

Allan D. Headley, PhD

Dean, Graduate Studies & Research

Professor of Chemistry

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Education

Postdoc., 1983 (Chemistry) University of California, Irvine, CA

Ph.D., 1982 (Chemistry) Howard University, Washington, D. C.

B.A., 1976 (Chemistry) Columbia Union College, Takoma Park, MD

Administrative Positions

- Dean, Graduate Studies and Research, Texas A&M University-Commerce (2004- present)
- Associate Dean, The Graduate School, Texas Tech University (1999 – 2004)
- Program Director, The National Science Foundation, Arlington, VA (2002 – 2003)
- Associate Chair, Department of Chemistry & Biochemistry, Texas Tech (1996 – 1999)

Academic Positions

- Professor of Chemistry, Texas A&M University-Commerce (2004 – present)
- Professor of Chemistry, Texas Tech University, Lubbock, TX (2002 – 2004)
- Associate Professor of Chemistry, Texas Tech University, Lubbock, TX (1995 – 2002)
- Assistant Professor of Chemistry, Texas Tech University, Lubbock, TX (1989 – 1995)
- Lecturer in Chemistry, University of California, Irvine, CA (1987 – 1989)
- Lecturer in Chemistry, University of the West Indies, Jamaica (1983 – 1987)

Professional Activities

- Lead Graduate Dean, Federation of North Texas Area Universities (2008 – present)
- Council of Graduate Schools Membership Committee (2008 - present)
- Texas Higher Education Coordinating Board, Restricted Research Review Panel (2006 – present)
- Texas Higher Education Coordinating Board, Graduate Education Advisory Committee (2005-2008)
- American Association of State Colleges and Universities Grants Resource Center Advisory Board (2005 – 2007)
- Ad hoc reviewer for various chemistry journals, including, Journal of Organic Chemistry, Tetrahedron, Tetrahedron Letters, Organic Letters, Chemical Reviews.
- Ad hoc reviewer for various funding agency proposals, including The National Science Foundation, American Chemical Society Petroleum Research Fund.

Society Memberships

- American Chemical Society - Chair-Elect (1993); Chair (1994) and Immediate Past-Chair (1995) of the South Plains Local Section, member since 1980

- National Organization for the Professional Advancement of Black Chemist and Chemical Engineers, member since 1981
- National Technical Association, member since 1981
- International Group for Correlation Analysis in Chemistry, member since 1991

Honors and Awards

- Outstanding Professor of the Year 2001, Alpha Epsilon Delta (Premedical Honor Society)
- Outstanding Achievement Award, West Indies College Alumni Association
- Procter and Gamble Graduate Research Fellowship

Research Interests

- Design and synthesis of chiral ionic liquids and their application to asymmetric reactions
- Quantitative structure-property/activity relationships
- *Ab Initio* calculations

Teaching Experience

Undergraduate Courses

General Chemistry
Organic Chemistry (Honors and non-Honors)
Physical Chemistry
Biochemistry

Graduate Courses

Advanced Organic Chemistry
Physical Organic Chemistry
Reaction Mechanism (Special Topics)

Collaborators and Affiliations

- Graduate Advisor: Professor Martin Feldman, Howard University, Washington, DC.
- Postdoc Mentor: Professor Robert W. Taft (deceased).
- Collaborators: Professor Guigen Li, Texas Tech University.
- Postdocs supervised: Dr. Jaewook Nam, Dr. Bukuo Ni.
- Graduate students supervised: Dr. Stephen Starnes; Dr. Raji Ganesan; Dr. Saibabu Kotti; Nichole Jackson, M.Sc; Eric Cheung, M.Sc; Satish Kumar M.Sc.
- Undergraduate research theses supervised: Erica Parker, Shenyl Porter, Regina Sandoval, Kimberly Kehoe, Casey Frizzel, Sharon Williams, Binita Patel, Rita Corona, Brittney McDaniel, Syam. B.Challapalli, Patricia Malone, Sean Jackson, Stephen Starnes, Mike McMurry.

Refereed Publications

1. Zhang, Q.; Ni, B.; Headley, A. D. *Tetrahedron* **2008**, 64, 5091-5097. *Asymmetric Michael Addition Reactions of Aldehyde with Nitrostyrenes Catalyzed by Functional Chiral Ionic Liquids.*
2. Bukuo, N.; Zhang, Q.; Headley, A. D. *Tet. Let.* **2008**, 49, 1249-1252. *Pyrrolidine-Based Chiral Pyridinium Ionic Liquids (ILs) as Recyclable and Highly Efficient Organocatalysts for the Asymmetric Michael Addition Reactions.*
3. Ni, B.; Zhang, Q.; Headley, A. D. *Tet. Asymmetry* **2007**, 18, 1443-1447. *Highly Enantioselective Michael Addition of Ketones to Nitroolefins Catalyzed by (S)-Pyrrolidine Arenesulfonamide.*
4. Headley, A. D.; Ni, B. *Aldrichimica ACTA*, **2007** 40(4), 107-117. *Imidazolium Ionic Liquids: Synthesis and their Influence on the Outcome of Organic Reactions.*

5. Ni, B.; Zhang, Q.; Headley, A. D. *Green Chemistry* **2007**, 9, 737-739. *Functionalized Chiral Ionic Liquid as Efficient Organocatalyst for Asymmetric Michael Addition to Nitroalkenes.*
6. Ni, B.; Garre, B.; Headley, A. D. *Tet. Lett.* **2007**, 48, 1999-2002. *Design and Synthesis of Fused-Ring Chiral Ionic Liquids from Amino acid Derivatives.*
7. Wang, Y-N.; Ni, Bukuo.; Headley, A. D.; Li, G. *Adv. Synth. Catal.* **2007**, 349, 319 – 322. *Ionic Liquid, [bmim][N(SO₂CF₃)₂] Resulted in the First catalyst-Free Aminohalogenation of Electron-Deficient Alkenes.*
8. Headley, A. D.; Kotti, S. R. R. S.; Ni, B. *Heterocycles.* **2007**, 71(3), 589-596. *Solvation Effects on Imidazolium Salts with Alkyl Side Chains.*
9. Ni, B.; Headley, A. D. *Tet. Lett.* **2006** 47, 7331-7334. *Novel Imidazolium Chiral Ionic Liquids That Contain a Urea Functionality.*
10. Ni, B.; Zhang, Q.; Headley, A. D. *J. Org. Chem.* **2006**, 71, 9857-9860. *Design and Synthesis of Pyridinium Chiral Ionic Liquids Tethered to a Urea Functionality.*
11. Ni, B.; Headley, A. D.; Li, G. *J. Org. Chem.* **2005**, 70, 10600-10602. *Design and Synthesis of C-2 Substituted Chiral Imidazolium Ionic Liquids from Amino Acid Derivatives.*
12. Headley, A. D.; Kotti, S. R. R. S.; Nam, J.; Li, K. *J. Phys. Org. Chem.* **2005**, 18, 1018-1022. *Effect of hydrophobic side-chains on the solvation of imidazolium salts.*
13. Xu, X.; Kotti, S.R.S.S.; Liu, J.; Cannon, J. F.; Headley, A. D.; Li, G. *Org. Lett.* **2004**, 6, 4877-4879. *Ionic Liquid Media Resulted in the First Asymmetric Aminohalogenation Reaction of Alkenes.*
14. Kotti, S.R.S.S.; Xu, X.; Wang, Y.; Headley, A. D.; Li, G. *Tetrahedron Lett.* **2004**, 45, 7209-7212. *Ionic Liquid Media Resulted in More Efficient Regio- and Stereoselective Aminohalogenation of Cinnamic Esters.*
15. Chen, D.; Timmons, C.; Liu, J.; Headley, A. D.; Li, G. *Eur. J. Org. Chem.* **2004**, 15, 3330-3335. *The First Enantioselective Halo Aldol Reaction of Allenates and Aldehydes.*
16. Timmons, C.; Cannon, J. F.; Headley, A. D.; Li, G. *Org. Lett.* **2004**, 6, 2075-2078. *New Asymmetric Halo Aldol Reaction Provides a Novel Approach to Biologically Important Chiral Cyclohexanes and Cycloamines.*
17. Saibabu Kotti, S. B. S.; Xu, Xin.; Li, G.; Headley, A. D. *Tetrahedron Letters*, **2004**, 45, 1427-1431. *Efficient Nucleophilic Substitution Reactions of Highly Functionalized Allyl Halides in Ionic Media.*
18. Pei, W.; Wei, H-X, Headley, A. D.; Li, G. *J. Org. Chem.* **2003**, 68, 8404-8408. *N,N-Dichloro-2-Nitrobenzenesulfonamide (2-NsNCl₂) as the Electrophilic Nitrogen Source for Direct Diamination of Enones.*
19. Karur, S.; Kotti, S. R. S. S.; Xu, X.; Cannon, J. F.; Headley, A. D.; Li, G. *J. Am. Chem. Soc.* **2003**, 125 (44), 13340-13341. *A Novel Catalytic Reaction of Alkynes via Multiple-Site Functionalization.*
20. Li, G.; Xu, X.; Chen, D.; Timmons, C.; Carducci, M. D.; Headley, A. D.; Li, G. *Organic Letters*, **2003**, 5(3), 329. *Asymmetric Halo Aldol Reactions (AHA).*
21. Karur, S.; Hardin, J.; Headley, A. D.; Li, G. *Tetrahedron Letters*, **2003**, 44, 2991-2994. *A Novel Approach to Mortia-Baylis-Hillman (MBS) Lactones via the Lewis Acid-Promoted Couplings of α,β -Unsaturated Lactone with Aldehydes.*
22. Headley, A. D.; Ganesan, R.; Nam, J. *Bioorganic Chemistry*, **2003**, 31, 97. *The Effect of the Cyclopropyl Group on the Conformation of Chemotactic Formyl Tripeptides.*
23. Headley, A. D.; Jackson, N. M. *J. Phys. Org. Chem.* **2002**, 15, 52. *The Effect of the Anion on the Chemical Shifts of the Aromatic Hydrogens of Liquid 1-Butyl-3-Methylimidazolium Salts.*

24. Headley, A. D.; Nam, J. J. *Mol. Struct. (THEOCHEM)* **2002**, 589, 423. *A Theoretical Analysis of Substituted Formamide Conformers.*
25. Headley, A. D.; Nam, J. J. *Phys. Org. Chem.* **2002**, 15, 62. *Analysis of the Basicity of Substituted Dimethylamines in Different Solvents by Theoretical Descriptors.*
26. Headley, A. D.; Starnes, S. D. *J. Mol. Struct. (THEOCHEM)*, **2001** 572, 89. *Conformational Analysis of α -Trifluoroalanine: A Theoretical Study.*
27. Headley, A. D.; Starnes, S. D. *J. Compt. Chem.* **2000**, 21(6), 426. *Conformational Analysis of Fluoroglycine.*
28. Headley, A. D.; Starnes, S. D. *J. Mol. Struct. (THEOCHEM)*, **2000**, 507, 281. *Anomeric Effect in Difluoroglycine.*
29. Headley, A. D.; Starnes, S. D. *J. Mol. Struct. (THEOCHEM)*, **1999**, 467, 95. *Theoretical Investigations of the Gas Phase Tautomerization of Sarcosine.*
30. Headley, A. D.; Starnes, S. D. *J. Phys. Org. Chem.* **1999**, 12, 289. *The Nature of the Association of Phenylglycine in Water.*
31. Headley, A. D.; Starnes, S. D. *J. Mol. Struct. (THEOCHEM)*, **1998**, 453, 247. *Theoretical Studies on the Gas Phase Tautomerization of N,N-Dimethylglycine.*
32. Headley, A. D.; Corona, R. E.; Cheung, E. T. *J. Phys. Org. Chem.* **1997**, 10, 898. *Effects of Solvents on the Tautomerization of N,N-Dimethylglycine.*
33. Headley, A. D.; Petal, B.; Cheung, E. T. *Tetrahedron Lett.* **1996**, 37, 6673. *Solvation Effects of the Tautomerization of N,N-Dimethylvaline.*
34. Headley, A. D.; Starnes, S. D. *J. Mol. Struct. (THEOCHEM)*. **1996**, 370, 147. *Conformational Analysis of N-Methylglycine and N,N-Dimethylglycine by ab Initio Calculations.*
35. Headley, A. D.; Starnes, S. D. *J. Am. Chem. Soc.* **1995**, 117, 9309. *The Effects of Branching on the Tautomeric Equilibrium of Amino Acids.*
36. Headley, A. D.; Starnes, S. D.; Cheung, E. T.; Malone, P. L. *J. Phys. Org. Chem.* **1995**, 8, 26. *Solvation Effects on the Relative Basicity of Propylamines.*
37. Headley, A. D.; Starnes, S. D.; Wilson, L. Y.; Famini, G. R. *J. Org. Chem.* **1994**, 59, 8040. *Analysis of Solute/Solvent Interactions for the Acidity of Acetic Acids by Theoretical Descriptors.*
38. Headley, A. D.; McMurry, M. E.; Starnes, S. D. *J. Org. Chem.* **1994**, 59, 1863. *The Effects of Substituents on the Acidity of Acetic Acids.*
39. Headley, A. D.; McMurry, M. E. *J. Phys. Org. Chem.* **1994**, 7, 63. *The Influence of Solvents on the Basicity of Dipolar Amines.*
40. Headley, A. D. *J. Org. Chem.* **1991**, 56, 3688. *Quantitative Analysis of Solvation Effects and the Influence of Alkyl Substituents on the Basicity of Amines.*
41. Headley, A. D. *J. Chem. Soc., Perkin Trans. II.*, **1989**, 5, 457. *Solvation Effects of Dipolar Substituents in Close Proximity to a Charged Reaction Centre.*
42. Taft, R. W.; Abboud, J. L. M.; Anvia, F.; Berthelot, M.; Fujio, M.; Gal, J.-F.; Headley, A. D.; Henderson, W. G.; Koppel, I.; Qian, J. H.; Mishima, M.; Taagepera, M.; Ueji, S. *J. Am. Chem. Soc.*, **1988**, 110, 1797. *Regarding the Inherent Dependence of Resonance Effects of Strongly Conjugated Substituents on Electron Demand.*
43. Jinfeng, C.; Topsom, R. D.; Headley, A. D.; Koppel, I.; Mishima, M.; Taft, R. W.; Ueji, S. *J. Mol. Struct. (THEOCHEM)*, **1988**, 168, 141. *Acidities of Substituted Acetic Acids.*
44. Headley, A. D. *J. Org. Chem.*, **1988**, 53, 312. *Solvent Effects on the Basicity of Substituted Dimethylamines.*

45. Headley, A. D. *J. Am. Chem. Soc.*, **1987**, 109, 2347. *Substituent Effects on the Basicity of Dimethylamines.*
46. Hehre, W. J.; Pau, C.-F.; Headley, A. D.; Taft, R. W.; Topsom, R. D. *J. Am. Chem. Soc.*, **1986**, 108, 1711. *A Scale of Directional Substituent Polarizability Parameters from ab Initio Calculations of Polarizability Potentials.*

Non-refereed Publications

1. Headley, A. D.; Sheppard, E. J. *The Communicator, August-September 2002*, XXXV (7), 9. *The National Science Foundation Graduate Research Fellowship Program.*
2. Headley, A. D.; Jackson, N. M. Proceedings on the 28th Annual National Conference of the National Organization of Black Chemists and Chemical Engineers, Baltimore, MD., **2001**, 28, 91. *Properties of Ionic Liquids.*
3. Headley, A. D.; Starnes, S. D. *Trends in Organic Chemistry*; Council of Scientific Research Integration: India, **1998**, 7, 75. *Conformational Analysis of Amino Acid Tautomers.*
4. Headley, A. D.; Starnes, S. D.; Cheung, E. T. Proceedings of the 4th Annual Meeting of Solvent/Solute Interactions, *U. S. Army Chemical Research, Development and Engineering Center, Aberdeen Proving Ground, Md. 1994*, 106. *Solute/Solvent Interactions That Affect the Acidity and Basicity of Amino Acids.*
5. Headley, A. D. Proceedings of the 3rd Annual Meeting of Solvent/Solute Interactions, *U. S. Army Chemical Research, Development and Engineering Center, Aberdeen Proving Ground, Md. 1993*, 58. *Substituent and Solvation Effects on the Tautomeric Equilibrium of N,N-Dimethylamino Acids.*
6. Headley, A. D. *Trends in Organic Chemistry*; Vol 3, Council of Scientific Research Integration: India, **1992**, 27. *Solvation and Structural Effects on the Basicity of Amines.*
7. Headley, A. D. Proceedings of the 2nd Annual Meeting of Solute/Solvent Interactions, *U. S. Army Chemical Research, Development and Engineering Center, Aberdeen Proving Ground, Md., 1992*, 111. *Proton Transfer Reactions Involving Substituted Dimethylamines.*
8. Brown, E. R.; Headley, A. D.; Greenaway, A. M.; Magnus, K. E. *Jour. Geol. Soc. Jamaica. 1986*. VI, 156. *The Effects of Low-Molecular-Weight Organics on Precipitation efficiency.*
9. Headley, A. D. University Microfilms International. Ann Arbor, MI. USA, **1986**. *Reduction of Carbonyl Compounds by Cr(II).*

Significant Presentations and Invited Lectures

1. *Recruiting Historically Underrepresented Populations into the Sciences*, 3rd Annual Lone Star Colloquium, Lubbock, TX, March 28-29, 2008.
2. *Joint Research Projects and Technology*, Association of Texas Graduate Deans Annual Meeting, Lubbock, TX. October 27, 2005.
3. *Promoting a Culture of Graduate Education for the Twenty-First Century*, Albany State University, Albany GA, August 15, 2003.
4. *Building Alliances Among Historical Black Colleges and Universities*, Council of Historical Black Graduate Schools, Tampa, FL. February 21, 2003.
5. *National Science Foundation Graduate Research Fellowship Program, An Update*, Fellowship Roundtable Meeting, National Research Council, Washington, DC, May 10, 2002
6. *Applications of Quantitative Structure-Activity Relationships*, Texas Tech University, TX, September 19, 2001
7. *Properties of Ionic Liquids*, National Organization of Black Chemists and Chemical Engineers, Baltimore, MD, April, 12, 2001

8. *Analysis of the Properties and Conformation of Amino Acids and Formyl Peptides*, Southwest Missouri State University, Springfield, MO, February 26, 2001.
9. *Analysis of Amino Acid Tautomers*, Department of Physical Sciences, Barry University, April 5, 1999.
10. *Conformational Analysis of Amino Acid Tautomers*, 15th South West Theoretical Chemistry Conference, The University of North Texas, Denton, TX, November 19-21, 1998.
11. *Factors that Affect the Tautomerization of Amino Acids*, Department of Chemistry, University of the West Indies, Jamaica, April 10, 1997.
12. *Conformational Analysis of Selected Unnatural Amino Acids*, Texas Southern University, TX, November 3, 1995.
13. *Factors That Affect The Relative Stability of Amino Acid Tautomers in Different Media*, 210th National Meeting of the American Chemical Society, Chicago, Illinois, August 20 - 24, 1995.
14. *Analysis of the Acidic and Basic Properties of Compounds by Quantitative Structure Activity Relationships (QSAR)*. Central Michigan University, Mount Pleasant, MI, September 26, 1994.
15. *Solute/Solvent Interactions That Affect the Basicity and Acidity of Amino Acids* ERDEC Meeting on Solute/Solvent Interactions, Aberdeen Proving Ground, Maryland, June 1 - 3, 1994.
16. *The Role of Solute/Solvent Interactions on the Basicity and Acidity of Structurally Different Molecule*, Texas Tech University, TX, March 30, 1994.
17. *Substituent and Solvation Effects on the Tautomeric Equilibrium of N,N-Dimethylamino Acids*, ERDEC Meeting on Solute/Solvent Interactions, Aberdeen Proving Ground, Maryland, June 2 - 4, 1993.
18. *Substituent and Solvation Effects on the Tautomeric Equilibrium of Amino Acids*, Texas Tech University, April 7, 1993.
19. *The Nature of N,N-Dimethylamino Acids in Water and Dimethyl Sulfoxide*, 48th Southwest Regional Meeting of the American Chemical Society, Lubbock, Texas, October 21 - 23, 1992.
20. *Analysis of Amino Acids in Polar Media by NMR and IR Spectroscopy*, Texas Tech University, October 13, 1992.
21. *Proton Transfer Reactions Involving Substituted N,N-Dimethylamines* ERDEC Meeting on Solute/Solvent Interactions, Aberdeen Proving Ground, Maryland, May 27 - 29, 1992.
22. *Solvation Effects on the Acidities of Substituted Acetic Acids*, Texas Mechanisms Conference, Roundtree, Texas, October 11 & 12, 1991.
23. *Quantification of Nonspecific Interactions of Dipolar Amines*, Solute/Solvent Interactions Workshop, Laguna Beach, California, December 20 -23, 1988.
24. *Solvation Effects on the Basicity of Alkyl Substituted Amines*, Texas Tech University, December 7, 1988.
25. *Solvation Effects on the Basicity of Dipolar Substituted Amines*, University of California, Riverside, December 1, 1988.
26. *The Effects of Dipolar Substituents on the Basicity of Amines*, Atlanta University, April 11, 1988.
27. *The Effects of Alkyl Substituents on the Basicity of Amines*, Solute/Solvent Interactions Workshop, Irvine, California, December 20 -23, 1987.
28. *Substituent Effects on Proton Transfer Reactions in the Gas Phase*, The University of the West Indies (Mona), February 16, 1984.

Co-Author of Other Presentations

1. *Functionalized Chiral Ionic Liquids as Recyclable Organocatalyst for Asymmetric Michael Addition to Nitrostryenes.* Q. Zhang, B. Ni, A. D. Headley. 63rd Southwest Regional Meeting of The American Chemical Society, Lubbock, TX. November 4-6, 2007.
2. *Design and Synthesis of Chiral Imidazolium Ionic Liquids and Their Application in Asymmetric Baylis-Hillman Reactions.* S. Garre, E. Parker and A. D. Headley. 63rd Southwest Regional Meeting of The American Chemical Society, Lubbock, TX. November 4-6, 2007.
3. *Pyrrolidine-Based Chiral Pyridinium Ionic Liquids (ILs) and Recyclable and Highly Efficient Organocatalysts for Asymmetric Michael Addition Reactions.* B. Ni, Q. Zhang and A. D. Headley. 63rd Southwest Regional Meeting of The American Chemical Society, Lubbock, TX. November 4-6, 2007.
4. *Design and Synthesis of Novel Pyridinium Chiral Ionic Liquids Tethered to a Urea Functionality,* Bukuo Ni, Qianying Zhang, and Allan D. Headley. 62nd Southwest Regional Meeting of The American Chemical Society, Houston, TX. October 19-22, 2006,
5. *Design and Synthesis of Novel Fused-ring Chiral Ionic Liquids,* Satish Garre, Allan, D. Headley, and Bukuo Ni. 62nd Southwest Regional Meeting of The American Chemical Society, Houston, TX. October 19-22, 2006,
6. *Ab Initio Study of the Conformations and Tautomerization of N,N-Dimethylglycines: A Stable Zwitterion Amino Acid in the Gas Phase?* Starnes, D. S.; Headley, A. D. 52nd American Chemical Society Southwest Regional Meeting, Houston, TX. October 17-19, 1996.
7. *Using Theoretical Descriptors in QSAR and LFER: The Role of Solute/Solvent Interactions in Solubility, Acidity and Basicity,* Famini, G. R.; Headley, A. D.; Wilson, L. 205th ACS Meeting, San Diego, CA. March 13 - 18, 1994.
8. *One-Electron Reduction of Benzaldehyde by Chromium(II) and Vanadium (II) Perchlorate in Aqueous Ethanol,* Feldman, M. R.; Headley, A. D.; Cummings, G. C.; Parker, A., Jr. ACS National Meeting, Miami, FL. December 20 -23, 1988.

Administrative Grants

<u>Source</u>	<u>Title of Project</u>	<u>Period Covered</u>	<u>Amount</u>
CH Foundation	Scholarship Support for High School Teachers of the Graduate Multidisciplinary Science Program*	2001 – 2005	\$57,000
US Department of Education	A National Model for Inter-Institutional Postbaccalaureate Distance Education Programs#	2000 – 2003	\$1,073,779
National Black Graduate School Committee/TTU	13 th National Black Graduate School Conference, hosted by Texas Tech University*	2000 – 2001	\$150,000
Plum Foundation	The Henry J. Shine Lectureship (Texas Tech University)	1999 - 2002	\$9,000

*Co-Principal Investigator ; #Project Team Member

Extramural Research Grants

<u>Source</u>	<u>Title of Project</u>	<u>Period Covered</u>	<u>Amount</u>
Welch Foundation	Ionic Liquids, A New Class of	2006-2009	\$150,000

	Solvents for Organic Reactions		
Welch Foundation	Ionic Liquids, A New Class of Solvents for Organic Reactions	2003-2006	\$150,000
Welch Foundation	Ionic Liquids, A New Class of Solvents for Organic Reactions	2000-2003	\$145,000
National Science Foundation	Application of Structure Activity Relationships to Biological Systems	1999 - 2000	\$60,000
National Science Foundation	Analysis of Weak Hydrogen Bonds by FTIR Matrix Isolation	1994 - 1996	\$49,000
American Chemical Society	Asymmetric Synthesis of Unnatural Amino Acids	Summer 1993	\$1,500
National Science Foundation	Substituent and Solvation Effects on Proton Transfer Reactions	1991 - 1993	\$12,000