Laurence A. Angel

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Qualifications

Doctor of Philosophy, Chemistry, 2000.
Bachelor of Science (Honors), Environmental Science with North American Studies (minor), 1996.

Professional Experience

September 2019 – Present, Professor, Texas A&M University-Commerce.
June 2013 – August 2019, Associate Professor, Texas A&M University-Commerce.
Aug 2007 – May 2013, Assistant Professor, Texas A&M University-Commerce.
July 2003 – Aug 2007, Assistant Research Professor, University of Nevada, Reno.
Sept.1999 – July 2003, Postdoctoral Research, Professor K.M. Ervin, University of Nevada, Reno.

Education

Sept.1996 – Sept.1999, Doctor of Philosophy, Professor A.J. Stace, University of Sussex, U.K.
Oct.1992 – June 1996, BSc (Hons), Environmental Science with North American Studies, University of Sussex.

Professional Awards

1. Texas A&M University – Commerce, 2016-2017, Faculty Senate Recognition Award for Professional Excellence: "Fearless Investigation".
2. Texas A&M University – Commerce, 2011, Provost Award: Research and Creative Activity.
3. University of Nevada, Reno, 2006, Outstanding Professor and Researcher EB-1 visa award.
4. D.Phil. research award, 1996-1999, Engineering and Physical Sciences Research Council, UK.

Professional Memberships

2005 – Present: American Society of Mass Spectrometry, Member.
2005 – Present: American Chemical Society, Member.

External Research Funding Acquired

1. PI, National Science Foundation: Chemical Structure, Dynamic & Mechanism B. CHE-1764436, RUI: Developing Ion Mobility Mass Spectrometry Techniques for Determining the Structure and Mechanisms of Metal Ion Recognition & Redox Activity of Metal Ion Binding Oligopeptides, $216,267, 2018-2021.

2. PI, National Science Foundation – Major Research Instrumentation Grant. CBET-0821247, Acquisition of a IM-Q-TOF Mass Spectrometer, Laurence Angel, Ph.D., (PI), Nenad Kostic, Ph.D., (Co-PI), Frank Miskevich, Ph.D., (Co-PI), Stephen Starnes, Ph.D., (Co-PI), William Whaley, Ph.D., (Co-PI), Serge P. von Duvillard, Ph.D., (Co-PI), Lani Lyman-Henley, Ph.D., (Co-PI). $310,000, 2008-2011

3. Co-PI, U.S. Department of Energy Grant.TX-W-20090427-0004-50. Advanced Artificial Science. The development of an artificial science and engineering research infrastructure to facilitate innovative computational modeling, analysis, and application to interdisciplinary areas of scientific investigation. S. Saffer, Ph.D., (PI), Derek Harter, Ph.D., (Co-PI), Sang Suh, Ph.D., (Co-PI), Laurence Angel, Ph.D., (Co-PI). $291,600, 2010.

Teaching

General Chemistry Tutorial (I-II), General and Quantitative Chemistry (I-II), General and Quantitative Chemistry Labs (I-II), Quantitative and Instrumental Analysis, Quantitative and Instrumental Analysis Lab, Instrumental Chemistry, Instrumental Chemistry Lab, Physical Chemistry II, Physical Chemistry II Lab, Advanced Analytical Chemistry, Advanced Instrumental Analysis (I-II), Advanced Research Techniques and Design (I-II), Advanced Mass Spectrometry Techniques (I-IV), Chemical Science and Profession, Graduate Seminar, Undergraduate Research, Graduate Thesis.

Publications in Peer-Reviewed Scientific Journals since joining TAMU-Commerce

1. **Collisional dynamics simulations revealing fragmentation properties of Zn(II)-bound poly-peptide** Abdul Malik, Laurence A. Angel, Riccardo Spezia, and William L. Hase *Physical Chemistry Chemical Physics***, 2020,** *22***,** 14551. DOI: 10.1039/d0cp02463e
2. **pH dependent chelation study of Zn(II) and Ni(II) by a series of hexapeptides using electrospray ionization – ion mobility – mass spectrometry** Ayobami B. Ilesanmi, Tessa C. Moore, Laurence A. Angel *International Journal of Mass Spectrometry* **2020**, *455*, 116369. https://doi.org/10.1016/j.ijms.2020.116369
3. **Comparison of the pH-dependent formation of His and Cys heptapeptide complexes of nickel(II), copper(II), and zinc(II) as determined by ion mobility – mass spectrometry** Enas N. Yousef and Laurence A. Angel *J. Mass Spectrom.* **2020**, *55*, e4489. DOI: 10.1002/jms.4489
4. **Weak Acid-Base Interactions of Histidine and Cysteine Affect the Charge States, Tertiary Structure, and Zn(II)-binding of Heptapeptides** Yu-Fu, Lin, Enas N. Yousef, Efren Torres, Linh Truong, James M. Zahnow, Cole B. Donald, Ying Qin, and Laurence A. Angel *J. Am. Soc. Mass Spectrom.* **2019**, *30*, 2068-2081. doi: 10.1007/s13361-019-02275-7
5. **Direct Dynamics Simulations of Fragmentation of a Zn(II)-2Cys-2His Oligopeptide. Comparison with Mass Spectrometry Collision-Induced Dissociation** Malik A. Rao, Yu-Fu Lin, Subha Pratihar, Laurence A. Angel, and William L. Hase *J. Phys. Chem. A* **2019**, *123*, 6868-6885. doi:10.1021/acs.jpca.9b05218
6. **Ion Mobility – Mass Spectrometry Techniques for Determining the Structure and Mechanisms of Metal Ion Recognition and Redox Activity of Metal Binding Oligopeptides** Enas N. Yousef, Ramakrishna Sesham, Jacob W. McCabe, Rajpal Vangala. and Laurence A. Angel *J. Vis. Exp.* (151), e60102, doi:10.3791/60102 (**2019**). Video URL: https://www.jove.com/video/60102
7. **Binding Selectivity of Methanobactin from *Methylosinus Trichosporium* OB3b for Copper(I), Silver(I), Zinc(II), Nickel(II), Cobalt(II), Manganese(II), Lead(II), and Iron(II)** McCabe, J. W.; Vangala, R. and Angel, L. A. *J. Am. Soc. Mass Spectrom.* **2017**, *28*, 2588-2601.
8. **Applying Ion Mobility – Mass Spectrometry Techniques for Explicitly Identifying the Products of Cu(II) Reactions of 2His-2Cys Motif Peptides** Vytla, Y. and Angel, L.A. *Analytical Chemistry*, **2016**, *88*, 10925.
9. **The Multiple Conformational Charge States of Zinc(II) Coordination by 2His-2Cys Oligopeptide Investigated by Ion Mobility - Mass Spectrometry, Density Functional Theory and Theoretical Collision Cross Sections** Wagoner, S. M.; Deeconda, M.; Cumpian, K. L.; Ortiz, R.; Chinthala, S. and Angel, L. A., *J. Mass Spectrom.* **2016**, *51*, 1120.
10. **Probing the Stability of Insulin Oligomers Using Electrospray Ionization - Ion Mobility - Mass Spectrometry** Boga Raja, U. K.; Injeti, S.; Culver, T.; McCabe, J. W.; Angel, L. A., *Eur. J. Mass Spectrom.* **2015**, *21*, 759.
11. **Redox Activity and Multiple Copper(I) Coordination of 2His-2Cys Oligopeptides** Choi, D.; Alshahrani, A.; Vytla, Y.; Deeconda, M.; Serna, V. J.; Saenz, R. F. and Angel, L. A., *J. Mass Spectrom.* **2015**, *50*, 316.
12. **The pH Dependent Cu(II) and Zn(II) Binding Behavior of an Analog Methanobactin Peptide** Sesham, R.; Choi, D.; Balaji, A.; Cheruku, S.; Ravichetti, C.; Alshahrani, A.; Nasani, M.; Angel, L. A., *Eur. J. Mass Spectrom.* **2013**, *19*, 463.
13. **Analysis of Methanobactin from *Methylosinus Trichosporium* OB3b via Ion Mobility Mass Spectrometry** Choi, D-W.; Sesham, R.; Kim, Y.; and Angel, L.A. *Eur. J. Mass Spectrom.*, **2012**, *18*, 509.

14. **Ion Mobility - Mass Spectrometry Study of Metal Ion Labeling of the Conformational and Charge States of Lysozyme** Angel, L.A. *Eur. J. Mass Spectrom.*, **2011**, *11*, 207.
15. **Metal Complexes as Artificial Proteases in Proteomics: A Palladium(II) Complex Cleaves Various Proteins in Solutions Containing Detergents** Miskevich, F.; Davis, A.; Leeprapaiwong, P.; Giganti, V.; Kostic, N.M.; Angel, L.A. *J. Inorg. Biochem.*, **2011**, *105*, 675.
16. **Ion Mobility-Mass Spectrometry Study of Folded Ubiquitin Conformers Induced by Treatment with *cis*-$[Pden(H_2O)_2]^{2+}$** Giganti, V.; Best, W.A; Kundoor, S.; Angel, L.A. *J. Am. Soc. Mass Spectrom.,* **2011**, *22*, 300.
17. **Effects of Transition Metal Ion Identity & π-Cation Interactions in Metal-*Bis*(Peptide) Complexes Containing Phenylalanine** Utley, B.; Angel, L.A. *Eur. J. Mass Spectrom.*, **2010**, *16*, 631.
18. **Ion Mobility Mass Spectrometry of $Au_{25}(SCH_2CH_2Ph)_{18}$ Nanoclusters** Angel, L.A; Majors, L.T.; Dharmaratne, A.C.; Dass, A. *ACS Nano*, **2010**, *4*, 4691.
19. **Threshold Collision Induced Dissociation of Hydrogen-Bonded Dimers of Carboxylic Acids** Jia, B.; Angel, L.A.; Ervin, K.M. *J. Phys. Chem. A*, **2008**, *112*, 1773.

Research Papers

Weakly-Bound Dimers that Underlie the Crystal Nucleation Precursors in Lysozyme Solutions Byington, M. C.; Safari, M. S.; Lubchenko, V.; McCabe, J. W.; **Angel, L. A.**; Hawke, D. H.; Bark, S. J.; Conrad, J. C. bioRxiv, Biophysics (**2018**), 1-20.

Invited Speaker at Universities and Conferences since joining TAMU-Commerce

1. **Dynamical Impedances to Translational Energy Activation of Gas-Phase S_N2 Reactions of Halide Ion with Halomethane** Angel, Laurence A.; Ervin, Kent M. From Abstracts, 73rd Southwest Regional Meeting of the American Chemical Society, Lubbock, TX, United States, October 29-November 1 (**2017**), SWRM-182.
2. **Comparison of the Selected Transition Metal Binding Characteristics of Methanobactin and 2His-2Cys Motif Metal Binding Peptides** Yashodharani Vytla, Jacob W. McCabe, Stephanie M. Wagoner, Manogna Deeconda, Kayleah L. Cumpian, Rafael Ortiz, Swetha Chinthala, **Laurence A. Angel** *Physical Chemistry Seminar, Texas Tech University, November 18. **2016**.*
3. **Methanobactin Analysis via Ion Mobility Mass Spectrometry** Yuri Kim, and DongWon Choi. **Laurence A. Angel** *Chemistry Seminar, Baylor University, February **2012**.*
4. **Methanobactin Analysis via Ion Mobility Mass Spectrometry** Yuri Kim, and DongWon Choi. **Laurence A. Angel** *Research Symposium TAMU-Commerce, April **2012**.*
5. **Gold Nanocluster Analysis via Ion Mobility Mass Spectrometry** Amala Dass and **Laurence A. Angel** *Research Symposium TAMU-Commerce, April **2011**.*
6. **Gas-Phase Acidity and the O-H Bond Dissociation Enthalpy of Phenol** Kent M.Ervin and **Laurence A. Angel** *Physics Symposium TAMU-Commerce, November **2007**.*

Organizer of National and Local Research Meetings

1. Presiding organizer of the section "Mass Spectrometry and Related Technologies for Energy and Fuels" at the 247th American Chemical Society National Meeting and Exposition, Dallas TX March 16-20 2014.
2. Organizing committee, judge and prize organizer for The 46th ACS DFW MEETING-in-MINIATURE, Texas A&M University-Commerce, Commerce, Texas, April 27, 2013.

Student Research Awards

1. **Yu-Fu Lin "How the primary structure of related heptapeptides affects their charge states, tertiary structure, and collision-induced dissociation" First Place** in the category for graduate oral presentation for College of Science and Engineering at the 2019 Annual Research Symposium held at Texas A&M University – Commerce, April 9th, 2019.
2. **Jacob McCabe "Investigation of selected metal ion binding characteristics of methanobactin from *Methyosinus trichosporium* OB3b" First Place –** Overall First Place for Posters – 13th Annual Texas A&M University System Pathways Symposium – November 2016.

3. **Jacob McCabe "Investigation of selected metal ion binding characteristics of methanobactin from *Methyosinus trichosporium* OB3b" First Place –** Physical Science – 13th Annual Texas A&M University System Pathways Symposium – November 2016.
4. **Jacob McCabe for his research poster "Investigation of the Cu(I), Ag(I), Pb(II), Co(II), Fe(III), Mn(II), Ni(II), and Zn(II) binding characteristics of methanobactin from *Methyosinus trichosporium* OB3b" Second place** in the Science, Technology, Engineering and Math category of the 7th Annual Federation Research Symposium held at Texas Women's University April 8th, 2016 Texas.
5. **Jacob McCabe "Investigation of the Cu(I), Ag(I), Pb(II), Co(II), Fe(III), Mn(II), Ni(II), and Zn(II) binding characteristics of methanobactin from *Methyosinus trichosporium* OB3b" First Place** in the category for graduate research posters at the 2016 Annual Research Symposium held at Texas A&M University – Commerce, April 7th, 2016.
6. **Jacob McCabe "Competitive Binding of Copper(I) and Zinc(II) by Methanobactin from *Methylosinus trichosporium* OB3b" Second Place** in the Physical Sciences category for graduate research posters at the 2015 Texas A&M System 12th Annual Pathways Student Research Symposium held at Texas A&M University-Corpus Christi on October 22nd - 23rd, 2015.
7. **Chirag Salva** won 2nd prize in the category graduate research poster at the 2013 Texas A&M University-Commerce Research Symposium.
8. **Amy Davis** won 3rd prize in the category of undergraduate research poster at the 2009 Texas A&M University – Commerce Science Symposium.
9. **Amy Davis** won 1st prize in the *overall* category of undergraduate research poster at the 2008 Texas A&M University System Pathways Student Research Symposium.
10. **Brandon Utley** won 3rd prize in the *overall* category of M.S. graduate research poster at the 2008 Texas A&M University System Pathways Student Research Symposium.

Research Mentor for Graduated MS Thesis Students

1. **Enas Yousef**; RUI-NSF funded graduate researcher, "Comparison of the Metal Ions Binding During pH 5-10 of a Series of Sequence Related Heptapeptides Using Ion Mobility–Mass Spectrometry" (graduated Summer 2019)
2. **Yu-Fu Lin**; "How primary structure of related heptapeptides affects their charge states and collision-induced dissociation as investigated by ion mobility – mass spectrometry " (graduated Spring 2019)
3. **Swetha Chintala,** Zn(II) and Cu(I/II) Binding To Alternative Metal Binding Peptide Using Fluorescence and Ion Mobility- Mass Spectrometry Techniques. (graduated Summer 2017)
4. **Jacob McCabe,** "Investigation of Zn(II) and Cu(I) binding characteristics of methanobactin from *Methyosinus trichosporium* OB3b" (graduated Spring 2017)
5. **Vangala, Rajpal**, "Investigation of Metal Binding Properties of Methanobactin and Alternative Metal Binding (Amb_7) Peptides by Fluorescence Spectroscopy And Ion Mobility Mass - Spectrometry**"**(graduated Spring 2017)
6. **Sravya Challa, "**Analysis of Cu(II) and Zn(II) Binding of Selected Ambs as a Function of Varying pH and Metal Equivalents Employing Ion Mobility Mass Spectrometric Studies" (graduated summer 2016)
7. **Manogna Deeconda, "**Study of Zn(II) Binding of an Analog Methanobactin Peptide Using Ion Mobility-Mass Spectrometry" (graduated summer 2016)
8. **Yashodharani Vytla, "**Ion Mobility – Mass Spectrometry Study of the Redox Activity of Methanobactin Analog Peptides" (graduated summer 2016)
9. **Aisha Alshahrani, "**Cu(II), Zn(II) and Ni(II) Binding Studies of a Series of Analog Methanobactin Peptides" (graduated Summer 2014)
10. **Hind Alsheri,** Study of the Metal Ions Binding Behavior of Methanobactin Analog Peptides by Traveling Wave Ion Mobility Mass Spectrometry (graduated Summer 2014)
11. **Ramakrishna Sesham,** "Investigation of Methanobactin and its Analog Peptides" (graduated Fall 2013)
12. **Sahithi Cheruku,** "Collision Cross Section Determination of Lysozyme and Methanobactin Analog Peptide by Travelling Wave Ion Mobility Mass Spectrometry" (graduated Fall 2013)
13. **Uday Kumar Boga Raja,** "Stability and Aggregation of Insulin Oligomers Analyzed by Electrospray Ionization - Ion Mobility Mass Spectrometry (ESI-IMMS)." (graduated Fall 2013)

14. **Anupama Singh Balaji,** "*In Silico* Binding Affinities of Methanobactin Analogs to First Row Transition Metal Ions" (graduated Fall 2013)
15. **Chirag Salva,** "Quantification and characterization of glycolipids and phospholipids of *Chalmydomonas reinhardtii* by HPLC-ESI-TOF-MS" (graduated Summer 2013)
16. **Maheshbabu Nasani,** "Study of methanobactin and methanobactin analog peptides for selective binding of Cu(II) and Zn(II) ions" (graduated Summer 2013)
17. **Chiranjeevi Ravichetti,** "Density functional theory analysis of methanobactin analog peptides for Cu(II) selectivity" (graduated Summer 2013)
18. **Swetha Bathula,** "Lipid profiling of Methylococcus capsulatus (bath): quantification and characterization of phospholipids, glycolipids and free fatty acids by using RP-HPLC-ESI-MS" (graduated Summer 2013)
19. **Sruthi Konachanchi,** "Comparative study of metal ion labeling of the conformational and charge states of native and disulfide reduced lysozyme" (graduated Summer 2013)
20. **Srilakshmi Injeti, "**Study of the stability of insulin oligomers in the presence and absence of Zn(II) using mass spectrometry" (graduated Fall 2012)
21. **Kiran Kumar Nalla,** "Mass Spectrometry and computational study of ubiquitin associated with different metal (II) ions: zinc, copper, nickel, cobalt, iron and manganese. (graduated Fall 2012)
22. **Archana Gujarri**, "Mass Spectrometry study of tetraglycine associated with selected metal ions (II): manganese, iron, cobalt, nickel, copper and zinc.", (graduated Spring 2012)
23. **Porntip Leeprapaiwong**, "Palladium complexes as proteomics reagents for the study of the cellular membrane", (graduated Spring 2012)
24. **Sriramu Kundoor**, "An ion mobility - mass spectrometry study of leucine-enkephalin (YGGFL) and ubiquitin associated with selected metal ions" (graduated Fall 2011)
25. **Tianran Shi**, "Ion mobility and mass spectrometry studies of the conformations of Zn(II) and Mn(II) *bis*-complexes containing the amino acids of His, Cys, Asp, Tyr, Glu and Gly." (graduated Fall 2010)
26. **Brandon Utley**, "Chemistry of transition metal cations & phenylalanine-containing peptides investigated by mass spectrometry" (graduated Summer 2009)
27. **Hsin-Yi Tsai**, "Competitive dissociation channels and conformations of Zn(II) and Mn(II) *bis*-complexes containing amino acids and dipeptides of His, Cys, Asp, Tyr and Gly" (graduated Summer 2009)

Mentor of Current MS Graduate Research Thesis Students

1. **Ayobami Ilesanmi,** "pH dependent chelation study of a series of hexapepetides with Zn(II), Ni(II), and Co(II) using ESI-IMMS"
2. **Alicia Barrett** "Circular Dichroism analysis of the beta-turn in amb peptides"
3. **Amber Flores** "Study of zinc, cobalt and nickel binding affinity of analog methanobactin peptide, for use as an affinity tag, using ion mobility mass spectrometry"
4. **Oladapo Falokun, "**Zn(II), Cu(II), Ni(II), Co(II), Mn(II), Ag(I), binding of $amb_{5O\text{-}R}$ hexapeptides depicting variations in arrangement of His binding groups"

Mentor for Undergraduate Honors Thesis Completed

1. **Linh Troung**; RUI-NSF funded undergraduate researcher "How the Primary Structure of Related Heptapeptides Affects their Charge States, Structure and Metal-binding Ability as Investigated by Ion Mobility- Mass Spectrometry " Honor's Thesis, Texas A&M University – Commerce.
2. **Nayeli Fuentes**; McNair Scholar and RUI-NSF funded undergraduate researcher "The pH dependent binding of Zinc(II), Cobalt(II), Magnesium(II), and Calcium(II) with a series of heptapeptides using Electrospray Ionization and Ion Mobility Mass Spectrometry" Honor's Thesis, Texas A&M University – Commerce.
3. **Tiffany Culver, "**Interactions of Zn^{2+} on insulin oligomer formation and stability: Analysis using ESI-IM-MS" Honor's Thesis, Texas A&M University – Commerce.

Supervision of BS Undergraduate Research

1. **Anna Arredondo** "Study of zinc, cobalt and nickel binding affinity of analog methanobactin peptide and NTA, for use as an affinity tag, using ion mobility mass spectrometry"
2. **Hannah Story,** "Study of zinc, cobalt and nickel binding affinity of analog methanobactin peptide and NTA, for use as an affinity tag, using ion mobility mass spectrometry"
3. **Aram Kim, "**Analog methanobactins as matrix metalloproteinase inhibitors"
4. **Linh Troung**; RUI-NSF funded undergraduate researcher "How the Primary Structure of Related Heptapeptides Affects their Charge States, Structure, and Metal-Binding Ability as Investigated by Ion Mobility-Mass Spectrometry and Density Functional Theory" Texas A&M University – Commerce.
5. **Nayeli Fuentes**; McNair Scholar and RUI-NSF funded undergraduate researcher "The Effects of Metal Binding to the Primary Structure of Five Different Heptapeptides as Investigated Through Ion Mobility-Mass Spectrometry" Texas A&M University – Commerce.
6. **Ellesia Grantham,** "Interactions of Histidine and Cysteine at pH 7.4 With Ni(II), Co(II), and Zn(II)-Binding of Heptapeptides"
7. **Efren Torres,** McNair Scholar and RUI-NSF funded undergraduate researcher, "Development of Spreadsheet Analysis of Collision Cross Sections Measurement of Amb-5 Peptides and Comparison with their Tertiary Structures located using Density Functional Theory"
8. **James Zahnow,** "Comparison of Collision-induced Dissociation and Collision Cross Sections from a Series of Sequence Related Heptapeptides"
9. **Ronald Donjuan** "Comparison of Ag^{+} binding by a series of related heptapeptides"
10. **Trevor Daugherty "**Cu(I), Pb(II), Ag(I), Co(II), Ni(II), Zn(II), Mn(II) Fe(III) pH titrations of methanobactin analog peptide-7 using ion mobility – mass spectrometry"
11. **Rafael Ortiz,** "Zn(II) titration and pH studies of a methanobactin analog peptide-5 using ion mobility – mass spectrometry"
12. **Robert Saenz** and **Victor Serna,** "Competitive Cu(II) titrations of methanobactin analog peptides 1-4 using ion mobility – mass spectrometry"
13. **Amanda Armstrong,** "Study of the molecular characteristics of methanobactin analog peptide-3 using density functional theory molecular modeling"
14. **Yuri Kim** "Ion mobility Mass Spectrometry of Methanobactin from *Methylosinus Trichosporium*"
15. **Virginia Giganti,** "Gene cloning of zif268 and identification by ion mobility mass spectrometry"
16. **Tiffany Culver, "**Interactions of Zn^{2+} on insulin oligomer formation and stability: Analysis using ESI-IM-MS"
17. **Ronald Rainey** "A biomimetric study of the active site of carbonic anhydrase"
18. **Mickey Matthews**, "Histidine Complexes of Zn(II)"
19. **Amy Davis, "**Pd(II) complexes as proteomic reagents for the cellular membrane"

Supervision of Students in the Research Experience for Undergraduates (NSF-REU) Program.

1. **Amy Davis** and **Lida Vatanpour**, summer 2008.
2. **Thandar Su Myint** and **Tam Phan,** summer 2009.
3. **Alex Best**, **Hossein Ganjizadeh** and **Josh Galloway,** summer 2010.
4. **Yuri Kim** and **Tiffany Culver,** summer 2011.
5. **Sean Hurlburt,** summer 2012.
6. **Kayleah Cumpian** and **Rafael Ortiz,** summer 2014.
7. **Francisco Rogers**, summer 2015.
8. **Joshua Pettibon**, summer 2016.
9. **Ying Qin**, "Collision-induced dissociation to determine the impact on affinities of zinc ion towards peptides with different amino acid sequences", summer 2017.
10. **Cole Donald** "Binding selectivity of amb_{5CC} peptide with Zn(II)" and **Jorge Ahumada** "How Primary Structure Affects the Secondary and Tertiary Structure of His-Cys Oligopeptides" summer 2018.
11. **Tessa Moore** and **Jack Williams** "Developing high performance liquid chromatography and ion mobility - mass spectrometry techniques (HPLC-IM-MS) for studying the competitive metal chelation properties of alternative metal-binding heptapeptides" summer 2019

Collaborations

William L. Hase (*Texas Tech University - Lubbock*) Comparison of Thermal and Collision Induced Dissociation of Zn(II)-2Cys-2His Oligopeptide using Direct Dynamics Simulations. Collisional dynamics simulations revealing fragmentation properties of Zn(II)-bound poly-peptide

Malik A. Rao (*Texas Tech University - Lubbock*) Comparison of Thermal and Collision Induced Dissociation of Zn(II)-2Cys-2His Oligopeptide using Direct Dynamics Simulations. Collisional dynamics simulations revealing fragmentation properties of Zn(II)-bound poly-peptide

Riccardo Spezia (*Laboratoire de Chimie Théorique, Sorbonne Université, UMR 7616 CNRS, 4, Place Jussieu, 75005 Paris, France*) Collisional dynamics simulations revealing fragmentation properties of Zn(II)-bound poly-peptide

Venu Cheriyath (*Texas A&M University - Commerce*) Investigations of analog methanobactins as matrix metalloproteinases inhibitors and affinity tags for recombinant proteins purification.

Obulisamy Parthiba Karthikeyan (*Department of Engineering Technology, College of Technology, University of Houston*) "Carbon sequestration by Methanobactin"

Yelica Rodriguez (*Biomedical Institute for Regenerative Research, Texas A&M University - Commerce*) Cardioprotective effect of Wharton's Jelly Stem Cells derived exosomes in Ossabaw miniature swine (Sus scrofa) model of metabolic syndrome.

Steven Starnes (*Texas A&M University - Commerce*) Characterizing and identifying porphyrin based receptors.

Michael C. Byington and **Peter G. Vekilov** (*Department of Chemical and Biomolecular Engineering, University of Houston)* Weakly-bound Dimers that Underlie the Mesoscopic Protein-rich Clusters in Lysozyme Solutions

Touradj Solouki (*Baylor University*) and **DongWon Choi** (Texas A&M University - Commerce) Characterization of solution and gas-phase behavior of methanobactin peptides.

Michael Hanna (*Texas A&M University - Commerce*) Gene Cloning of zinc finger (zif268) with conformational and binding analysis by ion mobility mass spectrometry.

Amala Dass (*University of Mississippi*) Ion mobility-mass spectrometry analysis of gold nanoclusters.

Frank Miskevich (*Texas A&M University - Commerce*) and **Nenad Kostic** (*Texas A&M University - Commerce*) Metal ion complexes as proteomic reagents for cellular membranes and identifying glycolipids in stem cells.