

Curriculum Vitae

Barbara L. Knutson

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EXPERIENCE

July 2003 – present Director of Graduate Studies, Dept. of Chemical and Materials Engineering, Univ. of Kentucky, Lexington, KY

July 2001 - present Associate Professor, Dept. of Chemical and Materials Engineering, University of Kentucky, Lexington, KY

July 1995 – June 2001 Assistant Professor, Dept. of Chemical and Materials Engineering, University of Kentucky, Lexington, KY

June 1994 -July 1995 Postdoctoral Research Associate
Princeton University, Princeton, NJ

EDUCATION

Ph.D., Chemical Engineering Georgia Institute of Technology, Atlanta, GA
June 1994

B.S., Chemical Engineering Georgia Institute of Technology, Atlanta, GA
June 1989

HONORS AND AFFILIATIONS

- Associate Faculty of Center of Membrane Sciences, University of Kentucky
- Advisory Board Member, Center for Applied Energy Research, University of Kentucky
- 1998-99, 2001-2002 Outstanding Chemical Engineering Teacher Award, University of Kentucky
- 2001 Inductee of the Georgia Institute of Technology College of Engineering Outstanding Young Alumni Council
- American Institute of Chemical Engineers (AIChE); American Chemical Society (ACS); Society of Women Engineers (SWE)
- University of Kentucky AIChE Student Chapter Faculty Advisor, 2000 – 2003
- Chair, University of Kentucky Chemical Safety Committee, 2004-2006
- AIChE Area 1f (High Pressure) Committee Chair, 2001-2003

AREAS OF RESEARCH SPECIALIZATION

Dr. Knutson has over 40 peer-reviewed publications in the areas of supercritical fluid and pressurized fluid technologies, with an emphasis on (i) biotechnology and bioseparations employing compressed solvents; (ii) applied phase behavior and thermodynamics of pressurized systems; and (iii) materials synthesis and processing employing compressed CO₂ and “CO₂-philic” (i.e. fluorinated) solvents.

PEER REVIEWED PUBLICATIONS

1. H.-J. Lehmler, G. D. Bothun, P. M. Bummer and B. L. Knutson, "Mixing of Perfluorooctanesulfonic Acid (PFOS) Potassium Salt with Dipalmitoyl Phosphatidylcholine (DPPC), *Colloids and Surfaces B: Biointerfaces*, **2006**, 51(1), 25-29.
2. S.M. Vyas, J. Turánek, P. Knötigová, A. Kašná, V. Kvardová, V. Koganti, S.E. Rankin, B.L. Knutson, and H.-J. Lehmler, "Synthesis and Biocompatibility Evaluation of Partially Fluorinated Pyridinium Bromides." *New Journal of Chemistry*, **2006**, 30(6), 944-951.
3. G.D. Bothun, B. L. Knutson, H. J. Strobel, and S.E. Nokes, "Liposome Fluidization and Melting Point Depression by Compressed and Liquid n-Alkanes," *Colloids and Surfaces, A: Physicochemical and Engineering Aspects*, **2006**, 279(1-3), 50-57.
4. G.D. Bothun, Y.W. Kho, J.A. Berberich, J. Shofner, T. Robertson, K.J. Tatum, and B.L. Knutson, "Surface Activity of Aqueous Lysozyme and Dipalmitoyl Phosphatidylcholine Vesicles at Compressed and Supercritical Fluid Interfaces," *J. Phys. Chem. B*, **2005**, 109(51), 24495-24501.
5. K. Ghosh, H.-J. Lehmler, S.E. Rankin and B.L. Knutson, "Supercritical Carbon Dioxide Processing of Fluorinated Surfactant Templated Mesoporous Silica Thin Films," *Langmuir*, **2005**, 21(14), 6145-6149.
6. B. Tan, S.M. Vyas, H.J. Lehmler, B.L. Knutson and S.E. Rankin, "Unusual Dependence of Particle Architecture on Surfactant Concentration in Partially Fluorinated Decylpyridinium Templated Silica," *J. Phys. Chem. B*, **2005** 109(49), 23225-23232.
7. B. Tan, H.-J. Lehmler, S. M. Vyas, B. L. Knutson, and S. E. Rankin, "Synthesis of Single-Walled Silica Vesicles with Mesoporous Shells by a Fluorinated Surfactant Templated Sol-Gel Process," *Advanced Materials*, **2005**, 17, 2368-2371.
8. B. Tan, H.-J. Lehmler, S.M. Vyas, B.L. Knutson and S.E. Rankin, "Large- and Small-Pore Silica Prepared from a Short-Chain Cationic Fluorinated Surfactant," *Nanotechnology*, **2005**, 16, S502-S507.
9. G. Osei-Prempeh, H.-J. Lehmler, B. L. Knutson and S. E. Rankin, "Fluorinated Surfactant Templating of Vinyl-Functionalized Nanoporous Silica," *Micropor. Mesopor. Mater.*, **2005**, 85:16-24.
10. B. Tan, H.-J. Lehmler, S.M. Vyas, B.L. Knutson and S.E. Rankin, "Control of Nanopore Size and Shape by Fluorosurfactant Templating of Silica," *Chemistry of Materials*, **2005**, 17(4), 916-925.
11. G.D. Bothun, B. L. Knutson, H. J. Strobel, and S.E. Nokes, Molecular and phase toxicity of compressed and supercritical fluids in biphasic continuous cultures of *Clostridium thermocellum*, *Biotech. Bioeng.*, **2005**, 89(1), 32-41.

12. G.D. Bothun, B. L. Knutson, H. J. Strobel, and S.E. Nokes, "Liposome Fluidization and Melting Point Depression by Pressurized CO₂ Determined by Fluorescence Anisotropy," *Langmuir*, **2005**, 21(2), 530-536.
13. S.E. Rankin, B. Tan, H.J. Lehmler, K.P. Hindman and B.L. Knutson, "Well-Ordered Mesoporous Silica Prepared by Fluorinated Surfactant Templating," *Micropor. Mesopor. Mater.*, **2004**, 73(3), 197-202.
14. B. Tan, A. Dozier, H.J. Lehmler, B.L. Knutson and S.E. Rankin, "Silica Nanorods with Mesh Phase Nanopore Structure by Fluorosurfactant Templating," *Langmuir*, **2004**, 20(17), 6981-6984.
15. G. D. Bothun, B. L. Knutson, Jason A. Berberich, H. J. Strobel, and S. E. Nokes, Metabolic Selectivity and Growth of *Clostridium thermocellum* in Continuous Culture under Elevated Hydrostatic Pressure, *Applied Microbiology and Biotechnology*, **2004**, 65(2), 149-157.
16. Y. W. Kho, D. C. Conrad, and B. L. Knutson. "Phase Behavior of CO₂-Expanded Fluorinated Microemulsions," *Langmuir*, **2004**, 20(7), 2590-2597.
17. S.E. Rankin, B. Tan, H.J. Lehmler and B.L. Knutson, "Fluorinated Surfactant Templating of Ordered Nanoporous Silica," *Mater. Res. Soc. Symp. Proc.* **2003**, 775, 47-52.
18. Y. W. Kho, D. C. Conrad, R. A. Shick, and B. L. Knutson, "Solvent Strength Characterization of Carbon Dioxide-Expanded, Fluorinated Solvents," *Ind. Eng. Chem. Res.* **2003**, 42, 6511-6517.
19. G. D. Bothun, B. L. Knutson, H. J. Strobel, and S. E. Nokes , "Mass Transfer in Hollow Fiber Contactor Extraction using Compressed Solvents," *J. Membrane Sci.*, **2003**, 227(1-2), 183-196.
20. M. Sarkari, I. Darrat, and B.L. Knutson, "Generation of Protein Microparticles using Compressed CO₂ and CO₂-philic Antisolvents." *Biotechnol. Progress*, **2003**, 19, 448-454.
21. G.D. Bothun, B.L. Knutson, H.J. Strobel, S.E. Nokes, E.A. Brignole, and S. Díaz, Compressed Solvents for the Extraction of Fermentation Products within a Hollow Fiber Membrane Contactor, *J. Supercritical Fluids*, **2003**, 25, 119-134.
22. Y.W. Kho, D.C. Conrad, and B.L. Knutson, "Phase Equilibria and Thermophysical Properties of Carbon-Dioxide Expanded Fluorinated Solvents," *Fluid Phase Equilibria*, **2003**, 206(1-2), 179-193.
23. G. D. Bothun, K. L. White, and B. L. Knutson, "Gas Antisolvent Fractionation of Semicrystalline and Amorphous Poly(lactic acid) Using Compressed CO₂." *Polymer*, **2002**, 43(16), 4445-4452.

24. J. A. Luckman, J. A. Berberich, D. C. Conrad, and B.L. Knutson, "Manipulation of the LLE of Vertrel-XF® + Hydrocarbon Solvent Systems with the Addition of a Third Component." *Ind. Eng. Chem. Res.*, **2002**, 41(11), 2792-2797.
25. J. A. Luckman, D. C. Conrad, and B. L. Knutson, "Liquid-Liquid Equilibria of a Hydrofluoroether + Water + Ethanol System." *Fluid Phase Equilibria*, **2002**, 201(1), 97-106.
26. Y. W. Kho, D. S. Kalika, and B. L. Knutson, "Precipitation of Nylon 6 Membranes Using Compressed Carbon Dioxide." *Polymer*, **2001**, 42, 6119-6127.
27. J. A. Berberich, B. L. Knutson, H. J. Strobel, S. Tarhan, S. E. Nokes, and K. A. Dawson. "Toxicity Effects of Compressed and Supercritical Solvents on Thermophilic Microbial Metabolism." *Biotechnol. Bioeng.*, **2000**, 70, 491-497.
28. J. A. Berberich, B. L. Knutson, H. J. Strobel, S. Tarhan, S. E. Nokes, and K. A. Dawson. "Product Selectivity Shift in *Clostridium thermocellum* in the Presence of Compressed Solvents." *Ind. Eng. Chem. Res.*, **2000**, 39(12) 4500-4505.
29. M. Sarkari, I. Darrat, and B. L. Knutson, "Generation of Microparticles Using CO₂ and CO₂-philic Antisolvents," *AIChE J.*, **2000**, 46 (9), 1856-1865.
30. M. Sarkari, B.L. Knutson, and C.-S. Chen, "Enzymatic Catalysis in Cosolvent-Modified Pressurized Organic Solvents," *Biotechnol. Bioeng.*, **1999**, 65(3), 258-264.
31. K.L. White, B.L. Knutson, and G. Kimber, "Extraction of Coal Tar Pitch Using a Mixture of Compressed CO₂ and Toluene," *Ind. Eng. Chem. Res.*, **1999**, 38(9) 3360-3366.
32. B.L. Knutson, H J. Strobel, S.E. Nokes, K. Dawson, J. A. Berberich, and C. R. Jones, "Effect of Pressurized Extractive Solvents on Ethanol Production by the Thermophilic Bacterium *Clostridium thermocellum*," *J. Supercritical Fluids*, **1999**, 16, 149-156.
33. E. R. Ridder, S. E. Nokes, and B.L. Knutson, "Optimization of Solid-State Fermentation Parameters for the Production of Xylanases by *Trichoderma longibrachiatum* on Wheat Bran in a Forced Aeration System," *Trans. ASAE*, **1999**, 42(6), 1785-1790.
34. E.R. Ridder, S.E. Nokes, and B.L. Knutson, "Optimization of Solid-State Fermentation Parameters for the Production of Xylanases by *Trichoderma Longibrachiatum* on Wheat Bran," *Trans. ASAE*, **1998**, 41(5), 1453-1459.
35. B.L. Knutson, S.R. Sherman, K. Bennett, C.L. Liotta, and C.A. Eckert, "Benzophenone as a Probe of Local Cosolvent Effects in Supercritical Ethane." *Ind. Eng. Chem. Res.*, **1997**, 36(3), 854-868.
36. C.A. Eckert, B.L. Knutson, and P.G. Debenedetti, "Supercritical Fluids as Solvents for Chemical and Materials Processing," *Nature*, **1996**, 383, 313-318.
37. M.A. Winters, B.L. Knutson, P.G. Debenedetti, H.G. Sparks, T.M. Przybycien, C.L. Stevenson, and S.J. Prestrelski, "Precipitation of Proteins in Supercritical Carbon Dioxide," *J. Pharm. Sci.*, **1996**, 86, 586-594.

38. B.L. Knutson, A.K. Dillow-Wilson, C.L. Liotta, and C.A. Eckert, "Kinetics of a Diels-Alder Reaction in Supercritical Propane," in Innovations in Supercritical Fluids: Science and Technology, K.W. Hutchenson and N.R. Foster, Eds., American Chemical Society, Washington, D.C., *ACS Symp. Ser 608*, **1995**, pp. 165-178.
39. C.A. Eckert, F.L.L. Pouillot, B.L. Knutson, G.S. Gurdial, and L. S. Scott, "Selective Separation of Valeric Acid from Dibasic Acids Using Supercritical Carbon Dioxide," *J. Supercritical Fluids*, **1995**, *8*, 1-5.
40. D.L. Tomasko, B.L. Knutson, F.L.L. Pouillot, C.A. Eckert, and C.L. Liotta, "Spectroscopic Study of Structure and Interactions in Cosolvent-Modified Supercritical Fluids," *J. Phys. Chem.*, **1993**, *97*, 11823-11834.
41. C.A. Eckert, and B.L. Knutson, "Molecular Charisma in Supercritical Fluids," *Fluid Phase Equilibria*, **1993**, *83*, 93-100.
42. D.L. Tomasko, B.L. Knutson, J.M. Coppom, W. Windsor, B. West, and C.A. Eckert, "Fluorescence Spectroscopy Study of Alcohol-Solute Interactions in Supercritical Carbon Dioxide," *ACS Symp. Ser 514*, **1993**, 220-227.
43. M. P. Ekart, B.L. Knutson, K.P. Payne, D.L. Tomasko, C.A. Eckert, C.L. Liotta, and N.R. Foster, "Supercritical Fluid Fractionation of a Nonionic Surfactant," *Ind. Eng. Chem. Res.*, **1992**, *32*, 1105-1111.
44. B.L. Knutson, D.L. Tomasko, C.A. Eckert, A.A. Chialvo, and P.G. Debenedetti, "Local Density Augmentation in Supercritical Fluid Solutions: Comparison of Spectroscopic and Molecular Dynamics Results," *ACS Symp. Ser 488*, **1992**, 60-72.
45. D.L. Tomasko, B.L. Knutson, and C.A. Eckert, "Spectroscopic Study of Cosolvent/Solute Interactions in Supercritical Fluid Solutions," *ACS Symp. Ser 488*, **1992**, 84-91.
46. J.J. Dyken, B.L. Knutson, J.F. Morris, and J.T. Sommerfeld, "Design of a Supercritical Extraction Process for the Production of Monocrotaline," *Process Biochemistry*, **1990**, *25*, 47-54.

BOOK CHAPTERS

- B.L. Knutson, J.W. Tom, and P.G. Debenedetti,* "Preparation of Microparticles Using Supercritical Fluids," in Microparticulate Systems for the Delivery of Proteins and Vaccines, S. Cohen and H. Bernstein, Eds., Marcel Dekker, Inc., New York, NY, **1996**, pp 89-125.
- B.L. Knutson* and M. Sarkari, "Processing of Biological Materials," in Drug Delivery and Supercritical Fluid Technology, P. York and U. Kompella, Eds., Marcel Dekker, Inc., New York, NY, **2004**, pp 411-460.

HIGHLIGHTS OF TEACHING ACTIVITIES

Course Title	Semester
The Engineering Profession (CME 006)*	Fall '00 (co-taught), Spring '00 Fall '01 – Spring '03
Introduction to Chemical Eng. (CME 101)	Fall '96 – '98
Process Principles (CME 200/205)	Fall '95, Fall '96, Fall '01, Fall '02
Separation Processes (CME 415)	Fall '99, Fall '03, Fall '04
Chemical Engineering Laboratory (CME 433) (co-taught)	Fall '97 - '00, Fall '03, Fall '04
Process Control (CME 462)	Spring '02 – Spring '06
Chemical Reactor Design (CME 550)	Fall '97, Fall '98
Graduate Equilibrium Thermodynamics (CME 620)	Spring '96-Spring '99, Fall '05
Bioseparations (Undergraduate Elective)	Spring '00
Colloids and Interfaces (Graduate Elective)	Fall '00

*Taught in my role as AIChE Student Chapter Faculty Advisor

STUDENT ADVISEES

- Past Ph.D Advisees: Jason Berberich, Ph.D. (2001), Agentase, LLC, Pittsburgh, PA ; Geoff Bothun, Ph.D. (2004), Assistant Professor, University of Rhode Island; Yeh Wei Kho, Ph.D. (2003), (deceased); Marazban Sarkari, Ph.D. (2000), RX Kinetics, Boulder, CO.
- Past Master's Advisees: Joel Luckman, M.S. (2001), Whirlpool Corporation; Karen White, M.S. (1997), Center for Nanoscale Science and Engineering (CNSE) at North Dakota State University; Jay Shah, M.S. (2003), co-advised with K.W. Anderson, UK Medical School; Matthew Penn, M.S. (2006) co-advised with K.W. Anderson.
- Current Graduate Students: Kaustav Ghosh (Ph.D.); Amanda Polley (M.S.); Gifty Osei-Prempeh (Ph.D); Vivian Ojogun (Ph.D)
- Current Post Doctoral Researcher: Satya Jujjuri
- Over 30 undergraduate students have conducted independent research projects under Dr. Knutson's supervision.