. Glatz. Crystal Growth Des., 2: 45-50, 2002. Solvent role in protein crystallization as determined by pressure dependence of nucleation rate and solubility.

74. Y. Bai, Z. L. Nikolov and C. E. Glatz. Biotechnol. Prog. 18: 1301-1305, 2002. Aqueous extraction of β -glucuronidase from transgenic canola: kinetics and microstructure.
75. X. Pan and C. E. Glatz. J. Crystal Growth. 240: 549-559, 2002. Solvent effects on the growth kinetics of subtilisin crystals.
76. Y. Bai and C. E. Glatz. Biotechnol. Bioengr. 81: 855-864, 2003. Capture of recombinant protein from unclarified canola extract using STREAMLINE expanded bed anion exchange.
77. Y. Bai and C. E. Glatz. Biotechnol. Bioengr. 81: 775-782, 2003. Bioprocess considerations for expanded bed chromatography of crude canola extract: Sample preparation and adsorbent reuse.
78. X. Pan, R. Bott and C. E. Glatz. J. Crystal Growth. 254: 492-502, 2003. Subtilisin surface properties and crystal growth kinetics.
79. X. Pan and C. E. Glatz. Crystal Growth Des. 3: 203-207, 2003. Solvent effects on the second virial coefficient of subtilisin and solubility.
80. Dharmadi, Y., Q. Chang, and C. E. Glatz. Enz. Microb. Technol., 33: 596-605, 2003. Recovery of enzyme byproducts during recombinant protein recovery from transgenic plants.
81. Menkhaus, T., C. Pate, A. Krech, and C. E. Glatz, Biotech. Bioengr. 86: 108-114, 2004. Recombinant Protein Purification From Pea.
82. Menkhaus, T. and C. E. Glatz, Biotech. Bioengr. 87: 324-336, 2004. Compatibility of Column Inlet and Adsorbent Designs for Processing of Corn Endosperm Extract by Expanded Bed Adsorption.
83. Pearson, C., M. Heng, M. Gebert, and C. E. Glatz. Biotech. Bioengr. 87:54-60, 2004. Zeta Potential As A Measure Of Polyelectrolyte Flocculation And The Effect Of Polymer Dosing Conditions On Cell Removal From Fermentation Broth.
84. Pearson, C., M. Heng, M. Gebert, and C. E. Glatz. Biotech. Bioengr. 87:61-68, 2004. A Study Of Enzyme Partitioning And Enzyme-Polymer Interactions During Polyelectrolyte Flocculation For Cell Removal From Fermentation Broth.
85. Menkhaus, T. J., Y. Bai, C. Zhang, Z. L. Nikolov, and C. E. Glatz, Biotechnol. Prog. 20: 1001-1014, 2004. Considerations for the Recovery of Recombinant Proteins from Plants (A Review).
86. Menkhaus, T. and C. E. Glatz, Biotechnol. Prog. 21: 473 - 485, 2005. Antibody Capture from Corn Endosperm Extracts by Packed Bed and Expanded Bed Adsorption.
87. Zhang, C. and C. E. Glatz, Journal of Chromatography A, 1069: 113–118, 2005. Applicability of the stoichiometric displacement model to description of the retention behavior of charged-fusion proteins during fast protein liquid chromatography.

88. Graves, K., G. Rozeboom, M. Heng, and C. E. Glatz. Biotechnol. Bioengr. 94: 346-352, 2006. Broth conditions determining specific cake resistance during microfiltration of *Bacillus subtilis*.
89. Glatz, C. E., R. González, M. E. Huba, S. K. Mallapragada, B. Narasimhan, P. J. Reilly, K. P. Saunders, J. V. Shanks. Biotechnol. Prog. 2006, 22, 173-178. Problem-based learning biotechnology courses in chemical engineering.
90. Zhong, Q. and C. E. Glatz. J. Agric. Food Chem. 54: 3181-3185, 2006. An enzymatic assay method for evaluating the lipase activity in complex extracts from transgenic corn seed.
91. Zhong, Q., Gu, Z., and C. E. Glatz. J. Agric. Food Chem., 54: 8086-8092, 2006. Extraction of recombinant dog gastric lipase from transgenic corn.
92. Gu, Z. and C. E. Glatz. J. Chromatogr. B, 845: 38-50, 2007. Aqueous two-phase extraction for protein recovery from corn extracts.
93. Gu, Z. and C. E. Glatz. Sep. Sci. Technol., 42: 1195-12-3, 2007. Recovery of recombinant dog gastric lipase from corn endosperm extract.
94. Gu, Z. and C. E. Glatz. Biotechnol. Bioengr. 97, 1159-1169, 2007. A method for three dimensional protein characterization and its application to a complex plant (corn) extract.
95. Q. Zhong, L. Xu, C. Zhang, and C. E. Glatz, Appl Microbiol Biotechnol 76:607–613, 2007. Purification of recombinant aprotinin from transgenic corn germ fraction using ion exchange and hydrophobic interaction chromatography.
96. R. Morales-Chabrand, H.-J. Kim, C. Zhang, C. E. Glatz, S. Jung. J. Am. Oil Chem. Soc. 85:383–390, 2008. Destabilization of the emulsion formed during aqueous extraction of soybean oil.
97. M. A. Aspelund, M. Heng, G. Rozeboom, C. E. Glatz. J. Mem. Sci. 324:198-208, 2008. Improving permeate flux and product transmission in the microfiltration of a bacterial cell suspension by flocculation with cationic polyelectrolytes.
98. de Moura, J. M. L. N., K. Campbell, A. Mahfuz, S. Jung, C. E. Glatz and L. Johnson. J. Am. Oil Chem. Soc. 85: 985-995, 2008. Enzyme-assisted aqueous extraction of oil and protein from soybeans and cream de-emulsification.
99. Cookman, D. J., C. E. Glatz. Bioresource Technology 100: 2012–2017, 2009. Extraction of protein from distiller's grain.
100. L. Xu and C. E. Glatz. J. Chromatogr. A, 1216: 274–280, 2009. Predicting protein retention time in ion-exchange chromatography based on three-dimensional protein characterizations.
101. Zhang, J. Baez, C., C. E. Glatz. J. Agric. Food Chem. 2009, 57 880-887. Purification and characterization of a 44 kDa recombinant collagen I alpha 1 fragment from corn grain.

102. Zhang, C., K. K. W. Pappu, J. Baez, C. E. Glatz, *Biotechnol. Prog.* 25:1660-1668, 2009. Purification and Characterization of a Transgenic Corn Grain-Derived Recombinant Collagen Type I alpha 1.
103. C. Zhang, S. Fox, L. Johnson, C. E. Glatz, *Biotechnol. Prog.* 25:1396-1401, 2009. Fractionation of transgenic corn seed by dry and wet milling to recover recombinant collagen-related proteins.
104. R. Morales-Charbrand and C. E. Glatz. *Enzyme Microb. Technol.* 45: 28–35, 2009. Destabilization of the Emulsion Formed During the Enzyme-Assisted Aqueous Extraction of Oil from Soybean Flour.
105. Campbell, K. E. and C. E. Glatz. *J. Agric. Food Chem.*, 57: 10904–10912, 2009. Mechanisms of Aqueous Extraction of Soybean Oil.
106. Campbell, K. E. and C. E. Glatz. *Biotechnol. Prog.* 26: 488-495, 2010. Protein Recovery from Enzyme-Assisted Aqueous Extraction of Soybean.
107. Paraman, I., Fox, S.R., Glatz, C.E., and Johnson, L.A., *Bioresource Technology* 101: 239-244, 2010. Recovering corn germ enriched in recombinant protein by wet-fractionation.
108. Aspelund, M. and C. E. Glatz. *J. Mem. Sci.* 353 (2010) 103–110. Purification of Recombinant Plant-Made Proteins from Corn Extracts by Ultrafiltration
109. Aguilar, O., M. Rito-Palomares, C. E. Glatz. 2010. *Separation Science and Technology*, 45: 2210 - 2225. Coupled Application of Aqueous Two-Phase Partitioning and 2D-Electrophoresis for Characterization of Soybean Proteins',
110. Aspelund, M. T. and C. E. Glatz. *Journal of Membrane Science* 365 (2010) 123–129. Clarification of aqueous corn extracts by tangential flow microfiltration.
111. Paraman, I., Moeller, L., Scott, M.P., Wang, K., Glatz, C. E. and Johnson, L.A. *J. Agric. Food Chem.* 58: 10419-10425, 2010. Utilizing Protein-lean Co-products from Corn Containing Recombinant Pharmaceutical Proteins for Ethanol Production.
112. de Moura, J.M.L.N., Campbell, K., de Almeida, N.M., Glatz, C.E., Johnson, L.A. 2011. Protein Recovery in Aqueous Extraction Processing of Soybeans Using Isoelectric Precipitation and Nanofiltration. *Journal of the American Oil Chemists' Society*, 88: 1447-1454.
113. Campbell, K.A., Glatz, C.E., Johnson, L.A., Jung, S., De Moura, J.M.N., Kapchie, V., Murphy, P. 2011. Advances in aqueous extraction processing of soybeans. *Journal of the American Oil Chemists' Society*, 88: 449-465.
114. de Moura, J.M.L.N., Campbell, K., de Almeida, N.M., Glatz, C.E., Johnson, L.A. 2011. Protein Extraction and Membrane Recovery in Enzyme-Assisted Aqueous Extraction Processing of Soybeans. *Journal of the American Oil Chemists' Society*, 88: 877-889.

OTHER PUBLICATIONS

1. C. E. Glatz, L. C. Tortorelli, and T. A. Massaro. Influence of glycosaminoglycan content on diffusive transport of calcium and water across the in vitro artery wall. Proceedings of the International Workshop Conference on Atherosclerosis, London, Ontario, Canada in Sept., 1975.
2. C. E. Glatz. Energy and materials from solid waste- illustrative example in a freshman course. Proceedings of the ASEE North Midwest Section Meeting, Milwaukee, WI, Oct., 1978.
3. C. E. Glatz. General one-dimensional steady-state diffusion problems. In American Institute of Chemical Engineers Modular Instruction. Vol C.7: 35-40 (1980) Transport. AIChE, New York.
4. C. E. Glatz and T. D. Wheelock, J. Am. Chem. Soc., 105:1075, 1983. Advances in Chemical Engineering (A Review).
5. K. P. Saunders, C. E. Glatz, M. E. Huba, M. H. Griffin, S. K. Mallapragada, and J. V. Shanks, Using Rubrics to Facilitate Students' Development of Problem Solving Skills, Proceedings of the ASEE Annual Meeting, Nashville, TN, June, 2003. (refereed)
6. B. Narasimhan, C.E. Glatz, S.K. Mallapragada, P.J. Reilly, and J.V. Shanks, K. Saunders and M. Huba, Problem-Based Learning Laboratories On Chemicals from Biorenewables. Proceeding of the ASEE Annual Meeting, Salt Lake City, UT, June 2004. (refereed)

TECHNICAL PAPERS FOR ORAL PRESENTATION

C. E. Glatz, L. C. Tortorelli, and T. A. Massaro. Influence of glycosaminoglycan content on diffusive transport of calcium and water across the in vitro artery wall. Paper presented to the International Workshop Conference on Atherosclerosis, London, Ontario, Canada in Sept., 1975 (proceedings published.)

J. M. Vislocky and C. E. Glatz. Binding of serum lipoproteins and glycosaminoglycans. Paper presented at the 70th Annual Meeting of the AIChE, New York, NY, Nov., 1977.

C. E. Glatz. Energy and materials from solid waste- illustrative example in a freshman course. Paper presented (by A. H. Pulsifer) at the ASEE North Midwest Section Meeting, Milwaukee, WI, Oct., 1978 (proceedings published).

C. E. Glatz and B. A. Berg. Binding of Serum Lipoproteins to Mucopolysaccharides. 1979 B. F. Ruth Chemical Engineering Research Symposium, Iowa State University, Ames, IA (proceedings published).

A. P. Crowther, L. A. Wilson, and C. E. Glatz. Effects of processing on adsorption on off-flavors onto soy protein. Annual Meeting, Institute of Food Technology, New Orleans, LA, June, 1980.

C. E. Glatz, B. A. Berg, S. Kimpton, and K. D. Wiggers. Effect on diet on binding of LDL to immobilized heparin. AIChE Annual Meeting, Chicago, IL, Nov., 1980.

G. C. Grabenbauer and C. E. Glatz. Protein Precipitation - Analysis of particle size distribution and kinetics. AIChE National Meeting, Detroit, MI, Aug., 1981.

A. M. Petenate, G. C. Grabenbauer, and C. E. Glatz. Protein precipitation -- A mechanistic particle growth model. AIChE Annual Meeting, New Orleans, LA, Nov., 1981.

A. M. Petenate, and G. C. Glatz. Protein precipitation kinetics. AIChE Annual Meeting, Los Angeles, CA, Nov., 1982.

C. D. Nelson and C. E. Glatz (presenter). Primary Particle Formation in Protein Precipitation. Engineering Foundation Conference on Recovery of Fermentation Products. Sea Island, GA, Feb., 1984. (Poster session).

R. A. Pollet (speaker), C. E. Glatz and D. C. Dyer. The Pharmacokinetics of Chlortetracycline Orally Administered to Turkeys: Influence of Citric Acid and P. Multocida Infection. Annual Meeting of AIChE, San Francisco, CA, Nov., 1984.

C. D. Nelson, D. L. Brown and C. E. Glatz (speaker). Role of Precipitation Conditions in the Recoverability of Protein. Annual Meeting of AIChE, San Francisco, CA, Nov., 1984.

R. R. Fisher (speaker), C. E. Glatz, P. A. Murphy. The Effects of Mixing During Acid Addition on Fractionally Precipitated Protein. ACS Annual Meeting, Chicago, IL, Sept., 1985.

D. L. Brown and C. E. Glatz (speaker). Aggregate breakage in protein precipitation. AIChE Annual Meeting, Chicago, IL, Nov., 1985.

K. M. Clark, C. E. Glatz (presenter), and R. M. Cordes. Polyelectrolyte Precipitation of Biopolymers. Engineering Foundation Conference on Recovery of Bioproducts. Uppsala, Sweden, May, 1986. (Poster session).

R. R. Fisher (speaker) and C. E. Glatz. Fractional Precipitation of Proteins: The Effects of Reactor Conditions on Product Properties. AIChE Annual Meeting, Miami, FL, Nov., 1986.

K. C. Clark and C. E. Glatz (speaker). Properties of Complexes Formed by Polyelectrolyte Precipitation of Protein. AIChE Annual Meeting, Miami, FL, Nov., 1986.

J. M. Kaiser and C. E. Glatz (speaker). Reduction of Long-term Fouling in Cheese Whey Ultrafiltration. Annual Meeting of the American Dairy Science Association, Columbia, MO, June, 1987.

K. M. Clark (presenter) and C. E. Glatz. Precipitation and Fractionation of Proteins by Carboxymethyl Cellulose. Poster presented at the Frontiers in Bioprocessing Conference, Boulder, CO, July, 1987.

J. M. Kaiser and C. E. Glatz (speaker). Limiting Resistances in Ultrafiltration of Soluble and Precipitated Whey Proteins. AIChE National Meeting, Minneapolis, MN, Aug., 1987.

K. M. Clark (speaker) and C. E. Glatz. Modeling of the Fractional Precipitation of Egg White Proteins by Carboxymethyl Precipitation. AIChE Annual Meeting, New York, NY, Nov., 1987.

R. R. Fisher (speaker) and C. E. Glatz. Using Mechanistic Models to Characterize the Polyelectrolyte Precipitation of Proteins. AIChE Annual Meeting, New York, NY, Nov., 1987.

J. Zhao (presenter), C. Ford, S. Gendel, M. Rougvie, and C. Glatz. Genetic Engineering of b-galactosidase with a poly-aspartate tail to enhance downstream product recovery by polyelectrolyte precipitation. Bio/Technology Winter Symposium, Miami, FL, Feb., 1988.

J. E. Hardwick (speaker) and C. E. Glatz. Enzymatic Hydrolysis of Corn Gluten Proteins. ACS Third Chemical Congress of North America, Toronto, Canada, June, 1988. Also at the National Corn Utilization Conference (invited paper), Columbus, OH, Nov., 1988.

K. C. Clark and C. E. Glatz (speaker). Polyelectrolyte Precipitation of Proteins - Before and After Genetic Engineering. ACS Third Chemical Congress of North America, Toronto, Canada, June, 1988.

K. C. Clark (speaker) and C. E. Glatz. A Multi-Equilibrium Binding Model for the Precipitation of Protein by Carboxymethyl Cellulose. AIChE Annual Meeting, Washington, DC, Nov., 1988.

C. E. Glatz, D. E. Parker (speaker), J. Zhao, C. Ford, S. Gendel, M. A. Rougvie. Genetic Engineering of b-Galactosidase to Improve Separation by Polyelectrolyte Precipitation. AIChE Annual Meeting, Washington, DC, Nov., 1988.

D. E. Parker, C. E. Glatz (speaker), C. F. Ford, S. M. Gendel, and M. A. Rougvie. Recovery of a Charged-Fusion Protein from Cell Extracts by Polyelectrolyte Precipitation. 32nd IUPAC Congress, Stockholm, Sweden, Aug., 1989.

I. Suominen (speaker) and C. E. Glatz. Use of Charged Peptides as Purification Fusions Suitable for Large-Scale Separation Methods. 46th Annual Meeting of the Society for Industrial Microbiology, Seattle, WA, Aug., 1989 (CEG invited).

A. G. Bozzano and C. E. Glatz (speaker). Separation of Proteins from Polyelectrolytes by Ultrafiltration. AIChE Annual Meeting, San Francisco, CA, Nov., 1989.

C. E. Glatz. Protein Aggregation/Disaggregation. AIChE Annual Meeting, San Francisco, CA, Nov., 1989 (invited).

I. Suominen (speaker), Craig Forney, John Luther, Mark Niederauer, and C.E. Glatz. Enhanced Selectivity in Bulk Separations Using Charged-Peptide Fusions. Engineering Foundation Conference on Recovery of Bioproducts, St. Petersburg Beach, FL, May, 1990. (CEG invited)

M.H. Heng and C.E. Glatz (speaker). Flux enhancement in Hollow Fiber Ultrafiltration for the Recovery of Aced Cheese Whey Precipitates. International Conference on Membranes, Chicago, IL, Aug., 1990.

J. R. Luther (presenter) and C.E. Glatz. Enhanced partitioning in aqueous two-phase systems using genetically engineered b-galactosidase. AIChE Annual Meeting, Chicago, IL, Nov., 1990. (poster)

J.-Y. Shieh and C.E. Glatz (speaker) Precipitation of proteins with polyelectrolytes: Role of polymer molecular weight. Presented at the ACS National Meeting, Atlanta, GA, Apr., 1991. (CEG invited)

J. Luther (speaker) and C. E. Glatz. Enhanced partitioning in aqueous two-phase systems using genetically engineered β -galactosidase. Presented at the 7th International Conference on Partitioning in Aqueous Two-Phase Systems, New Orleans, LA, June, 1991.

C. E. Glatz (speaker), C. Ford, M.A. Rougvie, M. Q. Niederauer, J.R. Luther, and C.R. Forney. Use of Charged Peptide Fusions to Enhance Selectivity of Protein Recovery. Presented at the Annual Meeting of the Midwest Biotechnology Symposium, Madison, WI, May, 1991. (CEG invited)

C. E. Forney (speaker) and C. E. Glatz. Behaviour of charged fusion proteins in reversed micellar extraction. Presented at the 65th ACS Colloid and Surface Science Symposium, Norman, OK, June, 1991. (CEG invited)

C. E. Glatz (speaker), M. Q. Niederauer, J. R. Luther, and C. E. Forney. Selectivity in Non-Chromatographic Protein Separations. Presented at the ACS National Meeting, New York, NY, Aug., 1991. (CEG invited)

C. E. Glatz, D. O'Brien, F. Ozadali, B. A. Glatz. Extractive Fermentation of Organic Acids Using a Hollow-Fiber Extractor. Presented at the Annual AIChE Meeting, Los Angeles, CA, Nov., 1991.

M. Q. Niederauer, C. E. Glatz, C. F. Ford, I. A. Suominen, M. A. Rougvie. Enhancement of Polyelectrolyte Precipitation Using Genetically Altered β -Galactosidase. Presented at the Annual AIChE Meeting, Los Angeles, CA, Nov., 1991. (CEG invited)

M.H. Heng, M.Q. Niederauer, C.E. Glatz (speaker), D.S. Stachon, C.F. Ford. Recovery of Charged Fusion Proteins from Crude Extracts. Presented at the ACS National Meeting, San Francisco, CA, Apr., 1992. (CEG invited)

F. Ozadali (speaker), B. A. Glatz, C. E. Glatz, D. O'Brien. Extractive Fermentation of Organic Acids Using a Hollow-Fiber Extractor. Presented at the AIChE National Meeting, Minneapolis, MN, Aug., 1992.

C.E. Glatz. Use of Purification Fusions to Enhance the Selectivity of Non-Chromatographic Separations. Plenary presentation at the Colorado Biotechnology Symposium, Fort Collins, CO, Sept., 1992. (CEG invited)

M.Q. Niederauer (presenter) and C.E. Glatz. Enhancement of Polyelectrolyte Precipitation Through the Genetic Fusion of Charged Peptide Tails to Proteins. Poster presented at the AIChE Annual Meeting, Miami Beach, FL, Nov., 1992.

B. A. Glatz and C.E. Glatz (presenter). Production of Propionic and Acetic Acids by Extractive Fermentation. A poster presented at the Midwest Plant Biotechnology Consortium Symposium, Indianapolis, IN, Nov., 1992.

M.Q. Niederauer, C. F. Ford, and C.E. Glatz (speaker). Use of Genetic Engineering to Enhance the Selectivity of Protein Recovery by Polyelectrolyte Precipitation. Presented at 92/7 Micro-

Symposium on Formation, Mechanism, and Structure of Protein-Polyelectrolyte Complexes, The Japanese Society of Polymer Science, Tsukuba University, Japan, Dec., 1992. (CEG invited)

M. H. Heng (speaker) and C. E. Glatz. Charged Fusions for Selective Protein Recovery and Enzyme Immobilization Using Ion Exchange Membrane Adsorption. Presented at the ACS National Meeting, Denver, CO, Apr., 1993.

J. R. Luther (speaker) and C. E. Glatz. Using Genetic Engineering to Enhance Protein Recovery in Aqueous Two-Phase Systems. Presented at the ACS National Meeting, Denver, CO, Apr., 1993.

M. V. Saikumar, C. E. Glatz, and M. A. Larson. High Pressure Crystallization of Proteins. Poster presented at the Fifth International Conference on Crystallization of Biological Macromolecules, San Diego, CA, Aug., 1993.

C. E. Glatz. Genetic Engineering to Enhance the Selectivity of Protein Separations. Frontiers in Bioprocessing Conference III, Boulder, CO, Sept., 1993. (invited)

T-Y. Hsiao (speaker) and C. E. Glatz. Water Reuse in a Yeast Fermentation. Paper presented at the AIChE Annual Meeting, St. Louis, MO, Nov., 1993.

M. V. Saikumar, C. E. Glatz (speaker), and M. A. Larson. High Pressure Crystallization of Lysozyme. Paper presented at the AIChE Annual Meeting, St. Louis, MO, Nov., 1993.

J. R. Luther and C. E. Glatz (speaker). Genetically Engineered Charge Modifications to Enhance Protein Separation in Aqueous Two-Phase Systems: Electrochemical Partitioning. Paper presented at the ACS National Meeting, San Diego, CA, Mar., 1994. (invited)

C. E. Forney, M. H. Heng, J. R. Luther, M. Rodriguez, and C. E. Glatz (presenter). Genetic Engineering to Enhance the Selectivity of Protein Separations. A poster presented at the ACS/EF Conference on Recovery of Biological Products, San Diego, CA, Sept., 1994.

C. E. Forney, C. Ford, and C. E. Glatz (speaker). Extraction of Charged Fusion Proteins in Reversed Micelles: Comparison Between Different Surfactant Systems. Paper presented at the AIChE Annual Meeting, San Francisco, CA, Nov., 1994.

M. Saikumar (speaker), M. A. Larson, and C. E. Glatz. Kinetics of Growth and Nucleation in the Crystallization of Lysozyme. Paper presented at the ACS National Meeting, New Orleans, LA, Mar., 1996.

W. Fan (speaker) and C. E. Glatz. Contributions of Electrochemical Charge to Protein Partitioning in Aqueous Two-Phase Systems. Paper presented at the ACS National Meeting, New Orleans, LA, Mar., 1996.

Zhong Gu (presenter), Charles E. Glatz, Bonita A. Glatz. Application of Liquid-liquid Extraction in Propionic Acid Fermentation. A poster presented at the National Corn Utilization Conference, St. Louis, MO, June 3-6, 1996.

W. Fan, U. Bakir, and C. E. Glatz (presenter). Charge Effects in Protein Partitioning in Aqueous Two-Phase Systems. Poster presented at the ACS/EF Conference on Recovery of Biological Products VIII, Tucson, AZ, Oct., 1996. (invited)

R. Y. Waghmare (speaker), M. V. Saikumar, J. N. Webb, T. W. Randolph, J. F. Carpenter, M. A. Larson, and C. E. Glatz. Crystallization Kinetics of Subtilisin: Effect of High Pressure. Paper presented at the AIChE Annual Meeting, Chicago, IL, Nov., 1996.

Zhong Gu (Speaker), Charles E. Glatz, Bonita A. Glatz. Fed-Batch Extractive Fermentation With Liquid-Liquid Extraction In A Hollow Fiber Membrane Module. Paper presented at the AIChE Annual Meeting, Chicago, IL, Nov., 1996.

C. E. Glatz (presenter) and C. Ford. Using Genetic Engineering for Bioseparations. Paper presented at the Engineering Foundation Conference on Separations, Davos, Switzerland, Oct., 1997 (invited).

W. Fan(presenter) and C. E. Glatz. Charge-Change Mutation Contribution to the Osmotic Second Virial Coefficient for Recombinant Proteins. A poster presented at the Annual Meeting of the AIChE, Los Angeles, CA, Nov., 1997.

F. Zaman, C. Glatz (speaker), and Z. Nikolov. Recovery of Recombinant Proteins by Precipitation from Oil Seed Extracts. A paper presented at the Annual Meeting of the AIChE, Los Angeles, CA, Nov., 1997.

C. Zhang (presenter), A. Kusnadi, Z. Nikolov, and C. Glatz. Recovery of fusion proteins from canola protein extracts by adsorption and chromatography. A paper presented at the Annual Meeting of the AIChE, Los Angeles, CA, Nov., 1997.

M. Saikumar (speaker), R. Waghmare, M. A. Larson, and C. E. Glatz. Modelling and Analysis of Nucleation Growth Kinetics in Protein Crystallization. A paper presented at the Annual Meeting of the AIChE, Los Angeles, CA, Nov., 1997.

J. Webb (speaker), R. Waghmare, B. G. Bindewald, T. W. Randolph, J. G. Carpenter, C. E. Glatz. Pressure effect on subtilisin crystallization and solubility measured via FTIR, EPR and activity assays. A paper presented at the Annual Meeting of the AIChE, Los Angeles, CA, Nov., 1997.

Z. Gu, D. Rickert, C. Glatz and B. Glatz (speaker). Production of Propionic Acid by Immobilized Cells. 2nd International Symposium on Propionibacteria, Cork, Ireland, June, 1998. (invited)

K. Ohmori (speaker) and C. Glatz. Effects of pH and Ionic Strength on Microfiltration of C. Glutamicum. A paper presented at the National Meeting of the ACS, Boston, MA, Aug., 1998.

C. Zhang (speaker) and C. E. Glatz. Genetic engineering strategies for purification of recombinant proteins from Canola by Anion Exchange Chromatography: An Example of Beta-Glucurodinase. A paper presented at the National Meeting of the ACS, Boston, MA, Aug., 1998.

C. Glatz. Overview of Bioseparations Research in our Laboratory, Genencor, International, Palo Alto, CA, Dec., 1998. (invited seminar)

C. Zhang, Y. Bai, Z. Nikolov and C. Glatz. Processing considerations for use of canola for recombinant protein production. A paper presented at the National Meeting of the ACS, Anaheim, CA, Mar., 1999. (invited)

C. M. Zhang, Y. Bai, Z. Nikolov and C. E. Glatz (speaker). Processing and Protein Engineering Considerations for Use of Canola for Recombinant Protein Production. A paper presented at the Recovery of Biological Products IX Conference, Whistler, Canada, May, 1999. (invited)

Q. Chang and C. E. Glatz (speaker). Point mutants for the purification of recombinant proteins from soybean. A paper presented at the AIChE Annual Meeting, Dallas, TX, Nov., 1999.

C. Zhang C. E. Glatz (speaker). Suitability of immobilized metal affinity chromatography for protein purification from canola. A paper presented at the AIChE Annual Meeting, Dallas, TX, Nov., 1999.

R. Waghamare (presenter), X. Pan, C. Glatz, M. Larson, J. Webb, T. Randolph. Effect of High Pressure on the Nucleation and Crystal Growth of Subtilisin. A poster presented at the AIChE Annual Meeting, Dallas, TX, Nov., 1999.

C. Glatz. Solvent and protein characteristics determining kinetics of protein crystallization. A seminar presented at Michigan State University, East Lansing, MI, Feb., 2000.

X. Pan and C. Glatz (speaker). Effects of Salts and Surface Properties of Proteins on the Growth Rate of Subtilisin Crystals. A paper presented at the ACS National Meeting, San Francisco, CA, Mar., 2000.

K. Ohmori and C. Glatz (presenter). Effect of carbon source on microfiltration of *Corynebacterium glutamicum*. A poster presented at the ACS National Meeting, San Francisco, CA, Mar., 2000.

T. Menkhaus (speaker), S. Erickson, P. Whitson and C. Glatz. Polyelectrolyte precipitation of wild-type and charge-modified β -glucuronidase from canola, corn and soy extracts. A paper presented at the AIChE Annual Meeting, Los Angeles, CA, Nov., 2000.

X. Pan (speaker) and C. Glatz. Solvent and protein characteristics determining kinetics of protein crystallization. A paper presented at the AIChE Annual Meeting, Los Angeles, CA, Nov., 2000.

Y. Bai (speaker), A. Liten and C. Glatz. Recovery of a recombinant protein from unclarified transgenic canola extract by expanded bed chromatography. A paper presented at the AIChE Annual Meeting, Los Angeles, CA, Nov., 2000.

C. E. Glatz. Some host plant strategies to simplify recombinant protein recovery. A seminar presented at Prodigene Co., College Station, TX, February, 2001.

C. E. Glatz. Use of expanded bed chromatography in protein recovery from plant extracts. A seminar presented at Amersham Pharmacia Biotech Co. meeting in Quebec City, Canada, May, 2001.

Y. Bai, T. J. Menkhaus, and C. E. Glatz (presenter). Matching unit operations to plant hosts for recovery of recombinant proteins. A poster presented at Recovery of Biological Products X, Cancun, Mexico, June, 2001.

T. J. Menkhaus, Y. Bai, and C. E. Glatz (presenter). Processing strategies for recovery of recombinant proteins from plant hosts. A paper presented at the AIChE Annual Meeting, Reno, NV, November, 2001. (invited)

Y. Bai, C. E. Glatz (presenter) and Z. Nikolov. Protein extraction from plant material: Glucuronidase from transgenic canola. A paper presented at the AIChE Annual Meeting, Reno, NV, November, 2001.

X. Pan, R. Bott and C. E. Glatz (presenter). Subtilisin surface properties and crystal growth kinetics. A paper presented at the AIChE Annual Meeting, Reno, NV, November, 2001.

T. J. Menkhaus, C. Zhang, Y. Bai, and C. E. Glatz (presenter). Recombinant Proteins from Plants – What will this mean for recovery? A paper presented at IBC's International Conference on Recovery and Purification of Biopharmaceuticals, San Diego, CA, November, 2001. (invited)

T. J. Menkhaus (presenter) and C. E. Glatz. Considerations for the application of expanded bed adsorption in the recovery of recombinant protein from maize. A paper presented at the ACS Annual Meeting, Boston, MA, August, 2002.

C. E. Glatz (presenter). CRCD – Chemicals from Biorenewables. A poster presented at the NSF Grantees Conference, Washington, D.C., October, 2002.

T. J. Menkhaus and C. E. Glatz (presenter). Expanded- and fixed-bed adsorption in capture of proteins from corn. A paper presented at the ACS Annual Meeting, New Orleans, LA, March, 2003.

Z. Gu and C. E. Glatz (presenter). Strategies for the use of aqueous two-phase systems in recovery of recombinant proteins from corn. A paper presented at the 12th International Conference on Biopartitioning and Purification, Vancouver, Canada, June 2003.

K. P. Saunders (presenter), C. E. Glatz, M. E. Huba, M. H. Griffin, S. K. Mallapragada, and J. V. Shanks, Using Rubrics to Facilitate Students' Development of Problem Solving Skills, a Multimedia presentation at the ASEE Annual Meeting, Nashville, TN, June, 2003.

C. Glatz (speaker) and Z. Nikolov. A University-Industrial Collaboration for a Bioseparations Problem-Based Learning Module. A paper presented at Recovery of Biological Products XI, Banff, Canada, September, 2003.

C. Bressler, M. Heng, M. Gebert, and C. E. Glatz (speaker). Product Enzyme Partitioning and Enzyme-Polymer Interactions During Polyelectrolyte Flocculation for Cell Removal from Fermentation Broth. A poster presented at Recovery of Biological Products XI, Banff, Canada, September, 2003.

C. Glatz (presenter), K. Saunders, M. Huba, S. Mallapragada, B. Narasimhan, P. Reilly and J. Shanks. PBL Approach to Bioprocessing Lab. A poster presented at the NSF Grantees Conference, Washington, D. C., September, 2003.

C. Bressler (speaker), M. Heng, M. Gebert, and C. E. Glatz. A paper presented at the Annual Meeting of the AIChE, San Francisco, November, 2003. Zeta Potential as a Measure of Polyelectrolyte Flocculation and the Effect of Polymer Dosing Conditions on Cell Removal from Fermentation Broth

B. Narasimhan (speaker), C.E. Glatz, S.K. Mallapragada, P.J. Reilly, J.V. Shanks, K. Saunders and M. Huba. New problem-based learning laboratories on chemicals from biorenewables. A paper presented at the AIChE Annual Meeting, November, 2003, San Francisco.

C. Glatz (presenter). Two seminars presented at the University of Iowa, Iowa City, IA, April 2004. "Insights into Flocculation that Lead to Improved Processing of Fermentation Broth for Extracellular Enzyme Recovery" (Chemical Engineering Dept.) and "Engineering Production of Biotechnology Products" (College of Engineering).

C. Glatz (presenter). Two seminars presented at Genencor, Intl., Palo Alto CA, May 2004. "Microfiltration: Describing the phenomena" and "Microfiltration: A study of resistances in filtration of a bacterial fermentation".

Z. Gu (presenter) and C. E. Glatz. Processing transgenic maize to recover industrial enzymes. A poster presented at the Corn Utilization and Technology Conference, Indianapolis, June 2004.

Q. Zhong (presenter), Z. Gu and C. E. Glatz. Extraction effects on corn protein patterns analyzed by two dimensional electrophoresis. A poster presented at the Corn Utilization and Technology Conference, Indianapolis, June 2004.

B. Narasimhan, C.E. Glatz (speaker), S.K. Mallapragada, P.J. Reilly, and J.V. Shanks, K. Saunders and M. Huba. Problem-Based Learning Laboratories On Chemicals from Biorenewables: Student Reflections. A paper presented at the ASEE Annual Meeting, Salt Lake City, UT, June 2004.

Maureen Griffen (speaker) and C. E. Glatz. A High School Chemistry Teacher's Experience with the NSF Research Experiences for Teachers Program. A paper presented at the ACS Biennial Conference on Chemical Education, Ames, IA, July, 2004.

Z Gu (presenter) and C. E. Glatz. Recovery and purification of recombinant protein from transgenic corn by aqueous two phase partitioning. A poster presented at the ACS Annual Meeting, San Diego, CA, March, 2005.

Q. Zhong (presenter) and C. E. Glatz. Development of a method to evaluate lipase activity in complex extracts from transgenic corn. A poster presented at the ACS Annual Meeting, San Diego, CA, March, 2005.

C. Zhang (presenter) and C. E. Glatz. Membrane coalescence of soy oil emulsions formed during aqueous oil extraction. A poster presented at the ACS Annual Meeting, San Diego, CA, March, 2005.

G. Rozeboom (presenter), M. Heng, A. Gaertner, C. Glatz, K. Graves. Genencor International, and Iowa State University, collaboration for characterization of resistance, during membrane filtration. A poster presented at the Annual Meeting of the North American Membrane Society, Providence, Rhode Island, June, 2005.

K. M. Graves, C. E. Glatz (Keynote Speaker), M. Heng, G. Rozeboom. Microbial cell cake as the determining resistance in microfiltration. A paper presented at the China/USA/Japan ChE Conference, Beijing, China, October, 2005. (invited)

C. E. Glatz. Membrane clarification: Past insights guiding future operation. A paper presented at the AIChE Annual Meeting, Cincinnati, OH, November, 2005. (invited)

Z. Gu (presenter) and C. E. Glatz. The potential for exploiting surface hydrophobicity differences for recovery of recombinant proteins from corn using aqueous two-phase partitioning. A poster presented at the AIChE Annual Meeting, Cincinnati, OH, November, 2005

K. M. Graves, C. E. Glatz (speaker), M. Heng, G. Rozeboom. Broth conditions determining specific cake resistance during microfiltration of *Bacillus subtilis*. A paper presented at the AIChE Annual Meeting, Cincinnati, OH, November, 2005.

Q. Zhong (speaker), Z. Gu, and C. Glatz. Strategies for Extracting Recombinant Dog Gastric Lipase from Transgenic Corn Seed. A paper presented at the AIChE Annual Meeting, Cincinnati, OH, November, 2005.

C. Glatz. Engineering Production of Biotechnology Products. An invited seminar presented at Kemin Industries, Des Moines, IA, June, 2006.

C. Glatz Engineering Production of Biotechnology Products. An invited seminar presented at the Department of Chemical And Process Engineering, University of Canterbury, Christchurch NZ, August 6, 2006

C. Glatz. Applying Proteomics to Bioseparations. An invited seminar presented at the Department of Chemical And Process Engineering, University of Canterbury, Christchurch NZ, September 14, 2006

C. Glatz. Applying Proteomics to Chromatographic Separations. An invited seminar presented at the Howard P. Isermann Dept. of Chemical and Biological Engineering Lecture Series, RPI, Troy, NY, Dec 6, 2006

C. Zhang (presenter), J. Baez, and C. E. Glatz. Purification and Characterization of a Recombinant Gelatin Expressed in Transgenic Maize. A poster presented at the AIChE Annual Meeting, San Francisco, November, 2006.

M. T. Aspelund (speaker), K. M. Graves, G. Rozeboom, M. Heng, and C. E. Glatz. Improving Permeate Flux in the Microfiltration of a Bacterial Cell Suspension by Flocculation with Cationic Polyelectrolytes. A paper presented at the AIChE Annual Meeting, San Francisco, November, 2006.

L. Xu and C. E. Glatz. A Proteomics Approach to Evaluate Expression Host and Downstream Recovery Compatibility: Analysis of Maize and Ion Exchange Chromatography. A paper presented at the AIChE Annual Meeting, San Francisco, November, 2006. (invited submission)

Z. Gu, and C. E. Glatz (speaker). A Method for Three Dimensional Protein Characterization and Its Application to a Complex Plant (Maize) Extract. A paper presented at the AIChE Annual Meeting, San Francisco, November, 2006.

F. M. Vales-Lara (presenter), C. E. Glatz, and M. Rito-Palomares. Recovery of by-Products from Distillers Dried Grains by Sequential Extraction. A poster presented at the AIChE Annual Meeting, San Francisco, November, 2006.

C. Glatz. Applying Proteomics to Bioseparations. An invited seminar presented at Pfizer Global Biologics, Chesteron, MO, January 2007.

K. A. Campbell (speaker), C. E. Glatz, T. M. Pepper. Kinetics and Mechanisms of Protease Assisted Aqueous Extraction of Soybean Oil. A paper presented at the 12th Annual Meeting of the Institute of Biological Engineering, St. Louis, Missouri, March 30-April 1, 2007

R. Morales Chabrand (presenter), H.-J. Kim, C. Zhang, C. E. Glatz, S. Jung. Destabilization of the emulsion formed during aqueous extraction of soybean flour. A poster presented at the American Oil Chemists Society Annual Meeting, Quebec City, May 2007.

K. A. Campbell (speaker) and C. E. Glatz. Value-Added Products From Protease-Assisted Aqueous Extraction Of Soybean Oil. A paper presented at the Annual Meeting of the AIChE, Salt Lake City, Nov. 2007

L. Xu (speaker) and C. E. Glatz. Predicting Ion-Exchange Behavior from Three-Dimensional Characterization of Proteins. A paper presented at the 236th ACS National Meeting & Exposition, August 17 - 21, 2008, Philadelphia, PA (invited presentation).

K. A. Campbell (speaker), R. Morales-Chabrand and C. E. Glatz. Protein Recovery from Enzyme-Assisted Aqueous Extraction of Soybean Oil. A paper presented at the AIChE Annual Meeting, November, 2008, Philadelphia, PA (invited presentation).

C. E. Glatz. Proteomics-Based Strategies for Downstream Recovery, a paper presented at the 13th International Conference of BioPartitioning and Purification, London, June, 2009. (invited session keynote)

O. Aguilar, C. E. Glatz, Marco Rito-Palomares (speaker). Characterization of green-tissue protein extract from alfalfa (*Medicago sativa*) exploiting a 3D technique, a poster presented at the 13th International Conference of BioPartitioning and Purification, London, June, 2009.

Leite Nobrega de Moura, J.M. (speaker), N.M. de Almeida, K. Campbell, C.E. Glatz, and L.A. Johnson. 2009. Protein Recovery in Enzyme-assisted Aqueous Extraction of Soybeans. Euromembrane, Montpellier, France, Sept. 6-10.

M. Aspelund (speaker) and C. E. Glatz. Purification of Recombinant Plant-Made Proteins From Corn by Ultrafiltration, has been accepted in the following session: Membranes for Bioseparations. A paper presented at the AIChE Annual Meeting, Nashville, November 2009

K. Campbell (speaker) and C. E. Glatz. Optimization of Protein Recovery From Enzyme-Assisted Aqueous Extraction of Soybean Oil, has been accepted in the following session: Extraction for Bioseparations. A paper presented at the AIChE Annual Meeting, Nashville, November 2009 (invited).

K. Campbell (speaker) and C. E. Glatz. Mechanism of Enzyme-Assisted Aqueous Extraction of Soybean Oil, has been accepted in the following session: Process and Product Development for Sustainability II. A paper presented at the AIChE Annual Meeting, Nashville, November 2009.

J. Milligan (presenter), K. Campbell and C. E. Glatz. Surfactant-Assisted Aqueous Extraction of Soybean Oil From Soybean and Recovery of Oil From Skim. A poster presented at the AIChE Annual Meeting, Nashville, November 2009.

Campbell, K. E. (speaker) and C. E. Glatz. Mechanisms of Aqueous Extraction of Extruded Sunflower Meal. A paper presented at the 101st AOCS Annual Meeting, Phoenix AZ, May 2010.

Colonna W., C. Garcia-Salinas, M. E. Marti and C. E. Glatz (speaker). Recovery of a Recombinant Maltose-Binding Protein-Biosurfactant Fusion Protein from Corn. A paper presented at the ACS National Meeting, San Francisco, March 2010.

Ibarra-Herrera, C. C., O. A. Aguilar, Dr. C. E. Glatz, M. A. Rito-Palomares (speaker). Alternative strategies for the potential recovery of recombinant proteins from plants. A paper presented at the ACS National Meeting, San Francisco, March 2010.

W. Colonna, M. E. Marti (speaker), M. Pynn, G. Reznik, K. Jarrell, B. Lamsal and C. E. Glatz, Integration of Biosurfactant Production into Advanced Biorefineries. A paper presented at the AIChE Annual Meeting, Minneapolis, October 2011

R. K. Swanson (speaker), R. Xu, D. S. Nettleton, and C. E. Glatz, Proteomics Approach for Predicting Separation Behavior of a Mixture of Proteins During Downstream Purification. A paper presented at the AIChE Annual Meeting, Minneapolis, October 2011

GRANTS AND SPONSORED PROGRAMS PARTICIPATION

ERDA/Ames Laboratory (PI with Murphy, Hill, Abraham)

"Environmental Control Technology"

1976

20,000

University Research Grant Award

"Modelling of Extrusion Cooking of Foods"

6/1/78 - 5/31/79

1,870

Iowa Heart Association

"Binding of lipoproteins to glycosaminoglycans"

7/1/78 - 6/30/79

4,000

University Research Grant

"Protein Precipitation Kinetics"

6/1/80 - 5/31/81

1,947

National Science Foundation

"Isoelectric Precipitation Kinetics of Protein"

7/1/83 - 7/1/85

94,530

National Science Foundation

"Precipitation of Biopolymers with Polyelectrolytes"

4/1/86 - 3/31/89	220,995
Iowa Corn Promotion Board "Enzymatic Hydrolysis of Corn Gluten Proteins" 9/1/86 - 8/31/89	41,600
Midland UDIA - Co-PI with B. Glatz, E. Hammond "Whey Utilization via Precipitation, Ultrafiltration, and Fermentation" 9/1/86 - 8/31/88	50,200
Iowa State University Biotechnology Council (PI with Ford) "Genetic Engineering for Protein Recovery" 12/1/86 - 6/30/89	91,935
Iowa State University Biotechnology Council- Co-investigator (B. Glatz, PI) "Biosynthesis of Propionic Acid" 12/1/86 - 6/30/89	60,000
Iowa Corn Promotion Board - Co-PI with B. Glatz, C. Bern "Production and Utilization of Propionic Acid from Fermentation of Corn" 7/1/87 - 6/30/89	36,600
National Science Foundation - Co-Investigator (Reilly, PI) "15-Liter Fermentor and Associated Equipment" (equipment grant) 1987	30,000
National Science Foundation (PI with Ford, Rougvie, Gendel) "Genetic Engineering of Proteins to Enhance Product Recovery" 11/15/87 - 11/14/90	433,980
Corn Refiners Association "Graduate Student Support" 10/1/87 - 9/30/88	12,000
U. S. Department of Agriculture (PI with B. Glatz) "National Needs Fellowships" 9/1/88 - 3/1/	48,000
Iowa Corn Promotion Board - Co-PI with B. Glatz, E. Hammond "Improvement of Propionic and Acetic Acid Production and Recovery from Fermentation of Corn-Based Substrates" 7/1/89 - 6/30/92	70,450
ISU Center for Crop Utilization Research - Co-PI with B. Glatz, E. Hammond "Recovery of Organic Acids from Fermentation Media" 1/1/89 - 12/31/89	21,208
U. S. Department of Agriculture (portion of multi-investigator) "Biotechnology Byproducts Consortium" 1/1/89 - 3/31/89	13,217

Iowa Department of Transportation (co-PI with E. Hammond, B. Glatz) "Production of Acetic Acid" 11/2/89 - 1/31/93	97,850
U. S. Department of Agriculture (portion of multi-investigator) "Biotechnology Byproducts Consortium" 4/1/90 - 3/31/91	26,700
U. S. Department of Agriculture (portion of multi-investigator) "Biotechnology Byproducts Consortium" 4/1/91 - 3/31/92	39,195
National Science Foundation (PI with Ford, Honzatko) "Genetic Engineering for Product Recovery Using Non-Chromatographic Methods" 9/1/91 - 8/31/94 REU Supplement	553,338 5,000
Corn Refiners Association "Graduate Student Support" 9/1/91 - 8/31/92	15,000
U. S. Department of Agriculture (with B. Glatz, portion of multi-investigator) "Biotechnology Byproducts Consortium" 4/1/92 - 3/31/93	51,860
ISU College of Engineering - with M. Larson "Crystallization of Proteins at High Pressure" 10/92 - 7/93	3,180
U. S. Department of Agriculture (with B. Glatz, portion of multi-investigator) "Biotechnology Byproducts Consortium" 4/1/93 - 3/31/94	51,328
Iowa Corn Promotion Board - Co-PI with B. Glatz "Production of Propionic and Acetic Acids by Extractive Fermentation" 7/1/93 - 6/30/96	64,220
U. S. Department of Agriculture (with B. Glatz, portion of multi-investigator) "Biotechnology Byproducts Consortium" 4/1/94 - 3/31/95	48,812
Consortium for Plant Biotechnology Research - Co-PI with B. Glatz "Production of Propionic and Acetic Acids by Extractive Fermentation" 8/15/94 - 8/14/95	21,650
New Energy Company of Indiana "Production of Propionic and Acetic Acids by Extractive Fermentation" 7/1/94 - 6/30/96	4,000
U. S. Department of Agriculture (with B. Glatz, Z. Nikolov, R. Seagrave)	

"Biotechnology Byproducts Consortium" 4/15/95 - 4/30/96	46,869
U. S. Department of Agricultural Competitive Grants (Z. Nikolov, PI) "Recovery of Recombinant Proteins from Transgenic Soybeans" 9/1/95 - 8/31/98	180,000
National Science Foundation (with M. Larson and R. Honzatko) "High-Pressure Investigation of Protein Crystallization" 9/1/95 - 8/31/97	306,031
National Science Foundation (with Z. Nikolov, L. Johnson, J. Howard) "Recovery of Recombinant Proteins from Transgenic Soybeans" 3/1/96 - 2/28/99 6/1/96 REU Supplement	289,100 9,350
U. S. Department of Agriculture (with B. Glatz, Z. Nikolov, R. Seagrave) "Biotechnology Byproducts Consortium" 5/1/96 - 4/30/97	46,869
Ajinomoto Company, Inc. "Recovery of Amino Acids from Fermentation Broth" 8/1/96 - 7/31/98	82,615
U. S. Department of Agriculture (with Z. Nikolov) "Biotechnology Byproducts Consortium" 5/1/97 - 4/30/98	19,884
Ajinomoto Company, Inc. "Recovery of Amino Acids from Fermentation Broth" 8/1/98 - 7/31/00	86,495
U. S. Department of Agriculture (with Z. Nikolov) "Biotechnology Byproducts Consortium" 5/1/98 - 4/30/99	63,680
U. S. Department of Agriculture (with J. Coats) "Biotechnology Byproducts Consortium" 5/1/99 - 5/31/00	58,013
Amersham Pharmacia "Expanded Bed Recovery of Recombinant Plant Proteins" 1/00 - 6/01 (provision of research equipment)	82,130
Genencor International "Broth Processing for Enzyme Recovery" 6/00 - 5/02	90,718
Prodigene, Inc. "Processing of Plant Material for Recovery of Protein"	

6/00 - 12/00	10,880
Dow Chemical Company "Processing of Plant Seed for Protein Recovery" 12/00 - 11/01	131,290
National Science Foundation (with 5 others) "CRCD - Chemicals from Biorenewables" 3/1/01 - 2/29/04	417,694
REU Supplement (2002)	11,000
RET Supplement (2002)	19,300
REU Supplement (2003)	12,000
USDA (L. Johnson, PI) "Use of Industrial Enzymes to Enhance Soybean Value" 10/01 - 9/02	177,728
Prodigene, Inc. "Recovery of Brazzein from Corn" 6/02 - 12/02	31,348
Genencor International "Broth Processing for Enzyme Recovery" 8/02 - 7/03	46,219
Biotechnology Research Consortium (Ames Laboratory) (PI with Johnson and Scott) "Processing Transgenic Maize to Recover Valuable Therapeutic Proteins and Industrial Enzymes" 9/03 – 10/04	\$79,935
USDA (L. Johnson, PI and four others) "Use of Industrial Enzymes to Enhance Soybean Value" 10/02 - 9/03	\$262,958
USDA (L. Johnson, PI and P. Scott) "Plant Biotechnology Iowa" 10/03 – 9/04	\$232,180
USDA (PI with L. Johnson) "Plant Biotechnology Test Production" 10/03 – 9/04	\$185,744
Genencor International "A Collaborative Study of Membrane Processing for Cell Removal" 4/03 – 4/04	\$54,899
Genencor International "A Collaborative Study of Membrane Processing for Cell Removal" 4/04 – 12/05	\$56,941

USDA (PI with L. Johnson - CEG portion) "Plant Biotechnology Test Production" 9/04– 8/06	\$166,225
USDA (PI with L. Johnson, P. Scott, K. Wan - CEG portion) "Plant Biotechnology Test Production" 9/05– 8/06	\$434,288 (\$142,048)
USDA (L. Johnson, PI; 4 others - CEG portion) "Aqueous Soybean Extraction Processing" 9/04 - 8/06	\$90,327
USDA (L. Johnson, PI; 4 others - CEG portion) "Aqueous Soybean Extraction Processing" 9/05 - 8/06	\$79,823
NSF (B. Narasimhan, PI; CEG participating faculty) "REU Site on Biological Materials and Processes (BioMaP)" 5/06 – 4/09 (approx)	
USDA (PI with L. Johnson, P. Scott, K. Wan - CEG portion) "Plant Biotechnology Test Production" 9/06– 8/07	\$429,763 (\$138,212)
USDA (L. Johnson, PI; 6 others - CEG portion) "Aqueous Soybean Extraction Processing" 9/06 - 8/07	\$780,966 (\$87,363)
Biotechnology Byproducts Consortium (USDA) (B. Shanks, PI – CEG portion) Value-Added Processing of Distiller's Grains 9/06 – 8/07	\$90,000 (\$30,000)
ISU Council for International Programs "Research Exchange for Characterization of Milk for Value-Added Processing in Iowa and New Zealand" 11/06 – 6/07	\$2300
USDA (PI with L. Johnson, P. Scott, K. Wan) "Plant Biotechnology Test Production" 9/06– 8/07	\$249,263 (\$125,287 CEG portion)
USDA (L. Johnson, PI; 6 others - CEG portion) "Aqueous Soybean Extraction Processing" 9/06 - 8/07	\$56,917
USDA (PI with L. Johnson, P. Scott, K. Wan, A. Pometto) "Corn-Based Biorefineries" 7/07– 6/08	\$249,263 (\$125,287 CEG portion)
USDA (L. Johnson, PI; 6 others - CEG portion) "Soybean-Based Refineries"	\$56,917

7/07– 6/08

USDA (PI with L. Johnson, P. Scott, K. Wan, A. Pometto) \$319,467
"Plant Biotechnology – Corn-Based Biorefineries" (\$184,622 CEG portion)

9/08– 8/09

USDA (L. Johnson, PI; 6 others - CEG portion) \$76,215
"Soybean-Based Refineries"

9/08– 8/09

USDA (PI with L. Johnson, P. Scott, K. Wan, A. Pometto) \$300,196
"Plant Biotechnology – Corn-Based Biorefineries" (\$137,795 CEG portion)

9/09– 8/10

USDA (L. Johnson, PI; 6 others) \$77,920 (CEG portion)
"Soybean-Based Refineries"

9/09– 8/10

USDA (L. Johnson, PI; 6 others) \$558,401
"Soybean-Based Refineries" \$100,888 (CEG portion)

9/10– 8/11

National Science Foundation \$190,093
Collaborative Research: Characterization of lipo-peptides for use \$89,998 (ISU portion)

as bio-dispersants to clean-up oil spills (co-PI w/B. Lamsal as PI)

9/10 – 8/11

Miscellaneous Funding from Industry for the Chemical Engineering Department
(see department records)

MASTERS THESES DIRECTED

- J. M. Vislocky. The interaction between swine lipoproteins and heparin. 1977.
- A. P. Crowther. Effects of processing on adsorption of off-flavors on soy protein. 1979.
- G. C. Grabenbauer. Continuous isoelectric precipitation of soybean protein. 1981.
- R. A. Pollet. The pharmacokinetics of chlortetracycline potentiation with citric acid in the chicken. 1982.
- C. D. Nelson. The effect of precipitation conditions on the micro-structure of precipitated soy protein. 1984.
- D. L. Brown. Modelling of the turbulent breakage of isoelectrically precipitated protein aggregates. 1985.
- J. M. Kaiser. Recovery of whey proteins by sequential precipitation and ultrafiltration. 1987.
- R. M. Cordes. Precipitation of nucleic acids with polyethyleneimine. 1987.
- J. E. Hardwick. Enzymatic hydrolysis of corn gluten proteins. 1988.
- D. E. Parker. Polyelectrolyte precipitation of a protein fused to a charged peptide. 1989.
- A. G. Bozzano. Fractionation and purification of proteins by ultrafiltration and selective precipitate redissolution following polyelectrolyte precipitation. 1989.
- J. Shieh. Role of polyelectrolyte molecular weight in protein recovery by polyelectrolyte precipitation. 1989.
- U. Gunduz. Aqueous two-phase extraction of genetically engineered proteins. 1989.
- M. H. Heng. Chemical pretreatments for flux improvement in cheese whey ultrafiltration. 1990.
- S. Rogers. Masters of Engineering. 1993.
- D. O. O'Brien. Acid production by extractive fermentation using propionibacterium and membrane extraction. 1993.
- M. Rodríguez Torres. Effect of neutral polymers in polyelectrolyte precipitation of lysozyme. 1995.
- F. Zaman. Precipitation of recombinant protein from canola extract. 1998.
- C. Bressler. Characterization of cell removal and protein purification from fermentation broth by polyelectrolyte flocculation. 2002.
- Y. Dharmadi. Recovery of enzyme byproducts during recombinant protein recovery from transgenic plants. 2002.

K. Graves. Broth conditions determining specific cake resistance during microfiltration of *Bacillus subtilis*. 2004.

R. Morales-Chabrand. Destabilization of the emulsion formed during aqueous extraction of oil from full fat soybean flour. 2007.

D. Cookman. Protein extraction from distillers' grain. 2008

L. Xu. Proteomics approach to investigate separation behavior of proteins in ion-exchange chromatography. 2008.

Y. Liu. Proteomics-based correlation of protein retention in hydrophobic interaction chromatography. M. E. Degree. 2009.

C. Setina. Purification of collagen type I $\alpha 1$ from a whole corn extract using pepsin digestion and precipitation. 2010.

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PH D THESES DIRECTED

M. A. Petenate. Kinetics of protein aggregate growth and breakage during isoelectric precipitation. 1982.

R. A. Pollet. The pharmacokinetics of chlortetracycline in turkeys. 1984.

R. R. Fisher. Protein precipitation with acids and polyelectrolytes: The effects of reactor conditions and models of the particle size distributions. 1987.

K. M. Clark. Mechanistic studies of protein fractionation by precipitation with carboxymethyl cellulose. 1988.

M. Q. Niederauer. Enhancement of polyelectrolyte precipitation through the genetic fusion of charged polypeptides to enzymes. 1993.

M. H. Heng. Charged fusions for enhanced protein purification and immobilization by ion exchange. 1993.

J. R. Luther. Genetically engineered charge modifications to enhance protein separation in aqueous two-phase systems. 1994.

C. E. Forney. Role of protein charge in reversed micellar extraction. 1994.

S. J. Blonigen. Ultrafiltration behavior of polyelectrolyte and protein mixtures. 1994.

T.-Y. Hsiao. Water reuse in fermentations. 1995.

M. V. Saikumar. Effects of pressure on the kinetics of lysozyme crystallization. 1996.

Z. Gu. Process development of propionic acid production by fermentation. 1997.

- W. Fan. Charge effect on protein partitioning in aqueous two-phase systems. 1997.
- R. Waghmare. High pressure crystallization of Purafect[®] subtilisin. 1999.
- C. Zhang. Enhancing chromatographic separations of recombinant proteins from canola extracts by genetic design and characterization of protein binding regions. 1999.
- Y. Bai. Recovery of recombinant protein from transgenic canola: Processing, extraction and purification. 2001.
- X. J. Pan. Surface and solvent influences on protein crystallization. 2001.
- T. Menkhaus. Recovery of recombinant proteins from transgenic plants: Strategies in implementation and optimization. 2002
- Z. Gu. Recovery and purification of recombinant protein from transgenic corn by aqueous two-phase partitioning. 2006.
- C. Zhang. Purification and characterization of recombinant collagens/gelatins from transgenic corn seeds. 2008.
- K. E. Campbell. Protein and oil recovery from enzyme-assisted aqueous extraction of soybean. 2010.
- M. T. Aspelund. Membrane-based separations for solid/liquid clarification and protein Purification. 2010.

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Postdoctoral Students, Visiting Graduate Students, and Research Associates

Ilari Souminen
John Luther
Craig Forney
Kazushige Ohmori
Mungara Saikumar
Qinglong Chang
Yutaka Okamoto
Qixin Zhong
Murali Subramanian
Oscar Alejandro Aguilar (Tec de Monterey, Mexico)
Jagan Bilikanti (U. of Canterbury, NZ)
Ramon Morales-Chabrand
Kerry Campbell

Current Students

Ryan Swanson

Current Postdoctoral and Research Associates

Bill Colonna
Mustafa Marti

COURSES TAUGHT

All of the Transport and Unit Operations Courses (356, 357, 358)
Senior Electives in Polymers (443, 442), Biochemical Engr. (415), Adv. Unit Ops (462)
Developed and taught Biological Engineering Lab (427)
Graduate Courses in Bioseparations (562), Bioseparations Lab (562L), Mass Transfer (earlier "553"), Advanced Biochemical Engr. (690), Responsible Conduct of Research (PLP 565A)
Team and co-taught Design (430), Environmental Bioprocessing (406), Chem Proc Ind (410)
Old Freshman courses (100,110)
Undergraduate Seminars – 302 and 401
Seminar courses in Engineering Ethics and Ethical Issues in Biotechnology
Extended learning short courses in Crystallization and Bioseparations
ChE London Summer Program (3 times)
Coordinator of Exchange Program with University College London

PAST SERVICE WITH SIGNIFICANT ADMINISTRATIVE COMPONENT

Chair, Engineering College Curriculum Committee
Chair, Engineering College Honors Committee
Chair, Engineering College Improvement Leave and Foreign Travel Committee
Chair, Engineering College Diversity Committee
Chair, Department Graduate Committee
Departmental Course and Instructor and T. A. Scheduling
Chair, Search Committee for Director of the Center for Teaching Excellence
Chair, Department of Chemical and Biological Engineering. Aug. 1997 – Aug. 2005
Interim Dean, College of Engineering, Iowa State University, July – December 2004
Chair, COE Diversity Committee, 2007-2008
Organizer of several symposia for AIChE (ca. 8), ACS (ca. 8), and Engr. Foundation (ca. 4) Conferences
Organizer (1 of 3 co-Chairs) for Recovery of Biological Products XIII (ACS BIOT Division), Quebec, June 2008.

RECENT OTHER UNIVERSITY SERVICE

Plant Sciences Council, College of Engineering Representative, 2001-3
University Committee on Women, 2001 – 2004
Fermentation Facility User's Advisory, 2000 - 2009
Chairs Council Cabinet, 2001 - 2003
Facilitator, Tuition Task Force, 2003-2004
University Honors Task Force, 2005
College of Engineering Diversity Committee, 2005-6, 2008-2009
COE Equity Advisor, NSF ADVANCE Program, 2007-2008
COE Budget Task Force, 2009 -
CBE ADVANCE Professor, 2010-
COE Curriculum Committee, 2011
McGee Research Grant Review Committee, 2011-

PAST UNIVERSITY SERVICE WITH SIGNIFICANT TIME COMMITMENT

Member of COE Curriculum Committee; COE Honors Committee; University Honors Committee; University Task Force on International and Diversity Requirement; Biotechnology Council; Advisory Committee for Center for Teaching Excellence; Search Committees for Vice-Provost for Research and Dean of Engineering; Provost's Faculty Review Board

RECENT DEPARTMENTAL SERVICE

Preparation (with Vigil and Seagrave) of Engineering Accreditation Report, 2000

Chair, Faculty Search Committee, 2005-6; 2011-12

Assessment Coordinator, F07 – F08

ADVANCE Professor, 2010-2012

Chair, Curriculum Committee, 2011

Curriculum Committee, 2010-

Advising Coordinator, 2010 -

Revised: 1//12