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DUARTE MOTA DE FREITAS

Professor of Chemistry and Biochemistry

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ACADEMIC DEGREES:

1984 Ph.D., UCLA
Thesis Director: Prof. Joan S. Valentine
Thesis Title: "Electrostatic interactions in the reaction mechanism of copper-zinc superoxide dismutase "
1979 B.Sc. and A.R.C.S. in Chemistry with First Class Honors, Imperial College, University of London, England

ACADEMIC APPOINTMENTS:

May 2012-	Chair, Department of Chemistry and Biochemistry, LUC
2011-April 2012	Interim Chair, Department of Chemistry, Loyola University
2010-2011	Assistant Chair, Department of Chemistry, Loyola University
1999 (Spring)	Acting Chair, Department of Chemistry, Loyola University
1998 -2003	Chemistry Graduate Program Director, Loyola University Chicago
1994-	Professor, Department of Chemistry, Loyola University Chicago
1990-1994	Associate Professor, Department of Chemistry, Loyola University
1984-1990	Assistant Professor, Department of Chemistry, Loyola University
1982-1983	Teaching Associate, UCLA
1980-1981	Instructor of Chemistry, University of Coimbra, Portugal
1979-1980	Tutor in Chemistry, Davies' College, London

HONORS:

2015	R15 Award, National Institutes of Heath
2003	Graduate Faculty Member of the Year, Loyola University Chicago
2000-2006	R01 Award, National Institute of Mental Health
1996-2000	R01 Award, National Institute of Mental Health
1993-4	NATO Award
1990-6	FIRST Award, National Institute of Mental Health

1987-9	Grant-in-Aid Award, American Heart Association of Metropolitan Chicago
1986-8	Cottrell Award, Research Corporation
1985,1988 and 2006	Summer Research Awards, Loyola University Chicago
1984	Exxon Fellowship in Chemistry
1981-1984	Calouste Gulbenkian Foundation Fellowship
1981-1982	University Fellow, UCLA
1981	JNIC (Portugal) Travel Grant
1981	Deutscher Akademischer Austauschdienst (DAAD) Fellowship, Munich, W. Germany
1979	H.V.A. Briscoe Award in Inorganic Chemistry, Imperial College, University of London

RESEARCH EXPERIENCE:

1984-present	Biophysical studies of guanine nucleotide-binding proteins; applications of multinuclear NMR and fluorescence spectroscopy to the study of the bioinorganic Mechanism of action of lithium salts in the treatment of manic-depression (bipolar disorder); Chemistry of lithium and magnesium ions; and metal ion binding and transport in cellular systems.
1981-1984	Spectroscopic studies of native and chemically modified proteins were performed in order to investigate the reaction mechanism of bovine copper-zinc superoxide dismutase. The spectroscopic techniques used included VIS/UV, ESR, Atomic Absorption and multinuclear FT-NMR spectroscopy.

Ph.D. GRADUATES:

Dr. Maryceline T. Espanol, April 1989. Dissertation title: Multinuclear magnetic resonance studies of lithium binding and transport in human erythrocytes. Schmitt Dissertation Fellow. High-school Teacher for Advanced Placement Chemistry, Boston, MA.

Dr. Ravichandran Ramasamy, September 1989. Dissertation title: Binding and transport of lithium in red cells from hypertensive patients and normotensive controls. Schmitt Dissertation Fellow. Associate Professor, Dept. Cardiology, SUNY, NY.

Dr. Lisa Wittenkeller Riedy, February 1992. Dissertation title: Multinuclear magnetic resonance study of chloride and cesium ion distribution in human erythrocyte suspensions. High-school Teacher for Advanced Placement Chemistry, Naperville, IL.

Dr. Aida Abraha, March 1992. Dissertation title: Lithium transport, Mg2+ competition, and phospholipid composition in human erythrocytes: a multinuclear magnetic

resonance study. Associate Professor of Chemistry, Chicago State University,
Dr. Qinfen Rong, November 1993. Dissertation title: Lithium binding to human RBC membranes and substrates of second messenger systems. Schmitt Dissertation Fellow; graduated with Honors. Research Scientist, Motorola, AZ.

Dr. Yuling Chi, February 1996. Dissertation title: Na+-H+ and Na+-Li+ Exchange in Human Erythrocytes: An NMR Investigation. Research Assistant Professor, Albert Einstein University.

Dr. Chandra Srinivasan, July 1996. Dissertation title: Competition Between Li+ and Mg2+ for Human RBC Membrane Phospholipids and Guanine Nucleotide Binding Proteins. Schmitt Dissertation Fellow. Assistant Professor of Chemistry, California State University, Fullerton.

Dr. Cherian Zachariah, July 1996. Dissertation title: Multinuclear Magnetic Resonance Studies of Anion Binding to Copper, Zinc-Superoxide Dismutase, and of Lithium Transport and Binding in Cultured Neuroblastoma Cells. University Dissertation Fellow. Presently conducting postdoctoral research with Professor A. Edison at University of Florida, Gainesville, FL.

Dr. Wanrong Lin, August 1996. Dissertation title: Multinuclear Magnetic Resonance Study of Cesium and Chloride Distribution in Human Erythrocyte Suspensions. Research Scientist at Abbott Laboratories, Chicago, IL.

Dr. Hanan Hasan, December 1996. Dissertation title: Ionic Interaction Studies of Bovine Copper,Zinc-Superoxide Dismutase. Professor, Department of Chemistry, Mu'tah University, Jordan.

Dr. Joyce Nikolakopoulos, June 1998. Dissertation title: Multinuclear Magnetic Resonance of Lithium Transport and Binding in Neuroblastoma Cells, and of Lithium Response and Toxicity in Manic-Depressive Patients. University Dissertation Fellow; graduated with Honors. Dumbach Award Recipient. Research Scientist at Biosystems, San Francisco.

Dr. Louis Amari, October 1998. Dissertation title: Competition Between Li+ and Mg2+ for Adenosine Triphosphate, Human RBC Membrane, Guanine Nucleotides Proteins, and in Human Neuroblastoma Cells. Schmitt Dissertation Fellow. Research Scientist at Abbott Laboratories, Chicago, IL.

Dr. Brian Layden, May 2001. Dissertation title: A Fluorescence, 31P NMR and 7Li NMR Spectroscopy Study of Li+/Mg2+ Competition, and of Li+ Transport and Binding in Human Neuroblastoma and Lymphoblastoma Cells. Schmitt Dissertation Fellow; graduated with Honors. Dumbach Award Recipient. Assistant Professor, Northwestern University Memorial Hospital.

Dr. Nicole Minadeo Williams, May 2002. Dissertation title: The Roles of Li+, Mg2+ and Na+ in Bipolar Disorder and Hypertension: A Multinuclear NMR and Fluorescence Study. Schmitt Dissertation Fellow; graduated with Honors. Staff Scientist, US Army, Washington, DC.

Dr. Abde Abukhdeir, April 2004. Dissertation title: Effects of Li+ on the Membrane Composition and on the Intracellular Levels of Free Mg2+ and Ca2+: A Multinuclear NMR and Fluorescence Study. Assistant Professor, Rush Medical Center, Chicago

Dr. Christopher Malarkey, July 2008. Dissertation title: Biophysical Studies on the Pharmacological Action of Lithiium. Schmitt Dissertation Fellow; graduated with Honors. Dumbach Award Recipient. Assistant Professor of Pharmaceutical Sciences, School of Pharmacy, Rueckert-Hartman College for Health Professions, Regis University, Denver, CO

Dr. Guoyan Wang, January 2009. Dissertation title: Fluorescence and NMR Studies on the Competition between Li^+ and $Mg^{2+}$for Native and Mutated $G_{i\alpha1}$ Proteins. Scientist, R&D Department, Xiamen Doingcom Chemical Company Ltd., Xiamen, China.

Dr. Matthew Najor, October 2013. Dissertation title: Biophysical Characterization of Tryptophan Environment, Mg^{2+} Binding and Folding in G_α Subunits. Postdoctoral Fellow, Rush Medical Center, Chicago.

M.S. GRADUATES:

Suilan Mo, May 1992. Thesis Title: NMR Study of Na+-H+ and Na+-Li+ Exchange in Human Erythrocytes. Associate Scientist at Hoffmann LaRoche, Branchburg, NJ.

Conrad Diven, May 2000. Thesis Title: Elucidation of Chloride in Nucleated Cells: A 35Cl NMR and Fluorescence Study. Graduated with Honors. Medical Doctor from University of Arizona.

Holly Cozzie, August 2004. Thesis Title: Preparation and Purification of Two Threonine-181 Mutants of Recombinant Giα1 Protein.

POSTDOCTORAL FELLOWS:

I have supervised five postdoctoral fellows: Dr. Anila Jain was supported by a Searle Fellowship (7/89 - 10/89); Dr. Elizabeth Dorus was supported initially by a Searle Fellowship (11/89 - 6/90), followed by my NIMH grant (7/90 - 12/90), and a Senior Fellowship of the American Heart Association of Metropolitan Chicago (7/91 - 6/93); Dr. Yang Nan was supported out of my NIMH grant (1/96 - 6/96); Dr. Yelena Glinka was also supported out of my NIMH grant (1/97 - 9/98), and Dr. Fei Wang (7/01 - 8/02).

CURRENT RESEARCH GROUP:

Graduate Students: Brian Leverson and Jesse Goossens. Undergraduate Students:.Andrea Wakim, Michelle Callagari and Teodora Lakic

FORMER UNDERGRADUATE RESEARCH STUDENTS:

Colin Senfelds, Iva Gomeli, Sean Kiel, Steve Chukwelebe, Patrycja Maja Wierzbicki, Mohammed Saim Jabbar, Ke David Xu, Matthew Najor, Osamah Abdallah, Virginia Yu, Lindsay Foresee, Neal Patel, Richard Carillo, Natasha Monroe, LaShaunna Pearson, Leigh Miles, Rhona DePaul, Kellen Hunter, Wajeeh Salah, Maya Campara, Lisa Oriti, Brian Brennan, Brian Sadowski, Jason Toon, Laura Carroll, Karrie Radloff, Victoria Thomas, Ilana Berlin, Abde Abukhdeir, Angelina Ciaccia, John Losurdo, Christopher Hatseras, Robert Rotnicki, and James Tran.

RESEARCH SUPPORT:

i) <u>External Agencies</u>

Period	Source	Total Amount	Indirect Costs
1985	NSF Travel Grant	$400	---
1986-8	Research Corporation	12,000	---
1987-9	American Heart Assoc. of Metropolitan Chicago	38,178	2,000
1990-5	National Institute of Mental Health (R01)	536,748	186,748
1991-3	American Heart Assoc. (Sponsor of Senior Fellowship)	55,000	---
1992	Portuguese-American Foundation Travel Grant	2,200	---
1993-95	NATO International Collaborative Grant	7,000	---
1996-00	National Institute of Mental Health (R01)	638,958	211,774

i) External Funding (cont.)

Period	Source	Total Amount	Indirect Costs
1997-00	National Institute of Mental Health-Minority Supplement	98,940	23,940
2000-06	National Institute of Mental Health (R01)	994,131	319,131
2002-05	NSF-Division of Biol. Infrastructure	251,000 (NMR)	---
2010-2013	NSF-Major Instrumentation (PI: R.Holz)	222,110 (EPR)	---
2010-2013	NSF-REU program (PI: K. Olsen)	246,375	___
2015-2018	National Institute of General Medical Sciences (R15)	343,200	103,200

ii) Internal Funding

Year	Source	Total Amount
1985	Research Stimulation Fund (RSG)	$1,200
1985	Summer Research Award	4,000
1985	NIH/BRSG	5,000
1986	RSG	1,200
1986	NIH/BRSG	1,000
1987	NIH/BRSG	1,000
1988	Summer Research Award	4,500
1988	RSG	1,200
1988	NIH/BRSG	3,000

ii) Internal Funding (cont.)

Year	Source	Total Amount
1994	RSG	1,200
2000	Summer Research Award (Declined)	6,000
2005	Supplemental Travel Award (CFPD)	900
2006	Summer Research Award	6,000
2006	Bridge Funding	5,000
2007	Capital Budget	84,622 (CD spectrophotometer)
2007	RSG	3,000
2008	RSG	4,000
2010	RSG	4,000
2013	RSG	5,000
2014	Manuscript Publication Assistance	375

PUBLICATIONS:

i) Refereed Articles

1. Bermingham-McDonogh, O.; Mota de Freitas, D.; Kumamoto, A.; Saunders, J.E.; Blech, D.M.; Borders, Jr., C.L.; Valentine, J.S.: Reduced Anion-Binding Affinity of Copper-Zinc Superoxide Dismutases Chemically Modified at Arginine. *Biochem. Biophys. Res. Commun.* **1982,** *108*, 1376-1382.

2. Mota de Freitas, D.; Valentine, J.S.: Phosphate is an Inhibitor of Copper-Zinc Superoxide Dismutase. *Biochemistry* **1984**, *23*, 2079 -2082.

3. Valentine, J.S.; Mota de Freitas, D.: Copper-Zinc Superoxide Dismutase: A Unique Biological Ligand for Bioinorganic Studies. *J. Chem. Ed.* **1985**, *62*, 990-997.

4. Mota de Freitas, D.; Luchinat, C.; Banci, L.; Bertini, I.; Valentine, J.S.: ^{31}P NMR Study of the Interaction of Inorganic Phosphate with Bovine Copper-Zinc Superoxide

Dismutase. *Inorg. Chem.* **1987**, *26*, 2788-2791.

5. Espanol, M.C.; Mota de Freitas, D.: ^{7}Li NMR Studies of Lithium Transport in Human Erythrocytes. *Inorg. Chem.* **1987**, *26*, 4356-4359.

6. Ramasamy, R.; Mota de Freitas, D.: Competition between Li^{+} and Mg^{2+} for ATP in Human Erythrocytes. A ^{31}P NMR and Optical Spectroscopy Study. *FEBS Lett.* **1989**, *244*, 223-226.

7. Ramasamy, R.; Espanol, M.C.; Long, K.M.; Mota de Freitas, D.; Geraldes, C.F.G.C.: Aqueous Shift Reagents for $^{7}Li^{+}$ NMR Transport Studies in Cells. *Inorg. Chim. Acta* **1989**, *163*, 41-52.

8. Ramasamy, R.; Mota de Freitas, D.; Bansal, V.K.; Dorus, E.; Labotka, R.J.: Nuclear Magnetic Resonance Studies of Lithium Transport in Erythrocyte Suspensions of Hypertensives. *Clin. Chim. Acta* **1990**, *188*, 169-176.

9. Mota de Freitas, D.; Silberberg, J.; Espanol, M.T.; Dorus, E.; Abraha, A.; Dorus, W.; Elenz, E.; Whang, W.: Measurement of Lithium Transport in RBC from Patients receiving Lithium Carbonate and Normal Individuals by ^{7}Li NMR Spectroscopy. *Biol. Psychiatry* **1990**, *28*, 415-424.

10. Mota de Freitas, D.; Ming, L.-J.; Ramasamy, R.; Valentine, J.: ^{35}Cl and ^{1}H NMR Study of Anion Binding to Reduced Bovine Copper-Zinc Superoxide Dismutase. *Inorg. Chem.* **1990**, *29*, 3512-3518.

11. Mota de Freitas, D.; Espanol, M.T.; Ramasamy, R.; Labotka, R.J.: Comparison of Li^{+} Transport in Human Red Blood Cells in the Presence and Absence of Dysprosium (III) Complexes of Triphosphate and Triethylenetetraminehexacetate. *Inorg. Chem.* **1990**, *29*, 3972-3979.

12. Ramasamy, R.; Mota de Freitas, D.; Jones, W.; Wezeman, F.; Labotka, R.J.; Geraldes, C.F.G.C.: Effects of Negatively Charged Shift Reagents on RBC Morphology, Li^{+} Transport, and Membrane Potential. *Inorg. Chem.* **1990**, *29*, 3979-3985.

13. Abraha, A.; Dorus, E.; Mota de Freitas, D.: Nuclear Magnetic Resonance Study of Differences Between ^{6}Li and ^{7}Li Ions in Transport Across Human Red Blood Cell Membranes. *Lithium* **1991**, *2*, 118-121.

14. Abraha, A.; Mota de Freitas, D.; Castro, M.M.C.A.; Geraldes, C.F.G.C.: Competition Between Li^{+} and Mg^{2+} for ATP and ADP in Aqueous Solution: A Multinuclear NMR Study. *J. Inorg. Biochem*. **1991**, *42*, 191-198.

15. Ramasamy, R.; Mota de Freitas, D.; Geraldes, C.F.G.C.; Peters, J.A.: Multinuclear NMR Study of the Interaction of the Shift Reagent Lanthanide(III)

Bistriphosphate with Alkali Metal Ions in Aqueous Solution and in the Solid State. *Inorg. Chem.* **1991**, *30*, 3188-3191.

i) Refereed Articles (cont.)

16. Wittenkeller, L.; Abraha, A.; Ramasamy, R.; Mota de Freitas, D.; Theisen, L.A.; Crans, D.C.: Vanadate Interactions with Bovine Cu,Zn-Superoxide Dismutase as Probed by ^{51}V NMR Spectroscopy. *J. Amer. Chem. Soc.* **1991**, *113*, 7872-7881.

17. Wittenkeler, L.; Mota de Freitas, D.; Geraldes, C.F.G.C.; Tome, A.J.R.: Physical Basis for the Resolution of Intra- and Extracellular ^{133}Cs NMR Resonances in Cs^+-Loaded Human Erythrocyte Suspensions. *Inorg. Chem.* **1992**, *31*, 1135-1144.

18. Wittenkeller, L.; Mota de Freitas, D.; Ramasamy, R.: Ionophore-induced Cl^- Transport in Human Erythrocyte Suspensions. A Multinuclear Magnetic Resonance Study. *Biochem. Biophys. Res. Commun.* **1992**, *184*, 915-921.

19. Abraha, A.; Mota de Freitas, D.: Ionophore-Induced Li^+ Transport Across Human Erythrocyte Membranes in the Presence of a Background of Na^+ Ions. *Lithium* **1992**, *3*, 203-211.

20. Rong, Q.; Mota de Freitas, D.; Geraldes, C.F.G.C.: Competition Between Lithium and Magnesium Ions for Guanosine Di- and Triphosphate in Aqueous Solution: A Nuclear Magnetic Resonance Study. *Lithium* **1992**, *3*, 213-220.

21. Mota de Freitas, D.; Rong, Q.; Geraldes, C.F.G.C.: Effect of Hematocrit on the Rate of Lithium Uptake in Human Erythrocyte Suspensions. *Lithium* **1992**, *3*, 281-285.

22. Ramasamy, R.; Castro, M.M.C.A.; Mota de Freitas, D.; Geraldes, C.F.G.C.: Lanthanide Complexes of Aminophosphonates as Shift Reagents for ^7Li and ^{23}Na NMR Studies in Biological Systems. *Biochimie* **1992**, *74*, 777-783.

23. Mota de Freitas, D.; Rong, Q.; Mo, S.: Reinvestigation of the Transmembrane Difference in ^7Li NMR T1 Values in Li^+-Loaded Human Erythrocyte Suspensions. *Magn. Reson. Med.* **1993**, *29*, 256-259.

24. Rong. Q.; Espanol, M.; Mota de Freitas, D.; Geraldes, C.F.G.C.: ^7Li NMR Relaxation Study of Li+ Binding in Human Erythrocytes. *Biochemistry* **1993**, *32*, 13490-13498.

25. Mota de Freitas, D.: Alkali Metal NMR. In Methods in Enzymology; Metallobiochemistry, Part C; Riordan, J.F. and Vallee, B.L.; Eds.; Academic Press: New York, 1993, vol. 227, pp. 78-106.

26. Mota de Freitas, D.; Abraha, A.; Rong, Q.; Silberberg, J.; Whang, W.; Borge, G.F.; Elenz, E.: Relationship Between Lithium Ion Transport and Phospholipid

Composition in Erythrocytes from Bipolar Patients Receiving Lithium Carbonate. *Lithium* **1994**, *5*, 29-39

i) Refereed Articles (cont.)

27. Mota de Freitas, D.; Amari, L.; Srinivasan, C.; Rong, Q.; Ramasamy, R.; Abraha, A.; Geraldes, C.F.G.C.; Boyd, M.K.: Competition Between Li^+ and Mg^{2+} for the Phosphate Groups in the Human Erythrocyte Membrane and ATP: An NMR and Fluorescence Study. *Biochemistry* **1994**, *33*, 4101-4110.

28. Rong, Q.; Mota de Freitas, D.; Geraldes, C.F.G.C.: Competition Between Lithium and Magnesium Ions for the Substrates of Second Messenger Systems: A Nuclear Magnetic Resonance Study. *Lithium* **1994**, *5*, 147-156.

29. Zachariah, C.; Mota de Freitas, D.; Castro, M.M.C.A.; Geraldes, C.F.G.C.; Lima, M.C.P.; Oliveira, C.R.: The Use of Microcarrier Beads in Ion Transport NMR Studies of Perfused Cells. *J. Magn. Reson., series B*, **1995**, *108*, 81-85.

30. Chi, Y.; Mota de Freitas, D.; Sikora, M.; Bansal, V.K.: Correlations of Na^+-Li^+ Exchange Activity with Na^+ and Li^+ Binding and Phospholipid Composition in Erythrocyte Membranes of White Hypertensive and Normotensive Individuals: A Nuclear Magnetic Resonance Investigation. *Hypertension*, **1996**, *27*, 456-464.

31. Chi, Y..; Mo, S.; Mota de Freitas, D.: Na^+-H^+ and Na^+-Li^+ Exchange Are Mediated by the Same Membrane Transport Protein in Human Red Blood Cells: An NMR Investigation. *Biochemistry*, **1996**, *35*, 12433-12442.

32. Nikolakopoulos, J.; Zachariah, C.; Mota de Freitas, D.; Geraldes, C.F.G.C.: Comparison of the Use of Gel Threads and Microcarrier Beads in Li^+ Transport Studies of Human Neuroblastoma SH-SY 5Y Cells. *Inorg. Chim. Acta,* **1996**, *251*, 201-205.

33. Lin, W.; Mota de Freitas, D.: ^{35}Cl NMR Study of Cl^- distribution and Transport in Human Red Blood Cell Suspensions. *Magn. Reson. Chem.*, **1996**, *34*, 768-772.

34. Nikolakopoulos, J.; Zachariah, C.; Mota de Freitas, D.; Stubbs, Jr., E.B.; Ramasamy, R.; Castro, M.M.C.A.; Geraldes, C.F.G.C.: ^7Li Nuclear Magnetic Resonance Study for the Determination of Li^+ Properties in Neuroblastoma SH-SY5Y Cells. *J. Neurochem.*, **1998**, *71*, 1676-1684.

35. Amari, L.; Layden, B.; Nikolakopoulos, J.; Rong, Q.; Mota de Freitas, D.; Baltazar, G.; Castro, M.M.C.A.; Geraldes, C.F.G.C.: Competition Between Li^+ and Mg2+ in Neurobalstoma SH-SY5Y Cells: A Fluorescence and ^{31}P NMR Study. *Biophys. J.*, **1999**, *76*, 2934-2942.

36. Amari, L.; Layden, B.; Rong, Q.; Geraldes, C.F.G.C.; Mota de Freitas, D.: Comparison of Fluorescence, ^{31}P NMR, and ^7Li NMR Spectroscopic Methods for

Investigating Li^+/Mg^{2+} Competition for Biomolecules. *Anal. Biochem*., **1999**, *272*, 1-7.

37. Srinivasan, C.; Minadeo, N.; Toon, J.; Graham, D.; Mota de Freitas, D.; Geraldes, C.F.G.C.: Competition Between Na^+ and Li^+ for Unsealed and Cytoskeleton-Depleted Human Red Blood Cell Membrane: A ^{23}Na NMR Multiple Quantum Filtered and ^7Li NMR Relaxation Study. *J. Magn. Reson.* **1999**, *140*, 206-217.

38. Lin, W.; Mota de Freitas, D.; Zhang, Q.; Olsen, K.W.: Nuclear Magnetic Resonance and Oxygen Affinity Study of Cesium Binding in Human Erythrocytes. *Arch. Biochem. Biophys.*, **1999**, *369*, 78-88.

39. Srinivasan, C.; Minadeo, N.; Geraldes, C.F.G.C.; Mota de Freitas, D.: Competition Between Li^+ and Mg^{2+} for Red Blood Cell Membrane Phospholipids: A ^{31}P, ^7Li, and ^6Li Nuclear Magnetic Resonance Study. *Lipids*, **1999**, *34*, 1211-1221.

40. Layden, B.; Diven, C.; Minadeo, N.; Bryant, F.B.; Mota de Freitas, D.: Li^+/Mg^{2+} Competition at Therapeutic Intracellular Li^+ Levels in Human Neuroblastoma SH-SY5Y Cells. *Bipolar Disord.,* **2000**, *2*, 200-204.

41. Fonseca, C.P.; Montezinho, L.P.; Baltazar, G.; Layden, B.; Mota de Freitas, D.; Geraldes, C.F.G.C.; Castro, M.M.C.A.: Li+ Influx and Binding, and Li^+/Mg^{2+} Competition in Bovine Chromaffin Cell Suspensions as Studied by ^7Li NMR and Fluorescence Spectroscopy. *Metal Based Drugs*, **2000**, *7*, 357-364.

42. Minadeo, N.; Layden, B.; Amari, L.; Thomas, V.; Radloff, K.; Srinivasan, C.; Hamm, H.E.; Mota de Freitas, D.: Effect of Li^+ upon the Mg^{2+}-Dependent Activation of Recombinant $G_{i\alpha1}$. *Arch. Biochem. Biophys*. **2001**, *388*, 7-12.

43. Wittenkeller, L.; Lin, W,; Diven, C.; Ciaccia, A.; Wang, F.; Mota de Freitas, D.: Ion Pairing Between Cl^- and ClO_4^- and Alkali Metal Complexes in Organic Solvents: A Multinuclear NMR and FT-IR Study. *Inorg. Chem.* **2001**, *40*, 1654-1662.

44. Abukhdeir, A.M.; Layden, B.T.; Minadeo, N.; Bryant, F.B.; Stubbs, Jr., E.B.; Mota de Freitas, D.: Effect of Chronic Li^+ Treatment on Free Intracellular Mg^{2+} in Human Neuroblastoma SH-SY5Y Cells. *Bipolar Disord.,* **2003**, *5*, 6-13.

45. Diven, C.F.; Wang, F.; Abukhdeir, A.M.; Salah, W.; Layden, B.T.; Geraldes, C.F.G.C.; and Mota de Freitas, D.: Evaluation of $[Co(Gly)_3]^-$ as $^{35}Cl^-$ NMR Shift Reagent for Cellular Studies. *Inorg. Chem*. **2003**, *42*, 2774-2782.

46. Minadeo, N., Layden, B.T., Suhy, J., Metreger, T., Foley, K., Abukhdeir, A.M., Borge, G., Crayton, J., Bryant, F.B., and Mota de Freitas, D.: Testing Competing Path Models Linking the Biochemical Variables in Red Blood Cells from Li^+-Treated Bipolar Patients *Bipolar Disord.* **2003**, *5*, 320-329.

i) Refereed Articles (cont.)

47. Layden B.T., Abukhdeir A.M., Williams N., Fonseca C.P., Carroll L., Castro M.M.C.A., Geraldes C.F.G.C., Bryant F.B., Mota de Freitas D.: Effects of Li^+ transport and Li^+ immobilization on Li^+/Mg^{2+} competition in cells: Implications for bipolar disorder. *Biochem Pharmacol* **2003**, *66*, 1915-1924.

48. Layden, B.T., Minadeo, N., Suhy, J., Abukhdeir, A.M., Metreger, T., Foley, K., Borge, G., Crayton, J.W., Bryant, F.B., and Mota de Freitas, D.: Biochemical and psychiatric predictors of Li^+ response and toxicity in Li^+-treated bipolar patients. *Bipolar Disord.* **2004**, *6*, 53-61.

49. Srinivasan, C., Toon, J., Amari, L., Abukhdeir, A.M., Hamm, H., Geraldes, C.F.G.C., Ho, Y., and Mota de Freitas, D.: Competition between Lithium and Magnesium Ions for the G-protein Transducin in the Guanosine 5'-Diphosphate Bound Conformation. *J. Inorg. Biochem.* **2004**, *98*, 691-701.

50. Montezinho, L.P., Duarte, C.B., Fonseca, C.P., Glinka, Y., Layden, B., Mota de Freitas, D., Geraldes, C.F.G.C., and Castro, M.M.C.A.: Intracellular Lithium and Cyclic AMP Levels are Mutually Regulated in Neuronal Cells. *J. Neurochem.* **2004**, *90*, 920-930.

51. Layden, B.T., Abukhdeir, A., Malarkey, C., Oriti, L.A., Salah, W., Stigler, C., Geraldes, C.F.G.C., and Mota de Freitas, D.: Identification of Li^+ Binding Sites and the Effect of Li^+ Treatment on Phospholipid Composition in Human Neuroblastoma Cells: A ^7Li and ^{31}P NMR Study. *Biochim. Biophys. Acta* **2005**, *174*, 339-349.

52. Mota de Freitas, D., Castro, M.M.C.A., and Geraldes, C.F.G.C.: Is Competition Between Li^+ and Mg^{2+} the Underlying Theme in the Proposed Mechanisms for the Pharmacological Action of Lithium Salts in Bipolar Disorder? *Acc. Chem. Res.* **2006**, 39, 283-291.

53. Malarkey, C.S., Wang, W., Ballicora, M.A., and Mota de Freitas, D.: Evidence for Two Distinct Mg^{2+} Binding Sites in $G_{s\alpha}$ and $G_{i\alpha1}$ Proteins. *Biochem. Biophys. Res. Commun.* **2008**, *372*, 866-869.

54. Najor, M.S., Olsen, K.W., Graham, D.J., and Mota de Freitas: Contribution of each Trp Residue toward the Intrinsic Fluorescence of the $G_{i\alpha1}$ Protein. *Protein Sci.* **2014**, *23*, 1392-1402.

ii) Book Chapters

1. Valentine, J.S.; Roe, J.; Butler, A.; Mota de Freitas, D.: Studies of Copper-Zinc Superoxide Dismutases: The Role of Zinc and of the Essential Arginyl Residue. In Biochemical and Inorganic Aspects of Copper Coordination Chemistry; Karlin, K.D.; Zubieta, J.; Eds.; Adenine Press, 1986, vol. 1, pp. 53-60.

2. Valentine, J.S.; Mota de Freitas, D.: NMR Studies of the Anion Binding Sites of Oxidized and Reduced Bovine Copper-Zinc Superoxide Dismutase. In Superoxide and Superoxide Dismutases in Chemistry, Biology, and Medicine; Rotilio, G.; Ed.; Elsevier Science Publishers: Amsterdam, 1986, pp. 149-154.

3. Mota de Freitas, D.; Espanol, M.C.; Ramasamy, R.: ^{7}Li NMR Studies of Li^{+} Transport in Red Cells of Manic-Depressive Patients and Normal Controls. In Lithium: Inorganic Pharmacology and Psychiatric Use; Birch, N.J.; Ed.; IRL Press Limited: Oxford, 1988, pp. 281-284.

4. Espanol, M.C.; Ramasamy, R.; Mota de Freitas, D.: Measurement of Lithium Transport across Human Erythrocytes by ^{7}Li NMR Spectroscopy. In Biological and Synthetic Membranes; Butterfield, D.A.; Ed.; Alan R. Liss: New York, 1989, pp. 33-43.

5. Mota de Freitas, D.; Espanol, M.C.; Dorus, E.: Lithium Transport in Red Blood Cells of Bipolar Patients. In Lithium and Blood; Lithium Therapy Monographs, Vol. 4; Gallicchio, V.; Ed.; Karger: Basel, 1991, pp. 96-120.

6. Mota de Freitas, D.; Dorus, E.: Techniques for Measuring Magnesium in Tissues from Hypertensive, Psychiatric, and Neurologic Patients. In Magnesium and the Cell; Birch, N.J.; Ed.; Academic Press: London, 1993, pp. 51-79.

7. Zachariah, C.; Nikolakopoulos, J.; Mota de Freitas, D.; Stubbs, Jr., E.; Castro, M.M.C.A.; Geraldes, C.F.G.C.; de Lima, M.C.P.; Oliveira, C.R.; Ramasamy, R.: ^{7}Li NMR Study of Lithium Ion Transport in Perfused Human Neuroblastoma Cells. In Lithium: Biochemical & Clinical Advances; Gallicchio, V.S.; Birch, N.J.; Eds.; Weidner Publishing Group: Cheshire, 1996, pp. 211-230.

8. Castro, M.M.C.A.; Nikolakopoulos, J.; Zachariah, C.; Freitas, D.M.; Stubbs, Jr., E.B.; Geraldes, C.F.G.C.; Ramasamy, R.: ^{7}Li NMR Study of Lithium Ion Transport in Perfused Human Neuroblastoma Cells. In Metal Ions in Biology and Medicine; Collery, P.; Corbella, J.; Domingo, J.L.; Etienne, J.C.; Uobet, J.M.; Eds.; John Libbey Eurotext: Paris, 1996, vol. 4, pp. 192-194.

ii) Book Chapters (cont.)

9. Castro, M.M.C.A.; Nikolakopoulos, J.; Zachariah, C.; de Freitas, D.M.; Geraldes, C.F.G.C.; Ramasamy, R.: Li^+ Transport Properties in Perfused Neuronal Cells by ^7Li NMR Spectroscopy. In Cytotoxic, Mutagenic, and Carcinogenic Potential of Heavy Metals Related to Human Environment; Hadjiliadis, N.D., Ed.; Kluwer Academic Publishers: Netherlands, 1997, pp. 311-321.

10. Layden, B.; Fonseca, C.P.; Minadeo, N.; Abdullahi, H.; H.; Castro, M.M.C.A.; Geraldes, C.F.G.C.; Mota de Freitas, D.: Comparison of the Use of Fluorescence, ^{31}P NMR and ^7Li NMR Spectroscopic Methods for the Investigation of Li^+/Mg^{2+} Competition in a Model System and their Applications to Cellular Systems. In Lithium - 50 Years: Recent Advances in Biology and Medicine; Lucas, K.C.; Becker, R.W.; Gallichio, V.S., Eds.; Weidner Publishing Group, Cheshire, CT, 1999, pp. 45-62.

11. William H. Gross, Stephen C. Encleson, Duarte Mota de Freitas, "Magnesium," in AccessScience, ©McGraw-Hill Companies, 2008

12. Marshall Sittig, Duarte Mota de Freitas, "Sodium," in AccessScience, ©McGraw-Hill Companies, 2008

13. Marshall Sittig, Duarte Mota de Freitas, "Potassium," in AccessScience, ©McGraw-Hill Companies, 2008

14. Mota de Freitas, D.; Leverson, B.D.; Goossens, J.L.: Lithium in Medicine: Mechanism of Action. In The Alkali Metal Ions: Their Role in Life; Metal Ions in Life Sciences, vol. 16; Sigel, A.; Sigel, H.; Sigel, R.K.O.; Eds. Springer International Publishing, Switzerland, 2016, pp. 557-584

iii) Published Abstracts

1. Mota de Freitas, D.; Valentine, J.S.: Phosphate is an Inhibitor of Copper-Zinc Superoxide Dismutase. *Inorg. Chim. Acta* **1983**, *79*, 35-36.

2. Mota de Freitas, D.; Valentine, J.S.: Anion Binding Sites of Reduced Bovine Copper-Zinc Superoxide Dismutase: A ^{35}Cl and High-Resolution ^1H NMR Study. *Rev. Port. Quim.* **1985**, *27*, 156-157.

3. Espanol, M.C.; Mota de Freitas, D.: Metal NMR Studies of Lithium Transport in Human Erythrocytes. *Biophys. J.* **1986**, *49*, 326a.

iii) Published Abstracts (cont.)

4. Mota de Freitas, D.; Espanol, M.C.; Ramasamy, R.: Investigation of the Biological Action of Lithium by ^{7}Li NMR Spectroscopy. *Recueil Trav. Chim. Pays-Bas* **1987**, *106*, 389.

5. Mota de Freitas, D.; Espanol, M.C.; Ramasamy, R.: Characterization of ^{7}Li NMR Shift Reagents Suitable for the Study of Lithium Transport in Human Erythrocytes. *Biophys. J.* **1987**, *51*, 73a.

6. Ramasamy, R.; Mota de Freitas, D.: Influence of Li^{+} on Free Intracellular Mg^{2+} Concentration in Human Red Blood Cells. *Biophys. J.* **1989**, *55*, 449a.

7. Mota de Freitas, D.; Espanol, M.; Ramasamy, R.; Abraha, A.; Wittenkeller, L.: ^{7}Li NMR Relaxation Studies of Li^{+} Storage and Transport in RBC. *J. Inorg. Biochem*. **1989**, *36,* 187.

8. Bansal, V.K.; Mota de Freitas, D.; Ramasamy, R.: Measurement of Abnormal Lithium Transport in Red Cells of Hypertensives by Nuclear Magnetic Resonance. *Kidney Int.* **1989**, *35*, 322.

9. Mota de Freitas, D.; Ramasamy, R.; Abraha, A.: Multinuclear NMR Investigation of the Competition between Mg^{2+} and Li^{+} in Human RBC. *Magnesium Res.* **1990**, *3*, 65.

10. Mota de Freitas, D.; Abraha, A.; Rong, Q.; Mo, S.; Wittenkeller, L.: Elucidation of Transport Mechanisms in Human RBC by Metal NMR. *J. Inorg. Biochem*. **1991**, *43*, 386.

11. Abraha, A.; Mota de Freitas, D.; Rong, Q.; Castro, M.M.C.A.; Geraldes, C.F.G.C.: Competition Between Li^{+} and Mg^{2+} for Purine Nucleoside Di- and

Triphosphates in Aqueous Solution: A Multinuclear NMR Study. *J. Inorg. Biochem.* **1991**, *43*, 389.

12. Mota de Freitas, D.; Mo, S.; Chi, Y.: Na^{+}-H^{+} Exchange Across Human Erythrocyte Membranes as Probed by Multinuclear NMR Spectroscopy. *Biophys. J.* **1993**, *64*, A401.

13. Mota de Freitas, D.; Mo, S.; Chi, Y.: Na^{+}-H^{+} Exchange Across Human Erythrocyte Membranes as Probed by Multinuclear Magnetic Resonance Spectroscopy. *J. Inorg. Biochem*. **1993**, *51*, 570.

14. Amari, L.; Srinivasan, C.; Mota de Freitas, D.: Competition Between Li^{+} and Mg^{2+} for the Metal Binding Domain in G Proteins. *Biophys. J.* **1996**, *70*, A106.

iii) Published Abstracts (cont.)

15. Amari, L.; Nikolakopoulos, J.; Mota de Freitas, D.: Competition Between Li^+ and Mg^{2+} in Human Neuroblastoma SH-SY5Y Cells. *Biophys. J.* **1997**, *72*, A202.

16. Nikolakopoulos, J.; Mota de Freitas, D.; Geraldes, C.F.G.C.; Stubbs, Jr., E.B.: NMR Spectroscopic Analysis of Li^+ Transport Pathways in Human Neuroblastoma SH-SY5Y Cells. *J. Inorg. Biochem.* **1997**, *67*, 167.

17. Diven, C.F.; Lin, W.; Mota de Freitas, D.: The Shift Reagent $[Co(gly)_3]^-$ May Provide an Avenue for the Observation of Chloride Transport in Human Skin Fibroblasts. *J. Inorg. Biochem.* **1999**, *74*, 115.

18. Geraldes, C.F.G.C.; Castro, M.M.C.A.; Fonseca, C.; Amari, L.; Layden, B.; Nikolakopoulos, J.; Rong, Q.; Mota de Freitas, D.: Comparison of Fluorescence, ^{31}P NMR, and ^7Li NMR Spectroscopic Methods for Investigating Li^+/Mg^{2+} Competition for Biomolecules: Model and Cellular Systems. *J. Inorg. Biochem*. **1999**, *74*, 139.

19. Minadeo, N.; Abdullahi, H.; Amari, L.; Mota de Freitas, D.: Role of Li^+/Mg^{2+} Competition in the Activation of Recombinant $G_{i\alpha1}$. *J. Inorg. Biochem*. **1999**, *74*, 236.

20. Diven, C.F.; Mota de Freitas, D.: Characterization of the Shift Reagent $[Co(gly)_3]^-$ and its Application for Studying Cl^- Transport in Perfused Cells: A ^{35}Cl NMR Study. *Biophys. J.* **2000**, *78*, 480A.

21. Layden, B.; Mota de Freitas, D.: Li^+/Mg^{2+} Competition in Human Lymphoblastoma Cells. *Biophys. J.* **2000**, *78*, 442A.

22. Minadeo, N.M.; Amari, L.; Mota de Freitas, D.: Li^+/Mg^{2+} Competition and Binding Site Determination in Recombinant $G_{i\alpha1}$. *Biophys. J.* **2000**, *78*, 42A.

23. Mota de Freitas, D.; Layden, B.: Li^+ Binding to Subcellular Components to Human Neuroblastoma SH-SY5Y Cells: A ^7Li NMR Study. *J. Inorg. Biochem*. **2001**, *86*, 347.

24. Minadeo, N.; Nicholas, M.; Bansal, V.; Chi, Y.; Mota de Freitas, D.: Use of Multinuclear NMR for the Determination of $[Mg^{2+}]_f$, Na^+-Li^+ Countertransport, Na^+ Binding, and Phospholipid Composition in Treated and Untreated Hypertensive Patients. *Am. J. Hypertens*. **2001**, *814*, A173.

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iii) Published Abstracts (cont.)

26. Williams, N.; Geraldes, C.F.G.C.; Mota de Freitas, D.: Li^{+}/Mg^{2+} Competition for Mg^{2+} Binding Sites in G-Proteins: Implications for Bipolar Disorder. *J. Inorg. Biochem.* **2003**, *96*, 15.

27. Mota de Freitas, D.; Najor, M.S.; Olsen, K.W.; Graham, D.J.: Contribution of each Trp Residue towards the Intrinsic Fluorescence of the $G_{i\alpha 1}$ Protein. *J. Biol. Inorg. Chem.* **2014**, *19 (Suppl 2)*, 19.

iv) Book Review

1. Mota de Freitas, D.: Endocrine and Metabolic Effects of Lithium (1986) by J.H. Lazarus, Plenum Medical Press. *J. Amer. Chem. Soc.* **1987**, *109*, 2865.

TEACHING EXPERIENCE:

a) *Summary of Lecture Courses Taught*

Graduate Courses: Advanced Inorganic Chemistry 441; Metals in Biology 445; Biophysical Chemistry 460; Biochemistry 461; Magnetic Resonance in Biochemistry 465.

Undergraduate Courses: General Chemistry A Discussion 101; General Chemistry B Discussion 102; Elementary Physiological Chemistry A 151; Elementary Physiological Chemistry B 152; Advanced Inorganic Chemistry 340; Survey in Biochemistry 361; Bioinorganic Chemistry 395; Biological Applications of NMR Spectroscopy 395.

b) *Specific Teaching Responsibilities*

Graduate Courses

Year and Semester	Course Number[a]	Contact hrs/wk	Number of Students	%Effort
Fall 84	460	3	9	10
Spring 85	441	3	8	25
Spring 85	461	3	7	25
Fall 85	460	3	3	25
Spring 86	441	3	8	25

Graduate Courses (cont.)

Year and Semester	Course Number[a]	Contact hrs/wk	Number of Students	%Effort
Spring 86	465/395	3	8	33
Spring 87	441	3	11	25
Fall 87	460	3	14	50
Spring 88	441	3	10	25
Fall 88	460	3	8	25
Spring 89	441	3	7	25
Fall 89	460	3	13	25
Spring 90	465/395	3	4	50
Fall 91	460	3	15	50
Fall 92	445/395	3	14	100
Spring 95	465/395	3	6	100
Fall 97	460	3	8	100
Fall 98	460	3	13	100
Fall 99	460	3	3	100
Spring 00	465	3	4	100
Spring 01	465	3	4	100
Spring 02	465	3	8	100
Fall 03	460/395	3	15	100
Fall 04	460/395	3	10	100
Fall 04	469	N/A	2	100

Graduate Courses (cont.)

Year and Semester	Course Number[a]	Contact hrs/wk	Number of Students	%Effort
Spring 05	469	N/A	4	100
Summer 05	469	N/A	2	100
Fall 05	460/395	3	13	100
Fall 05	469	N/A	2	100
Spring 06	469	N/A	1	100
Spring 06	610	N/A	1	100
Summer 06	469	N/A	1	100
Summer 06	501	N/A	1	100
Fall 06	460/395	3	6	100
Spring 06	600	N/A	2	100
Spring 07	600	N/A	2	100
Fall 07	469	N/A	1	100
Fall 07	600	N/A	2	100
Spring 08	461	3	10	50
Spring 08	600	N/A	2	100
Fall 08	469	N/A	1	100
Fall 08	600	N/A	1	100
Spring 09	461	3	3	50
Summer 09	469	N/A	1	100
Spring 09	469	N/A	1	100

Graduate Courses (cont.)

Year and Semester	Course Number[a]	Contact hrs/wk	Number of Students	%Effort
Fall 09	469	N/A	1	100
Spring 10	441	N/A	8	20 (Grading)
Summer 10	610	N/A	1	100
Fall 10	600	N/A	1	100
Spring 11	441	3	3	100
Spring 11	600	N/A	1	100
Fall 11	460	3	14	100
Fall 11	600	N/A	1	100
Spring 12	461	3	3	100
Spring 12	600	N/A	1	100
Fall 12	460	3	10	100
Fall 12	469	N/A	1	100
Fall 12	600	N/A	1	100
Spring 13	461	3	1	100
Spring 13	469	N/A	2	100
Spring 13	600	N/A	1	100
Summer 13	469	N/A	2	100
Fall 13	469	N/A	2	100
Fall 13	600	N/A	1	100
Spring 14	469	N/A	2	100

Graduate Courses (cont.)

Year and Semester	Course Number[a]	Contact hrs/wk	Number of Students	%Effort
Summer 14	469	N/A	2	100
Fall 14	469	N/A	2	100
Spring 15	469	N/A	2	100
Summer 15	469	N/A	1	100
Fall 15	610	N/A	2	100
Spring 16	610	N/A	2	100
Fall 16	600	N/A	2	100

[a]Chem. 441 - Advanced Inorganic Chemistry; Chem. 445/395 - Metals in Biology/Bioinorganic Chemistry; Chem. 460 - Biophysical Chemistry; Chem. 461 - Biochemistry; Chem. 469/465/445/395 - Special Topics in Biochemistry (Metals in Biology or Biological Applications of NMR Spectroscopy); Chem. 469 – Research in Biochemistry; Chem. 501 – Directed Study; Chem.600 – Dissertation Supervision; and Chem. 610 – Doctoral Study.

Undergraduate Courses

Year and Semester	Course Number[a]	Contact hrs/wk	Number of Students	%Effort	T.A. Assistance
Fall 84	101	1	18	Discussion	-
Spring 85	102	1	16	Discussion	-
Fall 85	395	3	7	100	-
Spring 86	152	4	40	100	Lab
Summer 86	152	9	9	100	Lab
Fall 86	361	3	35	100	Grading
Fall 86	101	1	33	Discussion	-

Undergraduate Courses (cont.)

Year and Semester	Course Number[a]	Contact hrs/wk	Number of Students	%Effort	T.A. Assistance
Spring 87	395	3	9	50	-
Summer 87	151	9	8	100	Lab
Summer 87	361	6	12	100	-
Fall 87	101	3	36	Discussion	-
Spring 88	361	3	31	100	-
Fall 88	395	3	5	100	-
Fall 88	101	1	32	Discussion	-
Spring 89	340	3	18	100	-
Summer 89	151	4	15	100	Lab
Fall 89	400	1	-[b]	100	-
Fall 89	101	1	31	Discussion	-
Spring 90	340	3	18	100	-
Fall 90	101	1	20	Discussion	-
Spring 91	152	4	51	100	Lab
Fall 91	101	1	29	Discussion	-
Spring 92	102	1	30	Discussion	-
Fall 92	101	1	30	Discussion	-
Fall 93	361	3	29	100	-
Fall 93	101	1	30	Discussion	-
Spring 94	340	3	21	100	-

Spring 94	102	1	30	100	-
Fall 94	361/395	3	46	100	-
Fall 94	101	1	30	Discussion	-
Spring 95	395	3	6	100	-
Spring 95	102	1	30	Discussion	-
Spring 97	361	3	57	100	-
Spring 97	102	1	25	Discussion	-
Fall 97	101	1	28	Discussion	-
Fall 97	300	3	2	100	-
Spring 98	340	3	34	100	-
Spring 98	102	1	25	Discussion	-
Fall 98	101	1	30	Discussion	-
Fall 98	300	3	2	100	-
Spring 99	102	1	20	Discussion	-
Spring 99	300	3	2	100	-
Fall 99	101	1	23	Discussion	-
Spring 00	395	3	1	100	-
Spring 00	102	1	14	Discussion	-
Fall 00	363	8	12	100	Lab
Fall 00	300	3	1	100	-
Spring 01	300	3	2	100	-
Fall 01	363	15	23	100	Lab

Undergraduate Courses (cont.)

Year and Semester	Course Number[a]	Contact hrs/wk	Number of Students	%Effort	T.A. Assistance
Spring 02	300	3	2	100	-
Fall 02	363	15	21	100	Lab
Spring 03	361	6	96	50	-
Spring 03	300	3	2	100	-
Fall 03	101	1	34	Discussion	-
Spring 04	340	3	16	100	-
Fall 04	101	1	32	Discussion	-
Spring 05	361	6	87	50	-
Spring 05	300	N/A	1	100	-
Fall 05	101	1	35	Discussion	-
Spring 06	361	6	98	50	-
Spring 06	102	1	40	Discussion	-
Spring 06	300	2	2	100	-
Summer 06	300	2	1	100	-
Fall 06	300	3	3	100	-
Spring 07	361	6	123	50	-
Spring 07	380	1	54	100	Grading
Spring 07	300	4	2	100	-
Summer 07	300	4	2	100	-
Fall 07	363	14	26	100	Lab

Undergraduate Courses (cont.)

Year and Semester	Course Number[a]	Contact hrs/wk	Number of Students	%Effort	T.A. Assistance
Fall 07	300	6	3	100	-
Spring 08	361	6	154	50	-
Fall 08	300	6	1	100	-
Fall 08	363	10	22	70	Lab
Spring 09	300	3	1	100	-
Spring 10	340	-	54	100	Grading
Fall 10	380	1	12	100	Grading
Spring 11	340	3	51	100	-
Spring 11	380	1	19	100	Grading
Fall 11	380	1	22	100	Grading
Fall 11	395	3	5	100	
Spring 12	361	3	197	50	-
Fall 12	395	3	2	100	-
Spring 13	361	3	202	50%	-
Fall 13	300	N/A	1	100	-
Spring 14	300	N/A	1	100	-
Spring 14	307	3	23	100	-
Fall 14	380	1.25	14	100	Grading
Fall 14	300	N/A	1	100	-

Undergraduate Courses (cont.)

Year and Semester	Course Number[a]	Contact hrs/wk	Number of Students	%Effort	T.A. Assistance
Spring 15	300	N/A	2	100	-
Spring 15	307	3	45	100	-
Fall 15	300	N/A	1	100	-
Fall 15	380	1.25	13	100	Grading
Spring 16	300	N/A	2	100	-
Spring 16	307	3	57	100	-
Fall 16	300	N/A	2	100	-
Fall 16	380	N/A	14	100	-
Spring 17	307	3	27	100	-

[a]Chem. 101 - General Chemistry A Discussion; Chem. 102 - General Chemistry B Discussion; Chem. 151 - Elementary Physiological Chemistry A; Chem. 152 - Elementary Physiological Chemistry B; Chem 300 - Undergraduate Research; Chem. 340 - Advanced Inorganic Chemistry; Chem 307- Inorganic Chem for Biochemistry Majors; Chem. 361 - Survey in Biochemistry; Chem. 363 - Biochemistry Laboratory and Discussion; Chem 380 – Chemistry Seminar; Chem. 395 - Special Topics in Chemistry (Bioinorganic Chemistry and Magnetic Resonance in Biochemistry).

PAPERS AND SEMINARS PRESENTED:

1. Seminar, Department of Chemistry, University of Coimbra, Portugal, July 1983.

2. Pacific Coast Conference on Chemistry and Spectroscopy, Pasadena, California, Oct. 1983.

3. Seminar, Department of Chemistry, UCLA, Los Angeles, Feb. 1984.

4. Seminar, Department of Chemistry, Loyola University of Chicago, Chicago, Illinois, Mar. 1984.

5. Seminar, Department of Biochemistry and Biophysics, Loyola University Medical Center, Maywood, IL, Oct. 1984.

Conference Presentations and Seminars (cont.)

6. Seminar, Department of Chemistry, Loyola University of Chicago, Chicago, IL, Jan. 1985.

7. Seminar, Department of Medicinal Chemistry and Pharmacognosy, College of Pharmacy, University of Illinois at Chicago, Chicago, IL, Jan. 1985.

8. Second International Conference on Bioinorganic Chemistry, Algarve, Portugal, Apr. 1985.

9. Seventh International Meeting on NMR Spectroscopy, University of Cambridge, England, July 1985.

10. Gordon Conference on Metals in Biology, Santa Barbara, CA, Jan. 1986.

11. 30th Biophysical Society Meeting, San Francisco, CA, Feb. 1986.

12. 192nd American Chemical Society Meeting, Metals in Medicine Symposium, Anaheim, CA, Sep. 1986.

13. Seminar, Department of Chemistry, Northwestern University, Chicago, IL, Apr. 1987.

14. Third International Conference on Bioinorganic Chemistry, Noordwijkerhout, The Netherlands, July 1987.

15. 194th American Chemical Society Meeting, Advanced NMR Techniques in Inorganic Chemistry Symposium, New Orleans, LA, Sep. 1987.

16. 2nd British Lithium Congress, Wolverhampton, England, Sep. 1987.

17. XIII International Conference on Magnetic Resonance in Biological Systems, Madison, WI, Aug. 1988.

18. Seventh Annual Meeting of the Society of Magnetic Resonance in Medicine, San Francisco, CA, Aug. 1988.

19. International Symposium on Biological and Synthetic Membranes, Lexington, KY, Oct. 1988.

20. Midwest NMR Discussion Group, Loyola University of Chicago, Nov. 1988.

Conference Presentations and Seminars (cont.)

21. 21st Annual Meeting of the American Society of Nephrology, San Antonio, TX, Dec. 1988.

22. 33rd Annual Biophysical Society Meeting, Cincinnati, OH, Feb. 1989.

23. 4th International Conference on Bioinorganic Chemistry, Boston, MA, Jul. 1989.

24. Instructor, Biological NMR Workshop, Coimbra, Portugal, Jul. 1989.

25. Seminar, Department of Chemistry, Marquette University, Milwaukee, WI, Oct. 1989.

26. The 1989 International Chemical Congress of Pacific Basin Societies, Honolulu, HA, Dec. 1989.

27. 3rd European Congress on Magnesium, Geneva, Switzerland, Mar. 1990.

28. Seminar, Department of Chemistry, University of Wisconsin, Milwaukee, Apr. 1990.

29. Seminar, Department of Pharmaceutical Chemistry, University of California, San Francisco, Jul. 1990.

30. Tenth International Biophysics Congress, Vancouver, British Columbia, Aug. 1990.

31. Ninth Annual Meeting of the Society of Magnetic Resonance in Medicine, New York, Aug. 1990.

32. Seminar, Department of Chemistry, Imperial College, University of London, England, Sept. 1990.

33. XIV International Conference on Magnetic Resonance in Biological Systems, Univ. of Warwick, England, Sep. 1990.

34. Seminar, Department of Psychiatry, Loyola University Medical Center, Maywood, Sep. 1990.

35. Tenth Midwest Enzyme Conference, Loyola University of Chicago, Oct. 1990.

36. The Pittsburgh Conference, Chicago, Mar. 1991.

37. Seminar, Neurosciences Program, Loyola University Medical Center, Maywood,
Conference Presentations and Seminars (cont.)

Apr. 1991.

38. Fifth International Conference on Bioinorganic Chemistry, Oxford, England, Aug. 1991.

39. Fourth Chemical Congress of North America and 202nd American Chemical Society National Meeting, New York City, Aug. 1991.

40. Seminar, Department of Psychology, Loyola University of Chicago, Oct. 1991.

41. Second Italian-Portuguese-Spanish Meeting in Inorganic Chemistry, The Algarve, Portugal, March 1992.

42. Eleventh Annual Meeting of the Society of Magnetic Resonance in Medicine, Berlin, Germany, August 1992.

43. 37th Annual Meeting of the Biophysical Society, Washington, February 1993.

44. Seminar, Department of Biology, University of Coimbra, Portugal, April 1993.

45. Sixth International Conference on Bioinorganic Chemistry, San Diego, August 1993.

46. 24th Annual Meeting of the Society for Neuroscience, Miami Beach, November 1994.

47. Tenth Meeting of the American Society of Hypertension, NY City, May 1995.

48. ISMAR '95 and 12th Conference of the International Society of Magnetic Resonance, Sydney, Australia, July 1995.

49. Malta Lithium Symposium, Malta, November 1995.

50. 40th Annual Meeting of the Biophysical Society, Baltimore, February 1996.

51. Seminar, Department of Chemistry, Roosevelt University, Chicago, May 1996.

52. The 37th ENC Experimental Nuclear Magnetic Resonance Conference, Pacific Grove, March 1996.

53. The Pittsburgh Conference, Chicago, March 1996.

54. International Society of Magnetic Resonance in Medicine, Fourth Scientific Conference Presentations and Seminars (cont.)

Meeting, NY City, April 1996.

55. 212th American Chemical Society National Meeting, Orlando, August 1996.

56. Seminar, Department of Chemistry and Physics, Purdue-Calumet, October 1996.

57. Seminar, Department of Chemistry and Biochemistry, UCLA, October 1996.

58. 41st Annual Meeting of the Biophysical Society, New Orleans, March 1997.

59. 213th American Chemical Society National Meeting, San Francisco, CA, April 1997.

60. Seminar, Albert Einstein College of Medicine, NY, May 1997.

61. Eighth International Conference on Bioinorganic Chemistry, Yokohama, Japan, July 1997.

62. 14th European Experimental NMR Conference, Bled, Slovenia, May 1998.

63. Conference on Molecular and Functional Diversity of Ion Channels and Receptors, New York Academy of Sciences, May 1998.

64. 216th National Meeting of the American Chemical Society, Boston, August 1998.

65. Fourth European Biological Inorganic Chemistry Conference, Seville, Spain, July 1998.

66. XVIII Midwest Enzyme Conference, Northwestern University, Evanston, IL, October 1998.

67. XI Congresso Nacional de Bioquimica, Tomar, Portugal, November 1998.

68. Second Portuguese-Spanish Biophysics Congress, Madrid, Spain, December 1998.

69. International Society for Lithium Research Conference, Lexington, KY, May 1999.

70. Ninth International Conference on Bioinorganic Chemistry, Minneapolis, July 1999.

71. European Mediterranean Conference in Inorganic Chemistry, Toulouse, France, Conference Presentations and Seminars (cont.)

October 1999.

72. Ressonancia Magnetica Nuclear VII Encontro de Usuarios, Rio de Janeiro, Brazil, May 1999.

73. IV Conferencia de Quimica Inorganica, Peniche, Portugal, March 1999.

74. Seminar, Department of Psychiatry, VA Hines Hospital, Hines, IL, March 2000.

75. 44th Annual Meeting of the Biophysical Society, New Orleans, February 2000.

76. 219th ACS National Meeting, March 2000.

77. 30th Congress Ampere on Magnetic Resonance and Related Phenomena, Lisbon, Portugal, July 2000.

78. Seminar, Department of Pharmaceutical Chemistry, University of Montana, May 2000.

79. XIX International Conference on Magnetic Resonance in Biological Systems, Florence, Italy, Aug. 2000.

80. IV Congresso Iberoamericano de Biofisica, Alicante, Spain, October 2000.

81. II Congresso de Investigacao em Medicina, Coimbra, Portugal, November 2000.

82. 16th Scientific Meeting of the American Society of Hypertension, San Francisco, May 2001.

83. VIII Encontro de Usuarios de Ressonancia Magnetica Nuclear, Rio de Janeiro, Brazil, May 2001.

84. Sixth FIGIPS Meeting in Inorganic Chemistry, Barcelona, Spain, July 2001.

85. Tenth International Conference on Bioinorganic Chemistry, Florence, Italy, August 2001.

86. Seminar, Bradley University, September 2001.

87. 46th Annual Meeting of the Biophysical Society, San Francisco, Feb. 2002.

88. 223rd ACS National Meeting, Orlando, April 2002.

Conference Presentations and Seminars (cont.)

89. European Bioinorganic Conference, Lund, Sweden, July 2002.

90. Seminar, Department of Molecular and Cellular Biochemistry, Loyola University Medical Center, October 2002.

91. 225th ACS National Meeting, New Orleans, March 2003.

92. 35th Great Lakes Regional ACS Meeting, Loyola University Chicago, May 2003.

93. Seminar, Department of Chemistry, Augustana College, March 2003.

94. XI International Conference on Biological Inorganic Chemistry, Cairns, Australia, July 2003.

95. Pittsburgh Conference, Chicago, March 2004.

96. Annual Biomedical Conference for Minority Students, Dallas, November 2004.

97. UCLA Symposium in Honor of 60th Birthday of Professor Joan Valentine, Los Angeles, September 2005.

98. Lithium Congress, University of Athens, Greece, October 2005.

99. Eight Biological Inorganic Chemistry International Conference, Aveiro, Portugal, July 2006.

100. Seminar, Olivet Nazarene University, Bourbonnais, IL, March 2007.

101. Seminar, Earlham College, Richmond, IN, March 2007.

102. Frontiers in Life Sciences Research Symposium, Loyola University Chicago, April 2010.

103. Denkewalter Lecture Poster Session, Loyola University Chicago, October 2010.

104. Seminar, Department of Chemistry, Loyola University Chicago, December 2010.

105. Frontiers in Life Sciences Research Symposium, Loyola University Chicago, March 2011.

106. Denkewalter Lecture Poster Session, Loyola University Chicago, April 2011.

107. NSF-REU poster session, LUC, August 2011.

Conference Presentations and Seminars (cont.)

108. St. Albert's Day, LUMC, October 2011.

109. Midwest Enzyme Chemistry Conference, University of Illinois at Chicago, September 2012.

110. NSF-REU poster session, LUC, August 2012.

111. 9th International Biometals Symposium, Duke University, Durham, NC, July 2014.

112. 12th European Biological Inorganic Chemistry Conference, Zurich, Switzerland, August 2014

113. 13th European Biological Inorganic Chemistry Conference, Budapest, Hungary, August 2016

ADMINISTRATIVE AND COMMITTEE RESPONSIBILITIES:

National and State: Member of the NSF Chemical Research Instrumentation and Facilities Multi-User Review Committee, October 2007; Member of the NSF Major Instrumentation Review Committee, Summer 2004; Member of the Neuropharmacology and Neurochemistry Study Section of NIH (permanent, Fall 1997-2001; temporary, Summer 1996 and Spring 1997; small grants, Fall 1991), Member of the Fellowship and Grant-in-Aid Review Committee of the Illinois Affiliate of the American Heart Association (1993-1995; 1997).

University: Member of the CAS Honors Programming Advisory Committee (1996-97), the Summer Research Stipend Committee (1995), the Committee on Research, Faculty Council (1992-1993), the Graduate Council Committee (1998-2003), the Internal Committee on Scientific Integrity (Summer 1999), of the Biosafety Committee (1999-2000), the Curriculum Committee of the Graduate Council (2001), and of the UPC-Research (2004-2007).

Department of Chemistry and Biochemistry: served in several leading capacities such as Chair (May 2012 to present), Interim Chair (July 2011 – May 2012), Acting Chair (Spring 1999) and Assistant Chair of the Department (AY2010-2011) and Graduate Program Director (Fall 1998 - 2003), and on numerous departmental committees including the Promotion & Tenure Committee as a member (1992 - 2001) and as Chair (2006-2011) and five Chemistry Faculty Search Committees, and chaired the Chemistry Graduate Admissions (1996-2003) and the Chemistry Undergraduate Studies (1993-1995) Committees.

The graduate progress, thesis, and dissertation committees in which I served for students other my own are listed below:

Name	Degree Program	Semester of Defense
Agnes Yoo	Ph.D.	Summer 85
Frank White	M.S.	Fall 85
Nachu Chakravarthy	Ph.D.	Spring 86
Opinya Ekabo	M.S.	Spring 86
Scott Erickson	M.S.	Spring 86
Steve Keller	Ph.D.	Summer 86
Thao Yang	M.S.	Fall 86
Eugene Zaluzec	Ph.D.	Fall 89
Thao Yang	Ph.D.	Fall 89
R. Subramanian	Ph.D.	Spring 90
David French	Ph.D.	Summer 90
Yin Zhang	Ph.D.	Spring 92
Carla Edwards	M.S.	Spring 92
Cliff Berkman	Ph.D.	Spring 93
He Huang	Ph.D.	Spring 94
Qun-Ying Zhang	Ph.D.	Fall 94
Nina Monberg	M.S.	Summer 95
A. El-Qisari	Ph.D.	Spring 96
Q. Yu	M.S.	Spring 96

Name	Degree Program	Semester of Defense
L. Zhao	M.S.	Fall 96
M.F. Clifton	Ph.D.	Fall 97
A. Aldridge	Ph.D.	Fall 97
J. Brunzelle	Ph.D.	Spring 99
S. Dragan	Ph.D.	Fall 01
D. Dzielawa	Ph.D.	Spring 02
D. Huffer	Ph.D.	Spring 02
E. Brusca	Ph.D.	Summer 02
S. Golden	Ph.D.	Spring 06
F. Amoako	M.S.	Fall 06
E. Tarasov	Ph.D.	Spring 07
A. Agyeman	Ph.D.	Spring 07
P. Kramer	Ph.D.	Spring 08
P. Sanjeevaiah	Ph.D.	Spring 09
J. Borden	Ph.D.	Spring 09
M. Kamm	M.S.	Spring 11
M. van Opstal	Ph.D.	Spring 14
Kyle Webster	Ph.D.	Spring 16
B. Hill	Ph.D.	Spring 16
M. Reichert	Ph.D.	Fall 16

PROFESSIONAL DEVELOPMENT:

Attended NMR Concepts (Traficante Series) course on "In vivo and in vitro Biological NMR Spectroscopy", Oct. 29 - Nov. 2, 1990, St. Louis, MO.

PROFESSIONAL MEMBERSHIPS:

Member of American Chemical Society (Inorganic and Biological Divisions), Biophysical Society, International Society of Biological Inorganic Chemistry, Society of Magnetic Resonance in Medicine, and International Society of Biological Magnetic Resonance.

PERSONAL DATA: Born on August 20, 1957
Single Male
Dual U.S. and Portuguese Citizenship