December 26, 2017

JOHN L. ANDERSON

EDUCATION

University of Illinois (Urbana)	Ph.D.	1971	Chemical Engineering
University of Illinois (Urbana)	M.S.	1969	Chemical Engineering
University of Delaware (Newark)	B.ChE.	1967	Chemical Engineering

PROFESSIONAL EMPLOYMENT

Illinois Institute of Technology, Chicago, IL 60616
- President (August 1, 2007–July 31, 2015)
- Professor of Chemical and Biological Engineering (August 1, 2007 – present)
- Distinguished Professor (August 1, 2015 – present)

Case Western Reserve University, Cleveland, OH 44106
- Provost and University Vice President (April 1, 2004–July 2007)
- Professor of Chemical Engineering (April 1, 2004–July 2007)

Carnegie Mellon University, Pittsburgh, PA 15213
- Adjunct Professor of Chemical Engineering (April 1, 2004–present)
- Dean, College of Engineering (July 1, 1996–March 31, 2004)
- University Professor (July 1, 1994–March 31, 2004)
- Professor of Chemical Engineering (September 1, 1979–March 31, 2004)
- Head, Department of Chemical Engineering (September 1, 1983–August 31, 1994)
- Director, Biomedical Engineering Program (June 1, 1980–June 30, 1985)
- Associate Professor of Chemical Engineering (September 1, 1976–August 31, 1979)

Cornell University, Ithaca, NY 14850
- Assistant Professor of Chemical Engineering (September 1, 1971–August 31, 1976) (also Assistant Professor of Applied Mathematics)

U.S. Army Reserves
- Captain, Inactive Reserves (honorably discharged 1977)
- 1st Lieutenant, USAR, Ithaca, NY (1972–1976)
- 2nd Lieutenant, Officer Basic School; Assistant Battalion S-3, Ft. McClellan, AL (1972)
- Reserve Officer Training, University of Illinois (1968-70)

E.I. DuPont de Nemours, Inc., Belle, WV 25015
- Process Engineer (Summer 1967)

Sun Oil Company, Research and Development, Marcus Hook, PA 19061
• Supervised pilot scale catalytic reactor (Summer 1966)

RESEARCH INTERESTS

Electrokinetic phenomena, transport in porous media and gels, membrane separations, fluid dynamics, bioengineering

HONORS, PROFESSORSHIPS and NAMED LECTURESHIPS

- National Science Board, 2014 – 2020 (Appointed by President Obama)
- National Engineering Award, American Association of Engineering Societies, 2012
- National Academy of Engineering (1992-present)
- Fellow of the American Academy of Arts and Sciences
- Fellow of the American Association for the Advancement of Science
- Andreas Acrivos Professional Progress Award, American Institute of Chemical Engineers, 1989
- Award for "Outstanding Professional Accomplishments in the Field of Academics," AIChE, Pittsburgh Section, 1999
- Alumni Wall of Fame, University of Delaware, 1993
- Co-author of "Best Technical Paper" at Annual AIChE Meeting, Miami Beach, 1992
- National Science Foundation Commemorative Lectureship, 1989
- Fellow of the John Simon Guggenheim Memorial Foundation, 1982–1983 (at MIT)
- University Professor, Carnegie Mellon University, 1994-2004
- Robert Mehrabian Professor, Carnegie Mellon University, 1997–2004
- Gulf Professor of Chemical Engineering, 1991–1997
- Themis Medicare Chemcon Distinguished Speaker Award, Indian Institute of Chemical Engineers, Mumbai, India, 2004
- Inaugural John A. Quinn Lecture, University of Pennsylvania, 2004
- Blue/Green Lecturer, University of Michigan and Michigan State University, 2003
- Stanley Katz Lecturer 2001, City College of New York, 2001
- 31st Annual W. N. Lacey Lectureship in Chemical Engineering, California Institute of Technology, 1998
- Barnett Dodge Lectureship, Yale University, 1997
- Research Scholar Award, University of Melbourne, Australia, 1995
- NWO Fellow, Landbouwuniversiteit Wageningen, the Netherlands, 1994
- Co-Chair of Gordon Conference on "Membranes: Materials and Processes," 1993
- Vice-Chair of Gordon Conference on "Synthetic Membranes," 1991
- Holtz Lecture, Johns Hopkins University, 1990
- Fifth Berkeley Lectures, University of California, March 1989
- Visiting Scholar, Irish American Technology Exchange Programme, Department of Chemical Engineering, University College Dublin, 1983
- Honorable Mention, Tau Beta Pi Teaching Award of the Engineering College at Cornell University, 1975 and 1976

- National Institutes of Health Pre-doctoral Fellowship, University of Illinois (Urbana), 1969–1971
- National Science Foundation Pre-doctoral Fellowship (declined), 1969
- Tau Beta Pi, Omicron Delta Kappa, Phi Kappa Phi, Sigma Xi

VISITING PROFESSORSHIPS

- University of Melbourne (Australia), Department of Mathematics, 1995 and 2001
- Landbouwuniversiteit Wageningen (The Netherlands), Vakgroep Fysische en Kolloidchemie, 1994
- Massachusetts Institute of Technology, Department of Chemical Engineering, 1982–1983

PROFESSIONAL ACTIVITIES

- National Science Board (2014-2020)
- Illinois Institute of Technology, Board of Trustees *ex-officio* 2007 - 2015
- Fermi National Laboratory, Board of Directors, 2007-2010
- Chicago Council on Science and Technology, Board of Directors, 2008-present
- Board of Trustees, Carnegie Mellon University (2014 – present)
- National Academy of Engineering
  - Member of Council (2015-18)
  - Committee on Membership (Vice-Chair 2015, Chair 2016, Past Chair 2017)
  - Membership Policy Committee (2013-16)
  - Nominating Committee, 2012-14 (Chair 2012-13)
  - Chair of Section 3 (Chemical Engineering), 2000
- National Research Council
  - Chair, Assessment Panel for the Chemical Science and Technology Laboratory (2007–2009)
  - Chair, Study Committee on *Countering Improvised Explosive Devices: Basic Research to Interrupt the IED Delivery Chain* (2005–2007)
  - Chair, Study Committee on the *Review of Existing and Potential Explosives Detection Techniques* (2003–2004)
  - Chair, Workshop on *Challenges for the Chemical Sciences in the 21st Century: National Security and Homeland Defense* (2002)—report issued
  - Study Committee on the *Design, Construction and Renovation of Laboratory Facilities* (1999–2000)—report issued
  - Board on Chemical Sciences and Technology (1996–2001, co-chair 1998–2001)
  - Assessment Panel for Chemical Science and Technology Division of NIST, National Research Council (1992–1998)
- American Institute of Chemical Engineers
  - Member, National Awards Committee (1990–1995)
  - Programming Committee, Area 1J (Fluid Mechanics) (1984–1990)
  - Programming Committee, Area 1C (Interfacial Phenomena) (1980–1988)
  - Chaired Symposia at National Meetings: Chicago (1996), Miami (1995), New York (1987), Miami (1986), Chicago (1980), San Francisco (1979), Miami (1978), Houston (1977), Los Angeles (1975), Pittsburgh (1974)

  - Student Chapters Committee (National, 1972–1974)
  - Editor, *Student Members Bulletin* (Spring 1974)
  - Successfully nominated four winners of National AIChE Awards
  - Reviewer, *AIChE Journal*
- American Chemical Society
  - Awards Committee (1987–1991)
  - Chaired Symposium (1983)
  - Member of Colloids Division and Polymers Division
- American Association for the Advancement of Science
  - Fellow, 2002 – present
  - Chair-Elect/Chair/Past Chair of Engineering Section M (2011–2013)
- Editorial Board, *Current Opinion in Colloid and Interface Science* (1995–2004)
- Associate Editor, *Industrial and Engineering Chemistry Research* (1986–2007)
- Vice Chair of Engineering Deans' Council Executive Board, American Society of Engineering Education (2003–2004)
- Pittsburgh Technology Council Board of Directors (2000–2004)
- Awards Committee, American Institute of Chemical Engineers (1989–1994)
- Advisory Board, Petroleum Research Fund, American Chemical Society (1986–1990)
- Associate Editor, *Advances in Chemical Engineering* (1985–1998)
- Advisory Board, CBT Division of the Engineering Directorate, National Science Foundation (1986–1987)
- University Representative, Council for Chemical Research (1983–1994)
  - Governing Board (1991–1994)
  - Executive Committee (1991–1994)
  - University/Industry/Government Interaction Committee (1988–1993)
  - Awards Committee, American Chemical Society (1987–1991)
  - Review Committee NRC for the NSF Graduate Fellowship Program (1988–1990)
- Visiting Committees and Advisory Councils
  - School of Engineering Academic Advisory Council, Virginia Commonwealth University (2000–2007)
  - Whiting School of Engineering Advisory Council, Johns Hopkins University (1999–2007)
  - Department of Chemical Engineering, University of Michigan (1997–2007)
  - College of Engineering Advisory Council, University of Delaware (1993–2008)
  - College of Engineering Advisory Board, Georgia Institute of Technology (2002–2004)
  - College of Engineering, Cornell University (1998–2004)
  - Faculty Review Committee, University College Dublin (2003)
  - Chemical and Biomolecular Engineering Evaluation Board, Cornell University (2002)
  - Department of Chemical Engineering, Princeton University (1999)
  - Department of Chemical Engineering, Vanderbilt University (1999)
  - College of Applied Science and Engineering, University of Toronto (1999)
  - Department of Chemical Engineering, University of California, Santa Barbara (1999)

  - School of Chemical Engineering, Cornell University (1990–1999)
  - IBM Center on Bioremediation, University of Virginia (1993–1997)
  - Department of Chemical Engineering, Massachusetts Institute of Technology (1988–1992)
  - Department of Chemical Engineering, University of Virginia (1988–1992)
- Consulting
  - Washington Advisory Group, for King Abdullah University of Science and Technology
  - HemaSure Inc., Marlborough, MA
  - Sepracor/Biosepra, Inc., Marlborough, MA (through Pennie & Edmonds)
  - Westvaco, Laurel, MD
  - Respironics, Pittsburgh, PA
  - Exxon Engineering and Research, Annandale, NJ
  - Baroid Drilling Fluids Inc., Houston, TX
  - E-Ink, Cambridge, MA

PUBLICATIONS

1. "Diffusion of Insulin-like Growth Factor-I and Ribonuclease Through Fibrin Gels," *Biophysical Journal*, **92**, 4444–4450 (2007) (with J. V. Nauman, P. G. Campbell, and F. Lanni).
2. "Movement of Colloidal Particles in Two-Dimensional Electric Fields," *Langmuir*, **21**, 10941–10947 (2005) (with J. Kim, S. Garoff, and L. J. M. Schlangen).
3. "Ionic Conduction and Electrode Polarization in a Doped Nonpolar Liquid," *Langmuir*, **21**, 8620–8629 (2005) (with J. Kim, S. Garoff, and L. J. M. Schlangen).
4. "Interactions Between Two Bubbles on a Hot or Cold Wall," *J. Colloid and Interface Science,* **276**, 239–247 (2004) (with H. Kasumi and P. J. Sides).
5. "Solvent Effects on the Permeability of Membrane Supported Gels," *Industrial & Engineering Chemistry Research*, **41**, 464–472 (2002) (with K. Buehler).
6. "Two-Particle Dynamics on an Electrode in *ac* Electric Fields," *Advances in Colloid & Interface Science*, **96**, 131–142 (2002) (with J. Kim, S. Guelcher, and S. Garoff).
7. "Effects of Zeta Potential and Electrolyte on Particle Interactions on an Electrode Under ac Polarization," *Langmuir*, **18**, 5387–5391 (2002) (with J. Kim, S. Garoff, and P. J. Sides).
8. "Two-Particle Dynamics on Electrodes," *Electrophoretic Deposition: Fundamentals and Applications*, Proceedings Volume **2002**–**21**, 191–197, (2002) (with J. Kim, S. Garoff, and P. J. Sides).
9. "Aggregation of Pairs of Particles on Electrodes During Electrophoretic Deposition," *Powder Technology*, **110**, 90–97, (2000) (with S. Guelcher and Y. Solomentsev).
10. "Measuring Colloidal Forces Using Differential Electrophoresis," *Langmuir,* **16**, 7, 3372–3384 (2000) (with D. Velegol and S. Garoff).

11. "Aggregation Dynamics for Two Particles During Electrophoretic Deposition at Steady Fields," *Langmuir*, **16**, 9208–9216 (2000) (with Y. Solomentsev, S. A. Guelcher, and M. Bevan).
12. "Thermocapillary Flow and Aggregation of Bubbles on a Solid Wall," *J. Colloid and Interface Science*, **232**, 111–120 (2000) (with H. Kasumi, Y. E. Solomentsev, S. A. Guelcher, and P. J. Sides).
13. "Applications in Chemistry/Chemical Engineering: Introduction," *Current Opinion in Colloid and Interface Science*, **3**, 349–350 (1999) (with J. Y. Walz).
14. "Tangential Forces Between Non-Touching Colloidal Particles," *Physical Review Letters*, **83**, 1243–1246 (1999) (with D. Velegol, S. Catana, and S. Garoff).
15. "Thermocapillary Phenomena and Bubble Coalescence During Electrolytic Gas Evolution," *J. of the Electrochemical Society*, **145**, 1848–1855 (1998) (with S. A. Guelcher, Y. E. Solomentsev, and P. J. Sides).
16. "Electrophoretic Rotation of Doublets Composed of Two Spheres Almost in Contact," *Colloids and Surfaces A*, **140**, 59–74 (1998) (with Y. Solomentsev, D. Velegol, and S. L. Carnie).
17. "Transport of Proteins Through Gel-Filled Porous Membranes," *J. Membrane Sci.*, **131**, 143 (1997) (with V. Kapur and J. Charkoudian).
18. "Conduction in the Small Gap Between Two Spheres," *Phys. Fluids*, **9**, 1209 (1997) (with Y. Solomentsev and D. Velegol).
19. "Particle Clustering and Pattern Formation During Electrophoretic Deposition: A Hydrodynamic Model," *Langmuir*, **13**, 6058–6068 (1997) (with Y. Solomentsev and M. Bohmer).
20. "Electrophoretic Motion of Two Spherical Particles with Thick Double Layers*," J. of Colloid Interface Science*, **191**, 357–371 (1997) (with A. A. Shugai, S. L. Carnie, and D. Y. C. Chan).
21. "Boundary Effects on Electrophoretic Motion of Spherical Particles of Arbitrary a," *J. Colloid Interface Science*, **185**, 497 (1997) (with J. Ennis-King).
22. "Hydrodynamic Effects of Surface Layers on Colloidal Particles," *Chem. Eng. Commun*., **148**–**150**, 291 (1996) (with Y. Solomentsev).
23. "Probing the Structure of Colloidal Doublets by Electrophoretic Rotation," *Langmuir*, **12**, 675 (1996) (with D. Velegol and S. Garoff).
24. "Partitioning and Diffusion of Proteins and Linear Polymers in Polyacrylamide Gels," *Biophys. J*., **70**, 1505 (1996) (with J. Tong).
25. "Rotation of a Sphere in Brinkman Fluids," *Phys. Fluids*, **8**, 1119 (1996) (with Y. Solomentsev).
26. "Hydrodynamic Permeability of Hydrogels Stabilized Within Porous Membranes," *I&EC Res*., **35**, 3179 (1996) (with V. Kapur, J. C. Charkoudian, and S. B. Kessler).
27. "Determining the Forces Between Latex Particles Using Differential Electrophoresis," *Langmuir*, **12**, 4103 (1996) (with D. Velegol and S. Garoff).

28. "Thermal Expansion and Contraction of Adsorbed Diblock Copolymers Near Conditions," *Langmuir*, **12**, 1040 (1996) (with R. M. Webber and C. C. van der Linden).
29. "Electrophoretic Transport of Spheroidal Colloids in Nonhomogeneous Electric Fields," *I&EC Research*, **34**, 3231 (1995) (with Y. Solomentsev).
30. "Effect of Solvated Block Size on the Layer Thickness of Copolymers Adsorbed to Liquid/Solid Interfaces," *Langmuir*, **10**, 1539 (1994) (with P. F. McKenzie and R. M. Webber).
31. "Electrophoresis of Nonuniformly Charged Chains," in *Macro-ion Characterization: From Dilute Solutions to Complex Fluids*, K. S. Schmitz, editor, American Chemical Society, Washington, D.C. (1994) (with Y. Solomentsev).
32. "Electrokinetic Transport of Colloidal Particles with Heterogeneous Surfaces," *J. Electrostatics*, **34**, 189 (1995).
33. "Effects of Adsorbed Homopolymer and Diblock Copolymer on Molecular Transport in Micropores," *Colloids and Surfaces A*: *Physicochemical and Engineering Aspects*, **86**, 263 (1994) (with P. F. McKenzie and V. Kapur).
34. "Effects of Adsorbing-Block Molecular Weight on the Thickness of Adsorbed Diblock Copolymers," *Langmuir*, **10**(9), 3156 (1994) (with R. M. Webber).
35. "Electrophoresis of Slender Particles," *J. Fluid Mech.*, **279**, 197 (1994) (with Y. Solomentsev).
36. "Electrophoretic Mobility of Nonuniformly Charged Spherical Particles with Polarization of the Double Layer," *J. Colloid and Interface Science*, **158**, 1 (1993) (with Y. Solomentsev and Y. Pawar).
37. "Polarization Effects on Diffusiophoresis in Electrolyte Gradients," *J. Colloid and Interface Science*, **155**, 488 (1993) (with Y. Pawar and Y. Solomentsev).
38. "A Model of Pulsatile Flow in a Uniform Deformable Vessel," *J. Biomechanics*, **25**, 91 (1992) (with G. A. Johnson and H. S. Borovetz).
39. "Electrophoresis of Heterogeneous Colloids: Doublets of Dissimilar Particles," *Langmuir*, **8**, 2850 (1992) (with M. C. Fair).
40. "Hindered Diffusion in Slit Pores," *I&EC Research*, **32**, 743 (1992) (with Y. Pawar).
41. "Electrophoretic Transport of Heterogeneous Colloids: Plate-Like Particles," Proceedings 9th International Symposium on Surfactants in Solution, Varna, Bulgaria, June 10–15, 1992 (not published) (with Y. Pawar, Y. Solomentsev, and L. Asavathiratham).
42. "Diffusion and Flow Through Polymer-Lined Micropores," *I&EC Research*, **30**, 1008 (1991) (with J. T. Kim).
43. "Model for Hydrodynamic Thickness of Thin Polymer Layers at Solid/Liquid Interfaces," *Langmuir*, **7**, 162 (1991) (with P. F. McKenzie and R. M. Webber).
44. "Diffusiophoresis Caused by Gradients of Strongly Adsorbing Solutes," *Langmuir*, **7**, 403 (1991) (with D. C. Prieve).

45. "Flow-Dependent Filtration of a Rigid-Rod Polymer," *Macromolecules*, **24**, 3562 (1991) (with R. P. Adamski).
46. "Electrophoresis of Dumbbell-Like Colloidal Particles," *Int. J. Multiphase Flow*, **16**, 663 (1990); **16**, 1131 (1990) (with M. C. Fair).
47. "Hydrodynamic Studies of Adsorbed Diblock Copolymers in Porous Membranes," *Macromolecules*, **23**, 1026 (1990) (with R. M. Webber and M. S. Jhon).
48. "Enhanced Protein Diffusion in a Solvent Gradient," *I&EC Research*, **29**, 309 (1990) (with E. S. Shane and M. M. Domach).
49. "Electrophoresis of Nonuniformly Charged Ellipsoidal Particles," *J. Colloid and Interface Science*, **127**, 388 (1989) (with M. C. Fair).
50. "Colloid Transport by Interfacial Forces," *Ann. Rev. Fluid Mech*., **21**, 61 (1989).
51. "Hindered Diffusion of Short-Chain Polystyrene and Porphyrins in Small Pores," *Macromolecules*, **22**, 1215 (1989) (with I. A. Kathawalla and J. S. Lindsey).
52. "Restricted Transport in Micropores with Adsorbed Polymers," *Polymer Preprints*, **30**(1), 381 (1989) (with J. T. Kim, R. M. Webber, and M. S. Jhon).
53. "Hindered Transport Through Micropores with Adsorbed Polyelectrolytes," *J. Membrane Sci.*, **47**, 163 (1989) (with J. T. Kim).
54. "Diffusiophoresis of Latex Particles in Electrolyte Gradients," *Langmuir,* **4**, 396 (1988) (with J. P. Ebel and D. C. Prieve).
55. "Pore Size Effects on Diffusion of Polystyrene in Dilute Solution," *I&EC Research*, **27**, 866 (1988) (with I. A. Kathawalla).
56. "Configurational Effects on Hindered Diffusion in Micropores," *Convection and Pore Diffusion in Porous Catalyst,* AIChE Symp. Series, **84** (No. 266), I. A. Webster and J. C. Strieder, editors (1988) (with I. A. Kathawalla and J. S. Lindsey).
57. "Fluid Dynamical Effects of Polymers Adsorbed to Spherical Particles," *J. Chem. Phys*. **86**, 5163 (1987) (with J. Kim).
58. "Chemically Induced Migration of Particles Across Fluid Streamlines," *Chem. Engr. Comm.*, **55**, 211 (1987) (with D. C. Prieve and J. P. Ebel).
59. "Transport Mechanisms of Biological Colloids," *Ann. New York Acad. Sci.: Biochemical Engineering IV*, **469**, 166 (1986).
60. "Effects of Adsorbed Polyelectrolytes on Convective Flow and Diffusion in Porous Membranes," *J. Membrane Sci.*, **28**, 269 (1986) (with W. K. Idol).
61. "Measuring Diffusion Coefficients by Taylor's Method of Hydrodynamic Stability," *AIChE J.*, **32**, 2028 (1986) (with J. A. Quinn and C. H. Lin).
62. "Configurational Effects on Polystyrene Rejection from Microporous Membranes," *J. Polym. Sci.: Polym. Physics*, **25**, 765 (1986) (with R. P. Adamski).
63. "Effects of Solvent Goodness and Polymer Concentration on Rejection of Polystyrene from Small Pores," *J. Polymer Sci.–Polymer Physics*, **23**, 191 (1985) (with T. D. Long).

64. "Boundary Effects on Electrophoretic Motion of Colloidal Spheres," *J. Fluid Mech.*, **153**, 417 (1985) (with H. J. Keh).
65. "Effects of Non-Uniform Zeta Potential on Particle Movement in Electric Fields," *J. Colloid Interface and Science,* **105**, 45 (1985).
66. "Droplet Interactions in Thermocapillary Motion," *Int. J. Multiphase Flow,* **11**, 813 (1985).
67. "Electro-Osmosis Through Pores with Nonuniformly Charged Walls," *Chem. Eng. Communications*, **38,** 93 (1985) (with W. K. Idol).
68. "Electrophoretic Transport of Colloids in Porous Media," Proceedings on The Chemistry and Physics of Composite Media, The Electrochemical Soc., Pennington, NJ, **85–8**, 103–111 (1985).
69. "The Streaming Potential and Inadequacies of the Helmholtz Equation," *J. Colloid Interface and Science*, **106**, 1 (1985) (with C. C. Christoforou and G. B. Westermann-Clark).
70. "Shape and Permeability Effects on Osmophoresis," *PhysicoChemical Hydrodynamics*, **5**, 205 (1984).
71. "Configurational Statistics of Brownian Dumbbells in a Quadratic Flow," *J. Chem. Phys.*, **80**, 1632 (1984) (with H. J. Keh).
72. "Comparison of GPC Elution Characteristics and Diffusion Coefficients for Asphaltenes," *FUEL*, **63**, 530 (1984) (with R. E. Baltus).
73. "Diffusiophoresis: Migration of Colloidal Particles in Gradients of Solute Concentration," *Separation and Purification Methods*, **13**, 67 (1984) (with D. C. Prieve).
74. "Flow Dependent Rejection of Polystyrene from Microporous Membranes," *J. Polymer Sci.–Polymer Physics Ed.*, **22**, 1261 (1984) (with T. D. Long).
75. "Diffusional Mass Transfer in a Simple Diaphragm Cell," *ASEE Annual Conference Proceedings*, Session 1616, 189 (1984).
76. "Motion of a Particle Generated by Chemical Gradients. Part II. Electrolytes," *J. Fluid Mech.*, **148**, 247 (1984) (with D. C. Prieve, J. P. Ebel, and M. E. Lowell).
77. "Solute Concentration Effect on Osmotic Reflection Coefficient," *Biophys. J.*, **44**, 79 (1983) (with R. P. Adamski).
78. "Solute Concentration Effects on Membrane Reflection Coefficients," *AIChE Symp. Series,* **79**(227), 84 (1983) (with R. P. Adamski).
79. "Hindered Diffusion of Asphaltenes Through Microporous Membranes," *Chem. Eng. Sci.*, **38**, 1959 (1983) (with R. E. Baltus).
80. "Movement of a Semi-Permeable Vesicle Through an Osmotic Gradient," *Phys. Fluids*, **26**, 2871 (1983).
81. "Motion of a Particle Generated by Chemical Gradients. Part I. Non-Electrolytes," *J. Fluid Mechanics*, **117**, 107 (1982) (with M. E. Lowell and D. C. Prieve).

82. "Anomalous Diffusion Rates in Hydrocarbon-Filled Pores in Muscovite Mica," *Chem. Eng. Sci.*, **37**, 483 (1982) (with R. E. Baltus and C. L. Baker).
83. "Concentration Effects on Distribution of Macromolecules in Small Pores," *Adv. Colloid Interface Science*, **16**, 391 (1982).
84. "Concentration Effects on Partitioning of Dextrans and Serum Albumin in Porous Glass," *J. Polymer Sci.–Polymer Physics*, **25**, 857 (1982) (with J. H. Brannon).
85. "Experimental Verification of a Theory for Electrokinetics in Charged Microporous Membranes," *J. Electrochem. Soc.*, **130**, 839 (1982) (with G. B. Westermann-Clark).
86. "Stable Concentration Gradients in a Vertical Tube," *Chem. Eng. Communications*, **18**, 93 (1982) (with M. E. Lowell).
87. "Concentration Dependence of the Distribution Coefficient for Macromolecules in Porous Media," *J. Polymer Sci.–Polymer Physics Edition*, **19**, 405 (1981) (with J. H. Brannon).
88. "Configurational Effects on the Reflection Coefficient of Rigid Solutes from Small Pores," *J. Theor. Biology*, **90**, 405 (1981).
89. "Concentration Dependence of Electrophoretic Mobility," *J. Colloid Interface and Science*, **82**, 248 (1981).
90. "Configurational Effects on Membrane Rejection," *J. Membrane Sci.*, **9**, 13 (1981) (with T. D. Long and D. L. Jacobs).
91. "Motion of a Charged Particle in a Gradient of Electrolyte," *International J. Physicochemical Hydrodynamics*, **1**, 51 (1980).
92. "Sedimentation Rates for Concentrated Suspensions of Particles and Drops," in *Proceedings of International Symposium on Solids Separation Processes*, Dublin, April 1980.
93. "Hindered Settling of a Suspension at Low Reynolds Number," *AIChE J.*, **26**, 816 (1980) (with C. C. Reed).
94. "Solvent Dielectric Effects on Electrokinetic Phenomena in Pores," *J. Electrochem. Soc.*, **127**(8), C404 (1980) (with G. B. Westermann-Clark).
95. "Rejection of Polyelectrolytes from Microporous Membranes," *J. Membrane Sci.*, **5**, 77 (1979) (with W. D. Munch and L. P. Zestar).
96. "Diffusion of Neutral Molecules in Charged Pores," *J. Colloid and Interface Science*, **64**, 57 (1978) (with W. H. Koh).
97. "Hindered Diffusion of Particles Through Small Pores," *Chem. Eng. Sci.*, **33**, 1429 (1978) (with D. M. Malone).
98. "Particle Diffusion as a Function of Concentration and Ionic Strength," *J. Phys. Chem.,* **82**, 608 (1978) (with F. Rauh and A. Morales).
99. "Electrokinetic Parameters for Capillaries of Different Geometries," *J. Colloid and Interface Science*, **59**, 149 (1977) (with W. H. Koh).

100. “Diffusional Boundary-Layer Resistance for Membranes with Low Porosity,” *AIChE J.*, **23**, 177 (1977) (with D. M. Malone).
101. “Analysis of Sedimentation Velocity in Terms of Binary Particle Interactions,” *Colloid Interface Sci*. Vol. IV. Hydrosols and Rheology, Academic Press (1976) (with C. C. Reed).
102. “Diffusion of Spherical Macromolecules at Finite Concentration,” *J. Chem. Phys*., **64**, 3240 (1976) (with C. C. Reed).
103. “Reply to the Comments by S. Alpert and G. Phillies,” *J. Chem. Phys.*, **65**, 4336 (1976) (with C. C. Reed).
104. “Breaking Bubbles and the Water-to-Air Transport of Particulate Matter,” *Chem. Eng. Sci.*, **30**, 1177 (1975) (with J. A. Quinn and R. A. Steinbrook).
105. “Electro-Osmosis and Electrolyte Conductance in Charged Microcapillaries,” *AIChE J.*, **21**, 1176 (1975) (with W. H. Koh).
106. “Restricted Diffusion in Small Pores: A Model for Steric Exclusion and Hindered Particle Motion,” *Biophysical J.*, **14**, 130 (1974) (with J. A. Quinn).
107. “The Mechanism of Osmotic Flow in Porous Membranes,” *Biophysical J*., **14**, 957 (1974) (with D. M. Malone).
108. “The Concentration Dependence of Macromolecular Diffusion Coefficient,” *Ind. & Eng. Chem. Fund.*, **12**, 488 (1973).
109. “Ionic Mobility in Microcapillaries: A Test for Anomalous Water Structures,” *J. Chem. Soc., Faraday Trans. 1*, **68**, 608 (1972) (with J. A. Quinn).
110. “Diffusion of Small Particles: Electrostatic Effects,” *J. Colloid and Interface Science*, **40**, 273 (1972) (with J. A. Quinn).
111. “Model Pores of Molecular Dimension. The Preparation of Track-Etched Membranes,” *Biophysical J*., **12**, 990 (1972) (with J. A. Quinn, W. S. Ho, and W. J. Petzny).
112. “The Relationship Between Particle Size and Signal in Coulter-Type Counters,” *Rev. Sci. Inst.*, **42**, 1257 (1971) (with J. A. Quinn).
113. “Bubble Columns: Flow Transitions in the Presence of Trace Contaminants,” *Chem. Eng. Sci.*, **25**, 373 (1970) (with J. A. Quinn).
114. “The Transition to Slug Flow in Bubble Columns,” *Chem. Eng. Sci*., **25**, 338 (1970) (with J. A. Quinn).

BOOKS

Chapters

1. “Electrokinetic- and Thermocapillary-Flow-Driven Aggregation of Particles and Bubbles on Surfaces,” in *Transport Processes in Bubbles, Drops, and Particles,* D. De Kee and R. P. Chhabra, editor, Taylor & Francis, p. 55–78, (2002) (with P. J. Sides, H. Kasumi, S. A. Guelcher, and Y. E. Solomentsev).

2. "Electrophoresis of Complex and Interacting Particles," in *Interfacial Electrokinetics and Electrophoresis*, A. V. Delgado, editor, Marcel Dekker, p. 147–172, (2001) (with D. Velegol and Y. Solomentsev).

3. "Electrophoresis of Nonuniformly Charged Chains," in *Macro-ion Characterization: From Dilute Solutions to Complex Fluids*, K. S. Schmitz, editor, American Chemical Society, Washington, D.C., (1994) (with Y. Solomentsev).

Reviewed

1. *Colloidal Dispersions*, by W. B. Russel, D. A. Saville, and W. R. Schowalter, Cambridge University Press, 1989. Review in *J. Fluid Mech*., **222**, 693 (1991) and *Langmuir*, **7**, 436 (1991).
2. *Colloidal Hydrodynamics*, by T. G. M. Van de Ven, Academic Press, 1989. Review in *Langmuir*, **7**, 436 (1991).

INVITED PRESENTATIONS

"Research, Teaching and Education: Evolution of Practice and Funding over 50 Years", Department of Chemical Engineering, Distinguished Alumni Lecture, U. Illinois (2018)

"The Leap from Osmosis to Diffusiophoresis – and Curiosity to Relevance", Interfaces and Transport Phenomena Workshop, University of Limerick, Ireland (2017)

Presidents' Forum, sponsored by the Faculty Senate of the University of Pennsylvania, 2016.

"Trajectory of a Chemical Engineer: From Professor to University President and Safe Return", seminar at Purdue University, 2015.

"Chemistry + Math = Chemical Engineering", keynote lecture to celebrate the centennial of the Chemical Engineering Department at Iowa State University (2013)

"Engineering Education: Back to the Future," seminar at Arizona State University (2011)

"IT Workforce: Role of Universities," presentation at the Executives Club of Chicago (2009)

"Hydrogels as Selective Filters for the Transport of Proteins and Other Macromolecules," Ralph Peck Lecture, Illinois Institute of Technology (2007)

"Electrokinetics of Non-Uniform Systems," National Taiwan University, Taipei, Taiwan (2005)

"Dancing on Surfaces: Self-Assembly of Particles Using Electric Fields," National Cheng Kung University, Tainan, Taiwan (2005)

"Dancing on Surfaces: Self-Assembly of Particles and Bubbles," The University of Akron (2005)

"Globalization of U.S. Business: Challenges and Opportunities for (Engineering) Education," ASME International Mechanical Engineering Education Conference, San Diego, California (2005)

"Diversity of Electrokinetics: Nonuniformly Charged Surfaces," First Annual John A. Quinn Lecture, University of Pennsylvania (2004)

"Dancing on Surfaces: Self-Assembly of Particles Using Electric Fields," Mumbai University Institute of Chemical Technology, Mumbai, India (2004)

"Interfaces and Fields from Membranes to Optical Displays," John Quinn Symposium, University of Pennsylvania (2003)

"Dancing on Surfaces: Self-Assembly of Particles Using Electric Fields," The Ohio State University, Arizona State University, Case Western Reserve University, New Jersey Institute of Technology, and University of Michigan/Michigan State (2003)

"Electrokinetic Flows in Heterogeneously Charged Systems," Illinois Institute of Technology (2002)

"Successful Practices in International Engineering Education," ASEE Annual Conference (2002)

"2-D Assembly of Colloids by Electrohydrodynamics," Gordon Research Conference on Chemistry at Interfaces (2002)

"Assembly of Colloids in 2-D Electrohydrodynamic Flows Near Electrodes," 14th U.S. National Congress of Theoretical and Applied Mechanics (2002)

"Two Particle Dynamics on Electrodes; Attraction and Repulsion in AC Fields," EPD Conference, Banff, Canada (2002)

"Dancing on a Surface: Self Assembly of Particles and Bubbles by Hydrodynamic Mechanisms," Stanley Katz Lecture 2001, City College of New York (2001)

"Electrophoresis of Heterogeneous Particles: Can Neutral Particles Move?" AIChE 2001 Annual Meeting, Keynote Lecture (2001)

"Dynamics of Self-Aggregation of Particles on Electrodes," Lehigh University and University of Kentucky (2000)

"Differential Electrophoresis: Rotation and Displacement of Heterogeneous Colloids," Electro-Optics 2000, Pamporovo, Bulgaria (2000)

"Role of Electro-Osmosis and Thermocapillarity on the Motion of Particles and Bubbles at Surfaces," McMaster University (1999)

"Differential Electrophoresis as a Probe of Colloidal Forces," University of Florida (1999)

"Differential Electrophoresis as a Probe of Colloidal Forces," symposium to honor Eli Ruckenstein on his receiving the Medal of Science, SUNY Buffalo (1999)

"Role of Electro-Osmosis and Thermocapillarity in the Motion of Particles and Bubbles at Surfaces," Tulane University (1999)

"Getting Something for Nothing: the Reciprocal Theorem," symposium to Honor Howard Brenner, Massachusetts Institute of Technology (1999)

"Electrokinetic Phenomena: Old Tricks for Young Dogs" and "Differential Electrophoresis: A Method to Probe the Forces Holding Colloidal Particles Together," 31st Annual W. N. Lacey Lectures in Chemical Engineering, Caltech (1998)

"Electrophoresis of Colloids in Aggregates and Near Electrodes," NSF Workshop on Particle Technology, Santa Barbara (1998)

"Determining Colloidal Forces Using Differential Electrophoresis," AIChE Meeting, Miami Beach (1998)

"A Model for Partnering: Carnegie Mellon University and Caterpillar, Inc.," ASEE National Meeting (1998)

"Differential Electrophoresis as a Probe of Colloidal Forces," Massachusetts Institute of Technology (1998)

"Role of Electro-Osmosis and Thermocapillarity in the Motion of Particles and Bubbles at Surfaces," Harvard University (1998)

"Differential Electrophoresis: A Method to Align and Stress Colloidal Aggregates," University of California, Santa Barbara (1997)

"Differential Electrophoresis: A Method to Align and Stress Colloidal Aggregates," UCLA (1997)

"Differential Electrophoresis: A Method to Probe the Forces Holding Colloidal Particles Together," Barnett Dodge Lecture, Yale University (1997)

"Self-Ordering of Particles During Electrophoretic Deposition," symposium honoring John Quinn, Los Angeles (1997)

"Probing Colloidal Forces by Differential Electrophoresis," University of Arizona and Clarkson University (1996)

"Probing Colloidal Forces by Differential Electrophoresis," invited paper at Electrokinetic Phenomena '96," Rome (1996)

"Probing the Structure of Colloidal Doublets by Electrophoretic Rotation," University of South Australia, University of Sydney, and University of Melbourne (1995)

"Electrokinetic Transport of Complex Colloids," Gordon Conference on Microgravity (1995)

"Convective and Diffusive Transport Through Gel-Filled Porous Membranes," University of Melbourne, University of Queensland, and University of Newcastle (1995)

"Probing the Structure of Colloidal Doublets by Electrophoretic Rotation," University of Adelaide, University of Melbourne, and University of Sydney (1995)

"Convective and Diffusive Transport Through Gel-Filled Porous Membranes," University of Melbourne, University of Newcastle, and University of Queensland (1995)

"On the Beach: A Sabbatical in The Netherlands and Australia," Carnegie Mellon University (1995)

"Partitioning and Diffusion of Proteins in Polymeric Gels," University of Massachusetts (1995)

"Electrokinetic Transport of Complex Colloids," invited paper at the Gordon Conference on Microgravity, Henniker, New Hampshire (1995)

"Clogged Pores: Gel-Filled Membranes as Separation Devices," invited paper at the Fine Particle Society Meeting, Chicago (1995)

"Molecular Transport Through Gel-Filled Pores," Exxon Research & Engineering, Annandale, New Jersey (1994)

"Transport of Colloids in Electric Fields," Hercules, Inc., Research and Development Center, Wilmington, Delaware (1994)

"Electrophoresis: Complex Particles and Non-Uniform Electric Fields," University of Utrecht, The Netherlands (1994)

"Molecular Transport Through Gel-Filled Porous Media," University of Bristol, UK (1994); NIZO, The Netherlands (1994)

"Phoretic Transport of Colloidal Particles," University of Kentucky (1993)

"Polymer Adsorbed to Porous Media: Good, Bad, or Just Ugly?" A. B. Metzner Symposium, University of Delaware (1993)

"Electrokinetic Measurements of Heterogeneous Media," invited paper at AIChE Annual Meeting, St. Louis (1993)

"Electrokinetic Transport of Heterogeneous Colloids," invited seminar at University of Pittsburgh and University of Toledo (1992)

"Electrokinetic Phenomena of Heterogeneous Surfaces," 9th International Symposium on Surfactants in Solution, Varna, Bulgaria (1992)

"Hindered Transport in Fuzzy Pores: Effects of Adsorbed Polymers on Diffusion," Fine Particle Society, Las Vegas (1992)

"Phoretic Transport of Colloidal Particles," invited seminar at Princeton University (1992)

"Electrophoresis of Non-Uniformly Charged Colloids," University of Melbourne and University of Sydney, Australia (1992)

"Colloid Transport by Interfacial Forces—Electrophoresis and Diffusiophoresis," seminar at University of Wisconsin, Madison (1991)

"Colloid Transport by Electrophoresis and Diffusiophoresis," seminar at University of Wisconsin (1991)

"Phoretic Transport of Heterogeneous Particles," presentation at International Symposium on Non-Equilibrium Electrical Surface Phenomena Membrane Transport and Related Topics, Kiev, Ukraine (May 1991)

"Polymers and Membranes: Selectivity with Large Pores," presentation at Gordon Research Conference on Reverse Osmosis, Ultrafiltration, and Gas Separations, Plymouth State College, Plymouth, New Hampshire (August 1991)

"Transport Through Porous Membranes: Effects of Adsorbed Polymers," invited seminar at Exxon Research & Development (1991)

"Transport Through Porous Membranes: Effects of Adsorbed Polymers," seminar at Georgia Institute of Technology (1991)

"Electrokinetics of Heterogeneous Colloids," Keynote Paper, AIChE Annual Meeting, Los Angeles (November 1991)

Presented First Annual John C. and Florence W. Holtz Lecture in Chemical Engineering, Johns Hopkins University (April 9, 1990)

"Polymer/Membrane Composites: Tunable Selectivity and Permeability," seminar at Penn State University (1990)

"Colloid Transport by Interfacial Forces—Electrophoresis and Diffusiophoresis," seminar at Carnegie Mellon University, Physics Department (1990)

"Polymer Membrane Composites: Tunable Selectivity and Permeability," seminar at University of Washington, Seattle (1990)

"Transport in Membranes with Polymer-Filled Pores," seminar at Air Products and Chemicals, Inc. (1990)

"Membrane Separation of Solutions" and "Electrokinetic Phenomena," two lectures presented at Moscow Institute of Food Technology, Moscow, Russia (1990)

"Mass Transfer in Complex Media: Understanding Molecular Selectivity," Professional Progress Award Lecture, AIChE Annual Meeting, Chicago (November 1990)

"Colloidal Transport by Interfacial Forces" and "Large Molecules in Small Pores: Membrane Separations and Life," Berkeley Lectures in Chemical Engineering (1989)

"Diffusion of Large Molecules in Small Pores-Model Compounds and Asphaltenes," invited seminar at Mobil Research and Development (1989)

"Hindered Transport Through Microporous Membranes," seminar at Indiana University-Purdue University Indianapolis (1989)

"Diffusiophoresis: Transport of Colloids by Chemical Gradients," seminar presented at Rensselaer Polytechnic Institute (1988) and SUNY–Buffalo (1988)

"Effect of Molecular Configuration on Diffusion in Small Pores," invited paper at 72nd Annual Meeting, Federation of American Societies for Experimental Biology, Las Vegas (1988)

"Transport of Colloids by Interfacial Forces," seminar presented at Purdue University (1988) and University of Illinois (1988)

"Principles of Membrane Separation," invited paper at symposium on separation process technology, ARCO Chemical Co. (1988)

"Polymer-Membrane Composites: Adjustable Permeability," symposium on selective transport and reactions in membranes," ACS National Meeting, New Orleans (1987)

"Transport of Polymers Through Microporous Membranes," seminar presented at University of Rochester (1986), University of Texas (1987), Lehigh University (1987), and University of Missouri–Rolla (1987)

"Diffusiophoresis: Chemotaxis of Dead Particles," Gordon Conference on Theoretical Biology and Biomathematics, New Hampshire (1986)

"Polymer Dynamics in Small Pores: Ultrafiltration of Polymer Chains," seminar presented at University of Rochester (1986)

"Forces, Friction, and the Transport of Colloidal Particles," seminar presented at Stanford University (1985), University of Southern California (1985), and Iowa State University (1985)

"Effect of Charge Distribution on Electrophoresis and Electro-Osmosis," seminar presented at University of Arizona (1985)

"Electrokinetic Phenomena in Porous Membranes," invited paper at the Conference on Electrolyte Solutions in Science and Engineering, National Bureau of Standards (1985)

"Transport of Polymer Solutions in Microporous Membranes," seminar presented at University of Delaware (1985), University of Pennsylvania (1986), and University of Virginia (1986)

"Phoretic Mechanisms of Colloidal Transport," seminar presented at Dow Chemical Co. (1985)

"Ultrafiltration of Polymer Chains from Microporous Membranes," seminar presented at University of Florida (1984), University of California, Berkeley (1985), UCLA (1985), and University of West Virginia (1985)

"Transport Mechanisms of Biological Colloids," paper at 4th International Conference on Biochemical Engineering, Galway, Ireland (September 30–October 5, 1984)

"Ultrafiltration of Polymer Chains," seminar presented at University of Puerto Rico (1984)

"Osmosis: Membrane Transport and Vesicle Motion," seminar presented at University of Puerto Rico (1984)

"Particle Motion Driven by Gradients of Molecular Solutes," seminar presented at Brown University, University of Michigan, and University of Massachusetts (1983)

"Hindered Diffusion of Asphaltenes Through Microporous Membranes," seminar presented at Exxon Research and Engineering (Linden) (1983)

"Particle Motion in Chemical Gradients," invited paper at Third International Conference on Partitioning in Two Polymer Systems (1983)

"Chemically-Driven Motion of Colloids," seminar presented at Department of Applied Mathematics and Theoretical Physics, Cambridge University (England) (1983)

"Ultrafiltration of Linear Macromolecules Through Microporous Membranes," seminar presented at University College (Dublin), Imperial College (London), Centre de Recherches sur Res Macromolecules (Strasbourg), and Institute Francais du Petrole (Rueil Malmaison) (1983)

"Particle Motions Driven by Concentration Gradients of Molecular Solutes," seminar presented at Schlumberger-Doll Research (1983)

"Flow Dependent Rejection of Polymer Chains from Porous Membranes," seminar presented at University of Pittsburgh (1983)

"Chemically-Driven Motion of Colloidal Particles," seminar presented at Clarkson College of Technology (1982)

"Hindered Diffusion of Asphaltenes Through Microporous Membranes," seminar presented at Cornell University, Stanford University, Chevron Research Co., Massachusetts Institute of Technology, Johns Hopkins University, and Exxon Corp. (Baton Rouge) (1982)

"Continuum Model for Electrolyte Transport in Charged Pores," paper presented at the Symposium on Membranes and Ionic/Electronic Conducting Polymers, sponsored by NASA and the Electrochemical Society, Case Western Reserve University (1982)

"Diffusionphoresis: Motion of Particles by a Gradient of a Small Solute," seminar presented at Marshall Space Flight Center, NASA, Huntsville, Alabama (1982)

"Space Charge Model for Electrokinetic Phenomena in Microporous Membranes," invited lecture at Annual AIChE Meeting, Los Angeles (1982)

"Role of Steric Interactions on Membrane Transport: Osmosis," presented at Gordon Conference on Water and Solute Exchange in the Microvasculature (1982)

"Transport Model for Electrokinetic Phenomena in Charged Microporous Membranes," presented at Gordon Conference on Separation and Purification (1982)

"Track-Etched Films as Model Membranes," seminar presented at the National Institutes of Health Instrumentation Symposium (1981)

"Hindered Transport Through Porous Membranes," seminar presented at Research Center, Stauffer Chemical Co. (1981)

"Concentration Effects on Distribution of Macromolecules in Small Pores," paper presented at the IUTAM-IUPAC Symposium on Interactions of Particles in Colloidal Dispersions, Canberra, Australia (March 1981)

"The Relationship Between Chemistry and Chemical Engineering Education," seminar presented to the student affiliate chapter of ACS, Allegheny College (1981)

"Electrolyte Transport in Charged Capillary Pores," seminar presented at Illinois Institute of Technology (1981)

"Hindered Molecular Transport in Porous Media," seminar presented at Caltech, Syracuse University, and Rensselaer Polytechnic Institute (1981)

"Chemically-Driven Motion of Particles," seminar presented at University of Houston (1981)

"Electrolyte Transport in Charged Capillary Pores," seminar presented at Rice University (1981)

"Equilibrium and Transport of Brownian Particles in Microporous Media," State-of-the-Art paper for Symposium at the 74th Annual AIChE Meeting, New Orleans (1981)

"Hindered Molecular Transport in Porous Media," seminar presented at University of Notre Dame (1980)

"Coupling of Solute Flux to Water Flux," symposium on direct measurements of transport and permeability in single capillaries, University of California, Davis (1979)

"Studies of Solute/Membrane Interactions Using Synthetic Microporous Membranes," seminar presented at University of Michigan (1979)

"Electrolyte Transport in Charged Pores," seminar presented at Case Western Reserve University (1978)

"Model Studies of Membrane Transport Using Synthetic Porous Membranes," seminar presented at Columbia University (1978)

"Studies of Solute/Membrane Interactions Using Synthetic Microporous Membranes," Gordon Conference on Transport Phenomena in Biological and Synthetic Microporous Membranes (1978)

"Electrokinetics" and "Passive Separator Transport," two separate seminars at Diamond Shamrock Corp. (1977–1978)

"Diffusion of Brownian Particles: Electrostatic and Size Effects," seminar presented at Carnegie Mellon University (Polymers Group) (1977)

"Transport of Macromolecules in Confined Systems," seminar presented at Carnegie Mellon University, University of Pennsylvania, and University of Virginia (1976)

"The Role of Wall-Solute Interactions in Determining Transport Rates in Small Pores," seminar presented at University of Delaware and Penn State University (1975)

"Diffusive Transport of Compact Macromolecules," seminar presented at University of Illinois, University of Rochester, and Princeton University (1975)

"The Hydrodynamic Mechanism Behind Osmotic Flow in Porous Membranes," seminar presented at SUNY–Buffalo (1974)

RESEARCH FUNDING

NSF CTS-0089875
"Effect of Alternating Current on the Dynamics of Colloidal Particles Near Electrodes"
March 1, 2001–February 28, 2004 ($270,000)

Philips Research Labs, Eindhoven, The Netherlands
"Mechanism of ac Field Aggregation"
September 1, 2001–August 31, 2003 ($106,000)

NASA NAG3-2159
"Lateral Motion of Particles and Bubbles Caused by Phoretic Flows Near a Solid Interface"
January 1, 1998–December 31, 2002 ($400,000)

NSF CTS-9814064
"Particle Aggregation During Electrophoric Deposition"
June 1, 1999–May 30, 2000 ($66,000)

NSF CTS-9420780
"Alignment and Transport of Colloidal Particles in Nonhomogeneous Electric Fields"
April 1, 1995–March 31, 1998 ($240,000)

Hercules, Inc.
"Unrestricted Support of Research in Colloid and Membrane Transport"
October 1, 1994–September 30, 1996 ($30,000)

NASA NAG8-964
"Electrokinetic Transport of Heterogeneous Particles in Suspensions"
January 1, 1993–December 31, 1995 ($279,000)

NSF CTS-91-22573
"Polymer-in-Pore Composite Membranes"
March 15, 1992–February 14, 1995 ($254,995)

ACS-PRF 25294-AC7E
"Diffusion, Flow, and Partitioning in Gels"
September 1, 1992–August 31, 1994 ($40,000)

Westvaco Corporation
"Dynamics of Polymer Chains and Colloidal Particles"
July 1983–June 1992 ($80,000)

NSF CTS 89-20600
"Electrophoretic Transport of Heterogeneous Colloids"
April 15, 1990–April 14, 1992 ($147,168)

NSF CBT 87-8720258
"Protein Transport by Ligand Gradients"
February 1, 1988–July 31, 1991 ($173,000)

NSF CBT 85-13673
"Phoretic Transport of Colloidal Particles"
April 1, 1986–September 30, 1989 ($240,000)

NSF CBT 86-21332
"Transport of Polymers in Confined Geometries"
September 1, 1986–March 1, 1989 ($133,000)

National Institutes of Health
National Research Service Award (Training Grants) GMO7477
July 1, 1983–June 30, 1988 ($570,000)

NSF CBT 86-16341
"Separation of Proteins Using Ligand Gradients"
August 15, 1986–January 31, 1988 ($30,000)

NSF CPT 84-12332
"Flow of Macromolecules Through Microporous Membranes"
November 15, 1984–April 30, 1987 ($127,000)

ACS-PRF 16085-AC5
"Effect of Molecular Configuration on Hindered Diffusion in Small Pores"
September 1, 1984–August 31, 1986 ($31,850)

NSF CPE 83-12788

"Flow of Macromolecules Through Microporous Membranes"
February 1, 1984–July 31, 1985 ($25,000)

NSF CPE 81-21332
"Chemically-Driven Particle Motion"
April 1, 1982–March 31, 1985 ($125,320)

NSF CPE 80-05344
"Hindered Diffusion with Chemical Reaction in Small Pores"
August 1, 1980–July 31, 1983 ($175,425)

Westvaco Corporation
"Flow of Linear Macromolecules Through Microporous Membranes"
November 1980–July 1983 ($20,000)

NSF CPE 80-07524
"Transport of Electrolyte Solutions Through Microscopic Charged Pores"
October 15, 1980–October 14, 1982 ($75,923)

NSF ENG 76-21921, ENG 78-06424
"Interactions Among Mass-Charge-Momentum Transport Within Small, Charged Pores"
September 1, 1976–November 30, 1980 ($91,641)

NSF CPE 79-24558
"Gel Permeation Chromatograph with On-Line Low Angle Laser Light Scattering Detection"
January 1, 1979–June 30, 1980 ($41,800)

NSF ENG 77-12997
"Hindered Diffusion with Chemical Reaction in Small Pores"
February 15, 1978–February 14, 1980 ($77,348)

NSF PCM 77-20525
"Hindered Molecular Transport in Confined Systems with Large Surface Area/Volume Ratio"
July 15, 1977–December 31, 1979 ($43,700)

NSF ENG 75-13440
"Transport of Polyelectrolytes in Aqueous, Microporous Systems"
September 1, 1975–February 28, 1978 ($40,500)

NSF GK-41279, ENG 73-04112
"Interaction Among Mass-Charge-Momentum Transport Within Small, Charged Pores"
January 1, 1974–August 31, 1976 ($43,000)

NSF Initiation GK-32682
"Particle/Wall Interactions in Transport Through Porous Membranes"
April 1, 1972–September 30, 1973 ($16,000)

DOCTORAL THESES SUPERVISED (26)

Jess Nauman, Carnegie Mellon University (2005)
"Diffusive and Convective Transport of Proteins in Fibrin Gels"
Current Position: Postdoctoral Associate, Carnegie Mellon University

Junhyung Kim, Carnegie Mellon University (2004)
"Dynamics of Particles in Spatially and Temporally Varying Electric Field Near Electrodes"
Current Position: New Business Development Leader, Circuit and Packaging Materials, DuPont Electronic Technologies, Seoul, Korea

Scott Guelcher, Carnegie Mellon University (1999)
"Investigating the Mechanism of Aggregation of Colloidal Particles During Electrophoric Deposition"
Current Position: Associate Professor, Department of Chemical and Biological Engineering, Vanderbilt University

Kristen Buehler, Carnegie Mellon University (1999)
"Effect of Membrane-Support and Solvent Quality on Permeability Characteristics of Confined Polyacrylamide Gels"
Current Position: Research Engineer, Institute for Defense Analyses, Alexandria, VA

Darrell Velegol, Carnegie Mellon University (1997)
"Determining the Forces Between Colloidal Particles Using Differential Electrophoresis"
Current Position: Professor, Department of Chemical Engineering, Penn State University

Vivek Kapur, Carnegie Mellon University (1995)
"Transport in Polymer/Gel Modified Micropores"
Current Position: Research Engineer, DuPont Central Research and Development, Wilmington, DE

Jane Tong, Carnegie Mellon University (1995)
"Partitioning and Diffusion of Macromolecules in Polyacrylamide Gels"
Current Position: Research Engineer, DuPont Company, Wilmington, DE

Yashodhara Pawar, Carnegie Mellon University (1993)
"Electrophoresis of Heterogeneously Charged Colloids"

Current Position: Lead, Process Development, Global Design Center, Unilever, Shanghai, China

Paul F. McKenzie, Carnegie Mellon University (1992)
"Effects of Adsorbed Polymers on Transport in Porous Membranes"
Current Position: Head, Global Development Organization, Johnson & Johnson PRD, Spring House, PA

Erica S. Shane, Carnegie Mellon University (1991)
"Effects of Gradients of Solvent Composition on Diffusion of Proteins"
Current Position: Principal Scientist, E Ink Corporation, Cambridge, MA

Richard M. Webber, Carnegie Mellon University (1991)
"Hydrodynamic Thickness as a Probe of the Extension of Adsorbed Diblock Copolymer in Microporous Membranes"
Current Position: Research Scientist, Lubrizol, Cleveland, OH

Mark C. Fair, Carnegie Mellon University (1990)
"Electrophoresis of Nonspherical and Nonuniformly Charged Colloidal Particles"
Current Position: Research Project Engineer, Aristech Chemical Corporation, Process Implementation Division, Monroeville, PA

Jeenok T. Kim, Carnegie Mellon University (1989)
"Flow and Diffusion Through Microporous Membranes with Adsorbed Polyelectrolyte"
Current Position: Research Engineer, Exxon Research & Engineering, Florham Park, NJ

Imtiaz A. Kathawalla, Carnegie Mellon University (1988)
"Configurational Effects on Hindered Diffusion Through Microporous Membranes"
Current Position: Marketing Development Manager, Cabot Industries, IL

Robert P. Adamski, Carnegie Mellon University (1987)
"The Effect of Molecular Configuration and Flowrate on the Convective Transport of Polymer Molecules Through Microporous Membranes"
Current Position: Associate Engineer, Shell Development, Houston, TX

James P. Ebel, Carnegie Mellon University (1986)
"Diffusiophoretic Transport of Colloidal Particles"
Current Position: Director, Global Consumer R&D, Wyeth Consumer Healthcare, Richmond, VA

W. Keith Idol, Carnegie Mellon University (1985)
"The Effect of Adsorbed Polymers on Solvent Flow and Molecular Diffusion in Small Pores"
Current Position: Research Engineer, Exxon Production Research, Houston, TX

Huan J. Keh, Carnegie Mellon University (1984)

"Hydrodynamic and Electrokinetic Characteristics of Transport of Macromolecules Through Porous Media"
Current Position: Professor of Chemical Engineering, National Taiwan University, Taipei

Treva D. Long, Carnegie Mellon University (1983)
"Convective Transport of Flexible Chain Macromolecules Through a Well-Defined Porous Membrane"
Current Position: Research Associate, Department of Chemical Engineering, Cornell University

Mark E. Lowell, Carnegie Mellon University (1983)
"Models for Diffusiophoretic Motions of Rigid Particles"
Current Position: Manager, Engineering, Tamaqua Cable Products Corporation, Schuylkill Haven, PA

Ruth E. Baltus, Carnegie Mellon University (1982)
"Hindered Diffusion of Petroleum-Derived Asphaltenes"
Current Position: Department Chair and Professor, Department of Chemical Engineering, Clarkson University

Judeth H. Brannon, Carnegie Mellon University (1981)
"The Concentration Dependence of the Partition Coefficient for Macromolecules in Porous Media"
Current Position: Senior Engineer, Borsig Technologies, Knight-Hawk Engineering, Houston, TX

Gerald B. Westermann-Clark, Carnegie Mellon University (1981)
"Ion Transport in Charged Porous Media"
Position: Associate Professor, Department of Chemical Engineering, University of Florida, Gainesville (deceased, December 1995)

C. Christopher Reed, Cornell University (1978)
"Mathematical Concepts in the Transport of Interacting Particles: Diffusion, Sedimentation, and Osmosis"
Current Position: Research Scientist, The Aerospace Corporation, Los Angeles, CA

Wei-Hu Koh, Cornell University (1977)
"Electrokinetic Flows in a Charged Microcapillary Model Membrane: Studies of Streaming Potential and Molecular Diffusion"
Current Position: Director of Advanced Technology Center–Asia, Motorola

Dermot M. Malone, Cornell University (1977)
"The Convection and Diffusion of Brownian Particles Within Porous Systems: A Theoretical and Experimental Approach"

Current Position: Lecturer (tenured), Department of Chemical Engineering, University College, Dublin, Ireland