

# Laurence A. Angel

## **Chemistry Department**

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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.

1. **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.* Accepted for publication 12/13/2019.
2. **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.
3. **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.* **2019**, *123*, 6868-6885.
4. **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>
5. **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.
6. **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.
7. **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.
8. **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.
9. **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.
10. **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.
11. **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.
12. **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.
13. **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.
14. **Ion Mobility-Mass Spectrometry Study of Folded Ubiquitin Conformers Induced by Treatment with *cis*-[Pden(H<sub>2</sub>O)<sub>2</sub>]<sup>2+</sup>** Giganti, V.; Best, W.A; Kundoor, S.; Angel, L.A. *J. Am. Soc. Mass Spectrom.*, **2011**, *22*, 300.
15. **Effects of Transition Metal Ion Identity &  $\pi$ -Cation Interactions in Metal-Bis(Peptide) Complexes Containing Phenylalanine** Utley, B.; Angel, L.A. *Eur. J. Mass Spectrom.*, **2010**, *16*, 631.
16. **Ion Mobility Mass Spectrometry of Au<sub>25</sub>(SCH<sub>2</sub>CH<sub>2</sub>Ph)<sub>18</sub> Nanoclusters** Angel, L.A; Majors, L.T.; Dharmaratne, A.C.; Dass, A. *ACS Nano*, **2010**, *4*, 4691.
17. **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 Submitted to Peer-Reviewed Scientific Journals

### **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 while at A&M-Commerce

1. **Dynamical Impedances to Translational Energy Activation of Gas-Phase S<sub>N</sub>2 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 Deconda, 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.*

## 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 9<sup>th</sup>, 2019.
2. **Jacob McCabe** “Investigation of selected metal ion binding characteristics of methanobactin from *Methyosinus trichosporium* OB3b” **First Place** – Overall First Place for Posters – 13<sup>th</sup> 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 – 13<sup>th</sup> 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 7<sup>th</sup> Annual Federation Research Symposium held at Texas Women’s University April 8<sup>th</sup>, 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 7<sup>th</sup>, 2016.
6. **Jacob McCabe** “Competitive Binding of Copper(I) and Zinc(II) by Methanobactin from *Methyosinus trichosporium* OB3b” **Second Place** in the Physical Sciences category for graduate research posters at the 2015 Texas A&M System 12<sup>th</sup> Annual Pathways Student Research Symposium held at Texas A&M University-Corpus Christi on October 22<sup>nd</sup> - 23<sup>rd</sup>, 2015.
7. **Chirag Salva** won 2<sup>nd</sup> prize in the category graduate research poster at the 2013 Texas A&M University-Commerce Research Symposium.
8. **Amy Davis** won 3<sup>rd</sup> prize in the category of undergraduate research poster at the 2009 Texas A&M University – Commerce Science Symposium.
9. **Amy Davis** won 1<sup>st</sup> 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 3<sup>rd</sup> prize in the *overall* category of M.S. graduate research poster at the 2008 Texas A&M University System Pathways Student Research Symposium.

### **Oral and Poster Presentations at American Society Mass Spectrometry Meetings**

1. **How Interactions of Histidine and Cysteine Affect the Charge States, Tertiary Structure, and Zn(II)-binding of Heptapeptides** Lin, Yu-Fu; Yousef, Enas; Torres, Efren; N.; Angel, Laurence A., 2019 ASMS Sanibel Conference, **Sanibel Conference on Chemical Cross-Linking & Covalent Labeling** January 24 - 27, **2019**, Hilton St. Petersburg, Florida.
2. **Comparison of the selected metal binding characteristics of the methanobactin from *Methylosinus trichosporium* OB3b** Jacob W. McCabe, Rajpal Vangala, **Laurence A. Angel** 65<sup>th</sup> Conference on Mass Spectrometry and Allied Topics, June 4-8, **2017**, Indianapolis, Indiana.
3. **Copper-binding and redox activity and of a series of alternative methanobactin peptide** Yashodharani Vytla, Manogna Deconda, Sravya Challa, Swetha Chintala, Rajpal Vangala, Jacob W. McCabe and **Laurence A. Angel**, 64<sup>th</sup> Conference on Mass Spectrometry and Allied Topics, June 5-9, **2016**, San Antonio, Texas.
4. **Investigation of the Cu(I), Ag(I), Pb(II), Co(II), Fe(II), Mn(II), Ni(II), and Zn(II) binding characteristics of methanobactin from *Methylosinus trichosporium* OB3b** **Jacob W. McCabe**, Rajpal Vangala, Laurence A. Angel, 64<sup>th</sup> Conference on Mass Spectrometry and Allied Topics, June 5-9, **2016**, San Antonio, Texas.

### **Oral and Poster Presentations at American Chemical Society Meetings**

1. **How the histidine and cysteine ligating sites in a series of heptapeptides affects their chelation of zinc(II), nickel(II), copper(II), silver(I), and cobalt(II)** Yousef, Enas N.; Fuentes, Nayeli; Truong, Linh; Flores, Amber; Angel, Laurence A. From Abstracts, 75<sup>th</sup> Southwest Regional Meeting of the American Chemical Society, El Paso, TX, United States, November 13-16 (2019), SWRM-RMRM 291.
2. **Investigation of the binding selectivity of zinc(II) with associated hexapeptides** Moore, Tessa; Ilesanmi, Ayobami; Angel, Laurence A. From Abstracts, 75<sup>th</sup> Southwest Regional Meeting of the American Chemical Society, El Paso, TX, United States, November 13-16 (2019), SWRM-RMRM 274.
3. **Determining the nickel-NTA and cobalt-NTA binding affinity of analog methanobactin peptides as potential affinity tags, using ion mobility mass spectrometry** Flores, Amber; Cheriyaath, Venu, Angel, Laurence A. From Abstracts, 75<sup>th</sup> Southwest Regional Meeting of the American Chemical Society, El Paso, TX, United States, November 13-16 (2019), SWRM-RMRM 75.
4. **pH dependent chelation study of a series of hexapeptides with Zn(II), Ni(II), and Co(II) using ESI-IMMS** Ilesanmi, Ayobami; Moore, Tessa; Williams, Jack; Angel, Laurence A. From Abstracts, 75<sup>th</sup> Southwest Regional Meeting of the American Chemical Society, El Paso, TX, United States, November 13-16 (2019), SWRM-RMRM 259.
5. **How the primary structure of related heptapeptides affects their charge states, tertiary structure, and collision-induced dissociation as investigated by ion mobility-mass spectrometry and density functional theory** Lin, Yu-Fu; Zahnow, James; Torres, Efren; Yousef, Enas N.; Angel, Laurence A. From Abstracts, 74<sup>th</sup> Southwest Regional Meeting of the American Chemical Society, Little Rock, AR, United States, November 7-10 (2018), SWRM-300.
6. **Comparison of the Zn(II) binding during pH 5 -10 of a series of sequence-related heptapeptides using ion mobility - mass spectrometry** Yousef, Enas N.; Donald, Cole; Zahnow, James; Angel, Laurence A. From Abstracts, 74<sup>th</sup> Southwest Regional Meeting of the American Chemical Society, Little Rock, AR, United States, November 7-10 (2018), SWRM-96.
7. **Integrating mass spectrometry with molecular dynamics simulations to elucidate Zn(II) coordination in 2Cys-2His model peptide** Abdul, Malik; Homayoon, Zahra; Pratihari, Subha; Angel, Laurence A.; Hase, William L. From Abstracts, 74<sup>th</sup> Southwest Regional Meeting of the American Chemical Society, Little Rock, AR, United States, November 7-10 (2018), SWRM-22.
8. **Comparison of selected metal binding by a series of related heptapeptides** Yousef, Enas; Qin, Ying; Angel, Laurence A. From Abstracts, 73<sup>rd</sup> Southwest Regional Meeting of the American Chemical Society, Lubbock, TX, United States, October 29-November 1 (**2017**), SWRM-336.

9. **Comparison of products from the collision-induced dissociation of a series of sequence related heptapeptides** Lin, Yu-Fu; Yousef, Enas; Qin, Ying; Angel, Laurence A. From Abstracts, 73rd Southwest Regional Meeting of the American Chemical Society, Lubbock, TX, United States, October 29-November 1 (2017), SWRM-294.
10. **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.
11. **Collision-induced dissociation to determine the influence on affinities of zinc ion towards peptides with different amino acid residues** Qin, Ying; Lin, Yu-Fu; Yousef, Enas; Angel, Laurence A. From Abstracts, 73rd Southwest Regional Meeting of the American Chemical Society, Lubbock, TX, United States, October 29-November 1 (2017), SWRM-56.
12. **Comparison of the selected transition metal binding characteristics of methanobactin and alternative metal binding peptides** Angel, Laurence A.; McCabe, Jacob W.; Vangala, Rajpal From Abstracts, 72nd Southwest Regional Meeting of the American Chemical Society, Galveston, TX, United States, November 10-13 (2016), SWRM-609.
13. **Investigation of the selected transition metal binding characteristics of methanobactin from *Methylosinus trichosporium* OB3b** McCabe, Jacob W.; Vangala, Rajpal; Angel, Laurence A. From Abstracts, 72nd Southwest Regional Meeting of the American Chemical Society, Galveston, TX, United States, November 10-13 (2016), SWRM-250.
14. **Investigation of metal binding properties of methanobactin and alternative methanobactin (amb7) peptides by fluorescence spectroscopy and ion-mobility mass spectrometry** Angel, Laurence A.; McCabe, Jacob W.; Vangala, Rajpal From Abstracts, 72nd Southwest Regional Meeting of the American Chemical Society, Galveston, TX, United States, November 10-13 (2016), SWRM-146.
15. **Zinc(II) and copper(I/II) binding to alternative metal binding peptide using fluorescence and ion mobility: Mass spectrometry techniques** Angel, Laurence A.; Chinthala, Swetha From Abstracts, 72nd Southwest Regional Meeting of the American Chemical Society, Galveston, TX, United States, November 10-13 (2016), SWRM-148.
16. **Competitive binding of copper(I) and zinc(II) by methanobactin from *Methylosinus trichosporium* OB3b and analog methanobactin peptide** McCabe, Jacob W.; Vangala, Rajpal; Angel, Laurence A.; From Abstracts, 67th Southeast/71st Southwest Joint Regional Meeting of the American Chemical Society, Memphis, TN, United States, November 4-7 (2015), SERMACS-SWRM-572.
17. **pH Dependent Zn(II) binding behavior of an analog methanobactin peptide** Cumpian, Kayleah L.; Deeconda, Manogna; Ortiz, Rafael; Wagoner, Stephanie M.; Angel, Laurence A. From Abstracts of Papers, 249th ACS National Meeting & Exposition, Denver, CO, United States, March 22-26, 2015 (2015), CHED-266.
18. **pH dependent Zn(II) binding behavior of an analog methanobactin peptide** Cumpian, Kayleah L.; Deeconda, Monogna; Ortiz, Rafael; Wagoner, Stephanie M.; Angel, Laurence A. From Abstracts, 70th Southwest Regional Meeting of the American Chemical Society, Fort Worth, TX, United States, November 19-22 (2014), SWRM-335
19. **Porphyrin-based hosts that complement the shape of the target guest show enhanced selectivity in anion recognition: A UV/Vis, NMR and computational study** Makineni, Sirisha; Jackson, Vanessa; Battles, Paul; Bommidi, Anusha; Nalla, Kiran; Ramos, Maritza; Angel, Laurence; Starnes, Stephen From Abstracts of Papers, 247th ACS National Meeting & Exposition, Dallas, TX, United States, March 16-20, 2014 (2014), ORGN-159
20. **The pH dependent Cu(II) and Zn(II) binding behavior of an analog methanobactin peptide** Angel, Laurence A.; Sesham, Ramakrishna; Choi, DongWon; Balaji, Anupama; Cheruku, Sahithi; Ravichetti, Chiranjeevi; Alshahrani, Aisha A.; Nasani, Maheshbabu From Abstracts, 69th Southwest Regional Meeting of the American Chemical Society, Waco, TX, United States, November 16-19 (2013), SWRM-345.
21. **Enhanced selectivity in anion recognition through hosts that complement the shape of the target guest: A UV/Vis, NMR and computational study** Makineni, Sirisha; Bommidi, Anusha; Nalla, Kiran; Jackson, Vanessa; Angel, Laurence A.; Starnes, Stephen D. From Abstracts, 69th Southwest Regional

- Meeting of the American Chemical Society, Waco, TX, United States, November 16-19 (2013), SWRM-196. | Language: English, Database: CAPLUS
22. **Structural analysis of methanobactin using ion mobility – mass spectrometry** Kim, Yuri; Choi, DongWon; Angel, Laurence A. From Abstracts, 67th Southwest Regional Meeting of the American Chemical Society, Austin, TX, United States, November 9-12 (2011), SWRM-614.
  23. **Interactions of Zn<sup>2+</sup> on insulin oligomer formation and stability: Analysis using ESI-IM-MS** Culver, Tiffany L.; Konakanchi, Sruthi; Injeti, Srilakshmi; Angel, Laurence A. From Abstracts, 67th Southwest Regional Meeting of the American Chemical Society, Austin, TX, United States, November 9-12 (2011), SWRM-467.
  24. **Study of the stability of insulin oligomers in the presence and absence of zinc(II) using mass spectrometry** Injeti, Srilakshmi; Konakanchi, Sruthi; Culver, Tiffany L.; Angel, Laurence A. From Abstracts, 67th Southwest Regional Meeting of the American Chemical Society, Austin, TX, United States, November 9-12 (2011), SWRM-201.
  25. **Synthesis and extraction procedure of C<sub>2</sub>H<sub>2</sub> type zinc finger proteins for analysis by ion-mobility mass spectrometry** Giganti, Virginia; Kim, Yuri; Hanna, Michael; Angel, Laurence A. From Abstracts, 67th Southwest Regional Meeting of the American Chemical Society, Austin, TX, United States, November 9-12 (2011), SWRM-40.
  26. **Gene Cloning of zinc finger (zif268) and identification by ion mobility mass spectrometry** Kim, Yuri; Giganti, Virginia; Choi, DonWong, Hanna, Michael; Angel, Laurence A. From Abstracts, 67th Southwest Regional Meeting of the American Chemical Society, Austin, TX, United States, November 9-12 (2011), SWRM-40.
  27. **Examining the effectiveness of IM-MS coupled with CID to determine metal ion binding sites on a series of small proteins and peptides** Davis, Amy N.; Angel, Laurence A. From Abstracts, Joint 66th Southwest and 62nd Southeast Regional Meeting of the American Chemical Society, New Orleans, LA, United States, December 1-4 (2010).
  28. **Ion-mobility mass spectrometry study of Pd-ubiquitin** Angel, Laurence A.; Giganti, Virginia From Abstracts, Joint 66th Southwest and 62nd Southeast Regional Meeting of the American Chemical Society, New Orleans, LA, United States, December 1-4 (2010).
  29. **Ion mobility - mass spectrometry study of metal ion labeling of the conformational and charge states of lysozyme** Angel, Laurence A.; Davis, Amy From Abstracts, Joint 66th Southwest and 62nd Southeast Regional Meeting of the American Chemical Society, New Orleans, LA, United States, December 1-4 (2010).
  30. **Metal complexes as artificial proteases in Proteomics: Using [Pd(en)(H<sub>2</sub>O)<sub>2</sub>]<sup>2+</sup> to selectively cleave proteins in zwitterionic detergents** Leeprapaiwong, Porntip; Davis, Amy; Giganti, Virginia; Kostic, Nenad M.; Angel, Laurence A. Miskevich, Frank From Abstracts, Joint 66th Southwest and 62nd Southeast Regional Meeting of the American Chemical Society, New Orleans, LA, United States, December 1-4 (2010).
  31. **Chemistry of Transition Metal Cations & Phenylalanine-Containing Peptides Investigated by Mass Spectrometry** Utley, Brandon; Angel, Laurence A. From Abstracts, 64th Southwest Regional Meeting of the American Chemical Society, Little Rock, AR, United States, October 1-4 (2008).
  32. **Palladium Complexes as Tools for Membrane Proteomics** Coon, John; Garza, Samantha; Kostic, Nenad M.; Angel, Laurence A.; Miskevich, Frank From Abstracts, 64th Southwest Regional Meeting of the American Chemical Society, Little Rock, AR, United States, October 1-4 (2008).
  33. **Proteomics of the Cellular Membrane** Vatanpour, Lida; Davis, Amy; Angel, Laurence A. From Abstracts, 64th Southwest Regional Meeting of the American Chemical Society, Little Rock, AR, United States, October 1-4 (2008).
  34. **A Biomimetic Study of the Active Site of Carbonic Anhydrase** Rainey, Ronald Andrew; Mathews, Mickey Lynn; Angel, Laurence A. From Abstracts, 64th Southwest Regional Meeting of the American Chemical Society, Little Rock, AR, United States, October 1-4 (2008).

**Presentations at The 46th ACS DFW MEETING-in-MINIATURE, Texas A&M University-Commerce, Commerce, Texas, Saturday, April 27, 2013**

1. **Chirag Savla** and Laurence A. Angel, "Quantification and Characterization of Glycolipids and Phospholipids of *Chlamydomonas reinhardtii* By HPLC-ESI-QTOF-MS."
2. **Uday Boga Raja** and Laurence A. Angel. "Conformation, stability and topology of insulin oligomers using electrospray ionization-ionmobility mass spectrometer (ESI-IMMS)."
3. **Sruthi Konakanchi** and Laurence A. Angel, "Comparative study of metal ion labeling of the conformational and charge states of native and disulfide reduced lysozyme."
4. **Maheshbabu Nasani** and Laurence A. Angel, "Comparative Metal Binding Studies of Methanobactin and Zinc Finger-like Peptide with Cu(II) and Zn(II) Metal Ions."
5. **Ramikrishna Sesham** and Laurence A. Angel. "Binding studies of methanobactin and zinc finger-like peptide."
6. **Swetha Bathula** and Laurence A. Angel. "Lipid profiling of *Chlamydomonas reinhardtii*: Quantification and characterization of glycolipids phospholipids and neutral lipids by RP-HPLC-ESI-TOF-MS."
7. **Singh Balaji** and Laurence A. Angel, "In Silico Binding Characteristics of Methanobactin Analog Peptides To First Row Transition Metal Ions."

**Presentations at Texas A&M University System Pathways Student Research Symposium.**

1. **Jacob McCabe** Rajpal Vangala, Laurence A. Angel "Investigation of selected metal ion binding characteristics of methanobactin from *Methyosinus trichosporium* OB3b" 13<sup>th</sup> Annual Texas A&M University System Pathways Symposium – November 2016.
2. **Josh Pettibon**, Swetha Chinthala, Rajpal Vangala, and Laurence A. Angel "Methanobactin Analog Studied by Fluorescence and Mass Spectrometry in Response to Cu(I/II) and Various pH Environments" 13<sup>th</sup> Annual Texas A&M University System Pathways Symposium – November 2016.
3. **Vangala, Rajpal.** McCabe, Jacob W., Angel, Laurence A. "Investigation of metal binding properties of methanobactin and alternative methanobactin (amb<sub>7</sub>) peptides by fluorescence spectroscopy and ion-mobility mass spectrometry" 13<sup>th</sup> Annual Texas A&M University System Pathways Symposium – November 2016.
4. **Chinthala, Swetha**, Angel, Laurence A. "Zinc(II) and copper(I/II) binding to alternative metal binding peptide using fluorescence and ion mobility: mass spectrometry techniques" 13<sup>th</sup> Annual Texas A&M University System Pathways Symposium – November 2016.
5. **Jacob McCabe**, Rajpal Vangala, Francisco Rodgers, Laurence A. Angel "Competitive Binding of Copper(I) and Zinc(II) by Methanobactin from *Methylosinus trichosporium* OB3b" 12<sup>th</sup> Annual Pathways Student Research Symposium held at Texas A&M University-Corpus Christi on October 22<sup>nd</sup> - 23<sup>rd</sup>, 2015.
6. **Aisha Alshahrani**, Sesham, R.; Choi, D.; Balaji, A.; Cheruku, S.; Ravichetti, C.; Nasani, M.; Angel, L. A., "The pH dependent Cu(II) and Zn(II) binding behavior of an analog methanobactin peptide" 11<sup>th</sup> Annual TAMUS Pathways Student Research Symposium, Texas A&M University at Galveston, Galveston, Texas, 2013.
7. **Srilakshmi Injeti**, **Uday Kumar Boga Raja** and Laurence A. Angel, "Study of the stability of insulin oligomers in the presence and absence of Zn(II) using mass spectrometry" 10<sup>th</sup> Annual TAMUS Pathways Student Research Symposium, Texas A&M University at Galveston, Galveston, Texas, 2012.
8. **Sruthi Konakanchi**, **Sahithi Cheruku**, Laurence A. Angel "Comparative study of metal ion labeling of the conformational and charge states of native and disulfide reduced lysozyme" 10<sup>th</sup> Annual TAMUS Pathways Student Research Symposium, Texas A&M University at Galveston, Galveston, Texas, 2012.
9. **Swetha Bathula**, **Chirag Savla**, DongWon Choi, Laurence A. Angel "Quantification and characterization of hydrophobic and hydrophilic lipids of *Chlamydomonas Reinhardtii*" 10<sup>th</sup> Annual TAMUS Pathways Student Research Symposium, Texas A&M University at Galveston, Galveston, Texas, 2012.
10. **Ramakrishna Sesham**, **Mahesh Babu Nasani**, Laurence A. Angel "Copper Binding Studies of Methanobactin" 10<sup>th</sup> Annual TAMUS Pathways Student Research Symposium, Texas A&M University at Galveston, Galveston, Texas, 2012.

11. **Yuri Kim, Virginia Giganti** and Laurence A. Angel, “Gene cloning of zif268 and identification by ion mobility mass spectrometry” 9<sup>th</sup> Annual TAMUS Pathways Student Research Symposium, Texas A&M University, College Station, 2011.
12. **Tiffany Culver** and Laurence A. Angel, “Interactions of Zn<sup>2+</sup> on insulin oligomer formation and stability: Analysis using ESI-IM-MS” 9<sup>th</sup> Annual TAMUS Pathways Student Research Symposium, Texas A&M University, College Station, 2011.
13. **Porntip Leeprapaiwong** and Laurence A. Angel, “Proteomics of the cellular membrane.” 8<sup>th</sup> Annual TAMUS Pathways Student Research Symposium, West Texas A&M, 2010.
14. **Amy Davis** and Laurence A. Angel, “Proteomics of the cellular membrane.” 7<sup>th</sup> Annual TAMUS Pathways Student Research Symposium, Texas A&M – Commerce, 2008.
15. **Hsin-Yi Tsai** and Laurence A. Angel, “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” 7<sup>th</sup> Annual TAMUS Pathways Student Research Symposium, Texas A&M – Commerce, 2008.
16. **Brandon Utley** and Laurence A. Angel, “Chemistry of transition metal cations & phenylalanine-containing peptides investigated by mass spectrometry” 7<sup>th</sup> Annual TAMUS Pathways Student Research Symposium, Texas A&M – Commerce, 2008.
17. **Ronald Rainey, Mickey Matthews,** and Laurence A. Angel, “A biomimetic study of the active site of carbonic anhydrase” 7<sup>th</sup> Annual TAMUS Pathways Student Research Symposium, Texas A&M – Commerce, 2008.

### **Annual Federation Graduate Student Research Symposium at Texas Woman’s University, Denton, Texas**

1. **Lin, Yu-Fu;** Yousef, Enas; Qin, Ying; Angel, Laurence A. “**Comparison of the charge states and products from the collision-induced dissociation of a series of alternative metal binding peptides**” Annual Federation Graduate Student Research Symposium, March 23, 2018 at Texas Woman’s University, Denton, Texas.
2. **Chinthala, Swetha,** Angel, Laurence A. “**Copper(I/II) binding to alternative metal binding peptide using ion mobility - mass spectrometry and fluorescence techniques**” Annual Federation Graduate Student Research Symposium, March 31, 2017 at Texas Woman’s University, Denton, Texas.
3. **Jacob McCabe,** Angel, Laurence A. “**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 *Methylosinus trichosporium* OB3b**” Science, Technology, Engineering and Math category of the 7<sup>th</sup> Annual Federation Research Symposium held at Texas Women’s University April 8<sup>th</sup>, 2016 Texas.

### **Presentations at A&M-Commerce Annual Research Symposium**

1. **Yu-Fu Lin;** Laurence A. Angel “How the primary structure of related heptapeptides affects their charge states, tertiary structure, and collision-induced dissociation” Texas A&M University – Commerce, April 9<sup>th</sup>, 2019.
2. **Enas Yousef;** Laurence A. Angel “Comparison of the Metal Ions Binding During pH 5-10 of a Series of Sequence Related Heptapeptides Using Ion Mobility–Mass Spectrometry” Texas A&M University – Commerce, April 9<sup>th</sup>, 2019.
3. **Linh Troung;** Laurence A. Angel “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, April 9<sup>th</sup>, 2019.
4. **Nayeli Fuentes;** Laurence A. Angel “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, April 9<sup>th</sup>, 2019.
5. **Lin, Yu-Fu;** Yousef, Enas; Qin, Ying; Angel, Laurence A. “Comparison of the charge states and products from the collision-induced dissociation of a series of alternative metal binding peptides” Annual Research Symposium, Texas A&M University -Commerce – April 3<sup>rd</sup> 2018.
6. **Jacob McCabe Rajpal Vangala,** Laurence A. Angel “Investigation of selected metal ion binding characteristics of methanobactin from *Methylosinus trichosporium* OB3b” Texas A&M University - Commerce – April 2017.



7. **Chinthala, Swetha**, Angel, Laurence A. “Copper(I/II) binding to alternative metal binding peptide using ion mobility - mass spectrometry and fluorescence techniques” Texas A&M University -Commerce – April 2017.
8. **Jacob McCabe** Rajpal Vangala, Laurence A. Angel “Investigation of Zn(II) and Cu(I) binding characteristics of methanobactin from *Methyosinus trichosporium* OB3b” Texas A&M University - Commerce – April 2016.
9. **Vangala, Rajpal**, McCabe, Jacob W., Angel, Laurence A. “Investigation of metal binding properties of methanobactin and alternative methanobactin (amb<sub>7</sub>) peptides by fluorescence spectroscopy and ion-mobility mass spectrometry“ Texas A&M University -Commerce – April 2016.
10. **Chinthala, Swetha**, Angel, Laurence A. “Zinc(II) and copper(I/II) binding to alternative metal binding peptide using fluorescence and ion mobility - mass spectrometry techniques” Texas A&M University - Commerce – April 2016.
11. **Deeconda, Monogna**; Cumpian, Kayleah L.; Ortiz, Rafael; Wagoner, Stephanie M.; Angel, Laurence A. “Study of Zn(II) binding of an analog methanobactin peptide using IM-MS” TAMUC Research Symposium 2015.
12. **Aisha Alshahrani**, Angel, L. A., “The pH dependent Cu(II) Zn(II)and Ni(II) binding behavior of a series of analog methanobactin peptides” TAMUC Research Symposium 2014.
13. **Ramakrishna Sesham**, Laurence A. Angel "Copper Binding Studies of Methanobactin" TAMUC Research Symposium 2013.
14. **Anupama Singh Balaji**, Laurence A. Angel “*In Silico* Binding Affinities of Methanobactin Analogs to First Row Transition Metal Ions” TAMUC Research Symposium 2013.
15. **Chirag Salva**, Laurence A. Angel “Quantification and characterization of glycolipids and phospholipids of *Chalmydomonas reinhardtii* by HPLC-ESI-TOF-MS” TAMUC Research Symposium 2013.
16. **Maheshbabu Nasani**, Laurence A. Angel “Study of methanobactin and methanobactin analog peptides for selective binding of Cu(II) and Zn(II) ions” Research Symposium 2013.
17. **Chiranjeevi Ravichetti**, Laurence A. Angel “Density functional theory analysis of methanobactin analog peptides for Cu(II) selectivity” Research Symposium 2013.
18. **Swetha Bathula**, Laurence A. Angel “Lipid profiling of *Methylococcus capsulatus* (bath): quantification and characterization of phospholipids, glycolipids and free fatty acids by using RP-HPLC-ESI-MS” Research Symposium 2013.
19. **Archana Gujarri** and Laurence A. Angel, “Mass Spectrometry study of tetraglycine associated with selected metal ions (II): manganese, iron, cobalt, nickel, copper and zinc.” TAMUC Research Symposium 2012.
20. **Sruthi Konakanchi** and Laurence A. Angel, “Ion Mobility - Mass Spectrometry Study of Metal Ion Labeling of the Conformational and Charge States of Lysozyme” TAMUC Research Symposium 2012.
21. **Yuri Kim, Virginia Giganti** and Laurence A. Angel, “Gene cloning of zif268 and identification by ion mobility mass spectrometry” TAMUC Research Symposium 2011.
22. **Tiffany Culver** and Laurence A. Angel, “Interactions of Zn<sup>2+</sup> on insulin oligomer formation and stability: Analysis using ESI-IM-MS” TAMUC Research Symposium 2011.
23. **Porntip Leeprapaiwong** and Laurence A. Angel, “Palladium complexes as proteomics reagents for the study of the cellular membrane” TAMUC Research Symposium 2011.
24. **Sriramu Kundoor** and Laurence A. Angel, “An ion mobility - mass spectrometry study of leucine-enkephalin (YGGFL) and ubiquitin associated with selected metal ions” TAMUC Research Symposium 2011.
25. **Tianran Shi** and Laurence A. Angel, “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.” TAMUC Research Symposium 2010.
26. **Amy Davis, Porntip Leeprapaiwong, Virginia Giganti** and Laurence A. Angel, “Proteomics of the cellular membrane.” TAMUC Research Symposium 2009.
27. **Brandon Utley** and Laurence A. Angel, “Chemistry of transition metal cations & phenylalanine-containing peptides investigated by mass spectrometry” TAMUC Research Symposium 2009.

28. **Hsin-Yi Tsai** and Laurence A. Angel, “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” TAMUC Research Symposium 2009.
29. **Ronald Rainey, Mickey Matthews,** and Laurence A. Angel, “A biomimetic study of the active site of carbonic anhydrase” TAMUC Research Symposium 2008.

### **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<sub>7</sub>) 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 Deconda**, “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 hexapeptides 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<sub>50-R</sub> hexapeptides depicting variations in arrangement of His binding groups”

### Supervision of BS Undergraduate Research

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 and Density Functional Theory” Texas A&M University – Commerce.
2. **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.
3. **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”
4. **James Zahnow**, “Comparison of Collision-induced Dissociation and Collision Cross Sections from a Series of Sequence Related Heptapeptides”
5. **Ronald Donjuan** “Comparison of Ag<sup>+</sup> binding by a series of related heptapeptides”
6. **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”
7. **Rafael Ortiz**, “Zn(II) titration and pH studies of a methanobactin analog peptide-5 using ion mobility – mass spectrometry”
8. **Robert Saenz** and **Victor Serna**, “Competitive Cu(II) titrations of methanobactin analog peptides 1-4 using ion mobility – mass spectrometry”
9. **Amanda Armstrong**, “Study of the molecular characteristics of methanobactin analog peptide-3 using density functional theory molecular modeling”
10. **Yuri Kim** “Ion mobility Mass Spectrometry of Methanobactin from *Methylosinus Trichosporium*”
11. **Virginia Giganti**, “Gene cloning of zif268 and identification by ion mobility mass spectrometry”
12. **Tiffany Culver**, “Interactions of Zn<sup>2+</sup> on insulin oligomer formation and stability: Analysis using ESI-IM-MS”
13. **Ronald Rainey** “A biomimetic study of the active site of carbonic anhydrase”
14. **Mickey Matthews**, “Histidine Complexes of Zn(II)”
15. **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<sub>5CC</sub> 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**

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

**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.