

## PUBLICATIONS (RESEARCH)

(Underlined names are those of undergraduate student assistants, double underlined are high school teachers.)

“Calix[4]arene, Calix[4]Resorcarene, and Cyclodextrin Derivatives and their Lanthanide Complexes as Chiral NMR Shift Reagents,” Smith, K. J.; Wilcox, J. D.; Mirick, G. E.; Wacker, L. S.; Ryan, N. S.; Vensel, D. A.; Readling, R.; Domush, H. L.; Amonoo, E. P.; Shariff, S. S.; Wenzel, T. J., *Chirality*, **2003**, *15*, in press.

“Chiral Reagents for the Determination of Enantiomeric Excess and Absolute Configuration using NMR Spectroscopy,” Wenzel, T. J.; Wilcox, J. D., *Chirality*, **2003**, *15*, 256-270.

“The Utility of Crown Ethers Derived from Methyl  $\beta$ -D-Galactopyranoside and their Lanthanide Couples as Chiral NMR Discriminating Agents”, Wenzel, T. J.; Thurston, J. E.; Sek, D. C.; Joly, J.-P.; *Tetrahedron: Asymmetry*, **2001**, *12*, 1125-1130..

“Lanthanide-Chiral Solvating Agent Couples as Chiral NMR Shift Reagents,” Wenzel, T. J.; *Trends in Organic Chemistry*, **2000**, *8*, 51-64.

“Enantiomeric Discrimination in the NMR Spectra of Underivatized Amino Acids and  $\alpha$ -Methyl Amino Acids Using (+)-(18-Crown-6)-2,3,11,12-Tetracarboxylic Acid,” Wenzel, T. J.; Thurston, J. E., *Tetrahedron Letters*, **2000**, *41*, 3769-3772.

“Lanthanide-Chiral Carboxylate and Chiral Ester Mixtures as NMR Shift Reagents,” Wenzel, T. J.; Brogan, K. L.; *Enantiomer*, **2000**, *5*, 293-302.

“(+)-(18-Crown-6)-2,3,11,12-Tetracarboxylic Acid and its Ytterbium(III) Complex as Chiral NMR Discriminating Agents,” Wenzel, T. J.; Thurston, J. E., *Journal of Organic Chemistry*, **2000**, *65*, 1243-1248.

“Dysprosium(III)-Diethylenetriaminepentaacetate complexes of Aminocyclodextrins as Chiral NMR Shift Reagents,” Wenzel, T.J.; Miles, R.D.; Zomlefer, K.; Frederique, D.E.; Roan, M.A.; Troughton, J.S.; Pond, B.V.; Colby, A.L., *Chirality*, **2000**, *12*, 30-37.

“Solid-Phase Lanthanide Luminescence Detection in Liquid Chromatography,” Wenzel, T.J., Evertsen, R., Perrins, B.E., Light, Jr., T.B., Bean, A.C., *Analytical Chemistry*, **1998**, *70*, 2085-2091.

"Chiral NMR Shift Reagents: Mixtures of Lanthanide Tris( $\beta$ -Diketonates) with Chiral Carboxylate Anions," Wenzel, T.J.; Bean, A.C.; Dunham, S.L.; *Magnetic Resonance in Chemistry*, **1997**, *35*, 395-402.

"Lanthanide-Crown Ether Mixtures as Chiral NMR Shift Reagents for Amino Acid Esters, Amines, and Amino Alcohols," Weinstein, S.E., Vining, M.S., Wenzel, T.J., *Magnetic Resonance in Chemistry*, **1997**, *35*, 273-280.

"Chiral NMR Shift Reagents: Lanthanide Mixtures with 1-(1-Naphthyl)ethylurea derivatives of Amino Acids," Wenzel, T.J., Miles, R.D.; Weinstein, S.E., *Chirality*, **1997**, 9, 1-9.

"Lanthanide Luminescence Detection of Bleomycins and Nalidixic Acid," Wenzel, T.J.; Zomlefer, K.; Rapkin, S.B.; Keith, R.H.; *Journal of Liquid Chromatography*, **1995**, 18, 1473-1486.

"Lanthanide-Cyclodextrin Complexes as Probes for Elucidating Cyclodextrin-Substrate Interactions and Optical Purity by NMR Spectroscopy," Wenzel, T.J.; Bogyo, M.S.; Lebeau, E.L.; *Journal of the American Chemical Society*, **1994**, 116, 4858-4865.

"Supercritical Fluid Extraction of Metal-Containing Selective Sorbents," Wenzel, T.J.; Townsend, K.J.; Frederique, D.E.; Baker, A.G.; *Journal of Chromatography*, **1993**, 637, 187-194.

"Lanthanide-Chiral Resolving Agent Mixtures as Chiral NMR Shift Reagents," Wenzel, T.J.; Morin, C.A.; Brechtling, A.A.; *Journal of Organic Chemistry*, **1992**, 57, 3594-3599.

"Lanthanide Shift NMR Studies of Bile Salt Aggregates," Meyerhoffer, S.M.; Wenzel, T.J.; McGown, L.B.; *Journal of Physical Chemistry*, **1992**, 96, 1961-1967.

"Luminescence Spectrometric Studies of Silica-Bound and Adsorbed Molecules," Lochmuller, C.H.; Kersey, M.T.; Wenzel, T.J., in *Chemically Modified Oxide Surfaces*, Volume 3, D.E. Leyden, Ed., Gordon & Breach Publishers, NY, **1990**, pp. 109-126.

"Spectroscopic Studies of Pyrene at Silica Interfaces," Lochmuller, C.H.; Wenzel, T.J.; *Journal of Physical Chemistry*, **1990**, 94, 4230-4235.

"NMR Shift Reagents for Organic Salts: Shift Mechanism, Bound Shifts, and Structural Analysis," Wenzel, T.J.; Cameron, K.; *Magnetic Resonance in Chemistry*, **1989**, 27, 734-739.

"Application of Metal Beta-diketonate Polymers as Selective Sorbents in Complex Mixture Analysis and for Sulfur-Containing Compounds," Wenzel, T.J.; Bonasia, P.J.; Brewitt, T.; *Journal of Chromatography*, **1989**, 463, 171-176.

"Liquid Chromatographic and Flow Injection Analysis of Tetracycline Using Sensitized Europium(III) Luminescence Detection," Wenzel, T.J.; Collette, L.M., Dahlen, D.T., Hendrickson, S.M., Yarmaloff, L.W., *Journal of Chromatography*, **1988**, 433, 149-158.

"Lanthanide Ions as Luminescent Chromophores for the Liquid Chromatographic Detection of Polynucleotides and Nucleic Acids," Wenzel, T.J.; Collette, L.M., *Journal of Chromatography*, **1988**, 436, 299-307.

"The Shift Mechanism of Binuclear Lanthanide(III)-Silver(I) NMR Shift Reagents," Wenzel, T.J.; Russett, M.D., *Journal of Magnetic Resonance*, **1987**, 75, 493-501.

"Metal Beta-Diketonate Polymers as Selective Sorbents for Gas Chromatography," Wenzel, T.J.; Yarmaloff, L.W.; St.Cyr, L.Y.; O'Meara, L.J.; Donatelli, M.; Bauer, R.W.; *Journal of Chromatography*, **1987**, 396, 51-64.

"Organic-Soluble Lanthanide Nuclear Magnetic Resonance Shift Reagents for Sulfonium and Isothiouonium Salts," Wenzel, T.J.; Zaia, J.; *Analytical Chemistry*, **1987**, 59, 562-567.

"Binuclear Lanthanide(III)-Silver(I) NMR Shift Reagents: Investigations of New Achiral and Chiral Analogs," Wenzel, T.J.; Ruggles, A.C.; Lalonde, D.R., Jr.; *Magnetic Resonance in Chemistry*, **1985**, 23, 778-783.

"Lanthanide Ions as Luminescent Chromophores for Liquid Chromatographic Detection," DiBella, E.E.; Weissman, J.B.; Joseph, M.J.; Schultz, J.R., Wenzel, T.J.; *Journal of Chromatography*, **1985**, 328, 101-109.

"Lanthanide Tetrakis(beta-diketonates) as Effective NMR Shift Reagents for Organic Salts," Wenzel, T.J.; Zaia, J.; *Journal of Organic Chemistry*, **1985**, 50, 1322-1324.

"Metal Chelates of 2,2,7-Trimethyl-3,5-Octanedione, H(tod)," Wenzel, T.J.; Williams, E.J.; Sievers, R.E.; *Inorganic Synthesis*, **1985**, 23, 144-149.

"Studies of Metal Chelates With the Novel Ligand 2,2,7-Trimethyl-3,5-Octanedione," Wenzel, T.J.; Williams, E.J.; Haltiwanger, R.C.; Sievers, R.E.; *Polyhedron*, **1985**, 4, 369-378.

"A Better Solvent for Binuclear Lanthanide(III)-Silver(I) NMR Shift Reagent Studies," Wenzel, T.J.; *Journal of Organic Chemistry*, **1984**, 49, 1834-1835.

"Secondary Deuterium Isotope Effects with Lanthanide(III)-Silver(I) NMR Shift Reagents," Wenzel, T.J.; *Spectroscopy Letters*, **1984**, 17, 77-84.

"New Binuclear NMR Shift Reagents for Olefins and Aromatics," Wenzel, T.J.; Lalonde, D.R., Jr.; *Journal of Organic Chemistry*, **1983**, 48, 1951-1954.

"Binuclear Shift Reagents for Nuclear Magnetic Resonance Spectrometry of Aromatic and Polycyclic Aromatic Compounds," Wenzel, T.J.; Sievers, R.E.; *Analytical Chemistry*, **1983**, 54, 1602-1606.

"Water-Soluble Paramagnetic Relaxation Reagents for Carbon-13 Nuclear Magnetic Resonance Spectroscopy," Wenzel, T.J.; Ashley, M.E.; Sievers, R.E., *Analytical Chemistry*, **1982**, 54, 615-621.

"Nuclear Magnetic Resonance Studies of Terpenes with Chiral and Achiral Lanthanide(III)-Silver(I) Binuclear Shift Reagents," Wenzel, T.J.; Sievers, R.E.; *Journal of the American Chemical Society*, **1982**, 104, 382-388.

"Liquid Hydrocarbon-Soluble Rare Earth Chelates Prepared from the Novel Ligand 2,2,7-Trimethyl-3,5-Octanedione and Fuels Containing Same," Sievers, R.E.; Wenzel, T.J.; U.S.Patent 4,251,233, **1981**.

"Binuclear Complexes of Lanthanide(III) and Silver(I) and Their Function as Shift Reagents for Olefins, Aromatics, and Halogenated Compounds," Wenzel, T.J.; Sievers, R.E.; *Analytical Chemistry*, **1981**, 53, 393-399.

"New Binuclear Lanthanide NMR Shift Reagents Effective for Aromatic Compounds," Wenzel, T.J.; Bettes, T.C.; Sadlowski, J.E.; Sievers, R.E.; *Journal of the American Chemical Society*, **1980**, 102, 5903-5904.

### PUBLICATIONS (EDUCATION)

"Peer-Assessment and Self-Assessment of Group Activities," Wenzel, T. J. *Analytical Chemistry*, in press

"The Teaching Learning Process in Analytical Chemistry," Wenzel, T. J.; *Microchimica Acta*, **2003**, in press.

"Controlling the Climate in Your Classroom," Wenzel, T. J.; *Analytical Chemistry*, **2003**, 75, 311A-314A.

"Using Mistakes as Learning Opportunities," Wenzel, T. J.; *Analytical Chemistry*, **2002**, 74, 439A-440A.

"Community-Based Projects in Analytical Chemistry Courses," Wenzel, T. J.; *Analytical Chemistry*, **2002**, 74, 279A-280A.

"General Chemistry: Expanding the Goals Beyond Content and Lab Skills," Wenzel, T. J.; in *Gender, Science and the Undergraduate Curriculum: Building Two Way Streets*, Association of American Colleges and Universities, **2001**, 29-46.

"Problem-Based Learning: A Teaching Method in Need of Supporting Materials," Wenzel, T. J.; *Analytical Chemistry*, **2001**, 73, 501A-502A.

"The Influence of Modern Instrumentation on the Analytical and General Chemistry Curriculum at Bates College," Wenzel, T. J.; *Journal of Chemical Education*, **2001**, 78, 1164-1165.

"Environmental Chemistry in the Undergraduate Laboratory," Wenzel, T. J.; Austin, R.N.; *Environmental Science and Technology*, **2001**, 35, 326A-331A.

"The Limits of Written Tests," Wenzel, T. J., *Analytical Chemistry*, **2001**, 73, 43A-44A.

"Defining Course Goals," Wenzel, T. J., *Analytical Chemistry*, **2000**, 72, 659A-660A.

“Undergraduate Research as a Capstone Learning Experience,” Wenzel, T. J., *Analytical Chemistry*, **2000**, 72, 547A-549A.

“Practical Tips for Cooperative Learning,” Wenzel, T. J., *Analytical Chemistry*, **2000**, 72, 359A-361A.

“Cooperative Student Activities as Learning Devices,” Wenzel, T. J., *Analytical Chemistry*, **2000**, 72, 293A-296A.

“All the World’s a Sample,” Wenzel, T. J., Award Address: J. Calvin Giddings Award for Excellence in Education, American Chemical Society, *Division of Analytical Chemistry Newsletter*, **2000**, Spring Issue, p. 1, 10-12.

“The Lecture as a Learning Device,” Wenzel, T. J., *Analytical Chemistry*, **1999**, 71, 817A-819A.

“Does Problem-Based Learning Sacrifice Content and Fundamentals?,” Wenzel, T.J., *Analytical Chemistry*, **1999**, 71, 693A-695A.

“Cooperative Group Learning in Undergraduate Analytical Chemistry,” Wenzel, T.J., *Analytical Chemistry*, **1998**, 70, 790A-795A.

"A New Approach to Undergraduate Analytical Chemistry," Wenzel, T.J.; *Analytical Chemistry*, **1995**, 67, 470A-475A.

"Isomerization of Dimethyl Maleate to Dimethyl Fumarate: An Undergraduate Experiment Utilizing High Performance Liquid Chromatography," Ledlie, D.B.; Wenzel, T.J.; Hendrickson, S.M.; *Journal of Chemical Education*, **1989**, 66, 781-782.

"Analysis of Xylene Mixtures Using Binuclear Lanthanide(III)-Silver(I) NMR Shift Reagents," Wenzel, T.J.; Russett, M.D., *Journal of Chemical Education*, **1987**, 64, 979-980.

### **PUBLICATIONS (BOOKS/CHAPTERS)**

“Magnetic Resonance: Enantiomeric Purity Studies Using NMR,” Wenzel, T.J., in *Encyclopedia of Spectroscopy and Spectrometry*, Academic Press, **2000**, Vol. 1, pp. 411-421.

"Liquid Chromatography," Lochmuller, C.H.; Wenzel, T.J.; in *Physical Methods in Chemistry*, Wiley, **1993**, pp. 85-161.

*Research in Chemistry at Primarily Undergraduate Institutions, Fifth Edition*, Wenzel, T.J., Editor, Council on Undergraduate Research, **1993**. ISBN #0-941933-09-1, 346 pp.

*NMR Shift Reagents*, Wenzel, T.J.; CRC Press, Uniscience Series, **1987**, 286 pp.

"Binuclear Lanthanide(III)-Silver(I) NMR Shift Reagents," Wenzel, T.J.; Chapter 5 in *Lanthanide Shift Reagents in Stereochemical Analysis*, Verlag Chemie, **1986**, 151-173.

### **PUBLICATIONS (OTHER)**

"A Reviewer's Perspective on the NSF REU Program," in *Council on Undergraduate Research Quarterly*, **2003**, 23, 162-164.

From the Editor-in-Chief in *Council on Undergraduate Research Quarterly*, **2003**, 23, 151.

"News Item: Art Ellis Begins Term as Director of the Division of Chemistry of the National Science Foundation," in *Council on Undergraduate Research Quarterly*, **2002**, 23, 99.

"Report from CUR 2002: Workshops and Funding Opportunities," in *Council on Undergraduate Research Quarterly*, **2002**, 23, 6-7.

"Posters on the Hill: How One Person's Vision and Persistence Paid Off," in *Council on Undergraduate Research Quarterly*, **2002**, 22, 178.

"The NSF Course, Curriculum, and Laboratory Improvement Program," in *Council on Undergraduate Research Quarterly*, **2002**, 22, 100.

"New Features for the *CUR Quarterly*," in *Council on Undergraduate Research Quarterly*, **2001**, 22, 52.

Review of the book "Academic Excellence: The Role of Research in the Physical Sciences at Undergraduate Institutions" in *Council on Undergraduate Research Quarterly*, **2001**, 22, 24-26.

"What is an Appropriate Teaching Load for a Research-Active Faculty Member at a Predominantly Undergraduate Institution?," Wenzel, T.J., *Council on Undergraduate Research Quarterly*, **2001**, 21, 104-107.

Review of the textbook "Analytical Chemistry" in *Analytical Chemistry*, **1999**, 71, 212A-213A.

"What is Undergraduate Research," President's Column, *Council on Undergraduate Research Quarterly*, **1996**, 17, 163.

President's Column, *Council on Undergraduate Research Quarterly*, **1996**, 17, 111.

"New Directions for CUR," President's Column, *Council on Undergraduate Research Quarterly*, **1996**, 17, 59.

"Highlights: CUR's Sixth National Conference," Wenzel, T.J.; Gaddini, S., *Council on Undergraduate Research Quarterly*, **1996**, 17, 30-31.

President's Column, *Council on Undergraduate Research Quarterly*, **1996**, 17, 7.

"The Fifth National CUR Conference. The Bottom Line: Creating and Maintaining a Healthy Undergraduate Research Environment," Wenzel, T.J.; Mateja, J., *Council on Undergraduate Research Quarterly*, **1993**, 14, 87-92.

"Sources of Research Funding Primarily for Chemists," *Council on Undergraduate Research Newsletter*, **1991**, 12, 83-93.

"Sources of Research Funding Primarily for Chemists," *Council on Undergraduate Research Newsletter*, **1990**, 11, 88-95.

"Sources of Research Funding Primarily for Chemists," *Council on Undergraduate Research Newsletter*, **1989**, 10, 82-92.

"Research in Analytical Chemistry at Bates College," Wenzel, T.J., *Council on Undergraduate Research Newsletter*, **1988**, 9, 27-33.

#### **GRANTS - EXTERNAL**

- 2003-2007** National Science Foundation - \$185,000  
"Chiral NMR Shift Reagents"
- 2002-2005** Camille and Henry Dreyfus Foundation - \$105,000  
"Scholar/Fellow Program"
- 2002-2004** National Science Foundation - \$78,630  
"Undergraduate Research Summit: Bates College, Lewiston, ME; Summer 2003"
- 2001-2004** National Science Foundation - \$246,700  
"Acquisition of a High Field Nuclear Magnetic Resonance Spectrometer for Use in Chemistry Research" (Partially matched by Bates)
- 2001** – Pfizer Pharmaceutical - \$5,000  
"Chiral Calixarenes as NMR Shift Reagents"
- 2000** – National Science Foundation - \$134,250  
"Chiral NMR Shift Reagents"
- 1999** – National Science Foundation - \$74,404  
"General Chemistry in the Study of the Environment" (Matched by Bates)
- 1998** – National Science Foundation - \$21,789  
"Capillary Electrophoresis in the Undergraduate Curriculum in Chemistry and Biological Chemistry" (Matched by Bates)

- 1997** – National Science Foundation - \$128,500  
"Chiral NMR Shift Reagents"
- 1997** – Pfizer Pharmaceutical - \$5,000  
"Lanthanide-Cyclodextrin Complexes as Chiral NMR Shift Reagents"
- 1996** – Pfizer Pharmaceutical - \$5,000  
"Mixed Lanthanide  $\beta$ -Diketonate-Resolving Agent Complexes as Chiral NMR Shift Reagents"
- 1996** – Auburn Manufacturing - \$3,000  
"Support for the Executive Committee Meeting, Council of Undergraduate Research"
- 1995** – National Science Foundation - \$7,890  
"Chiral NMR Shift Reagents" - Supplement to purchase equipment
- 1995** – Pfizer Pharmaceutical - \$5,000  
"Crown Ethers as Chiral NMR Shift Reagents"
- 1994** – National Science Foundation \$124,700  
"Chiral NMR Shift Reagents"
- 1994** – National Science Foundation - \$74,875  
"Instrumentation for Geochemical Study of Water, Soil, and Rock in an Undergraduate Curriculum" [Co-PI] (Matched by Bates College)
- 1994** – Kraft General Foods - \$36,350  
"Data System for Gas Chromatograph-Mass Spectrometer"
- 1993** – New England Consortium for Undergraduate Science Education - \$1,160  
"Travel support to the National Conference on Undergraduate Research - Two Students"
- 1993** – New England Consortium for Undergraduate Science Education - \$10,000  
"Support for Speakers at the Fifth National Conference of the Council on Undergraduate Research"
- 1992** – National Science Foundation - \$5,000  
"Chiral NMR Shift Reagents - Research Experience for Undergraduates"
- 1992** - Camille and Henry Dreyfus Foundation - \$15,000  
"Summer Research Program for High School Teachers"
- 1992** – Pfizer Pharmaceutical - \$5,000  
"Chiral NMR Shift Reagents"

- 1992** – Council on Undergraduate Research (AIURP Program) - \$2,500  
"Chiral NMR Shift Reagents"
- 1992** – Auburn Manufacturing - \$2,500  
"Support for the Fifth National Conference on Undergraduate Research"
- 1991** – National Science Foundation - \$88,800  
"Chiral NMR Shift Reagents"
- 1991** – American Chemical Society - \$300  
"Selective Sorbents for Gas Chromatography" (ACS Polymer Division)
- 1991** – Pfizer Pharmaceutical - \$4,000  
"Selective Sorbents for Gas Chromatography"
- 1991** – Briston-Myers Squibb Company - \$1,500  
"Lanthanide Luminescence Detection of Bleomycins"
- 1990** – Camille and Henry Dreyfus Foundation - \$45,000  
"Grant Program in Chemistry for Liberal Arts Colleges" (Post-doctoral mentor program)
- 1990** – National Science Foundation - \$140,800  
"High Field Nuclear Magnetic Resonance Spectrometer" [Co-PI] (Partially matched by Bates College)
- 1990** – Research Corporation - \$21,500  
"Lanthanide-Cyclodextrin Complexes as Chiral NMR Shift Reagents"
- 1987** – National Science Foundation - \$27,710  
"Gas Chromatograph-Mass Spectrometer" (Matched by Bates College)
- 1986** – National Science Foundation - \$11,000  
"Spectrofluorometer for Biochemical Research" (Matched by Bates College)
- 1986** – Research Corporation - \$9,000  
Lanthanide Ions as Luminescent Chromophores for Liquid Chromatographic Detection"
- 1985** – National Science Foundation - \$12,592  
"Gradient High Performance Liquid Chromatograph" (Matched by Bates College)
- 1985** – Petroleum Research Fund - \$15,000  
"Polymeric Metal Chelates as Selective Sorbents and Stationary Phases for Gas Chromatography"
- 1985** – American Chemical Society - \$750  
"Project SEED Program" (To hire a high school student for the summer)

- 1984** – Petroleum Research Fund - \$2,000  
 "American Chemical Society-Petroleum Research Fund Summer Research Fellowship"  
 (to hire a visiting student fellow)
- 1983** – Research Corporation - \$5,875  
 "Lanthanide Ions as Fluorescent Probes in Liquid Chromatographic Detection"
- 1983** – Petroleum Research Fund - \$15,000  
 "Polymeric Metal Chelates as Selective Sorbents and Stationary Phases for Gas Chromatography"
- 1983** – National Science Foundation - \$21,425  
 Gas Chromatograph for the Study of Polymeric Metal Chelates as Sorbents and Stationary Phases"
- 1982** – Pittsburgh Conference - \$2,000  
 "R.K. Scott Memorial Award" (To purchase equipment to update the instructional laboratory in analytical chemistry.)
- 1981** - Research Corporation - \$10,000  
 "Lanthanide Ions as Fluorescent Probes in Liquid Chromatographic Detection"

### **GRANTS - INTERNAL**

#### Roger C. Schmutz Faculty Grants:

- |      |           |                                                                          |
|------|-----------|--------------------------------------------------------------------------|
| 1981 | (\$500)   | "Selective Sorbents for the Simplification of Complex Gas Chromatograms" |
| 1982 | (\$500)   | "Improved Chiral Nuclear Magnetic Resonance Shift Reagents for Olefins"  |
| 1983 | (\$1,000) | "Selective Sorbents for Gas Chromatography"                              |
| 1984 | (\$1,000) | "NMR Shift Reagents for Organohalides and Organosulfides"                |
| 1985 | (\$1,000) | "Lanthanide Ions as Luminescent Detection Chromophores"                  |
| 1986 | (\$1,000) | "Structural Studies with Binuclear Shift Reagents"                       |
| 1989 | (\$1,000) | "Metal Chelate Polymers as Selective Sorbents for Gas Chromatography"    |
| 1994 | (\$700)   | "Solid Phase Lanthanide Luminescence Detection in Liquid Chromatography" |

President's Discretionary Award:

- 1985 (\$2,500) "Book entitled NMR Shift Reagents"
- 1988 (\$2,500) "Support for Sabbatical Leave at Duke University"
- 1992 (\$2,500) "Summer Student Stipend Support"

Dana Apprentice Program:

- 1986 (\$2,500) "Structural Analysis of Chemical Compounds"

Mellon Summer Research Grant:

- 1991 (\$3,000) "Dietary Reconstruction from Chemical Residues on Prehistoric Pottery"
- 1993 (\$3,000) "Lanthanide Luminescence Detection in Liquid Chromatography"

Mellon Professional Development Grant:

- 1991 (\$2,000) "Lanthanide Luminescence Detection in Liquid Chromatography (to undertake research at the Free University in Amsterdam during a Short Term leave)"

Hughes Grant:

- 1994 (\$8,000) "Lanthanide Luminescence Detection in Liquid Chromatography"
- 2000 (\$15,000) "Lanthanide-Crown Ether Couples as Chiral NMR Shift Reagents"
- 2001 (\$14,475) "High Performance Liquid Chromatography in the Chemistry Curriculum"
- 2003 (\$13,540) "Carboxymethylated Cyclodextrins and their Lanthanide Complexes as Chiral NMR Shift Reagents"

Faculty Development Grant:

- 1997 (\$10,000) To develop a new introductory course entitled "Chemical Structure and its Importance in the Environment"

Phillip J. Otis Faculty Curricular Development Grant:

- 1997 (\$2,500) To develop a new introductory course entitled "Chemical Structure and its Importance in the Environment."

Merck Grant:

1999 (\$5,500) “Calixarenes and Resorcarenes as Chiral NMR Shift Reagents”

Student Research Apprenticeship:

2000 (\$3,000) “Gendered Language in the Presentation of Acid-Base Chemistry”

**PRESENTATIONS**

“Teaching and Research at an Undergraduate Institution,” University of New Hampshire, April 11, **2003** (Invited).

“Writing a Follow-on Grant Proposal,” CUR Dialogue: The Art of Grantmanship, Fairfax, VA, Feb. 23-25, **2003** (Invited).

“NSF Research in Undergraduate Institutions (RUI) and Research Opportunities Awards (ROA) Programs,” CUR Dialogue: The Art of Grantmanship, Fairfax, VA, Feb. 23-25, **2003** (Invited).

“Proposal Writing: Tales from the Trenches,” CUR Dialogue: The Art of Grantmanship, Fairfax, VA, Feb. 23-25, **2003** (Invited opening plenary address).

“The Use of Lanthanide-Chiral Solvating Agent Couples as Chiral NMR Shift Reagents,” Bowdoin College, Nov. 15, **2002** (Invited).

“The Use of Lanthanide-Chiral Solvating Agent Couples as Chiral NMR Shift Reagents,” University of South Dakota, Nov. 4, **2002** (Invited).

“Panel Presentation: Models of Undergraduate Research and Creative Activity: A Dialogue with CUR Presidents,” University of South Dakota, Nov. 4, **2002** (Invited).

“Panel Presentation: Problem-Based Learning in Analytical Chemistry,” Federation of Analytical Chemistry and Spectroscopy Societies meeting, Providence, RI, Oct. 13-17, **2002** (Invited).

“Lanthanide-Chiral Solvating Agent Couples as Chiral NMR Shift Reagents,” 14<sup>th</sup> International Symposium on Chirality, Hamburg, Germany, Sept. 8-12, **2002** (Invited plenary address).

“What’s Involved in Doing ‘Productive’ Undergraduate Research at a Predominantly Undergraduate Institution,” 17<sup>th</sup> Biennial Conference on Chemical Education, Bellingham, WA, July 28 - August 1, **2002** (Invited).

“Analytical Science: Teaching in Ways that Promote Better Learning,” Education Forum 2002, Problem-Based Learning: The Way Forward, Royal Society of Chemistry, University of Huddersfield, United Kingdom, July 3, **2002** (Invited plenary address).

“Right-handed Sugar Doughnuts: Nutritional Food for Undergraduates,” Council on Undergraduate Research Fellows Award Address, CUR 2002 National Conference, New London, CT, June 19-22, **2002** (Invited).

“Funding Undergraduate Research: Importance and Availability of External Sources of Support,” American Chemical Society, National Conference, Orlando, FL, Apr. 7-10, **2002** (Invited).

“Undergraduate Research at Undergraduate Institutions: ‘Talking the Talk’ and ‘Walking the Walk’”, American Chemistry Society, National Conference, Orlando, FL, Apr. 7-10, **2002** (Invited).

“Curricular Reform in Analytical Chemistry,” University of Michigan, Nov. 30, **2001** (Invited).

“Problem-Based Learning in Analytical Chemistry: Panel Presentation,” American Chemical Society, National Conference, Chicago, IL, Aug. 26-29, **2001** (Invited).

“Impact of ILI and CCLI Awards on the General and Analytical Chemistry Curriculum at Bates College,” American Chemical Society, National Conference, Chicago, IL, Aug. 26-29, **2001** (Invited).

“What is Undergraduate Research,” Practice-Oriented Education Conference, Boston, MA, Apr. 25-27, **2001** (Invited).

“Problem-based Learning in Analytical Chemistry,” Pacifichem Conference, Honolulu, HI, Dec. 14-19, **2000** (Invited).

“Undergraduate Analytical Chemistry: Lessons from the Second Millennium as a Guide for Teaching in the Third,” Eastern Analytical Symposium, Atlantic City, NJ, Oct. 29-Nov. 3, **2000** (Invited).

“The Role of Textbooks in Problem-based Learning,” Federation of Analytical Chemistry and Spectroscopy Societies Conference, Nashville, TN, Sept. 24-28, **2000** (Invited).

“Succeeding as a Faculty Member at an Undergraduate Institution,” American Chemical Society, National Conference, Washington, DC, Aug. 19-23, **2000** (Invited)

“Best Practices in Analytical Chemistry - Panel Presentation,” Federation of Analytical Chemistry and Spectroscopy Societies Conference, Vancouver, BC, Oct. 24-29, **1999** (Invited).

“All the World’s a Sample,” American Chemical Society, National Conference, New Orleans, LA, Aug. 22-26, **1999** (Invited - Award Address)

“Active Learning in Analytical Chemistry,” American Chemical Society, National Conference, New Orleans, LA, Aug. 22-26, **1999** (Invited - Award Symposium)

“Lanthanide-Crown Ether Couples as Chiral NMR Shift Reagents” 11<sup>th</sup> International Symposium on Chiral Discrimination, Chicago, IL, July 25-28, **1999**.

“Institutionalizing Undergraduate Research: Why Its Important and Elements of Some Successful Program,” Northeastern University, December 1, **1998** (Invited).

“Undergraduate Research: Chemistry Education at its Best,” American Chemical Society, National Conference, Boston, MA, Aug. 23-26, **1998** (Invited)

“A New Approach to Teaching Undergraduate Analytical Chemistry,” American Chemical Society, National Conference, Boston, MA, Aug. 23-26, **1998** (Invited)

“A New Approach to Teaching Undergraduate Analytical Chemistry,” Pittsburgh Conference, New Orleans, LA, Feb. 28-March 4, **1998** (Invited).

“A New Approach to Teaching Undergraduate Analytical Chemistry,” University of Colorado, December 8, **1998** (Invited).

"A New Approach to Undergraduate Analytical Chemistry," at the Macro-Research Opportunity Awards Reunion, University of Kansas, July 10-12, **1997** (Invited guest speaker)

"A New Approach to Undergraduate Analytical Chemistry," at an NSF-sponsored workshop entitled "Curricular Development in Analytical Sciences," Atlanta, GA, Mar. 13-15, **1997** (Invited).

"Undergraduate Analytical Chemistry: Relegating the Quant/Instrumental Mentality to the Scrap Heap," University of New Hampshire, January 30, **1997** (Invited)

"Undergraduate Analytical Chemistry: Relegating the Quant/Instrumental Mentality to the Scrap Heap," 14th Biennial Conference on Chemical Education," Clemson, SC, Aug. 4-8, **1996**

"Undergraduate Research: Chemistry Education at Its Best," 14th Biennial Conference on Chemical Education," Clemson, SC, Aug. 4-8, **1996** (Invited)

"Lanthanide-Cyclodextrin Complexes as Chiral NMR Shift Reagents," 22nd Annual Conference of the Federation of Analytical Chemistry and Spectroscopy Societies, Cincinnati, OH, Oct. 15-20, **1995** (Invited).

"The Status of Undergraduate Research in Colleges and Universities," Sixth Annual Student/Faculty Research Days, University of New England, Biddeford, ME, May 4-5, **1995** (Invited Keynote Address).

"Mechanism and Use of Cyclodextrin-Lanthanide Ion Chelates as Chiral NMR Shift Reagents," Sixth National Conference on Chiral Discrimination, St. Louis, MO, Apr. 26-28, **1995** (Invited Keynote Address).

"Teacher-Scholar vs. Scholar-Teacher," Ninth National Conference on Undergraduate Research, Union College, Schenectady, NY, April 20-22, **1995** (Invited Panel Participant).

"An Alternative Format for Teaching Analytical Chemistry to Undergraduates," Fifth National Conference of the Council on Undergraduate Research, Lewiston, ME, June 23-25, **1994** (Invited).

"Lanthanide-Cyclodextrin Complexes as Chiral NMR Shift Reagents," Free University (Amsterdam), April 11, **1994** (Invited).

"Selective Sorbents for the Pre-Treatment of Environmental Samples," Bowdoin College, February 10, **1994** (Invited).

"The Role of the Council on Undergraduate Research in the Undergraduate Research Program," Eastern Analytical Symposium, Somerset, NJ, Nov. 15-18, **1993** (Invited).

"Supercritical Fluid Extraction of Metal-Containing Selective Sorbents," Free University (Amsterdam), July 8, **1993** (Invited).

"Chiral NMR Shift Reagents," Colby College, April 6, **1993** (Invited).

"NEAACCC Inspiration - An Alternative Format for Teaching Analytical Chemistry to Undergraduates," New England Academic Analytical Chemistry Conference, Fairhaven, MA, Oct. 23-24, **1992**.

"Supercritical Fluid Extraction of Metal Chelate Polymers," Saint Joseph College, Oct. 22, **1992** (Invited).

"Supercritical Fluid Extraction of Metal-Containing Selective Sorbents," New England Academic Analytical Chemistry Conference, Kennebunkport, ME, Oct. 25-26, **1991**.

"NMR Shift Reagents - New Approaches to Chiral Resolution," University of Massachusetts at Amherst, Oct. 22, **1991** (Invited).

"Lanthanide Luminescence Detection in Liquid Chromatography," Bowdoin College, Mar. **1991** (Invited).

"Chiral Lanthanide NMR Shift Reagents," New England Academic Analytical Chemistry Conference, Bolton Valley, VT, Nov. 2-3, **1990**.

"Spectroscopic Studies of Pyrene on Silica Interfaces," University of Vermont, Nov. 1, **1990** (Invited)

"Spectral Anomalies in Pyrene Luminescence in Adsorbed and Covalently-Bound States", Pittsburgh Conference, Atlanta, GA, Mar. 3-7, **1989**.

“HPLC in the Undergraduate Curriculum in Chemistry,” National American Chemical Society Meeting, New Orleans, August 30-September 4, **1987**.

“The Use of Terbium(III) and Europium(III) as Luminescent Chromophores for Liquid Chromatographic Detection,” Rocky Mountain Conference on Analytical Chemistry, Denver, CO, August 4-7, **1986**. (Invited)

“The Use of Terbium(III) and Europium(III) as Luminescent Chromophores for Liquid Chromatographic Detection,” Tenth International Symposium on Column Liquid Chromatography, San Francisco, CA, May 18-23, **1986**.

“Metal Chelates as NMR Shift Reagents and Selective Sorbents for Gas Chromatography,” University of New Hampshire, October 11, **1983**. (Invited)

“Aqueous Relaxation Reagents for Carbon-13 and Nitrogen-15 NMR Spectroscopy,” Rocky Mountain Analytical Conference, Denver, CO, August **1981**.

“Water-Soluble Gadolinium(III) Chelates as NMR Paramagnetic Relaxation Reagents,” Second Chemical Congress of the North American Continent, Las Vegas, NV, August, **1980**.

“New Binuclear Shift Reagents for Altering NMR Spectra of Aromatic, Olefinic, and Halogenated Compounds, Rocky Mountain Analytical Conference, Denver, CO, August **1980**.

“Binuclear Complexes of Lanthanide(III) and Silver(I) and Their Function as Shift Reagents for Aromatic and Olefinic Compounds,” Southwest Regional American Chemical Society Meeting, Salt Lake City, UT, June **1980**.

“New Binuclear NMR Shift Reagents Effective for Altering the Spectra of Aromatic, Olefinic, and Phosphine Compounds,” National American Chemical Society Meeting, Houston, TX, March **1980**.

## **WORKSHOPS**

Short-course Leader: “Problem-Based Learning in Analytical Chemistry,” Pittsburgh Conference, March 9-14, **2003**, Orlando, FL.

Workshop Leader: “Problem-Based Learning Methods,” Education Forum 2002, Problem-Based Learning: The Way Forward, Royal Society of Chemistry, University of Huddersfield, United Kingdom, July 3, **2002**.

Workshop Leader: “Problem-Based Learning in Analytical Chemistry,” Pittsburgh Conference, March 17-21, **2002**, New Orleans, LA.

Workshop Leader: “Problem-Based Learning in Analytical Chemistry,” Pittsburgh Conference, March 4-8, **2001**, New Orleans, LA.

Workshop Leader: “Analytical Chemistry: Project-Based Laboratories,” July 9-21, **2000**, Bates College, Lewiston, ME. Organized through the Center for Chemical Education at Miami University, Ohio.

Workshop Leader: “Problem-Based Learning in Analytical Chemistry,” Pittsburgh Conference, March 11-13, **2000**, New Orleans, LA.

Workshop Leader: “Problem-Based Learning in Analytical Chemistry,” Pittsburgh Conference, March 7-8, **1999**, Orlando, Florida

Workshop Leader: “Problem-Based Learning in Analytical Chemistry,” Southeast Regional American Chemical Society Meeting, Nov. 6-8, **1998**, Research Triangle Park, North Carolina.

Workshop Leader: “Analytical Chemistry: Project-Based Laboratories,” July 6-17, **1998**, Bates College, Lewiston, ME. Organized through the Center for Chemical Education at Miami University, Ohio.

#### **CHAired SYMPOSIA**

“New Models for Conducting Research at Undergraduate Institutions,” American Chemical Society, Chemical Education Division, National Conference, New Orleans, LA, March 23-26, **2003**.

“Problem-Based Learning in Analytical Chemistry,” Federation of Analytical Chemistry and Spectroscopy Societies conference, Providence, RI, Oct. 13-17, **2002**.

“Problem-Based Learning in Analytical Chemistry,” American Chemical Society, Chemical Education Division, National Conference, Chicago, IL, Aug. 26-30, **2001**.

“Best Practices in Analytical Chemistry,” Federation of Analytical Chemistry and Spectroscopy Societies Conference, Vancouver, BC, Oct. 24-29, **1999**.

“Problem-Based Learning in Analytical Chemistry,” American Chemical Society, Analytical Division, National Conference, Boston, MA, Aug. 23-26, **1998**.

“NMR Spectroscopy,” 22nd Annual Conference of the Federation of Analytical Chemistry and Spectroscopy Societies, Cincinnati, OH, Oct. 15-20, **1995**.

“Advances in Chromatography” Rocky Mountain Conference on Analytical Chemistry, Denver, CO, August 4-7, **1986**.

**STUDENT PRESENTATIONS**  
**(by students working in my laboratory)**

“Carboxymethylated Cyclodextrins and their Lanthanide Complexes as Chiral NMR Solvating Agents,” American Chemical Society National Conference, New Orleans, LA, March 23-26, **2003** (Stella Aniagyei).

“Calix[4]arenes and Calix[4]resorcarenes as Chiral NMR Solvating Agents,” American Chemical Society National Conference, New Orleans, LA, March 23-26, **2003** (James Wilcox).

“Crown Ethers and their Ytterbium(III) Complexes as Chiral NMR Solvating Agents,” American Chemical Society National Conference, New Orleans, LA, March 23-26, **2003** (Bailey Freeman).

“Chiral Calixarenes and their Lanthanide Couples as Chiral NMR Shift Reagents,” American Chemical Society National Conference, Orlando, FL, Apr 7-10, **2002** (Kristin Smith)

“(+)-(18-Crown-6)-2,3,11,12-Tetracarboxylic Acid and Its Ytterbium(III) Complex as Chiral NMR Discriminating Agents,” National American Chemical Society Conference, San Francisco, CA, March 26-30, **2000** (Jolene Thurston)

“Lanthanide-Cyclodextrin Complexes as Chiral NMR Shift Reagents,” International Symposium on Chiral Discrimination, Chicago, IL, July 25-28, **1999** (Amanda Colby)

“Lanthanide-Chiral Carboxylate Complexes as Chiral NMR Shift Reagents,” International Symposium on Chiral Discrimination, Chicago, IL, July 25-28, **1999** (Laura DiLorenzo)

“Lanthanide-Crown Ether Couples as Chiral NMR Shift Reagents,” American Chemical Society National Conference, Boston, MA, August 23-27, **1998** (Melissa Vining)

“Synthesis of an Organic-Soluble Lanthanide-Encapsulating Ligand for use with NMR Spectroscopy,” Twelfth National Conference on Undergraduate Research, Salisbury, MD, April 23-25, **1998** (David Richard)

“Synthesis of an 18-Crown-6 Ether to be Used in Conjunction with Lanthanides as a Chiral Resolving Agent,” Twelfth National Conference on Undergraduate Research, Salisbury, MD, April 23-25, **1998** (Melissa Vining)

“A Study of Cyclodextrin Inclusion Complex Geometry Using NMR Spectroscopy,” Twelfth National Conference on Undergraduate Research, Salisbury, MD, April 23-25, **1998** (Jeffrey Troughton)

“Calixarenes as Chiral Resolving Agents in NMR Spectroscopy,” Twelfth National Conference on Undergraduate Research, Salisbury, MD, April 23-25, **1998** (Denby Johnson)

"Lanthanide Conjugates with Organic-Soluble Chiral Resolving Agents as NMR Shift Reagents," Eleventh National Conference on Undergraduate Research, Austin, TX, April 23-27, **1997** (Rhonda Crosson)

"Geometric Inclusion Studies of Cyclodextrin-Substrate Interactions Using NMR Spectroscopy," Eleventh National Conference on Undergraduate Research, Austin, TX, April 23-27, **1997** (Bethany Pond)

"Lanthanide-Chiral Carboxylate Complexes as NMR Shift Reagents," Eleventh National Conference on Undergraduate Research, Austin, TX, April 23-27, **1997** (Kathryn Brogan)

"Lanthanide-Crown Ether Couples as Chiral NMR Shift Reagents," Tenth National Conference on Undergraduate Research, Asheville, NC, April 18-20, **1996** (Sarah Weinstein)

"Lanthanide-Chiral Carboxylate Complexes as Chiral NMR Shift Reagents," Tenth National Conference on Undergraduate Research, Asheville, NC, April 18-20, **1996** (Kathryn Brogan)

"Lanthanide-Chiral Resolving Agent Mixtures as Organic-Soluble Chiral NMR Shift Reagents," 22nd Annual Conference of the Federation of Analytical Chemistry and Spectroscopy Societies, Cincinnati, OH, October 15-20, **1995** (Sarah Weinstein)

"Organic-Soluble Lanthanide Derivatives as Chiral Resolving Agents," Ninth National Conference on Undergraduate Research, Schenectady, NY, April 20-22, **1995** (Amy Bean)

"Utility of Relaxation Time Data with Cyclodextrin-Gadolinium(III) Complexes," Ninth National Conference on Undergraduate Research, Schenectady, NY, April 20-22, **1995** (Sarah Coulter)

"Cyclodextrin-Lanthanide Complexes as Chiral NMR Resolving Agents," Ninth National Conference on Undergraduate Research, Schenectady, NY, April 20-22, **1995** (Rebecca Miles)

"Solid-Phase Lanthanide Luminescence Detection in Liquid Chromatography," Ninth National Conference on Undergraduate Research, Schenectady, NY, April 20-22, **1995** (Brooke Perrins)

"Lanthanide Luminescence Detection of Bleomycins," Seventh National Conference on Undergraduate Research, Salt Lake City, UT, Mar 25-27, **1993**. (Sharon Rapkin)

"Lanthanide-Containing Chiral NMR Shift Reagents," Seventh National Conference on Undergraduate Research, Salt Lake City, UT, Mar 25-27, **1993**. (Sarah Dunham)

"Synthesis of Highly Luminescent Anion Exchange Lanthanide Complexes", 2nd Symposium on Undergraduate Research, Groningen, The Netherlands, Nov. 27, **1992** (Johannes Vissers)

"Metal Polymers as Selective Sorbents for Gas Chromatography, Sixth National Conference on Undergraduate Research, Minneapolis, MN, Mar 26-28, **1992**. (Karen Townsend)

"Chiral NMR Shift Reagents," Sixth National Conference on Undergraduate Research, Minneapolis, MN, Mar 26-28, **1992**. (Matthew Bogyo)

## **PROFESSIONAL ORGANIZATIONS AND ACTIVITIES**

*Analytical Chemistry* – Contributing Editor (Educational Topics) – (1999- )

American Chemical Society (1978- )

Analytical Division – Coordinator of Speaker’s Fund for Regional Meetings (2002- )

Analytical Sciences Digital Library – Advisory Board Member (2003- )

Council on Undergraduate Research (1989- )

Councilor - 1990-present

President-elect - 1995-1996

President - 1996-1997

Immediate Past-president - 1997-1998

Associate Editor, CUR Newsletter

Sources in Funding in Chemistry - 1989, 1990, 1991

Series: Research in Analytical Chemistry at Undergraduate Institutions

Editor: "Research in Chemistry at Primarily Undergraduate Institutions,"  
Fifth Edition, 1993.

Conference Co-Chair: "The Fifth National Conference of the Council on Undergraduate Research and First National Conference of CUR Kids," Bates College, June 23-25, 1994.

Workshop and Poster Coordinator: "The Seventh National Conference of the Council on Undergraduate Research," Occidental College, June 25-28, 1998

Coordinator: CUR Institute, "How to Institutionalize Undergraduate Research," University of North Carolina, Asheville, Nov. 15-17, 1996.

Coordinator: CUR Institute, "Concerns of Mid-Career Faculty," Bates College, May 8-10, 1998

Conference Co-chair, CUR 2004, The Tenth National Conference of the Council on Undergraduate Research," to be held at the University of Wisconsin, La Crosse

Editor-in-Chief, Council on Undergraduate Research Quarterly, 2001-

National Science Foundation, Chemistry Division Workshops

Curricular Developments in the Analytical Sciences, Atlanta, GA, March 13-15, 1997  
(Speaker/Participant)

Research Sites for Educators in Chemistry, Arlington, VA, March 8-10, 2002  
(Participant)

Undergraduate Research Centers, Arlington, VA, March 30- April 1, 2003(Participant)

Workshop on the Postdoctorate, Arlington, VA, May 11-13, 2003 (Member of the  
Steering Committee)