

Curriculum Vitae

Theodore W. Randolph
Gillespie Professor of Bioengineering
Department of Chemical and Biological Engineering
University of Colorado
Boulder, CO 80309

Education

1983-1987 University of California, Berkeley
Ph.D. Chemical Engineering, 1987. Thesis advisors: Harvey W. Blanch, John M. Prausnitz.
Thesis: "Enzyme-Catalyzed Reactions in Supercritical Fluids."

1981-1983 University of Colorado, Boulder
B.S. Chemical Engineering, 1983.
1979-1981 University of Arizona, Tucson
Major: Chemical Engineering.

Major Research Areas: Protein formulation, lyophilization of proteins, Protein-solvent interactions in non-aqueous environments, co-solvent assisted protein refolding, supercritical fluid-based separation techniques, free-radical reactions in micellar supercritical fluid solutions, electron paramagnetic resonance spectroscopic investigations of protein conformation and molecular dynamics in engineering environments.

Professional Experience

- 1987- 1989:Chemical Engineer/ Collaborateur Scientifique, Swiss Federal Institute of Technology, Lausanne, Switzerland.

Description:Post-doctoral research position under the direction of Professor U. von Stockar.Research in two main areas:fermentation optimization and control via bench-scale fermentation calorimetry, and immobilized whole-cell reactors under supercritical conditions.

- 1989-1992:Assistant Professor, Department of Chemical Engineering, Yale University.
- 1993:Associate Professor, Department of Chemical Engineering, Yale University
- 1993:Patten Associate Professor, Department of Chemical Engineering, University of Colorado, Boulder
- 1997: Co-Director, University of Colorado Center for Pharmaceutical Biotechnology
- 1999: Professor, Department of Chemical Engineering, University of Colorado, Boulder

Awards, Memberships, Editorial Boards

- American Society of Engineering Educators Dow Lectureship Award, 2007
- Editorial Board Member *J. Pharmaceutical Innovation*
- Ebert Award, Best Original Investigation in 2006, American Pharmacists Association
- American Institute of Chemical Engineers, Professional Progress Award, 2005
- Boulder Faculty Assembly Research and Creative Work Award 2003
- College of Engineering and Applied Sciences Max Peters Award for Outstanding Service 2002
- Editorial Board Member, *Journal of Pharmaceutical Sciences*
- Outstanding Graduate Teaching Award, Department of Chemical Engineering, 2000
- Faculty Fellowship, University of Colorado, Boulder 1999-2000
- Editorial Board Member, *Current Pharmaceutical Biotechnology*
- College of Engineering and Applied Sciences Outstanding Research and Service Award, 1998
- Invited Foreign Researcher, Japanese Agency of Industrial Science and Technology, 1995
- Patten Associate Professor Chair in Chemical Engineering, University of Colorado, Boulder, 1993
- John J. Lee Junior Professorship Chair in Chemical Engineering, Yale University, 1993
- Senior Faculty Fellowship, Yale University, 1993
- National Science Foundation Presidential Young Investigator Award, 1991

- 1990 Yale Nominee for the David and Lucille Packard Fellowship Award
- William H. Peterson Award from the American Chemical Society Division of Microbial and Biochemical Technology for Best Student Paper, 1987 Annual Meeting of the ACS.
- Outstanding Teaching Assistant Award, Department of Chemical Engineering, University of California, Berkeley, Fall, 1984.
- George Gregson Scholarship for Academic Excellence, Department of Chemical Engineering, University of Arizona, 1979-1981.
- Member, Tau Beta Pi National Engineering Honor Society
- Member, Omega Chi Epsilon National Chemical Engineering Honor Society
- Member, American Institute of Chemical Engineers
- Member, American Association for the Advancement of Science
- Member, American Association of Pharmaceutical Scientists

Industrial Boards

Co-director, Medical and Scientific Advisory Board, RxKinetix, Inc. 10/97-4/99

Member, Scientific Advisory Board, RxKinetix, Inc. 5/01-

Member, Scientific Advisory Board, AktivDry, Inc. 01/02-

Member, Scientific Advisory Board, Integrated Biosystems, Inc. 1998-

Member, Board of Directors, University Technology Corporation, 2000-2002

Founder and Scientific Advisory Board Director, BaroFold, Inc., 2002-

Member, Scientific Advisory Board, P. Hoffmann-La Roche, Ltd, Basel

Publications

141. Thirumangalathu, R, Krishnan, S, Bondarenko, P, Speed-Ricci, M, Randolph, TW, Christians, U, (2007) "Oxidation of methionine residues in recombinant human interleukin-1 receptor antagonist: Implications of conformational stability on protein oxidation kinetics" *Biochemistry* 46 (21): 6213-6224.

140. Randolph, TW and Carpenter, JF (2007) "Engineering challenges of protein formulations," *AIChE J*, 53(8), 1902-1907.

139. Downey, C. D.; Crisman, R. L.; Randolph, T. W.; Pardi, A. (2007) "Influence of Hydrostatic Pressure and Cosolutes on RNA Tertiary Structure" *J. Am. Chem. Soc.* 129(30); 9290-9291.

138. Ng KY, Zhou HY, Zhang YL, Hybertson B, Randolph T, Christians U (2007). Quantification of isoniazid and acetylisoniazid in rat plasma and alveolar macrophages by liquid chromatography-tandem mass spectrometry with on-line extraction. *Journal Of Chromatography B-Analytical Technologies In The Biomedical And Life Sciences* 847(2):188-198.

137. Vessely, C., Estey, T, Randolph, TW, Henderson, I, Nayar, R., and Carpenter, JF, (2007) "Effects of Solution Conditions and Surface Chemistry on the Adsorption of Three Recombinant Botulinum Neurotoxin Antigens to Aluminum Salt Adjuvants", *J. Pharmaceutical Science, Journal of Pharmaceutical Sciences*, Volume 96, Issue 9, 2375-2389

136. Gabrielson JP, Brader ML, Pekar AH, Mathis KB, Winter G, Carpenter JF, Randolph TW. (2007) "Quantitation of aggregate levels in a recombinant humanized monoclonal antibody formulation by size-exclusion chromatography, asymmetrical flow field flow fractionation, and sedimentation velocity". *J Pharm Sci.* 2007 Feb;96(2):268-79.

135. Gabrielson JP, Randolph TW, Kendrick BS, Stoner MR (2007) "Sedimentation velocity analytical ultracentrifugation and SEDFIT/c(s): Limits of quantitation for a monoclonal antibody system". *Anal. Biochem.* Feb 1;361(1):24-30. Epub 2006 Nov 28.

134. Jarmer, D. J., C. S. Lengsfeld, et al. (2006). "Scale-up criteria for an injector with a confined mixing chamber during precipitation with a compressed-fluid antisolvent." *Journal of Supercritical Fluids* 37(2): 242-253.

133. Lee, S. H., J. F. Carpenter, et al. (2006). "Effects of solutes on solubilization and refolding of proteins from inclusion bodies with high hydrostatic pressure." *Protein Science* 15(2): 304-313.
132. Stoner, M. R., D. A. Dale, et al. (2006). "Surfactant-induced unfolding of cellulase: Kinetic studies." *Biotechnology Progress* 22(1): 225-232.
131. Thirumangalathu, R., S. Krishnan, et al. (2006). "Effects of pH, temperature, and sucrose on benzyl alcohol-induced aggregation of recombinant human granulocyte colony stimulating factor." *Journal Of Pharmaceutical Sciences* 95(7): 1480-1497.
130. Kim YS, Randolph TW, Seefeldt MB, High-pressure studies on protein aggregates and amyloid fibrils, Amyloid, Prions, and Other Protein Aggregates, Pt C *Methods In Enzymology* 413: 237-253
129. Roy, S., Katayama, D., Dong, A., Kerwin, BA, Randolph, TW, and Carpenter, JF. (2006) Temperature Dependence of Benzyl Alcohol- and 8-Anilino-naphthalene-1-sulfonate-induced Aggregation of Recombinant Human Interleukin-1-receptor Antagonist, *Biochemistry*, 45(12): 3898-3911.
128. Jarmer, DJ, Lengsfeld, CS, Anseth, KS, and Randolph, TW, (2005) Supercritical fluid crystallization of griseofulvin: crystal habit modification with a selective growth inhibitor. *J. Pharm. Sci.*, 94(12) 2688-2702.
127. Chi, EY, Kendrick, BS, Carpenter, JF, and Randolph, TW, (2005) Population Balance Modeling of Aggregation Kinetics of Recombinant Human Interleukin-1 Receptor Antagonist, *J. Pharm Sci.* , 94(12), 2735-2748
126. Seung-Hyun Lee, S-H, Carpenter, JF, Chang, BS, Randolph, TW, and Kim Y-S (2006) Effects of Solutes on Solubilization and Refolding of Proteins from Inclusion Bodies with High Hydrostatic Pressure. *Protein Science* 15 (2): 304-313
125. Stoner, MJ, Dale, DA, Gualfetti, PJ, Becker, T, and Randolph, TW, (2006) Surfactant-induced unfolding of cellulase: kinetic studies. *Biotechnology Progress*, 22 (1): 225-232
124. Stoner, MR, Dale, DA, Gualfetti, PJ, Becker, T, Randolph, TW (2005) "Ca²⁺ surfactant interactions affect enzyme stability in detergent solutions" *Biotechnology Progress*, 21(6): 1716-1723.
123. Jarmer, DJ, Lengsfeld, CS, Randolph, TW, (2006) Scale-up criteria for an injector with a confined mixing chamber during precipitation with a compressed-fluid antisolvent. *J. Supercritical Fluids* 37 (2): 242-253.
122. Zhou, HY, Zhang, YL, Biggs, DL, Manning, MC, Randolph, TW, Christians, U, Hybertson, BM, Hg, KY (2005). Microparticle-based lung delivery of INH decreases INH metabolism and targets alveolar macrophages *Journal Of Controlled Release*, 107(2), 288-299.
121. Seefeldt MB, Kim YS, Tolley KP, Seely, J., Carpenter, JF, and Randolph, TW (2005). High-pressure studies of aggregation of recombinant human interleukin-1 receptor antagonist: Thermodynamics, kinetics, and application to accelerated formulation studies , *Protein Science* 14 (9): 2258-2266
120. Berchtold KA, Randolph TW, Bowman CN, (2005) Propagation and termination kinetics of cross-linking photopolymerizations studied using electron paramagnetic resonance spectroscopy in conjunction with near IR spectroscopy. *Macromolecules* 38 (16): 6954-6964
119. Hesterberg LK, Seefeldt MB, Carpenter JF, and Randolph, TW, (2005) High-Hydrostatic pressure refolding of proteins. *Genetic Engineering News* 25 (4): 46-47
118. Chou DK, Krishnamurthy R, Randolph TW, Carpenter, JF, and Manning, MC (2005) Effects of Tween 20 (R) and Tween 80 (R) on the stability of albutropin during agitation *Journal Of Pharmaceutical Sciences* 94 (6): 1368-1381

117. Roy S, Jung R, Kerwin BA, Randolph, TW and Carpenter, JF, (2005) Effects of benzyl alcohol on aggregation of recombinant human interleukin-1-receptor antagonist in reconstituted lyophilized formulations *Journal Of Pharmaceutical Sciences* 94 (2): 382-396
116. Carpenter, J.F., Chang, B.S, and Randolph, T.W., (2004), Physical Damage to Proteins During Freezing, Drying, and Reconstitution,” chapter in *Lyophilization of biopharmaceuticals*, H.R. Costantino and M.J. Pikal, eds, American Association of Pharmaceutical Scientists, 423-442.
115. Zhang Y, Roy S, Jones LS, Krishnan S, Kerwin BA, Chang BS, Manning MC, Randolph TW, Carpenter JF (2004). Mechanism for benzyl alcohol-induced aggregation of recombinant human interleukin-1 receptor antagonist in aqueous solution. *J Pharm Sci* 93(12):3076-3089
114. Chi, EY, Weickmann, J, Carpenter, JF, Manning, MC, Randolph, TW, (2005) “Heterogeneous Nucleation-Controlled Particulate Formation of Recombinant Human Platelet-Activating Factor Acetylhydrolase in Pharmaceutical Formulation,” *Journal of Pharmaceutical Sciences* 94(2), 256-274.
113. Jarmer DJ, Lengsfeld CS, Randolph TW (2004), “Nucleation and growth rates of poly(L-lactic acid) microparticles during precipitation with a compressed-fluid antisolvent”, *Langmuir* 20 (17): 7254-7264.
112. Stoner MR, Fischer N, Nixon L, Buckel S, Benke M, Austin F, Randolph TW, Kendrick BS (2004), “Protein-solute interactions affect the outcome of ultrafiltration/diafiltration operations” *Journal of Pharmaceutical Sciences* 93 (9): 2332-2342
111. Seefeldt MB, Ouyang J, Froland WA, Carpenter JF, Randolph TW, (2004), “High-pressure refolding of bikunin: Efficacy and thermodynamics” *Protein Science* 13 (10): 2639-2650
110. Patel MM, Zeles MG, Manning MC, Randolph TW, Anchordoquy TJ (2004) “Degradation kinetics of high molecular weight poly (L-lactide) microspheres and release mechanism of lipid : DNA complexes”, *Journal of Pharmaceutical Sciences* 93 (10): 2573-2584.
109. Jarmer, DJ, Lengsfeld, CS, and Randolph, TW, (2003) “Manipulation of particle size distribution of poly(L-lactic acid) nanoparticles with a jet-swirl nozzle during precipitation with a compressed antisolvent,” *J. Supercritical Fluid* 27(3), 317-336.
108. Biggs, DL, Lengsfeld, CS, Hybertson, BM, Ng, K-Y, Manning, MC, and Randolph, TW, (2003) “In vitro and in vivo evaluation of the effects of PLA microparticle crystallinity on cellular response” *J. Controlled Release*, 92, 147-161.
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105. Chi EY, Krishnan S, Kendrick BS, Chang BS, Carpenter JF, Randolph TW (2003) “Roles of conformational stability and colloidal stability in the aggregation of recombinant human granulocyte colony-stimulating factor” *Protein Science* 12 (5): 903-913.
104. Owens, JL, Anseth, KS, and Randolph, TW, (2003) “Mechanism of Microparticle Formation in the Compressed Antisolvent Precipitation and Photopolymerization (CAPP) Process,” *Langmuir*, 19 (9): 3926-3934
103. Eva Y. Chi, Sampathkumar Krishnan, Theodore W. Randolph, John F. Carpenter (2003) ”Physical Stability of Proteins in Aqueous Solution – Mechanism and Driving Forces in Non-native Protein Aggregation,” *Pharmaceutical Research*, 20(9), 1325-1336

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101. Randolph, T.W., and Searles, J.A. (2002) "Freezing and Annealing Phenomena in Lyophilization: Effects Upon Primary Drying Rate, Morphology, and Heterogeneity," *Am. Pharm. Rev.*, 3, 2-5.
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99. Kim, Y.-S., Randolph, T.W., Stevens, F.J., and Carpenter, J.F. (2002) "Kinetics and energetics of assembly, nucleation and growth of aggregates and fibrils for an amyloidogenic protein: Insights into transition states from pressure, temperature and co-solute studies," *J. Biol. Chem.*, 277 (30): 27240-27246.
98. Kim YS, Jones LS, Dong AC, Kendrick BS, Chang BS, Manning MC, Randolph TW, Carpenter JF (2003) "Effects of sucrose on conformational equilibria and fluctuations within the native-state ensemble of proteins," *Protein Science*, 12(6), 1252-1261.
97. Lengsfeld, C.S., Pitera, D., Manning, M.C., and Randolph, T.W., (2002) "Dissolution and partitioning behavior of hydrophobic ion paired compounds," *Pharm. Res.* 19(10), 1572-1576.
96. Stay, M.S., Xu, J., Randolph, T.W., and Barocas, V.H. (2003) "Computer Simulation of Convective and Diffusive Transport of Controlled-Release Drugs in the Vitreous Humor" *Pharm. Res.*, 20 (1): 96-102
95. Webb, SD, Cleland, JL, Carpenter, JF, and Randolph, TW, (2003) Effects of Annealing Lyophilized and Spray-Lyophilized Formulations of Recombinant Human Interferon- γ , *J. Pharm. Sci.* 92 (4): 715-729
94. Carpenter, J.F., Chang, B.S., Garzon-Rodriguez, W., and Randolph, T.W., (2002) "Rational Design of Stable Lyophilized Protein Formulations: Theory and Practice," In *Rational Design of Stable Protein Formulations: Theory and Practice*, John Carpenter and Mark Manning, eds., pp. 109-134, Kluwer Academic/Plenum Publishers, New York. Rational Design
93. Randolph, T.W., and Jones, L.S., (2002) "Surfactant-Protein Interactions," In *Rational Design of Stable Protein Formulations: Theory and Practice*, John Carpenter and Mark Manning, eds., pp. 159-176, Kluwer Academic/Plenum Publishers, New York.
92. Sampathkumar Krishnan, Eva Y. Chi, Jonathan N. Webb, Byeong S. Chang, Daxian Shan, Marrill Goldenberg., Mark C. Manning, Theodore W. Randolph, John F. Carpenter (2002) "Aggregation of Granulocyte Colony Stimulating Factor under Physiological Conditions: Characterization and Thermodynamic Inhibition" *Biochemistry*, 41(20):6422-31
91. Lengsfeld, CS, Manning, MC, and Randolph, TW, (2002) "Encapsulating DNA within polymer microparticles" *Current Pharmaceutical Biotechnology*, 3, 227-235.
90. St. John, RJ, Carpenter, JF, Balny, C, and Randolph, TW, (2001) "High Pressure Refolding of Recombinant Human Growth Hormone from Insoluble Aggregates: Structural Transformations, Kinetic Barriers, And Energetics" *J. Biol. Chem.* 276: 46856-46863.
89. Carpenter, JF, Manning, MC, and Randolph, TW, (2002) "Protein Storage and Stabilization", *Current Protocols in Protein Science*, supplement 27, 4.6.1-4.6.6.
88. Owens, JL, Anseth, KS, and Randolph, TW, (2002) "Compressed Antisolvent Precipitation and Photopolymerization to Form Highly Crosslinked Polymer Particles", *Macromolecules*, 35, 4289-4296.
87. DePaz, RA, Dale, DA, Barnett, CC Carpenter, JF, Gaertner, AL and Randolph, TW, (2002) "Effects of Drying Methods and Additives on the Structure, Function, and Storage Stability of Subtilisin: Role of Protein Conformation and Molecular Mobility", *Enzyme and Microbial Technology* 31(6), 765-774
86. St. John, RJ, Carpenter, JF, and Randolph, TW, (2002) "High-Pressure Refolding of Covalently-Crosslinked Lysozyme Aggregates: Thermodynamics and Optimization" *Biotechnology Progress* 18 (3): 565-571.

85. Randolph, TW, Seefeldt, M., and Carpenter, J.F. (2002) "High Hydrostatic Pressure as a Tool to Study Protein Aggregation and Amyloidosis" *BBA - Protein Structure & Molecular Enzymology*, *Biochim Biophys Acta.* 1595(1-2):224-34.
84. Webb, SD, Golledge, SL, Cleland, JL, Carpenter, JF, and Randolph, TW (2002) "Surface Adsorption of Recombinant Human Interferon- γ in Lyophilized and Spray-Lyophilized Formulations" *J. Pharm. Sci.*, 91(6), 1474-1487.
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82. Zhou, H, Lengsfeld, C., Claffey, D.J., Ruth J.A., Hybertson, B., Randolph, T.W., Ng, K-Y. , and Manning, M.C., (2002) "Hydrophobic Ion Pairing of Isoniazid Using a Prodrug Approach" *J. Pharm Sci*, 91(6) 1502-1511.
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16. Carlier, C., and Randolph, T. W., "Dense-Gas Solvent Solute Clusters at Near-infinite Dilution: EPR Spectroscopic Evidence," *AIChE J.*, 39, No. 5, 876-884, 1993.

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4. Randolph, T. W., Clark, D. S., Blanch, H. W., and Prausnitz, J. M., "Enzymatic Oxidation of Cholesterol Aggregates in Supercritical Carbon Dioxide," *Science*, 239, pp. 387-390 (1988).
3. Randolph, T. W., Blanch, H. W., Prausnitz, J. M., "Enzyme Catalyzed Oxidation of Cholesterol in Supercritical Carbon Dioxide," *AIChE J.*, Vol. 34, No. 8, pp. 1354-1360, August, 1988.
2. Randolph, T. W., Clark, D. S., Blanch, H. W., Prausnitz, J. M., "Cholesterol Aggregation and Interaction with Cholesterol Oxidase in Supercritical carbon Dioxide," *Proc. Natl. Acad. Sci., USA*, Vol. 85, pp. 2979-2983, May, 1988.
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Patents

- "**Producing Products by Enzyme Catalyzed Reactions in Supercritical Fluids**" U.S. Patent No. 4,925,790, issued May 15, 1990.
- "**Solubilization of Pharmaceutical Substances in an Organic Solvent and Preparation of Pharmaceutical Powders Using the Same**", U.S. Patent #5,770,559, June 23, 1998, M.C. Manning, T.W. Randolph, E. Shefter, R.F. Falk
- "**Solubilization of Pharmaceutical Substances in an Organic Solvent and Preparation of Pharmaceutical Powders Using the Same**", U.S. Patent #5,981,474, November 9, 1999, M.C. Manning, T.W. Randolph, E. Shefter, R.F. Falk
- "**Chemical reactions in water-in-carbon dioxide microemulsions and control thereof**" U.S. Patent 5,814,678, September 29, 1998

- **“High Pressure Refolding of Protein Aggregates and Inclusion Bodies”** U.S. Patent 6,489,450, December 3, 2002
- **“Microparticles of Lactide-Co-Glycolide Copolymers and Methods of Making and Using the Same”**, US 6,319,521, November 20, 2001
- **“Preparation and Use of Photopolymerized Microparticles”** US Patent 6,403,672, June 11, 2002 **“Sustained-release composition including amorphous polymer”** United States Patent 6,613,358 September 2, 2003, and Canadian Patent No. 2,324,254, Issued January 4, 2005.
- **“Hydroxyethyl starch—containing polypeptide compositions”** U.S. patent No. 6,982,080, January 3, 2006

Professional Service

- Co-Organizer, 2007 Protein Stability Conference, Breckenridge, CO July 19-21, 2007
- Co-Organizer, 2005 Protein Stability Conference, Breckenridge, CO July 2005
- Co-Organizer, 2003 Protein Stability Conference, Breckenridge, CO July 17-19, 2003
- Co-Organizer, 2002 Protein Stability Conference, Breckenridge, CO July, 2002
- Session Chair, 2001 Macromolecular Drug Delivery Conference, Breckenridge, CO, July 11-14, 2001.
- Co-Organizer, 2000 Protein Stability Conference, Breckenridge, CO, July, 2000
- Short Course Instructor, “Issues in Formulation of Biopharmaceuticals: Surfactant-Stabilized Protein Formulations,” 1998 American Association of Pharmaceutical Scientists Meeting, November 15, 1998, San Francisco.
- Session Chair, “Pharmaceutical Applications of Supercritical Fluids”, 1998 National Meeting of the AIChE
- Co-Director, Center for Pharmaceutical Biotechnology
- Co-Organizer, 3rd Protein Stability Conference, Breckenridge, CO, July, 1998
- Session Chair, American Chemical Society Annual Meeting, San Francisco, 1997, “Stabilization, Formulation, and Delivery of Proteins and Nucleic Acids
- Session Chair, American Chemical Society, New Orleans, 1996, “Protein Formulation: Solution and Solid State”
- Session Chair, American Institute of Chemical Engineers Annual Meeting, 1996, Chicago, “Applications of Supercritical Fluid Technology in Combustion and Energy Systems”
- Co-Organizer, 2nd Protein Stability Conference, Breckenridge, CO, July, 1996
- Organizer, 8th Annual Colorado Biotechnology Symposium, Boulder, 1995, plenary session *“Protein Formulations”*
- Session Chair, Association Internationale pour la Promotion des Fluides Supercritiques, 3rd International Symposium on Supercritical Fluids, Strasbourg, France 1994, session “Applications of Spectroscopy to Supercritical Fluids”
- Session Chair, 7th Annual Colorado Biotechnology Symposium, Boulder, 1994 session “Bioreactors and Downstream Processing”
- Session Chair, American Institute of Chemical Engineers Annual Meeting, San Francisco, 1994, session “Supercritical Fluid Fundamentals”
- Symposium Chairman, American Institute of Chemical Engineers Area 1f Symposium on Supercritical Fluids, St. Louis, 1993,
- Session Chair, American Institute of Chemical Engineers Annual Meeting, 1991, session “Applications of Enzyme Systems in Biochemical Engineering”
- Session Chair, American Institute of Chemical Engineers Annual Meeting, 1991, session “Supercritical Fluids IV: Physical and Chemical Rate Processes”
- Session Chair, American Institute of Chemical Engineers Annual Meeting, 1988, session “Special Topics in Supercritical Technology”
- Member, American Institute of Chemical Engineers Area 1f High Pressure Committee

University and College Service

- Director, NIH Leadership Training Program in Pharmaceutical Biotechnology.
- Director, University of Colorado Center for Pharmaceutical Biotechnology
- Chair, Biomedical Engineering Committee

- Chair, Faculty Inventor's Council
- Member, University Committee on Intellectual Property
- Reviewer, Dean's Small Grants Awards
- Ad-hoc space committee
- Integrated Teaching Laboratory High Performance Computing Committee
- Undergraduate Admissions Committee, 1993, Yale University

Graduate Students Supervised

- Amber Lea Clausi, Ph.D. 2007, University of Colorado, Boulder, "Lyophilized vaccine Preparations Containing Aluminum Salt Adjuvants: Preparation, Immunogenicity and Stability"
- John Alford, Ph.D. 2007, University of Colorado, Boulder, "Physical Stability of a Therapeutic Protein in High Protein Concentration Aqueous Formulations"
- John Gabrielson, Ph.D. 2006, University of Colorado, Boulder, "Monoclonal Antibody Aggregation in Therapeutic Formulation: Size and Shape Analysis"
- Billie-Jean Savage, Masters, 2004, University of Colorado, Boulder, "Controlled Freezing and Thawing of Cells Using a Fluidized Bed"
- Eva Chi, Ph.D., 2004, University of Colorado, Boulder, "Protein Aggregation in Aqueous Solution- Mechanism, Thermodynamics, and Kinetics"
- Daniel Jarmer, Ph.D. 2004, University of Colorado, Boulder, "Manipulation and Control of Particle Size Distribution During Precipitation with Compressed Antisolvents"
- Steven Cottle, Masters, 2004, University of Colorado, Boulder, "Development of Methods and Formulation for Maintaining Aluminum Salt Adjuvant Stability and Adsorption Capacity During Freeze-Drying"
- Michael Stoner, Ph.D., 2004, University of Colorado, Boulder, "Mechanistic Studies of Enzyme Degradation in Liquid Detergent"
- Matthew Seefeldt, Ph.D., 2004, University of Colorado, Boulder, "High Pressure Refolding of Protein Aggregates: Efficacy and Thermodynamics"
- Daniel Biggs, Ph.D., 2003, University of Colorado, Boulder, "Biodegradable Poly-(L-lactide) Microparticles for Pulmonary Drug Delivery with Targeting to Alveolar Macrophages: Applications in Treating Tuberculosis"
- Jennifer L. Owens, Ph.D., 2002, University of Colorado, Boulder, "Biodegradable Microparticles for Controlled Drug Release Applications: Formation Using the Compressed Antisolvent Precipitation and Photopolymerization Process"
- DePaz, Roberto, Ph.D., 2001, University of Colorado, Boulder, "Thermodynamics and Kinetics of Protein Degradation in Dried Solids"
- Webb, Serena D. ,2001, University of Colorado, Boulder, "Reconstitution of Lyophilized Therapeutic Proteins: Effects of Formulation, Processing Techniques, and Surfaces"
- St. John, Richard J., Ph.D., 2001, University of Colorado, Boulder, "High pressure Refolding of Protein Aggregates and Inclusion Bodies"
- Dixon, Daniel Abbas, MS, 2000, University of Colorado, Boulder, "Spray Freezing and Fluidized Bed Drying of Pharmaceutical Powders"
- James Searles, PhD, 2000, University of Colorado, Boulder, "Calorimetric Control and Modeling of Pharmaceutical Lyophilization Processes"
- Jon Webb, PhD, 2000, University of Colorado, Boulder, "High Pressure Crystallization, refolding, and Disaggregation of Proteins"
- Lyman, Scott MS 1999, University of Colorado, Boulder, "Surfactant Interactions with recombinant human Interferon Beta"
- Jing Xu, MS, 1999, University of Colorado, Boulder, "Controlled Release of Drugs in Vitreous Humor"
- Kenneth Benjamin, MS, 1999, University of Colorado, Boulder, "Heat Transfer in Supercritical Jet Fuels"
- Lorraine Pietrazewski, MS, 1999, "Stability of Water-in-CO₂ Emulsions"
- Richard Falk, Ph.D., 1998, University of Colorado, Boulder, "Gas Antisolvent Precipitation Processing for Preparation of Controlled-Release Pharmaceutical Products"
- Martin C. Heller, Ph.D., 1998, University of Colorado, Boulder, "Causes and Consequences of Polymeric Phase Separations in Protein Formulations During Lyophilization"

- Janet deGrazia, Ph.D., 1998, University of Colorado, Boulder, "Structure in Supercritical Fluids: Reactions, Microemulsions, and Emulsions"
- Sriram Natarayan, MS, 1996, University of Colorado, Boulder, "Ultrasonic Velocity Measurements in Supercritical Jet Fuel"
- LaToya Shantel Jones. MS, 1996, University of Colorado, Boulder, "Surfactant Interactions with recombinant Hepatitis B Surface Antigen"
- Claude Carlier Ph.D. 1995, Yale University "Reactions in Supercritical Fluids" (Award:Harding Bliss Award for Outstanding Best Thesis Research in Engineering and Applied Science, 1995)
- Narendra Bam Ph.D. 1995, Yale University "Mechanisms of Stabilization of Recombinant Protein Formulations by Surfactants and Polymers"
- Ganapathy Shankar Ph.D. 1995, Yale University "Computational and Experimental Studies of Free Radical Reactions in Supercritical Fluids"
- Claudia Heinen, Diplomarbeit 1994, Julius-Maximilians-Universitat Wurzburg "Protein-Stabilizer Interactions During Freezing and Drying"
- David Barbieri, MS, 1995, University of Colorado, Boulder "A Theoretical Approach to Protein Stability During the Freezing Portion of Lyophilization"
- Eugenia Pelli, MS, 1993, Yale University.

Current Graduate Students (degree goal)

Branden Salinas, (Ph.D.)
 Amber Fradkin (Ph.D.)
 Ryan Crisman (Ph.D.)
 D. Brett Ludwig, (Ph.D.)
 Fauna Samuel (Ph.D.)
 Amanda Cordes (Ph.D.)
 Matthew Hoehne (Ph.D.)
 Jared Bee (Ph.D.)

Post-doctoral Students Supervised

Claude Carlier (1993-1995)
 Vibha Bansal (1996-1997)
 Thomas J. Anchordoquy (1996-1997)
 Corrine Connon Lengsfeld (1998-1999)
 Stephen Cape 2001
 Hasige A. Sathish (2006-2007)
 Jonas Fast (2007-)