

## PROFESSOR MICHAEL C. FITZGERALD

*CURRICULUM VITAE* (August 2007)

Duke University  
Chemistry Department  
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### EDUCATION:

- 1989-1994 **University of Wisconsin.** Madison, Wisconsin, Ph.D.  
Ph.D. in Analytical Chemistry. (Thesis Advisor: Prof. Lloyd M. Smith)  
1985-1989 **Davidson College.** Davidson, North Carolina, B.S., Honors in Chemistry

### PROFESSIONAL POSITIONS:

- 2005-Present **Associate Professor** (Secondary Appointment) Department of Biochemistry  
Duke University Medical Center, Durham, NC  
2004-Present **Associate Professor**, Department of Chemistry, Duke University, Durham, NC  
2004-Present **Member**, Center for Biomolecular and Tissue Engineering, Duke University,  
Durham, NC  
1999-Present **Member**, Center for Chemical Biology, Duke University Medical Center,  
Durham, NC  
1999-Present **Member**, Cancer Center, Duke University Medical Center, Durham, NC  
2001-2005 **Assistant Professor** (Secondary Appointment) Department of Biochemistry  
Duke University Medical Center, Durham, NC  
1998-2004 **Assistant Professor**, Department of Chemistry, Duke University, Durham, NC  
1994-1998 **Post-Doctoral Research Fellow.** The Scripps Research Institute, La Jolla, CA  
Analytical and Synthetic Protein Chemistry, (Advisor: Dr. Stephen B.H. Kent)

### HONORS:

- 2001 NSF Presidential Early Career Award for Scientists and Engineers (PECASE)  
2001 Research Award, American Society of Mass Spectrometry  
1999 Research Innovation Award, Research Corporation  
1995-1997 NIH National Service Research Award  
1993 Charles N. Reilley-Upjohn Outstanding Analytical Graduate Student Award

### EDITORIAL BOARD

2003-Present *Bioorganic Chemistry*

### MEMBERSHIPS:

American Chemical Society, American Society for Mass Spectrometry, Protein Society

### PERSONAL:

Born: December 20, 1966; Washington, DC

Married: August 22, 2000; Wife (Susan); Two Daughters (Madeline and Emily)

## PUBLICATIONS:

### Peer Reviewed Research Papers

#### *Undergraduate*

[1] Beeston, R. F., Larson, S. L. and Fitzgerald, M. C. (1989). Ground- and Excited-State Properties of a Photostable Hemicage Ruthenium(II) Polypyridine Complex. *Inorganic Chemistry* **28**, 4187-4189.

#### *Graduate*

[2] Fitzgerald, M. C., Skowron, P., Van Etten, J. L., Smith, L. M. and Mead, D. A. (1992). Rapid Shotgun Cloning Utilizing the Two Base Recognition Endonuclease CviJI *Nucleic Acids research* **20** (14), 3753-3762.

[3] Parr, G. R., Fitzgerald, M. C. and Smith, L. M. (1992). Matrix-Assisted Laser Desorption/Ionization Mass Spectrometry of Synthetic Oligodeoxyribonucleotides. *Rapid Communications in Mass Spectrometry* **6**, 369-372.

[4] Fitzgerald, M. C., Zhu, L. and Smith, L. M. (1993). The Analysis of Mock DNA Sequencing Reactions Using Matrix-Assisted Laser Desorption/Ionization Mass Spectrometry. *Rapid Communications in Mass Spectrometry* **7**, 895-897.

[5] Fitzgerald, M. C., Parr, G. R. and Smith, L. M. (1993). Basic Matrices for the Matrix-Assisted Laser Desorption/Ionization Mass Spectrometry of Proteins and Oligonucleotides. *Analytical Chemistry* **65** (22), 3204-3211.

[6] Zhu, L., Fitzgerald, M. C., Parr, G. R. and Smith, L. M. (1995). Oligodeoxynucleotide Fragmentation in MALDI-TOF Mass Spectrometry Using 355 nm Radiation. *Journal of the American Chemical Society* **117** (22), 6048-6056.

#### *Postdoctoral*

[7] Fitzgerald, M. C., Chernushevich, I., Standing, K. G., Kent, S. B. H. and Whitman, C.P. (1995). Total Chemical Synthesis and Catalytic Properties of the Enzyme Enantiomers L- and D-4-Oxalocrotonate Tautomerase. *Journal of the American Chemical Society* **117** (45), 11075-11080.

[8] Fitzgerald, M. C., Harris, K., Shevlin, C. G., and Siuzdak, G. (1996). Direct Characterization of Solid Phase Resin-Bound Molecules by Mass Spectrometry. *Bioorganic and Medicinal Chemistry Letters* **6** (8), 979-982.

[9] Fitzgerald, M. C., Chernushevich, I., Standing, K. G., Whitman, C.P. and Kent, S. B. H. (1996). Probing the Oligomeric Structure of an Enzyme by Electrospray Ionization Time-of-Flight Mass Spectrometry. *Proceedings of the National Academy of Sciences USA* **93**, 6851-6856.

- [10] Muir, T. M., Dawson, P. E., Fitzgerald, M. C. and Kent, S. B. H. (1996). Probing the Chemical Basis of Binding Activity in an SH3 Domain by Protein Signature Analysis. *Chemistry and Biology* **3** (10), 817-825.
- [11] Qian, X., Moris-Varas, F., Fitzgerald, M. C., and Wong, C. H. (1996) C<sub>2</sub>-Symmetrical Tetrahydroxyazepenes as Inhibitors of Glycosidases and HIV/FIV Proteases. *Bioorganic & Medicinal Chemistry*, **4** (12), 2055-2069.
- [12] Dawson, P. E., Fitzgerald, M. C., Muir, T. W. and Kent, S. B. H. (1997) Methods for the Chemical Synthesis and Readout of Self-Encoded Arrays of Polypeptide Analogues. *Journal of the American Chemical Society*, **119**, 7917-7927.
- [13] Laco, G. S., Fitzgerald, M. C., Morris, G. M., Olson, A. J., Kent, S. B. H., and Elder, J. H. (1997) Molecular Analysis of the Feline Immunodeficiency Virus Protease; Generation of a Novel Form of the Protease by Autoproteolysis and Construction of Cleavage Resistant Proteases. *Journal of Virology*, **71** (7), 5505-5511.
- [14] Carrasco, M. R., Fitzgerald, M. C., Oda, Y. and Kent, S. B. H. (1997) Direct Monitoring of Organic Reactions on Polymeric Supports. *Tetrahedron Letters*, **38** (36), 6331-6334.
- [15] Fitzgerald, M. C., Laco, G. S., Elder, J. H., and Kent, S. B. H. (1997) A Continuous Fluorometric Assay for the FIV Protease. *Analytical Biochemistry*, **254** (2), 226-230.
- [16] Johnson, W. H., Czerwinski, R. M., Fitzgerald, M. C. and Whitman, C. P. (1998) Inactivation of 4-Oxalocrotonate Tautomerase by 2-Oxo-3-pentynoate. *Biochemistry*, **36** (50), 15724-15732.
- [17] Fitzgerald, M. C. and Kent, S. B. H. (1998) A General Approach to Deciphering How Proteins Work Using Synthetic Chemistry and Mass Spectrometry. *NATO ASI Series: New Methods for the Study of Molecular Aggregates*, Standing, K. G. and Ens, W., eds., Kluwer Academic Publishers, The Netherlands.
- [18] Stamps, S. L., Fitzgerald, M. C. and Whitman, C.P. (1998) Characterization of the Role of the Amino-Terminal Proline in the Enzymatic Activity Catalyzed by Macrophage Migration Inhibitory Factor. *Biochemistry* , **37** (28), 10195-10202.
- [19] Winston, R. L. and Fitzgerald, M. C. (1998) Concentration and Desalting of Protein Samples for Mass Spectrometry Analysis. *Analytical Biochemistry* , **262**, 83-85.
- [20] Beeston, R.F., Aldridge, W.S., Treadway, J.A., Fitzgerald, M.C., Degraff, B.A., and Stitzel, S.E. (1998) Synthesis, Characterization, and Photochemical/Photophysical Properties of Ruthenium (II) Complexes with Hexadentate Bipyridine and phenanthroline Ligands. *Inorganic Chemistry*, **37** (17) 4368-4379.

*From Duke University*

**2000**

[21] Ghaemmaghami, S., Fitzgerald, M.C., and Oas, T.G. (2000) A Quantitative, High-Throughput Screen for Protein Stability. *Proceedings of the National Academy of Sciences*, **97** (15), 8296-8301.

[22] Nakhle, B. M., Silinski, P., and Fitzgerald, M.C. (2000) Identification of an Essential Backbone Amide Bond in the Folding and Stability of a Multimeric Enzyme. *Journal of the American Chemical Society*, **122** (34), 8105-8111.

**2001**

[23] Wang, M. Z. and Fitzgerald, M.C. (2001) A Solid Sample Preparation Method Reduces Signal Suppression Effects in the MALDI Analysis of Peptides. *Analytical Chemistry*, **73** (3), 625-631.

[24] Moss, J.A., Silinski, P., and Fitzgerald, M.C. (2001) Mapping Tertiary Interactions in Protein Folding Reactions: A Novel Mass Spectrometry- and Chemical Synthesis-Based Approach. *Fresenius Journal of Analytical Chemistry* (Invited Contribution for North American Authors Special Issue), **369**, 252-257.

[25] Silinski, P., Allingham, M.J., and Fitzgerald, M.C. (2001) The Guanidine-Induced Equilibrium Unfolding of a Homo-Hexameric Enzyme 4-Oxalocrotonate Tautomerase (4-OT). *Biochemistry*, **40** (14), 4493-4502.

[26] Powell, K.D. and Fitzgerald, M.C. (2001) Measurements of Protein Stability by H/D Exchange and Matrix-Assisted Laser Desorption/Ionization (MALDI) Mass Spectrometry using Picomole of Material. *Analytical Chemistry*, **73** (14), 3300-3304.

[27] Wales, T.E. and Fitzgerald, M.C. (2001) The Energetic Contribution of Backbone-Backbone Hydrogen Bonds to the Thermodynamic Stability of a Hyperstable P22 Arc Repressor Mutant. *Journal of the American Chemical Society*, **123**, 7709-7710.

**2002**

[28] Powell, K.D. Wales, T.E., and Fitzgerald, M.C. (2002) Thermodynamic Stability Measurements on Multimeric Proteins using a New H/D Exchange- and Matrix-Assisted Laser Desorption/Ionization (MALDI) Mass Spectrometry-Based Method. *Protein Science*, **11**, 841-851.

[29] Silinski, P. and Fitzgerald, M.C. (2002) A Stable Dimer in the pH-Induced Equilibrium Unfolding of the Homo-Hexameric Enzyme 4-Oxalocrotonate Tautomerase (4-OT). *Biochemistry*, **41** (13), 4480-4491.

[30] Powell, K.D., Ghaemmaghami, S., Wang, M.Z., Liyuan, M., Oas, T.G., and Fitzgerald, M.C. (2002) A General Mass Spectrometry-Based Assay for the Quantitation of Protein-Ligand Binding Interactions in Solution. *Journal of the American Chemical Society*, **124**, 10256-10257.

## 2003

[31] Campa, M.J., Wang, M.Z., Howard, B., Fitzgerald, M.C., and Patz, E.F. (2003) Protein Expression Profiling Identifies MIF and Cyclophilin A as Potential Molecular Targets in Non-Small Cell Lung Cancer. *Cancer Research*, **63** (7), 1652-1656.

[32] Powell, K.D. and Fitzgerald, M.C. (2003) Accuracy and Precision of a New H/D Exchange- and Mass Spectrometry-Based Technique for Measuring the Thermodynamic Properties of Protein-Peptide Complexes. *Biochemistry*, **42**, 4962-4970.

[33] Silinski, P. and Fitzgerald, M.C. (2003) Comparative Analysis of Two Different Amide-to-Ester Bond Mutations in the  $\beta$ -Sheet of 4-Oxalocrotonate Tautomerase. *Biochemistry*, **42** (21), 6620-6630.

[34] Wang, M.Z., Howard, B., Campa, M.J., Patz, E.F., Fitzgerald, M.C. (2003) Analysis of Human Serum Proteins by Liquid Phase Iso-Electric Focusing and Matrix-Assisted Laser Desorption/Ionization Mass Spectrometry. *Proteomics*, **3**, 1661-1666.

[35] Howard, B.A., Wang, M.Z., Campa, M.J., Corro, C., Fitzgerald, M.C., and Patz, E.F. (2003) Identification and Validation of a Potential Lung Cancer Serum Biomarker Detected by Matrix-Assisted Laser Desorption/Ionization-Time of Flight Spectral Analysis. *Proteomics*, **3**, 1720-1724.

[36] Powell, K.D., Wang, M.Z., Silinski, P., Ma, L., Wales, T.E., Dai, S., Warner, A.H., Yang, Xiaoye, and Fitzgerald, M.C. (2003) The Accuracy and Precision of a New H/D Exchange- and Mass Spectrometry-Based Technique for Measuring the Thermodynamic Stability of Proteins. *Analytica Chimica Acta* (Invited Contribution for Young North American Faculty Special Issue), **496**, 225-232.

[37] Ma, L. and Fitzgerald, M.C. (2003) A New H/D Exchange- and Mass Spectrometry-Based Method Thermodynamic Analysis of Protein-DNA Interactions. *Chemistry & Biology*, **10**, 1205-1213.

## 2004

[38] Powell, K.D. and Fitzgerald, M.C. (2004) A New High-Throughput Screening Assay for the Selection of Protein Ligands. *Journal of Combinatorial Chemistry*, **6**, 262-269.

[39] Cisneros, G.A., Wang, M., Silinski, P., Fitzgerald, M.C., and Yang, W. (2004) The Protein Backbone Makes Important Contributions to 4-Oxalocrotonate Tautomerase Enzyme Catalysis: Understanding from Theory and Experiment. *Biochemistry*, **43**, 6885-6892.

[40] Wales, T.E., Richardson, J.S., and Fitzgerald, M.C. (2004) Facile Chemical Synthesis and Equilibrium Unfolding Properties of CopG. *Protein Science*, **13**, 1918-1926.

[41] Wang, M.Z., Shetty, J.T., Howard, B.A., Campa, M.J., Patz, E.F., and Fitzgerald, M.C. (2004) Thermodynamic Analysis of Cyclosporin A Binding to Cyclophilin A in a Lung Tumor Tissue Lysate. *Analytical Chemistry*, **76**, 4343-4348.

[42] Howard, B.A., Zheng, Z., Campa, M.J., Wang, M.Z., Sharma, A., Haura, E., Herndon, J.E., Fitzgerald, M.C., Bepler, G., and Patz, E.F. (2004) Translating Biomarkers into Clinical Practice: Prognostic Implications of Cyclophilin A and Macrophage Migration Inhibitory Factor Identified from Protein Expression Profiles in Non-Small Cell Lung Cancer. *Lung Cancer*, **46**, 313-323.

[43] Roulhac, P.L., Powell, K.D., Dhungana, S., Weaver, K.D., Mietzner, T.A., Crumbliss, A.L., and Fitzgerald, M.C. (2004) SUPREX (Stability of Unpurified Proteins from Rates of H/D Exchange) Analysis of the Thermodynamics of Synergistic Anion Binding by Ferric Binding Protein (FbpA), a Bacterial Transferrin, *Biochemistry*, **43**, 15767-15774.

## 2005

[44] Dai, S.Y., Gardner, M.W., and Fitzgerald, M.C. (2005) An Improved Protocol for the SUPREX (Stability of Unpurified Proteins from Rates of H/D Exchange) Analysis of Some Proteins, *Analytical Chemistry*, **77**, 693-697.

[45] Tong, Y., Wuebbens, M.M., Rajagopalan, K.V., and Fitzgerald, M.C. (2005) Thermodynamic Analysis of Subunit Interactions in *Escherichia coli* Molybdopterin Synthase. *Biochemistry*, **44**, 2595-2601.

[46] Lin, S., Haney R.P., Campa, M.J., Fitzgerald, M.C., and Patz, E.F. (2005) Characterising Phase Variations in MALDI-TOF Data and Correcting them by Peak Alignment. *Cancer Informatics*, **1** (1), 32-40.

## 2006

[47] Cisneros, G. A., Wang, M., Silinski, P., Fitzgerald, M.C., and Yang, W. (2006) Theoretical and Experimental Determination on Two Substrates Turned Over by 4-Oxalocrotonate Tautomerase. *Journal of Physical Chemistry*, **110** (2), 700-708.

[48] Wang, M., Wales, T.E., and Fitzgerald, M.C. (2006) The Thermodynamics of Backbone-Backbone Hydrogen Bonds are Conserved in a Protein Fold. *Proceedings of the National Academy of Sciences, USA*, **103** (8), 2600-2604.

[49] Yang, X. and Fitzgerald, M.C. (2006) Total Chemical Synthesis of the B1 Domain of Protein L from *Peptostreptococcus magnus*. *Bioorganic Chemistry*, **34**, 131-141.

[50] Dai, S.Y. and Fitzgerald, M.C. (2006) A Mass Spectrometry-Based Probe of Equilibrium Intermediates in Protein Folding Reactions. *Biochemistry*, **45**, 12890-12897.

[51] Dai, S.Y. and Fitzgerald, M.C. (2006) Accuracy of H/D Exchange- and Mass Spectrometry-Based Measurements of Protein Folding Free Energies Made under Non-EX2 Exchange Conditions. *Journal of the American Society of Mass for Mass Spectrometry*, **17**, 1535-1542.

[52] Yang, X., Wang, M., and Fitzgerald, M.C. (2006) Direct Analysis of Backbone-Backbone Hydrogen Bond Formation in Protein Folding Transition States. *Journal of Molecular Biology*, **363**, 506-519.

**2007**

[53] Frankel, B.A., Tong, Y., Bentley, M.L., Fitzgerald, M.C., and McCafferty, D.G. (2007) Mutational Analysis of Active Site Residues in the *Staphylococcus aureus* Transpeptidase SrtA. *Biochemistry*, **46**, 7269-7278.

[54] Williams, J.C., Roulhac, P.L., Roy, A.G., Vallee, R.B., Fitzgerald, M.C., and Hendrickson, W.A. (2007) Structural and Thermodynamic Characterization of a Cytoplasmic Dynein Light Chain-Intermediate Chain Complex. *Proceedings of the National Academy of Sciences, USA*, **104** (24), 10028-10033.

[55] Tang, L., Hopper, E.D., Tong, Y., Sadowsky, J.D., Peterson, K.J., Gellman, S.H., and Fitzgerald, M.C. (2007) H/D Exchange- and Mass Spectrometry-Based Strategy for the Thermodynamic Analysis of Protein-Ligand Binding. *Analytical Chemistry*, **79**, 5869-5877.

### **Book Chapters & Reviews**

#### ***Graduate***

[1] Fitzgerald, M. C. and Smith, L. M. (1995). Mass Spectrometry of Nucleic Acids: The Promise of Matrix-Assisted Laser Desorption/Ionization (MALDI) Mass Spectrometry. *Annual Review of Biophysics and Biomolecular Structure* **24**, 117-140.

#### ***Postdoctoral***

[2] Fitzgerald, M. C. and Siuzdak, G. (1996). Biochemical Mass Spectrometry: Worth the Weight? *Chemistry and Biology* , **3**, 707-715.

[3] Muir, T. M., Dawson, P. E., Fitzgerald, M. C., and Kent, S. B. H. (1997). Protein Signature Analysis: A Practical New Approach for Studying Structure-Activity Relationships in Peptide and Proteins, in *Methods in Enzymology: Solid-Phase Peptide Synthesis*, **289**, Fields, G. B., ed., Academic Press, New York, pp. 545-564.

[4] Winston, R. L. and Fitzgerald, M. C. (1997). Mass Spectrometry as a Readout of Protein Structure and Function. *Mass Spectrometry Reviews* **16**, 165-179.

[5] Fitzgerald, M. C. and Kent, S.B.H. (1998). Total Chemical Synthesis of Proteins, in *Bioorganic Chemistry: Peptides and Proteins*, Hecht, S.M., ed., Oxford University Press, New York, pp. 65-99.

#### ***From Duke University***

[6] Winston, R. L. and Fitzgerald, M. C. (2000). Combinatorial Chemistry and the Structure-Function Analysis of Proteins. *Peptide and Protein Drug Analysis*, 101, Reid, R. E., ed., Marcel Dekker, Inc., New York, 207-235.

[7] Yang, X., Wang, M., and Fitzgerald, M.C. (2004) Analysis of Protein Folding and Function using Backbone Modified Proteins. *Bioorganic Chemistry*, **32**, 438-449.

[8] Fitzgerald, M.C., Dai, S., and Tong, Y. (2007) SUPREX Analysis of Protein Folding and Function. *Encyclopedia of Mass Spectrometry*, vol. 6, M. L. Gross and R. M. Caprioli, eds. p. 794-802.

[9] Fitzgerald, M.C., Tang, L., and Hopper, E.D. (2007) Thermodynamic Analysis of Protein Folding and Ligand Binding by SUPREX. *Protein Mass Spectrometry*, J. Whitelegge, ed., Elsevier, Inc. (IN PRESS).

## **PATENT**

[1] Oas, T.G., Ghaemmaghami, S., Powell, K.D., and Fitzgerald, M.C. U.S. Patent Application Serial No. 10/807,034 for “Quantitative, High-Throughput Screening Method for Protein Stability,” U.S. Letters Patent No. 6,734,023 Issued May 11, 2004.

[2] Oas, T.G., Ghaemmaghami, S., Powell, K.D., and Fitzgerald, M.C. U.S. Patent Divisional Application Serial No. 11/634,019 for “Quantitative, High-Throughput Screening Method for Protein Stability” based on U.S. Patent Application Serial No. 10/807,034. May 3, 2007.

## **INVITED LECTURES (From Duke University)**

- [1] American Association of Pharmaceutical Scientists Annual Meeting & Exposition; San Francisco, CA (November 1998)
- [2] Davidson College; Davidson, NC (November 1998)
- [3] University of North Carolina-Pembroke; Pembroke, NC (March 1999)
- [4] University of North Carolina-Charlotte; Charlotte, NC (April 2000)
- [5] University of North Carolina-Greensboro; Greensboro, NC (September 2001)
- [6] State University of New York-Stoney Brook; Stoney Brook, NY (March 2002)
- [7] Rockefeller University, New York, NY (March 2002)
- [8] Baltimore-Washington Area Mass Spectrometry Discussion Group; Baltimore, MD (April 2002)
- [9] Amgen Pharmaceuticals MS Symposium; Thousand Oaks, CA (October 2002)
- [10] University of Wisconsin-Madison; Madison, WI (November 2002)
- [11] University of North Carolina-Chapel Hill; Chapel Hill, NC (January 2003)
- [12] LabAutomation2003; Palm Springs, CA (February 2003)
- [13] The 54th Pittsburgh Conference on Analytical Chemistry; Orlando, CA (March 2003)
- [14] University of Chicago; Chicago, IL (April 2003)
- [15] ExSAR Corporation; Monmouth Junction, NJ (April 2003)
- [16] 51st Annual Meeting of the Mass Spectrometry Society of Japan; Tsukuba, Japan (May 2003)
- [17] Gordon Research Conference on Proteins; Holderness, NH (June 2003)
- [18] Gordon Research Conference on Biological Molecules in the Gas Phase; New London, CT (July 2003)
- [19] Southeastern Regional Meeting of the American Chemical Society, Atlanta, GA (November, 2003)
- [20] Center for Excellence in Analytical Chemistry, Swiss Federal Institute of Technology Zurich (ETHZ), Zurich, Switzerland (January 2004)
- [21] Santa Clara University, Santa Clara, CA (May 2004)
- [22] The 52<sup>nd</sup> ASMS Conference on Mass Spectrometry and Allied Topics, Oral Session on "Protein Conformation and Binding," Nashville, TN (May 2004)
- [23] Southeastern Regional Meeting of the American Chemical Society, Research Triangle Park, NC (November, 2004)
- [24] University of New Mexico, Department of Chemistry, Seminar Program, Albuquerque, NM (February 2005)
- [25] University of Nebraska-Lincoln, Department of Chemistry, Lincoln, NE (February 2005)
- [26] Vanderbilt University School of Medicine, Center in Molecular Toxicology Seminar Program, Nashville, TN (February 2005)
- [27] The 18<sup>th</sup> Sanibel Conference on Mass Spectrometry, "Focus on Biomolecular Structure, Dynamics and Function: Hydrogen Exchange and Covalent Labeling Techniques," Sanibel Island, FL (January 2006).
- [28] Thomas Jefferson University, Department of Biochemistry and Molecular Biology, Seminar Program, Philadelphia, PA (February 2006).
- [29] Southeastern Regional Meeting of the American Chemical Society, Oral Session on "Modern Developments and Applications of Mass Spectrometry." Augusta, GA (November, 2006)

- [30] University of Maryland Biotechnology Institute, Center for Advanced Research in Biotechnology (CARB), Rockville, MD (November 2006)
- [31] Brown University, Department of Chemistry Seminar Program, Providence, RI (January 2007)
- [32] Roche Colorado Corporation Peptide Symposium, Roche Colorado Corporation, Boulder, CO (September 2007)

## **OTHER PRESENTATIONS OF DUKE RESEARCH**

- [28] The 13<sup>th</sup> Symposium of the Protein Society, Boston, MA (August 1999)  
*1-Poster Presentation*
- [29] The 48<sup>th</sup> ASMS Conference on Mass Spectrometry and Allied Topics, Long Beach, CA (June 2000) *1-Selected Oral Presentation; 2-Poster Presentations*
- [30] The 14<sup>th</sup> Symposium of the Protein Society, San Diego, CA (August 2000)  
*2-Poster Presentations*
- [31] The 49<sup>th</sup> ASMS Conference on Mass Spectrometry and Allied Topics, Chicago, IL (May 2001) *1-Selected Oral Presentation; 2-Poster Presentations*
- [32] Gordon Research Conference on Proteins, Holderness, NH (June 2001)  
*2-Poster Presentations*
- [33] The 15<sup>th</sup> Symposium of the Protein Society, Philadelphia, PA (July 2001)  
*4-Poster Presentations*
- [34] The 53<sup>rd</sup> Pittsburgh Conference on Analytical Chemistry; New Orleans, LA (March 2002) *1-Selected Oral Presentation*
- [35] The 50<sup>th</sup> ASMS Conference on Mass Spectrometry and Allied Topics, Orlando, FL (June 2002) *3-Poster Presentations*
- [36] The 16<sup>th</sup> Symposium of the Protein Society, San Diego, CA (August 2002)  
*1-Selected Oral Presentation; 3-Poster Presentations*
- [37] The 51<sup>st</sup> ASMS Conference on Mass Spectrometry and Allied Topics, Montreal, CA (June 2003) *1-Selected Oral Presentation; 1 Poster Presentation*
- [38] The 94th Annual Meeting American Association for Cancer Research (AACR), Washington, DC (July 2003) *2-Poster Presentations*
- [39] The 17<sup>th</sup> Symposium of the Protein Society, Boston, MA (July 2003)  
*4-Poster Presentations*
- [40] The 52<sup>nd</sup> ASMS Conference on Mass Spectrometry and Allied Topics, Nashville, TN (May 2004) *2 Poster Presentations*
- [41] The 18<sup>th</sup> Symposium of the Protein Society, San Diego, CA (August 2004)  
*4-Poster Presentations*
- [42] The 53<sup>rd</sup> ASMS Conference on Mass Spectrometry and Allied Topics, San Antonio, TX (June 2005) *2 Poster Presentations*
- [43] The 19<sup>th</sup> Symposium of the Protein Society, Boston, MA (July 2005)  
*2-Poster Presentations*
- [44] The 54<sup>th</sup> ASMS Conference on Mass Spectrometry and Allied Topics, Seattle WA (June 2006) *4-Poster Presentations*
- [45] The 55<sup>th</sup> ASMS Conference on Mass Spectrometry and Allied Topics, Indianapolis, IN (June 2007) *2-Poster Presentations*