

Peter W. Carr
Curriculum Vitae

Education

Bachelor's Degree: B.S. (Chemistry) - Polytechnic Institute of Brooklyn (1965)

Doctorate: Ph.D. (Chemistry) - Pennsylvania State University (1969)

Postdoctoral Studies: Stanford University Medical School (1968-69)

Professional Background

- **Lab Technician**, American Molasses Company, Brooklyn, NY, summers 1961 to 1963
- **Research Assistant**, Brookhaven National Laboratory, Brooklyn, NY, summer 1965
- **Research Associate**, Brookhaven National Laboratory, Brooklyn, NY, winter, summer 1966
- **Postdoctoral Associate**, Stanford University Medical School, September 1968 to September 1969
- **Assistant Professor**, Department of Chemistry, University of Georgia, September 1969 to September 1975
- **Associate Professor**, Department of Chemistry, University of Georgia, September 1975 to September 1977
- **Associate Professor**, Department of Chemistry, University of Minnesota, September 1977 to September 1981
- **Professor**, Department of Chemistry, University of Minnesota, September 1981 to date.
- **Associate Director**, Cooperative Research Center for Bioanalytical Processing, University of Minnesota, June 1987 to September 1990
- **Associate Member**, Graduate Faculty, Microbial Engineering, University of Minnesota, February 1990 to date

Awards

- **NDEA Fellow**, Pennsylvania State University, 1965-68.
- **Fellow**, Analytical Division of the American Chemical Society, 1967
- **R.S. Palmer Award**, Minnesota Chromatography Forum, April 1984.
- **Merit Award**, Chicago Chromatography Discussion Group, May 1987.
- **Benedetti-Pichler Award**, American Microchemical Society, 1990.
- **Award in the Fields of Analytical Chemistry**, Eastern Analytical Symposium, Incorporated, presented on November 17, 1993.
- **1996 Dal Nogare Award of the Delaware Chromatography Forum**, presented at The Pittsburgh Conference on Analytical Chemistry and Applied Spectroscopy, Inc., Chicago, IL, March 3, 1996.
- **1996 ACS Award in Chromatography sponsored by SUPELCO, Inc.**, presented at the National ACS Meeting in San Francisco, CA, April 15, 1997.

- **2000 Award for Outstanding Achievements in Separation Science**, Eastern Analytical Symposium, Incorporated, sponsored by Waters Corporation, presented October 31, 2000.
- **2001-2002 Award for Outstanding Contributions to Postbaccalaureate, Graduate, and Professional Education**, University of Minnesota Alumni Association, presented April 22, 2002.
- **2004 Pittsburgh Analytical Chemistry Award**, sponsored by the Society for Analytical Chemists of Pittsburgh, presented March 9, 2004.

Honors, Biographical Citations and Appointments

- **Member**, Phi Lambda Upsilon, Chemistry Honorary Fraternity, 1964.
- **President**, Symposium on the Recent Advances in the Analytical Chemistry of Pollutants, Inc.
- **Editorial Advisory Board**, *Analytical Chemistry*, January 1978 to January 1981.
- **Member**, Program Advisory Committee and the Nominations Committee of the Division of Analytical Chemistry, American Chemical Society.
- **First President**, Minnesota Chromatography Forum, 1978-1979.
- **Editorial Advisory Board**, *Talanta* 1981-1984.
- **Editorial Advisory Board**, *LC-GC* 1983 to date.
- **Editorial Board**, *Microchemical Journal*, 1986-1997.
- **Chairman-Elect**, Chromatography and Separations Chemistry Sub-Division of the Analytical Division of the American Chemical Society, August 1987-December, 1988.
- **Metallobiochemistry Study Section**, National Institutes of Health, February 17-18, 1988.
- **Chairman**, Chromatography and Separations Chemistry Sub-Division of the Analytical Division of the American Chemical Society, January-December 1989.
- **Editorial Board**, *Journal of Chromatography*, January 1990-December 2000.
- **Editorial Advisory Board**, *Chromatographia*, July 1989 to date.
- **Editorial Board**, *Comprehensive Analytical Chemistry Series*, Elsevier Science Publishers, January 1992 to December 1995.
- **Guest Editor**, with D.E. Martire and L.R. Snyder, Special Volume of the *Journal of Chromatography A*, "The Retention Process in Reversed-Phase Liquid Chromatography," Vol. 656, Nos. 1+2, December 17, 1993.
- **Program Chair**, HPLC '94, Eighteenth International Symposium on Column Liquid Chromatography, Minneapolis, MN, May 8-13, 1994.
- **Chairman**, Symposium: "Optimization in HPLC," 1996 Eastern Analytical Symposium and Exposition, Somerset, NJ, November 19, 1996.
- **1997 ISCO Award**, Department of Chemistry, University of Nebraska, April 3, 1997.
- **American Men and Women of Science**, listed 1997.
- **Editorial Board**, *Separation Science and Technology*, 1997 –
- **Academy of Distinguished Teachers, University of Minnesota**, induction 2002.
- **Session Presider and Organizer**, Symposium: "High Stability/Novel Phases for HPLC," 2003 Pittsburgh Conference & Exposition, Orlando, FL, March 11, 2003.
- **Session Presider and Organizer**, "High Speed HPLC: Increasing Speed in HPLC," 2004 Pittsburgh Conference & Exposition, Chicago, IL, March 10, 2004.
- **Organizer**, Symposium: "Advances in Fast LC," HPLC 2004–28th International Symposium and Exhibit on High Performance Liquid Phase Separations and Related Techniques, Philadelphia, PA, June 12-18, 2004.

- **Organizer**, Symposium: "High Throughput/Parallel Separations," HPLC 2004–28th International Symposium and Exhibit on High Performance Liquid Phase Separations and Related Techniques, Philadelphia, PA, June 12-18, 2004.
- **Research Career Profiled**, "60th Birthday of Professor Peter W. Carr," Editorial in *Chromatographia* **60**, 143-144, August, No. 3/4, 2004.
- **Research Profiled**, "Heat Speeds Up 2-D-LC for Proteomics Use," Science and Technology Concentrates Section of *Chemical & Engineering News*, p. 30, March 28, 2005.
- **Research Profiled**, "Guidelines Help High-Speed Gradient-Elution RPLC," In the News section of *Trends in Analytical Chemistry* **24**, iv, 2005.
- **Research Profiled**, "High-Temperature 2-D LC," Currents section of *Journal of Proteome Research*, **4**, 661, 2005.
- **Who's Who in Science and Engineering.**
- **Who's Who in the Midwest.**
- **Who's Who in America**, 2004.

Professional Societies

American Chemical Society
 Phi Lambda Upsilon
 Sigma Xi
 American Association of Clinical Chemists
 Minnesota Chromatography Forum
 New York Academy of Science, 1986 to date
 The Chromatographic Society

Research Interests

- Theory of Analysis and Thermoanalytical Chemistry, including thermometric titrimetry, enthalpimetric analysis, scanning calorimetry and thermogravimetry
- Electron Transfer Processes in Homogeneous Solution

Research Interests (Continued)

- Clinical Chemistry and Analytical Biochemistry
- Liquid Chromatographic Investigation of Biochemicals and Affinity Chromatography
- Analytical Applications of Immobilized Enzymes in Clinical Chemistry and Environmental Analysis
- Study of Solute-Solvent Interaction by Chromatography
- Study of Porous Ceramics, Especially Zirconia
- Theory of Retention in Chromatography
- Linear Solvation Energy Relationships
- Development of Novel Stationary Phases

Industrial Consulting

Consultant to Leeds & Northrup Company in Analytical and Clinical Chemistry, September 1970 to 1979

- **Consultant** to 3M Company in Analytical Chemistry, December 1979 to 1990
- **Consultant** to Hewlett Packard Co., 1984-to date

Industrial Grants

Over the past three years, I have been deeply involved in and have been a principal owner and officer (President) of ZirChrom Separations, Inc of Anoka, MN. This company is the exclusive licensee of the University of Minnesota's patents on zirconia-based stationary phases for high performance liquid chromatography. As part of my role as President and technical leader of the company, I have led in the preparation of proposals to secure funding, chiefly through the various Small Business Innovation Research (SBIR) programs of the National Science Foundation and National Institutes of Health. Many of these grants have resulted in collaborative work being carried out at the University of Minnesota under subcontracts from ZirChrom Separations. Since January 1998, ZirChrom has received a total of \$548,335 in grant support, with an additional \$600,658 pending. Thus far, ZirChrom has subcontracted \$262,396 to support research in Professor Alon McCormick's laboratory in the Department of Chemical Engineering and Materials Science and Professor Anu Subramanian's laboratory in the Department of Biosystems and Agricultural Engineering. In addition, in collaboration with a second small company, Systek, Inc., ZirChrom has prepared the NSF Phase II proposal listed as pending below. This is our only grant that does not have a University collaborator.

Patents

- W.D. Bostick and P.W. Carr, U.S. Patent No. 3,821,643 - "**A Novel Coagulation Detector**". Rights owned by University of Georgia and Research Corporation.
- D.F. Hagen, S.J. St. Mary, L.A. Errede, and P.W. Carr, U.S. Patent No. 4,810,381 - "**Composite Chromatographic Article**". Rights owned by Minnesota Mining and Manufacturing Company, St. Paul, MN. March 7, 1989.
- P.W. Carr, Eric F. Funkenbusch, M.P. Rigney, P.L. Coleman, D.A. Hanggi, and W.A. Schafer, U.S. Patent No. 5,015,373 - "**High Stability Porous Zirconium Oxide Spherules**." Rights owned by the Regents of the University of Minnesota, May 14, 1991.
- E.F. Funkenbusch, P.W. Carr, D.A. Hanggi, and T.P. Weber, U.S. Patent No. 5,108,597 - "**Carbon-Clad Zirconium Oxide Particles**," Rights Owned by the University of Minnesota, April 28, 1992.
- P.W. Carr, Eric F. Funkenbusch, M.P. Rigney, P.L. Coleman, D.A. Hanggi, and W.A. Schafer, U.S. Patent No. 5,141,634 - "**High Stability Porous Zirconium Oxide Spherules**." Rights owned by the Regents of the University of Minnesota, August 25, 1992.

- E.F. Funkenbusch, P.W. Carr, D.A. Hanggi, and T.P. Weber, U.S. Patent No. 5,182,016 - **"Polymer-Coated Carbon-Clad Inorganic Oxide Particles,"** Rights owned by the Regents of the University of Minnesota, January 26, 1993.
- P.W. Carr, Eric F. Funkenbusch, M.P. Rigney, P.L. Coleman, D.A. Hanggi, and W.A. Schafer, U.S. Patent No. 5,205,929 - **"High Stability Porous Zirconium Oxide Spherules."** Rights owned by the Regents of the University of Minnesota, April 27, 1993.
- E.F. Funkenbusch, P.W. Carr, T.P. Weber and D.A. Hanggi, U.S. Patent No. 5,254,262, issued - **"Carbon-Clad Zirconium Oxide Particles,"** Rights owned by the Regents of the University of Minnesota, October 19, 1993.
- P.W. Carr, Eric F. Funkenbusch, M.P. Rigney, P.L. Coleman, D.A. Hanggi, and W.A. Schafer, U.S. Patent Application No. 08/005,873 allowed on May 5, 1993 - **"High Stability Porous Zirconium Oxide Spherules."**
- E.F. Funkenbusch, P.W. Carr, D.A. Hanggi, and T.P. Weber, U.S. Patent No. 5,271,833 - **"Polymer-Coated Carbon-Clad Inorganic Oxide Particles,"** Rights owned by the Regents of the University of Minnesota, December 21, 1993.
- E.F. Funkenbusch, P.W. Carr, D.A. Hanggi, and T.P. Weber, U.S. Patent No. 5,346,619 – **"Carbon-Clad Zirconium Oxide Particles."** Rights owned by the Regents of the University of Minnesota, September 13, 1994.
- P.W. Carr, M.P. Rigney, Eric F. Funkenbusch, P.L. Coleman, and D.A. Hanggi, European Patent Specification EP 0 331 283 B1- **"High Stability Porous Zirconium Oxide Spherules."** Rights owned by the Regents of the University of Minnesota, April 28, 1993.
- E.F. Funkenbusch, P.W. Carr, D.A. Hanggi, and T.P. Weber, U.S. Patent No. Re.34,910 - **"Carbon-Clad Zirconium Oxide Particles,"** Rights owned by Regents of the University of Minnesota, April 18, 1995.
- E.F. Funkenbusch, P.W. Carr, D.A. Hanggi, and T.P. Weber, European Patent Specification EP 0 448 302 B1 - **"Carbon-Clad Inorganic Oxide Particles and the Same with a Polymer Coating Thereon,"** Rights owned by the Regents of the University of Minnesota, August 30, 1995.
- M.C. Flickinger, M.J. Robichaud, J.E. Morris, C.M. Griffith, M.J. Annen, P.W. Carr, and C. Dunlap, U.S. Patent No. 5,837,826– **"Protein Adsorption by Very Dense Porous Zirconium Oxide Particles in Expanded Beds,"** Rights owned by the Regents of the University of Minnesota, November 17, 1998.
- M.C. Flickinger, M.J. Robichaud, J.E. Morris, C.M. Griffith, M.J. Annen, P.W. Carr, and C. Dunlap, U.S. Patent No. 6,036,861 – **"Protein Adsorption by Very Dense Porous Zirconium Oxide Particles in Expanded Beds,"** Rights owned by the Regents of the University of Minnesota, March 14, 2000.

- P.W. Carr, M.P. Rigney, Eric F. Funkenbusch, P.L. Coleman, and D.A. Hanggi, European Patent Specification EP 0 524 663 A1- "**High Stability Porous Zirconium Oxide Spherules and Support Comprising Same**" Date of Filing: September 25, 1992. Applicant: Minnesota Mining and Manufacturing Company.
- P.W. Carr, A.V. McCormick, M.J. Annen, and L. Sun, U.S. Patent Application 08/294/374 allowed November 3, 1995 - "**Synthesis of Porous Inorganic Particles by Polymerization-Induced Colloid Aggregation (PICA)**." Issued July 30, 1996.
- P.W. Carr, A.V. McCormick, B. Yan, C.V. McNeff and F. Chen, Patent Publication No. U.S. 2002/0160196 A1 – "**Microspheres of Metal Oxides and Methods.**" Rights owned by the Regents of the University of Minnesota, October 31, 2002.
- P.W. Carr, M.A. Hillmyer, H. Liu, H. Luo, L. Ma and B.C. Trammell, U.S. Patent No. 6,991,852 – "**Silica-Based Materials and Methods.**" Rights owned by the Regents of the University of Minnesota, January 31, 2006.
- xxx, Canadian Patent Application No. 589,479, - "**High Stability Porous Zirconium Oxide Spherules.**" Date of Filing: Spring 1994.
- C.V. McNeff, P.W. Carr, and Q.H. Zhao, U.S. Patent Application 08/552,557 filed November 3, 1995 – "**Porous Zirconia Particles with Crosslinked Polymer Coatings.**"
- P.W. Carr, U.S. Patent Application in preparation, July, 1996 – "**Lewis Base Modified Zirconia.**"
- P.W. Carr, U.S. Patent Application in preparation, July, 1996 – "**Metal and Metal Coatings on Porous Zirconia.**"
- P.W. Carr, A.V. McCormick, B. Yan, C.V. McNeff and F. Chen, U.S. Patent Application in preparation, November 2000, U of M Docket Number Z01053 – "**The Production of Monodisperse, Nonporous Microspheres of Metal Oxides for Chromatography and Chemical Separations.**"
- P.W. Carr, A.V. McCormick, B. Yan, C.V. McNeff and F. Chen, Provisional U.S. Patent Application filed November 13, 2000, M&R Docket Number 110.01440161, U of MN #Z01053 – "**Microspheres of Metal Oxides and Methods.**"
- P.W. Carr, A.V. McCormick, B. Yan, C.V. McNeff and F. Chen, Provisional U.S. Patent Application filed November 14, 2000, M&R Docket Number 110.1440162, U of MN Z01053 – "**Monodisperse, Nonporous Microspheres of Metal Oxides and Methods.**"
- P.W. Carr, A.V. McCormick, B. Yan, C.V. McNeff and F. Chen, Provisional U.S. Patent Application filed November 16, 2000, M&R Docket Number 110.01440163, U of MN Z01053 – "**Microspheres of Metal Oxides and Methods.**"

- P.W. Carr, A.V. McCormick, B. Yan, C.V. McNeff and F. Chen, Provisional U.S. Patent Application filed October 28, 2000, M&R Docket Number 110.1440160, U of MN Z01053 – **“Monodisperse, Nonporous Microspheres of Metal Oxides and Methods.”**
- P.W. Carr, Provisional U.S. Patent Application filed March 13 2002, M&R Docket Number 110.01810160, U of MN Z02146 – **“Surface-Assembled Monolayer on Zirconia.”**
- P.W. Carr, U.S. Patent Application M&R Docket Number 110.01810101, U of MN Z02146 **Acid Stable Silica-Based Material.”**
- P.W. Carr, M.A. Hillmyer, H. Liu, H. Luo, L. Ma and B.C. Trammell, U.S. Patent Application M&R Docket Number 110.01810201, U of MN Z02146 **Silica-Based Materials and Methods.”** International Patent Application submitted March 11, 2003. International Patent Application No. PCT/US03/07532.

Students: University of Georgia

- Earl B. Smith** (Ph.D. 1972, "The Thermometric Titration of Proteins") --Greenville General Hospital
William D. Bostick (Ph.D. 1974, "The Thermometric Determination of Blood Coagulation") --ORNL
Joseph H. Kennedy (M.S. 1973, "A Survey of Purity Assay by Differential Scanning Calorimetry") --Eli Lilly
William B. Spieg (M.S. 1973, "The Saponification and Analysis of Serum Triglycerides in MSO") --
Larry D. Bowers (Ph.D. 1975, "Biochemical and Clinical Applications of Thermoanalytical Chemistry") -- U.S. Anti-Doping Agency, Colorado Springs, CO
Robert H. Callicott (Ph.D. 1975, "Selected Applications of Thermoanalytical Chemistry") --Procter & Gamble
Leslie M. Canning (M.S. 1975, "The Thermochemical Analysis of Serum Urea Using an Immobilized Urease Packed Column") --
Larry F. Whiting (Ph.D. 1978, "Theoretical and Experimental Investigations of Enzyme-Substrate Reactions by Differential Scanning Calorimetry") --Dow
S. Richard Schiffreen (Ph.D. 1978, "Theoretical and Practical Aspects of Flow Enthalpimetry in Clinical Analysis") --Promega Corporation, Madison, WI
R. Cameron Dorey (Ph.D. 1980, "A Liquid Chromatography Detector for Transition and Rare-Earth Metal Ions Based on a Cupric Ion-Selective Electrode") --University of Central Arkansas, Conway, AR
Robert E. Adams (Ph.D. 1977, "Development and Application of a Totally Electrochemical pH-Stat and Controlled Current Acid-Base Analyzer for Biological Studies") --Southern Research Institute

Students: University of Minnesota

- Mark W. Watson** (Ph.D. 1981, "Simplex Optimization in Gradient Elution High Performance Liquid Chromatography: The Preparation and Characterization of Bio-compatible High Performance Liquid Chromatography Packing Materials) --Du Pont
James E. Elvecrog (M.S. 1980, "A Thermochemical Unsegmented Flow System Bases on the Iodide Catalyzed Cerium-Arsenic Reaction") --3M Company
Young T. Shih (Ph.D. 1983, "Trace Metal Analysis by High Performance Liquid Chromatography with n-Butyl-2-Naphthylmethylthiocarbamate Complexes") --3M Company
William E. Barber (Ph.D. 1983, "Peak Shape Analysis in HPLC UV Visualization of Inorganic Anions by Reverse Phase Ion Interaction Chromatography") --Agilent Technologies
James E. Brady (Ph.D. 1984, "Theoretical and Experimental Investigations of Solvatochromism") --Hercules, Inc.
Amy J. Muller (Ph.D. 1984, "The Preparation and Characterization of a High Performance Liquid Affinity Chromatography System") --Lucent Technologies
Paul Sadek (Ph.D. 1984, "Elucidation of the Factors Responsible for Small Solute Retention and Irreversible Protein Binding in Reversed-Phase High Performance Liquid Chromatography") --Analytical Consulting Laboratories
Douglas Hanggi (Ph.D. 1987, "High Performance Dye-Ligand Affinity Chromatography Using Immobilized Triazine Dyes") --3M Company
Peter R. Johnson (M.S., 1987), "Analysis of Serum Bile Acids with an Immobilized Enzyme Reactor by Flow Injection Analysis and Reverse Phase High Performance Liquid Chromatography") --3M company
Martha Crowell-Gill (M.S. 1988, "The High Performance Liquid Chromatography of Metal Butyl-naphthyl-methylthiocarbamates")
Tina Wade (M.S. 1988, "The Study of Small Molecule-Ligand Interactions in High Performance Affinity Chromatography Using Immobilized Triazine Dyes") --North Hennepin Community College, Minneapolis, MN
Jung-Hag Park (Ph.D. 1988, "Headspace Gas Chromatographic Measurement and Applications of Limiting Activity Coefficients") --Yeung Nam University, Korea
James Wade (Ph.D. 1988, "The Theory of Nonlinear Chromatography and Its Application to Affinity Chromatography") --CPKelco, San Diego, CA
Martin P. Rigney (Ph.D. 1988, "The Development of Porous Zirconia as a Support for Reversed-Phase High-Performance Liquid Chromatography") --Echo Labs.
Won-Jo Cheong (Ph.D. 1988, "Measurements of Limiting Activity Coefficients of Homologous Series of Solutes and Their Application to the Study of Retention Mechanism in Reversed Phase Liquid Chromatography") --Inha University, Korea

Students: University of Minnesota (Continued)

- Wes Schafer** (M.S. 1990, "The Use of Zirconium Oxide Sorbents in the Separation of Biological Compounds") -- Merck, Sharp & Dohme Research Laboratories
- David Schisla** (Ph.D. 1990, "Hollow-Fiber Liquid Chromatography")--Shell Development Company
- John A. Blackwell** (Ph.D. 1991 "Metal-Ion Modified Zirconium Oxide Based Chromatographic Supports") -- Rhodia, Inc., PA
- Thomas P. Weber** (Ph.D. 1991, "The Development and Characterization of High Performance Liquid Chromatographic Supports Based on High Temperature Modified Porous Zirconia Micro-particles") --INEX Pharmaceuticals Corp., Burnaby, BC, Canada
- Alan J. Bergold** (Ph.D. 1992, "High Performance Lectin Affinity Chromatography: An Examination of the Thermodynamic and Kinetic Limitations of the Technique and the Development of an Alternative Elution Method") --Sigma-Genosys, The Woodlands, TX
- Jianjun Li** (Ph.D. 1992, "Solvatochromic and Thermodynamic Studies of Retention in Gas Chromatography and Gas-Liquid Equilibria) —Procter & Gamble, Cincinnati, OH
- David Eikens** (Ph.D. 1993, "Applicability of Theoretical and Semi-Empirical Models for Predicting Infinite Dilution Activity Coefficients") --
- Randall A. Wanke** (Ph.D. 1993, "Investigations into the Hydrogen Bonding and Hydrogen-Bond Aggregation Leading to Hydrogen-Bonded Crystal Formation")--Augustana College, Rock Island, IL
- Lifang Sun** (Ph.D. 1994, "Polybutadiene-Coated Zirconia as a Biocompatible Reversed-Phase High Performance Liquid Chromatography Support") – San Diego State University, San Diego, CA
- Lay Choo Tan** (Ph.D. 1994, "Study of Retention Mechanism in Reversed Phase Liquid Chromatography") – Novartis, New Jersey
- Andrew J. Dallas** (Ph.D. 1995, "Fundamental Solvatochromic and Thermodynamic Studies of Complex Chromatographic Media") -- Donaldson Company, Inc., Bloomington, MN
- Clayton V. McNeff** (Ph.D., 1996, "Synthesis and Use of Polyanine Coated Porous Zirconia for High Performance Anion-Exchange Chromatography") – ZirChrom Separations, Inc., Anoka, MN
- Li Li** (M.S., 1996, "Studies of Retention Mechanisms and Stability of Horizontally Polymerized Bonded Phase for RPLC") – Bristol-Myers Squibb, NJ
- Jeffery D. Weckwerth** (Ph.D. 1996, "Solvatochromic Studies of Retention in Supercritical Fluid Chromatography") – Hutchinson Technology Inc.
- Christopher J. Dunlap** – (Ph.D. 1997, "The Synthesis and Characterization of Dextran-Coated Zirconia as a Stationary Phase Material for High Performance Liquid Chromatography") – St. Mary's College, Notre Dame, IN
- Mark Vitha** (Ph.D. 1997, "Thermodynamic and Solvatochromic Studies of the Fundamental Chemical Forces Governing Solute Interactions with Surfactant Micelles") – Drake University, Des Moines, IA
- Paul Jackson** (Ph.D. 1997, "Chemically Modified Zirconia: Synthesis and Evaluation of Novel High Performance Liquid Chromatographic Materials") – St. Olaf College, Northfield, MN
- Andrew M. Clausen** (Ph.D. 1998, "Synthesis and Characterization of a Chelator Modified Zirconia Support for BioChromatographic Applications") – Merck and Company, Inc.
- Yue Hu** (Ph.D. 1998, "Synthesis and Evaluation of Novel Polymer-Coated Zirconia as Reversed and Ion-Exchange Stationary Phase's) – BMS, New Brunswick, NJ
- Jianhong Zhao** (Ph.D. 1999, "Synthesis, Evaluation, Application and Modification of a Novel Aromatic Polymer Coated Zirconia HPLC Support")--Pfizer, CT
- James Paulson** (M.S. 1999) – 3M Company
- Glenn Langenburg** (M.S. 1999) – Bureau of Criminal Apprehension, State of Minnesota
- Aosheng Wang** (Ph.D. 2001, "Multivariate Calibration of Retention in Reversed-Phase Liquid Chromatography") – Beckman-Coulter, St. Paul, MN
- Yun Mao** (Ph.D. 2001, "Selectivity Optimization in Liquid Chromatography Using the Thermally Tuned Tandem Concept (T³C)") – Merck and Company, Inc., West Point, PA
- Brian Trammell** (Ph.D. 2002, "Novel Stationary Phases on Silica and Zirconia for the Reversed-Phase High Performance Liquid Chromatographic Separation of Acidic and Basic Analytes") – Patheon, Cincinnati, OH
- Jon Thompson** (Ph.D. 2003, High Temperature Ultrafast Liquid Chromatography) – Systec, Inc., New Brighton, MN
- Matthew Bigert** (M.S. 2003, "Selectivity Optimization Flexibility in Liquid Chromatography Using the Eluent Variable (X) Tuned Tandem Column Concept (XTTC): Solvent Tuned Tandem Column (STTC) and Ionic Strength Tuned Tandem Column (ITTC) Concepts") – Merck and Company, Inc., West Point, PA

Department of Chemistry

Comment: Left May 2002. Thesis not yet submitted 8/03.

Ilya Tsukerman (M.S. 2003, “The Effect of Phosphate on Retention of Anti-Depressant Drugs on Polybutadiene-Coated Zirconia (PBD-ZrO₂)” –
Xiqin Yang (Ph.D. 2004), “Mixed-Mode Separations of Cationic Analytes on Polybutadiene Coated Zirconia and Octadecyl Silane Bonded Silica Phases” – GlaxoSmithKline, King of Prussia, PA
Jun Dai (Ph.D. 2005), “Understanding Retention Mechanisms and Adjusting Selectivity of Basic Pharmaceutical Separations by Reversed Phase Liquid Chromatography” – Bristol-Myers Squibb, Lawrenceville, NJ
Lianjia (Leo) Ma (Ph.D. 2005), Bristol Meyer Squibb – New Brunswick, NJ,

Postdoctoral Research Associates

Christine Bowman, 3/71-9/71 (Ph.D., University of Wisconsin)
Stephen R. Betso, 10/71-4/73 (Ph.D., Ohio State University)
Richard G. Leffler, 9/76-9/77 (Ph.D., Michigan State University)
Rogers Gurira, 9/79-9/80, (Ph.D. Pennsylvania State University)
Xindu Geng, 6/82-5/83, (Ph.D., People's Republic of China)
Abul Hussam, 1/83-8/85 (Ph.D., University of Pittsburgh)
Sarah C. Rutan, 1/88-7/88 (Ph.D., Washington State University)
Chuck Lucy, 7/88-6/89 (Ph.D., University of Alberta, Edmonton)
Yunke Zhang, 4/89 to 11/90 (Ph.D., University of New Hampshire)
Hsui Ouyang, 6/91 to 6/93 (Ph.D., University of Pittsburgh)
Hong-Bing Ding, 4/92 to 6/92 (Ph.D., University of Minnesota)
Jacek Nawrocki, 9/92 to 9/93 (Ph.D., Adam Mickiewicz University, Poznan, Poland)
Michael Annen, 9/92 to 3/94 (Ph.D., Virginia Polytechnic Institute and State University)
Jung-Hag Park, 9/93 to 8/94 (Ph.D., University of Minnesota)
Asadollah Nasehzadeh, 11/94 to 9/95 (Ph.D., University of Surrey, United Kingdom)
Jianwei Li, 11/94 to 12/96 (Ph.D., Purdue University)
Arun Sathyagal, 1/95 to 12/96 (Ph.D., Purdue University)
Ravi Ranatunga, 8/96 to 7/98 (Ph.D., University of Houston)
Sabir Majumder, 1/97 to 2/98 (Ph.D., University of New Mexico)
Mario Reta, 7/97 to 3/99 (Ph.D., Universidad Nacional de Rio Cuarto, Argentina)
Gary Mabbott, 5/98 to 9/99
Cecilia Castells, 10/97 to 12/99 (Ph.D., National University of La Plata, Argentina)
Bing-Wen Yan, 9/97 to 5/01 (Ph.D., Nankai University, People's Republic of China)
Dihua Jin, 5/00 to 5/02 (Ph.D., Purdue University)
Bin Chen, 9/01 to 7/02 (Ph.D., University of Minnesota)
Huqun Liu, 1/02 to 5/03 (Ph.D., University of New Hampshire)

Comment: Estimated departure date