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TEXAS A&M UNIVERSITY-COMMERCE
Graduate Academic Program Review

Department: Chemistry

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The Chemistry Department houses one undergraduate program and one MS program. The undergraduate program includes regular BS (Chemistry, Pre-Med Chemistry & Broadfield Science major in Chemistry) and ACS BS certified by the American Chemical Society (ACS). The guidelines of the ACS certification can be found at the link below. http://portal.acs.org/portal/PublicWebSite/about/governance/committees/training/acsapproved/degreeprogram/WPCP_008491.

The graduate program includes two options, thesis and non-thesis. The non-thesis option includes three tracks, including Chemistry, Chemical Business and Chemical Education. The mission statement, purpose of the program and major changes in the last five years are described below.

A. Mission Statement

Small Scale, Big Impact is the mission statement of Chemistry Department. The Department is dedicated to teaching, scholarship, and service. It educates undergraduate and graduate students for careers and citizenship. It seeks new knowledge and new applications of existing knowledge. It cooperates with other university departments, and it serves the state of Texas and the broader chemical community.

B. Purpose of Program

Graduate program in chemistry educates M.S. professionals and educators while developing faculty members' scholarly abilities. Because most of the graduate students do original research, the program creates new science and scientific applications.

C. Changes in Past Five (5) Years

Leadership

After several non-chemist interim Heads from 1997 to 2004 and a couple of short term Headships afterward, Dr. Ben Jang has been serving as the Chemistry Department Head since May 2007. All current full-time faculty has been with the department since 2007. The stable team and leadership provided the necessary environment for the department to grow in the last few years, especially since 2010.

Grants

Department of chemistry won a three-year NSF grant for research internships for community-college students under the Research Experience for Undergraduates (REU) program in 2006. The program focusing on research areas of chemistry and surface science was led by Drs. Jang and Whaley in 2006-2009. In 2009-2012, the 2nd REU project was led by Drs. Ben Jang and Stephen Starnes. Ten capable student researchers had a very successful summer each year. Overall, about 40% of these REU students transferred to TAMU-Commerce after the summer experiences.

Dr. Jang, teamed with several Chemistry and other STEM faculties, also received several different projects from NSF, including S-STEM ($594k) in 2008, CCLI project ($181k) in 2009 and Noyce project ($172k) in 2012. These projects provided different channels for the department to effectively recruit community college transfer students which helped maintain the productivity of the undergraduate degree program while enhancing the quality of the graduate program by moving them to our graduate program selectively.

Dr. Headley, though served as the Dean of the Graduate studies and Research from 2004 to 2012, has been maintaining a very active research group. He continued his 3-yr $150k Welch project from 2006 to 2008 and from 2008 to 2012. He also collaborated with Dr. Bukuo Ni on a 3-yr NSF Chemistry research grant ($330k), awarded in 2012.

Welch Foundation renewed our 3-yr departmental grant in 2009 & 2-yr departmental grant in 2012, which supports research of undergraduate and graduate students. The grant has been continued since 1991.

Graduate program

The graduate program grows quickly over the last five years, both in quantity and quality. Because all 5 full-time faculty, including Dr. Headley, are fully committed to education and research, most graduate students are heavily involved in research and gaining extensive training on problem solving skills, We raised admission standards for our M.S. program. Our August 2007 class is more numerous and better qualified than any in recent years. For the first time in years, all of our graduate assistants hold B.S. or M.S. degrees in chemistry or biochemistry. They are improving our teaching of general chemistry and organic chemistry and relieving the faculty of some laboratory duties in these courses.

We introduced review of graduate students after each semester and are basing appointments of graduate assistants on these evaluations. We also introduced a schedule of raising stipends for graduate assistants, in order to reward them better and to recruit well-qualified ones via scholarship and/or tuition remission mechanism.

The Department requires that M.S. research begin in the beginning of second semester in residence and continue until graduation. Publications are expected in addition to M.S. thesis. We introduced awards to best teachers and researchers among our graduate students to encourage them to pursue excellence. our course offerings has been updated with new courses to meet the needs of larger number of incoming MS students each semester and obsolete courses were eliminated.

We now teach most graduate courses in daytime, on traditional schedules. However, with a minimum effort, we still offer on-line courses to fit the schedule of part-time students. We no longer condense all weekly lectures into one weekly session.

Other changes

The department submitted a 5-year report to the American Chemical Society's Committee on Professional Training in 2009. The ACS certification was continued and the next 5-year review is in 2014.

Drs. Headley and Starnes are co-advisors for the student affiliate chapter of the ACS and recruited for it not only chemistry majors but also other students who like chemistry or seek careers related to chemistry.

With the hiring of Dr. Bukuo Ni as a tenure track assistant professor and the return of Dr. Headley from administration in August 2012, the department now consists of five tenure track/tenured faculty, one instructor/lab coordinator and three adjuncts. However, the departmental stockroom manager retired in Spring 2010 and the position was lost.

D. ALIGNMENT OF PROGRAM WITH STATED PROGRAM AND INSTITUTIONAL GOALS

Chemistry Department seeks new knowledge and new applications of existing knowledge which aligns well with the mission statement of CoSEA "Innovation and Discovery". Faculty, staff and students of Chemistry Department work collectively to achieve the goals of CoSEA described in the following link. http://web.tamu-commerce.edu/academics/colleges/scienceEngineeringAgriculture/documents/CoSEAStrategicPlan2013.pdf.

The Department also works cohesively as a unit based on the university Guiding Principles, including d*iversity, service, student success, stewardship, globalization, research, communication.* The details of the Guiding Principles are described in the following link.
. http://web.tamuc.edu/aboutUs/ourMission/documents/guidingPrinciples.pdf. Chemistry Department serves more than 50% major with diverse and international background and the faculty, with various international background, includes 1/3 female in a department which traditionally has been dominated by males. Chemistry department offers courses to support wide variety of majors, including other majors in the STEM field, pre-professional degrees and the nursing program. The curricula of chemistry MS degrees emphasize research training which requires students to have command in global literature in the specialized research area and the writing and oral communication skills.

SECTION II: FACULTY PROFILE

A. FACULTY QUALIFICATIONS

Complete curriculum vitae for each faculty member are attached in Appendix A at the end of this document. All chemistry tenure track/tenured faculty received additional postdoctoral training before their hiring as full-time faculty. They are better equipped to mentor and guide students on innovative research projects. Students are in better position to compete for jobs or additional graduate programs when they finish their degrees at A&M-Commerce.

The major awards of the faculty received during this review period are listed below.

Ben Jang: Nomination of 2012 PAESMEM award
Ben Jang: The Trezzie Pressley "Ceaseless Industry" Award, 2011
Stephen Starnes: Student Recognition Award for Teaching Excellence, TAMU-C, spring 2012
Stephen Starnes: Paul W. Barrus Distinguished Faculty Award for Teaching, TAMU-C, 2012
Laurence Angel: Texas A&M University – Commerce 2011 Provost Award: Research and Creative Activity.

B. TERMINAL DEGREES

As shown in the tables below, Chemistry department used all faculties with terminal degree to teach all graduate courses. It ensures that graduate students receive quality education at A&M-Commerce. Although the number of tenure track/tenured faculty went down from 5 in 2007 to 3 in 2011, there are five tenure track/tenured faculty currently in the Department.

Fall	**2007**	**2008**	**2009**	**2010**	**2011**
Tenured Faculty	2	2	2	1	1
Tenure-track Faculty	3	2	2	2	2
FT Non-Tenured Track Faculty	0	0	0	0	1
Adjunct	1	1	1	1	2

Fall	2007	2008	2009	2010	2011
Adjunct faculty teaching graduate courses	0	0	0	0	0
Faculty without terminal degree teaching graduate courses	0	0	0	0	0

C. FACULTY PUBLICATIONS

As shown in the vitae in Appendix A and summary tables below, the total number of publications increased from 7 in 2001-2006 to 34 in 2007-2011. In the same way, the total number of presentations dramatically increased from 10 to 156 in the same period. The number of funded external proposals increased from 7 in 2001-2006 to 14 in 2007-2011. It demonstrates the commitment of faculty toward scholarships to enhance the research experience of students in the department for complete preparation

of students. In addition, an US patent was filed in 2007 by Dr. Jang and is expected to be published in 2013.

Peer-reviewed publications	2007	2008	2009	2010	2011
Laurence Angel	1	0	2	3	1
Ben Jang	3	1	2	1	3
Stephen Starnes	0	0	0	0	2
Allan Headley/Bukuo Ni	3	2	4	4	2
Total	7	3	8	8	8
2007-2011 total	34				

Presentations	2007	2008	2009	2010	2011
Laurence Angel	9	2	6	11	1
Ben Jang	6	6	8	9	19
Stephen Starnes	22	5	10	14	15
Allan Headley/Bukuo Ni	3	1	4	2	3
Total	40	14	28	36	38
2007-2011 total	156				

D. FACULTY EXTERNAL GRANTS

The external grant activity of the department continued to grow quickly in the last five years. The active total funding in Fall 2007 was about $550k. However, the total active funding in Fall 2012 grew to more than $1.5 Million. The total funding in the 2008-2012 period was more than $2.7 Million, as summarized in the Table below.

Proposals Funded

Funding Year	**Investigator**	**Title**	**Amount Funded**	**Agency**
2006-2008	Stephen Starnes	Operation Spark	$192,941	ACS
2007	Stephen Starnes	ACS Project SEED	$7,500	ACS
2006-2009	Ben Jang	Research Experience for 2-year College Undergraduates at Texas A&M U.-Commerce	$191,340	National Science Foundation
2006-2008	Ben Jang	Non-thermal plasma technology & catalysis	$100,000	Advanced Research Project-THECB
2007-2008	Ben Jang	no-cost uses of state-of-the-art equipment with professional assistance	$50,000	User Project with CNMS of ORNL
2008-2009	Ben Jang	no-cost uses of state-of-the-art equipment with professional assistance	$50,000	User Project with CNMS of ORNL
2008	Stephen Starnes	ACS Project SEED	$3,750	ACS
2008-2013	Ben Jang	S-STEM project at Texas A&M U.-Commerce	$593,700	National Science Foundation

2008-2012	Allan Headley	Ionic Liquids, A New Class of Solvents for Organic Reactions	$200,000	Welch Foundation
2008-2011	Laurence Angel	Major Research Instrumentation Grant-Acquisition of a IM-Q-TOF Mass Spectrometer	$310,000	National Science Foundation
2009-2012	Ben Jang	Departmental Grant	$105,000	Welch Foundation
2009-2013	Ben Jang	NSF CCLI project at Texas A&M U.-Commerce	$181,192	National Science Foundation
2009-2013	Ben Jang	Research Experience for 2-year College Undergraduates at Texas A&M U.-Commerce	$219,000	National Science Foundation
2010	Ben Jang	International Symposium at ACS national meetings	$4,500	ACS-PRF
2011-2013	Ben Jang	Building the Capacity of STEM Teacher Preparation at Texas A&M University-Commerce	$174,020	National Science Foundation
2012-2014	Ben Jang	Departmental Grant	$50,000	Welch Foundation
2012-2015	Allan Headley	Development and Application of Organocatalysts for Asymmetric Reactions	$329,679	National Science Foundation
Total			**$2,762,622**	

The large amount of external funding received in the period was due to the submission of many quality proposals. The details of titles, requested funding amounts and funding agencies of undunded proposals are listed in Appendix B.

In addition to the external grant received by the Department, Chemistry faculty was also very successful in securing internal grants. The internal grants awarded in 2007-2011 are listed in the Table below, total $120k.

Chemistry Internal Funding Received 2007-2011

Funding Year	Investigator	Amount Funded	Type of Project
2008-2009	Laurence Angel	$12,614	Research Enhancement Grant
2008-2009	Laurence Angel	$30,000	Integrated Research Proposal
2009-2010	Laurence Angel	$14,916	Research Enhancement Grant
2010-2011	Laurence Angel	$17,506	Research Enhancement Grant
2009-2010	Ben Jang	$29,883	Interdisciplinary Research Incentive
2008-2009	Stephen Starnes	$7,320	Faculty Research Enhancement
2009-2010	Bukuo Ni	$8,000	Faculty Research Enhancement

Total		**$120,239**	

E. FACULTY TEACHING LOAD

Due to the lab assignments, the calculation of teaching load is somewhat not traditional compared to other disciplines. If faculty teaches lower level lab with graduate assistants, each lab counts for 1 contact hour and if faculty teaches upper level labs with graduate assistants, each lab counts 2 contact hours, though faculty has to supervise each lab for 4 hours. As shown in the table below, the first number in each cell is simply based on the official credit hour of each course. The second number is based on the contact hours specified above. As indicated in the Table, although the credit hour is slightly lower than the standard 24 sch/yr, the contact hours generally exceed the 24 h/yr standard. This calculation does not include the release time for grant activity and does not include any supervision hours of teaching labs, not to mention the hours supervising 418 (Undergraduate Research), 518 (Thesis), 490 (Honors Thesis) or Chem 491 (Honors Readings). All faculty teach both undergraduate and graduate programs. So, the teaching load is not broken down to programs.

In FY 2007-08, there were 5 tenure track/tenured faculty in the department. One faculty left at the end of the FY 07-08. Another faculty left in 2010, so the total number of tenure track/tenured faculty was 3 in FY 10-11 & FY 11-12. With the return of Dr. Allan Headley to the department in fall 2012 from Graduate Studies and Research and the hire of Dr. Bukuo Ni as the new tenure track faculty, currently, there are five tenure track/tenured in the Department, the same as the number in FY 07-08. On the other hand, the enrollment of the university had increased more than 30% in the period and the MS gradate enrollment of the Chemistry Department had increased more than 300%.

The average teaching load of Fall 2012 was 11.46/12.93. This is a better average compared to the previous years, but it is resulted from the total 12 credit hours of release time of two faculty. In addition, the assignments of graduate assistants to be the instructor of the record of 19 sections lower level labs and Chem 101 dropped the faculty teaching load significantly. Although this decreased the teaching load of the faculty, it also eliminated the direct interaction of students in these labs with faculty. In order to recruit and retain students in these lower level classes and labs and to maintain the productivity of undergraduate chemistry degrees, this approach will need to be adjusted and carefully implemented to minimize losing majors.

Faculty Teaching Load of tenured/tenure track faculty, credit hours and contact hours

	2007-08	**2008-09**	**2009-10**	**2010-11**	**2011-12**
Fall	9.33/13.78	8.44/12.22	9.14/11.43	9.76/13.17	12.44/15.36
Spring	10.0/13.37	6.89/10.22	18/22	11.71/13.17	8.05/10.24
Total	**19.99/27.15**	**15.33/22.44**	**27.14/33.43**	**21.47/26.34**	**20.49/25.60**
***Core Faculty**	**4.5**	**3.5**	**3.5**	**2.5**	**2.5**

**Core faculty: Full-time tenured and tenure-track faculty who teach 50 percent or more in the graduate program or other individuals integral to the graduate program who can direct research.*

In addition, as shown in the table below, the numbers of research students supervised in fall and spring semesters from FY 2007-08 to FY 2011-12 are summarized. Undergraduate courses that involve research students include Chem 418 (undergraduate research), Chem 490 (Honors Thesis) and Chem 491 (Honors Readings). Graduate courses include Chem 518 (Thesis) and Chem 595 (Research Literature & Techniques). The teaching loads of faculty were not counted toward the credit hour or contact hour loads as mentioned above. The average number of students per faculty per academic year (not counting summer research) increased form 6.9 in FY 2007-08 to 31.6 in FY 2011-12. The significant increase, especially in FY 2010-11 & FY 2011-12, is related to the enrollment growth of the MS program and due to the decrease of the number of tenured/tenure track faculty. With 2 more in FY 2012-13, the number (15.1 students/faculty) of FY 2012-13 is still very high. Additional tenured/tenure track faculty is needed to decrease the number and maintain the quality of education and training, so the graduates could be competitive for job placement.

Number of research students supervised by tenured/tenure track faculty from FY 2007-08 to FY 2011-12

	2007-08		**2008-09**		**2009-10**		**2010-11**		**2011-12**	
	Fall	Spring	Fall	Spring	Fall	Spring	Fall	Spring	Fall	Spring
Chem 418/490/ 491	6	12	16	21	11	11	12	10	11	13
Chem 518/595	9	4	10	8	8	13	9	14	28	27
Total	**15**	**16**	**26**	**29**	**19**	**24**	**21**	**24**	**39**	**40**
***Core Faculty**	4.5		3.5		3.5		2.5		2.5	
# of students / faculty/	**6.9**		**15.7**		**12.3**		**18**		**31.6**	

**Core faculty: Full-time tenured and tenure-track faculty who teach 50 percent or more in the graduate program or other individuals integral to the graduate program who can direct research.*

F. FACULTY/STUDENT RATIO

The average student to faculty ratio is about 15 students per section in Fall and Spring semesters. The ratio has been pretty much the same in the last five years. However, the enrollment has increased for 47% from Fall 2007 to Fall 2012. The numbers of tenure track/tenured faculty in Fall 2007 and Fall 2012 were the same which means that the number of sections being taught by non-tenure track/tenured faculty has increased quickly. A full-time Instructor/Lab coordinator, Ms. Joy Zhang, has been on staff since Fall 2010. Her teaching of Chem 101, Chem 102, Chem 1411 and/or Chem 1412 has helped shifting tenure track/tenured faculty toward teaching more graduate courses.

Enrollment and section size from fall 2007 to fall 2012.

	2007-2008			2008-2009			2009-2010			2010-2011			2011-2012			
	Fall 2007	**Spr 2008**	**Sum 2008**	**Fall 2008**	**Spr 2009**	**Sum 2009**	**Fall 2009**	**Spr 2010**	**Sum 2010**	**Fall 2010**	**Spr 2011**	**Sum 2011**	**Fall 2011**	**Spr 2012**	**Sum 2012**	**Fall 2012**
Enrollment	683	676	85	718	651	119	649	604	242	813	592	202	873	873	322	1005

No. Sections	45	45	19	51	50	23	50	54	19	53	36	29	56	56	33	65
Avg Section Size	15	15	4	14	13	5	12	11	12	15	16	6	15	15	9	15

G. ADDITIONAL FACULTY PROFILE INFORMATION

As shown in the tables below for the full time faculty numbers, the chemistry departments of SUNY-Oswego and Colorado State University-Pueblo are 2 times bigger than the chemistry department at A&M-Commerce; the number of faculty of the Chemistry department at Sam Houston State University is around 3 times bigger than the chemistry Department, TAMU-Commerce; Pittsburgh State is about 1.5 times bigger than the size of Chemistry Department at A&M-Commerce. As will be discussed in Section III H, Chemistry Department of A&M-Commerce has the highest MS degree production rate in the last five years among the peer institutions listed.

Total number of full-time faculty lines of A&M-Commerce compared to peer institutions.

	2007	**2008**	**2009**	**2010**	**2011**
Texas A&M University-Commerce					
Professor	2	2	2	1	1
Associate Professor	0	0	0	0	0
Assistant Professor	3	2	2	2	2
Other Faculty	0	0	0	1	1
Total	5	4	4	4	4
Sam Houston State University					
Professor	6	6	6	6	6
Associate Professor	1	1	2	2	2
Assistant Professor	2	3	2	2	3
Other Faculty	3	4	6	2	2
Total	12	14	16	12	13
Pittsburgh State					
Professor	3	3	4	3	3
Associate Professor	1	1	1	0	0
Assistant Professor	1	2	2	1	1
Other Faculty	2	1	3	3	4
Total	7	7	10	7	8
TAMU-Kingsville					
Professor	N/A	N/A	N/A	N/A	N/A
Associate Professor	N/A	N/A	N/A	N/A	N/A
Assistant Professor	N/A	N/A	N/A	N/A	N/A
Other Faculty	N/A	N/A	N/A	N/A	N/A
Total	11	10	10	10	9

SUNY Oswego					
Professor	1	1	1	1	1
Associate Professor	3	3	3	3	3
Assistant Professor	4	4	4	4	5
Other Faculty	1	1	N/A	N/A	N/A
Total	9	9	8	8	9
Colorado State University-Pueblo					
Professor	3	3	4	4	3
Associate Professor	1	1	0	1	2
Assistant Professor	4	4	3	3	3
Other Faculty	0	0	0	0	1
Total	8	8	7	8	9

The salaries of Chemistry faculty at A&M-Commerce show a slow increase in the last five years, ~6% over five years for professors but ~13% for assistant professors, as shown in the tables below. The increase rate for professors of A&M-Commerce is comparable to peer institutions, but the rate for assistant professors is higher than the peer institutions, ~13% versus ~7%.

Average (mean) salary, by rank for the chemistry faculty at A&M-Cmmerce and the peer institutions over the past five (5) years.

	2007	**2008**	**2009**	**2010**	**2011**
Professor	72,978	73,653	74,389	75,231	77,231
Associate Professor	0	0	0	0	0
Assistant Professor	49,875	52,398	54,227	56,402	56,532
Others	12,463	30,300	17,687	6,250	24,900

**The first figure in each column is the mean salary.
**The second and third figures represent the range of salaries.

Salaries from Peer Institutions

	2007	**2008**	**2009**	**2010**	**2011**
Professor					
Texas A&M-Commerce	72,978	73,653	74,389	75,231	77,231
Sam Houston State University	85,707	87,465	89,889	89,889	91,809
Pittsburgh State	64,548	66,854	66,329	66,624	67,424
TAMU-Kingsville*	57194*	58468*	60713*	61811*	60661*
SUNY Oswego*	56305*	60555*	66213*	69847*	68400*
Associate Professor					
Texas A&M-Commerce	0	0	0	0	0
Sam Houston State University	64,026	66,042	70,542	70,542	72,999
Pittsburgh State	59,539	61,753	0	0	0
TAMU-Kingsville					
SUNY Oswego					
Assistant Professor					
Texas A&M-Commerce	49,875	52,398	54,227	56,402	56,532
Sam Houston State University	62,766	64,350	64,764	64,764	67,698
Pittsburgh State	48,000	49,680	49,680	50,380	51,380
TAMU-Kingsville					

SUNY Oswego					
Others					
Texas A&M-Commerce	12,463	30,300	17,687	6,250	24,900
Sam Houston State University	39,780	36,444	38,740	40,914	42.426
Pittsburgh State	17,500	36,225	12,333	25,400	19,250
TAMU-Kingsville					
SUNY Oswego					

These are 9-month salaries
*The average salary of all ranks of faculty.

SECTION III: STUDENT PROFILE

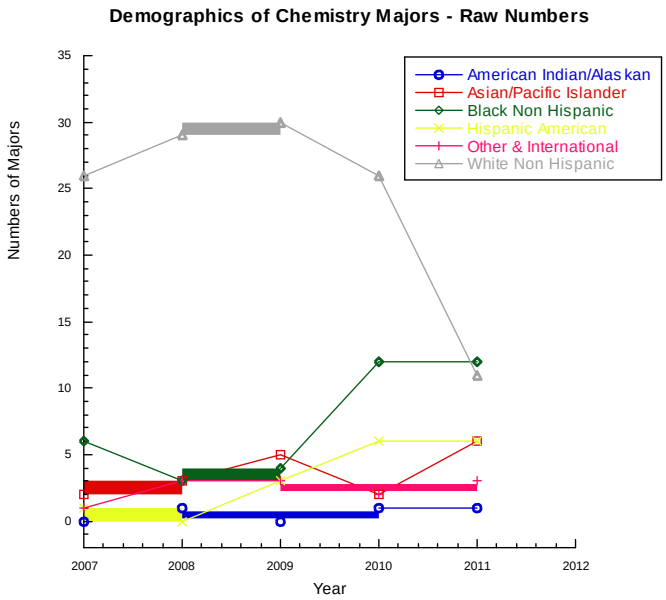
A. STUDENT DEMOGRAPHICS

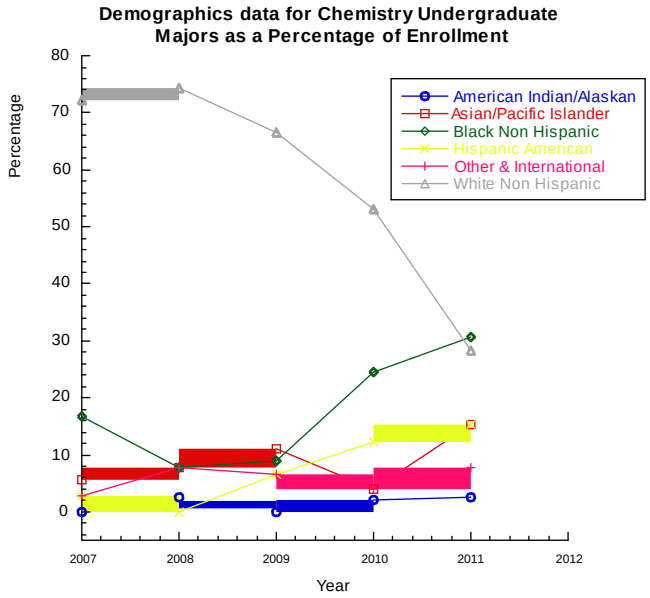
Demographics of enrolled students and their trends are summarized in the following tables and figures.

(Fall Data)

Ethnicity

	2007	2008	2009	2010	2011	Total	%	TAMUC
Undergraduates								**F-11 data**
American Indian/Alaskan	0	1	0	1	1	3	1.4	-
Asian/Pacific Islander	2	3	5	2	6	18	8.7	1.7
Black Non-Hispanic	6	3	4	12	12	37	17.8	19.3
Hispanic American	1	0	3	6	6	16	7.7	12.2
Other & International	1	3	3	2	3	12	5.8	2.0
White Non-Hispanic	26	29	30	26	11	122	58.7	62.7
Total Undergraduates	36	39	45	49	39	208	100.1%	99.9%
Graduate (Master's Students)								
American Indian/Alaskan	0	0	0	0	0	0	0.0	-
Asian/Pacific Islander	0	1	2	3	3	9	7.0	3.4
Black Non-Hispanic	0	0	0	2	1	3	2.3	16.8
Hispanic American	2	1	0	0	1	4	3.1	8.5
Other-International	6	5	11	24	43	89	69.5	17.1
White Non-Hispanic	5	4	1	7	6	23	18.0	54.1
Total Graduates	13	11	14	36	54	128	99.9	99.9%





Gender

	2007	2008	2009	2010	2011	Total	%	TAMU-C
Undergraduates								**F11 data**
Female	18	22	21	30	17	108	51.9	60.3
Male	18	17	24	19	22	100	48.1	39.7
Total Undergraduates	36	39	45	49	39	208		
Graduate (Master's Students)								
Female	5	6	7	21	31	70	54.7	60.4
Male	8	5	7	15	23	58	45.3	39.6
Total Graduates	13	11	14	36	54	128		

The demographics of the enrollment of the Chemistry department at A&M- Commerce are diverse. It includes ~26% minority enrollment during the 2007-2011 period in the undergraduate program which is similar to the percentage at the university level (~31%). The chemistry department has experienced an increase in minority enrollment over the last 2-3 years as illustrated in the tables and figures above. In particular, growth has been observed in the enrollment of the Hispanic and Black student populations. This is likely attributed to the increased funding and recruiting efforts geared towards minority populations with the NSF-REU, CCLI and S-STEM programs.

The minority percentage at the graduate level in the department is much lower, with an average ~5% during the period 2007-2011. This is substantially lower than minority enrollment in graduate programs at the university level for all graduate programs (~25%). The graduate enrollment demographics are likely similar to national trends in chemistry graduate programs, which are challenged to boost enrollment of minorities in chemistry graduate programs. The graduate program does have a small enrollment of White non- Hispanic students as well, which is also reflected in national trends. The program has a large enrollment of international students, which also parallels national trends. The department should seek out methods to increase the enrollment of domestic students. However, the GA stipend is an issue to compete against other programs, especially in the North Texas area.

Over the last 5 years, the department has had a fairly equal distribution of male and female undergraduate and graduate students as shown in the table above. The department has a slightly larger enrollment of male students (51.9% undergrad, 54.7% graduate) than female students compared to the University average of ~40% male enrollment to ~60% female enrollment. This is also typical in the STEM disciplines.

B. STUDENT TIME TO DEGREE

The average time required to earn degree for Master's from 2007-2010 is summarized in the table below. The average time for total 17 MS degrees is 2.06 years. This is much larger than the average time of all MS programs on campus, 1.0 years. This is due to the requirement of thesis for most MS in Chemistry degrees.

Average time to degree of Master's in Chemistry from 2007 to 2010.

	2007	2008	2009	2010	**Total**
Total Students Graduated	3	2	2	10	**17**
Average years to complete degree	2.0	2.0	2.5	2.0	**2.06**

C. STUDENT PUBLICATION AND AWARDS

Students, including both undergraduates and graduates, who have published in the last five years can be found in the CVs of faculty in the Appendix A. As mentioned in section II C, there were 34 publications in 2007-2012. 70.6% (24/34) of them involved at least one student. Students who received various scholarships over the past five years are listed in the following tables. As shown in the scholarship-summary table below, the total scholarship amounts for undergraduates increased from $15,650 in 2007 to $37,900 in 2012, an over 140% increase in 5 years. The increase of graduate scholarships is even more dramatic, more than 600% from 2007 to 2012. The scholarship is a critical factor to successfully recruit, retain and graduate chemistry majors. Chemistry Department has been successful in securing external funding from NSF, such as REU, CCLI, S-STEM, and Noyce grants, to support chemistry majors in the last 5 years.

Various scholarship awarded from fall 2007 to Spring 2012.

Year Awarded	Scholarship/Award	Amount
Fall 2007		
Undergraduate	Robert A Welch, 3 awards	$2,250
Total undergraduate		**$2,250**
Graduate	Robert A Welch, 3 awards	$1,600
Total graduate		**$1,600**
Spring 2008		
Undergraduate	Charles Rohrer, 3 awards	$950
	Denis Quane, 3 awards	$750
	Robert A Welch, 8 awards	$5,350
Total undergraduate		**$7,050**
Graduate	Robert A Welch, 4 awards	$2,100
Total graduate		**$2,100**
Summer 2008		
Undergraduate	Robert A Welch, 6 awards	$11,700
Total undergraduate		**$11,750**
Graduate		
	Robert A Welch, 5 awards	$8,250
Total graduate		**$8,250**
FY 2007-08 total		**$33,000**
Fall 2008		
Undergraduate	Robert A Welch	$500
	Total undergraduate	**$500**
Spring 2009		

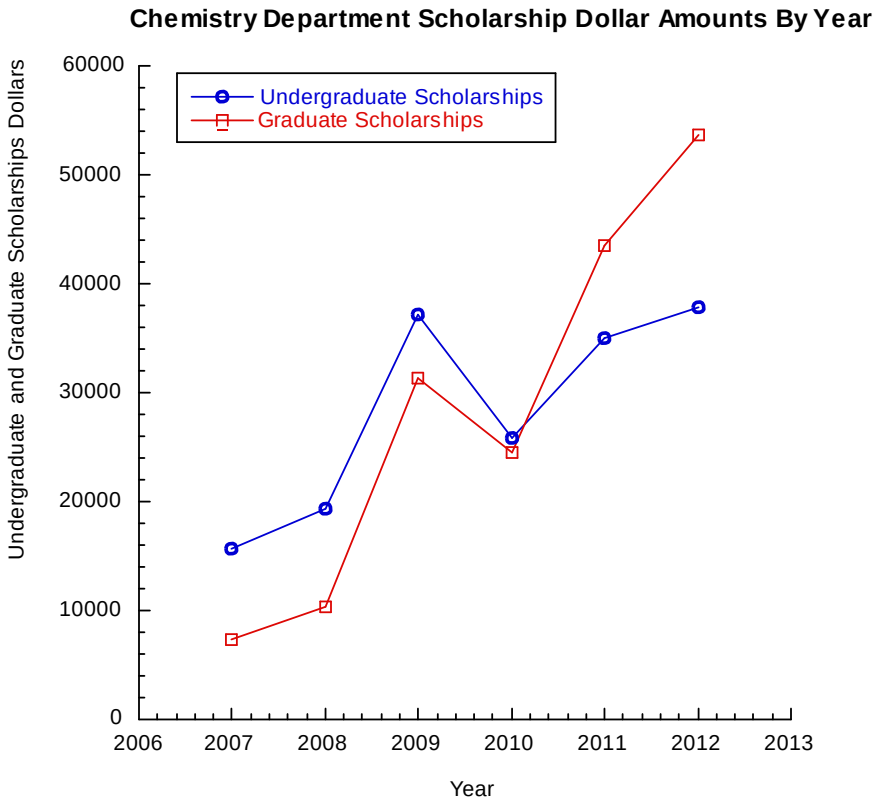
Undergraduate	Nagarkatti, 2 awards	$2,000
	Robert A Welch	$500
	Dennis Quane, 2 awards	$1,000
	Charles Rohrer, 2 awards	$1,200
	NSF-SSTEM, 6 awards	$10,000
Total undergraduate		**$14,700**
Graduate	Robert A Welch, 5 awards	$2,500
	NSF-SSTEM	$1,000
Total graduate		**$3,500**
Summer 2009		
Undergraduate	Robert A Welch, 3 awards	$9,000
	NSF-SSTEM, 5 awards	$5,500
Total undergraduate		**$14,500**
Graduate	Robert A Welch, 7 awards	$21,000
	NSF-SSTEM, 2 awards	$1,700
Total graduate		**$22,700**
FY 2008-09 total		**$55,900**
Fall 2009		
Undergraduate	NSF-SSTEM, 6 awards	$7,967
Total undergraduate		**$7,967**
Graduate	NSF-SSTEM, 3 awards	$3,600
	Robert A Welch, 3 awards	$1,500
Total graduate		**$5,100**
Spring 2010		
Undergraduate	Chemistry Excellence	$200
	Dennis Quane, 3 awards	$1,000
	Justus Brown Cameron & Nannie Day Cameron, 2 awards	$800
	Charles Rohrer	$600
	Nagarkatti	$1000
	NSF-SSTEM, 5 awards	$8,985
Total undergraduate		**$12,585**
Graduate	Nagarkatti	$1000
	Robert A Welch, 6 awards	$3,000
	NSF-SSTEM, 2 awards	$4,000
Total graduate		**$8,000**
Summer 2010		
	NSF-SSTEM, 2 awards	$4,500
Total undergraduate		**$4,500**
Graduate	Robert A Welch, 3 awards	$1,500
	NSF-SSTEM, 4 awards	$7,000
Total graduate		**$11,500**

FY 2009-10		**$49,652**
Fall 2010		
Undergraduate	Robert A. Welch, 2 awards	$1,000
	NSF-SSTEM, 6 awards total	$7,783.64
Total undergraduate		**$8,783.64**
Graduate	Robert A. Welch, 8 awards	$4,000
	NSF-SSTEM	$1,000
Total graduate		**$5,000**
Spring 2011		
Undergraduate	Chemistry Excellence, 2 awards	$1,200
	Dennis Quane	$500
	Justus Brown Cameron & Nannie Day Cameron, 2 awards	$1,000
	Charles Rohrer	$600
	Robert A. Welch, 2 awards	$1,000
	NSF-SSTEM total	$6,724
Total undergraduate		**$11,024**
Graduate	Robert A. Welch, 8 awards	$4,000
	Nagarkatti	$1,000
	NSF-SSTEM	$1,000
Total graduate		**$6,000**
Summer 2011		
Undergraduate	Robert A. Welch	$1,000
	NSF-SSTEM, 8 awards	$13,000
Total undergraduate		**$14,000**
Graduate	Robert A. Welch, 19 awards	$25,000
	NSF-SSTEM	$2,000
Total graduate		**$27,000**
FY 2010-11 Total		**$71,807.64**
Fall 2011		
Undergraduate	Robert A. Welch	$500
	NSF-SSTEM, 5 awards	$9,500
Total undergraduate		**$10,000**
Graduate	Robert A. Welch, 11 awards	$6,000
	NSF-SSTEM, 3 awards	$4,500
Total graduate		**$10,500**
Spring 2012		
Undergraduate	Denis Quane, 3 awards	$1,200
	Charles Rohrer, 3 awards	$1,500
	Chemistry Excellence, 13 awards	$3,100
	NSF-SSTEM total, 5 awards	$8,200
Total undergraduate		**$14,000**

Graduate	Chemistry Endowment, 7 awards	$7,000
	Robert A. Welch, 19 awards	$10,500
	NSF-SSTEM total	$3,000
Total graduate		**$21,500**
Summer 2012		
Undergraduate	NSF-SSTEM, 6 awards	$8,400
Total undergraduate		**$8,400**
Graduate	Robert A. Welch, 19 awards	$19,800.00
	Chemistry Indirect Costs, 3 awards	$2,800
	NSF-SSTEM	$3,088
Total graduate		**$25,688**
FY 2011-12 Total		**$90,088**

Scholarships - Summary

	2007	**2008**	**2009**	**2010**	**2011**	**2012**	**total**
Undergraduate							
Spring	$6,700	$7,050	$14,700	$12,585	$11,024	$14,000	$66,059
Summer	$6,700	$11,750	$14,500	$4,500	$14,000	$8,400	$59,850
Fall	$2,250	$500	$7,967	$8,783.64	$10,000	$15,500	$45,001
total	$15,650	$19,300	$37,167	$25,869	$35,024	$37,900	$170,910
Graduate							
Spring	$0	$2,100	$3,500	$8,000	$6,000	$21,500	$41,100
Summer	$5,700	$8,250	$22,700	$11,500	$27,000	$25,688	$100,838
Fall	$1,600	$0	$5,100	$5,000	$10,500	$6,500	$28,700
total	$7,300	$10,350	$31,300	$24,500	$43,500	$53,688	$170,638



The department continues use the Welch departmental grant to support undergraduate and graduate research. The amount of Welch scholarships ranges from $500 to $4,000 per semester depending on the qualification and research experiences of students. Recently, the department had slowly refocused the fund to support undergraduate research and expect the faculty to bring in external grants to support graduate research. However, the transition is slow which is affecting the ability of the department to recruit new quality graduate students. As shown in the GRE table, the average GRE score is slightly above 1000 which is acceptable to the department at this point and due to a significant drop in 2010 to recruit more students. However, there are over 40 gradaute students in the department now. The immediate goal of the department is to recruit higher quality graduate students with higher GRE and GPA to minize the training, so students could be more productive toward their theses in a shorter period of time after adequate training. Of course, GRE and GPA are not the only measures of student quality. The department has already added new requirements, such as research experience, reference letters, etc., to gauge student's potential.

Average GRE Scores in Fall Semesters

	2007	2008	2009	2010	2011
Mean Score	**1035**	**1055**	**1050**	**948**	**1055**
# Students	**4**	**2**	**3**	**17**	**15**

D. STUDENT RETENTION RATES

From the 1st table (6-yr retention rate) below, the 2nd yr retention rate (1-yr retention rate) from Fall 2007 to Fall 2008 is 77.78% with no one graduated in the period. The 3rd yr retention rate (2-yr retention rate) from Fall 2007 to Fall 2009 for the Fall 2007 cohort is 44.44% (8 out of 18). However, according to the other table (6-yr graduation rate), 3 graduated in the same period. The true 2-yr retention rate should be 53.33% (8/(18-3)). Using the same calculations the 3-yr and 4-yr retention rates are 70% ((7/(18-3-5)) and 150% (3/(18-3-5-8)), respectively. These numbers appear to be too high. It is likely due to transfer students during the period.

Chemistry Undergraduate 6-yr retention rate of the Fall 2007 cohort.

Admit Major	Initial Cohort Enrolled 200780	2nd Yr Enrolled 200880	2nd Yr %Retained 200780 200880	3rd Yr Enrolled 200980	3rd Yr %Retained 200780 200980
CHEM	10	10	100.00%	5	50.00%
	5	1	20.00%	0	.00%
	2	2	100.00%	2	100.00%
	1	1	100.00%	1	100.00%
*TOTAL CHEM	**18**	**14**	**77.78%**	**8**	**44.44%**

4th Yr Enrolled 201080	4th Yr %Retained 200780 201080	5th Yr Enrolled 201180	5th Yr %Retained 200780 201180	6th Yr Enrolled 201280	6th Yr %Retained 200780 201280
4	40.00%	2	20.00%	1	10.00%
0	.00%	0	.00%	0	.00%
2	100.00%	0	.00%	0	.00%
1	100.00%	1	100.00%	0	.00%
7	**38.89%**	**3**	**16.67%**	**1**	**5.56%**

Chemistry Undergraduate 6-yr graduation rate of the Fall 2007 cohort

Admit Major	Initial Cohort Enrolled 200780	2nd Yr #Graduated 200780 200880	2nd Yr %Graduated 200780 200880	3rd Yr #Graduated 200780 200980	3rd Yr %Graduated 200780 200980
CHEM	10	0	.00%	3	30.00%
	5	0	.00%	0	.00%
	2	0	.00%	0	.00%
	1	0	.00%	0	.00%
***TOTAL CHEM**	**18**	**0**	**.00%**	**3**	**16.67%**

4th Yr #Graduated 200780 201080	4th Yr %Graduated 200780 201080	5th Yr #Graduated 200780 201180	5th Yr %Graduated 200780 201180	6th Yr #Graduated 200780 201280	6th Yr %Graduated 200780 201280
4	40.00%	6	60.00%	7	70.00%
0	.00%	0	.00%	0	.00%
1	50.00%	2	100.00%	2	100.00%
0	.00%	0	.00%	0	.00%
5	**27.78%**	**8**	**44.44%**	**9**	**50.00%**

Based on the classification information below, the change in numbers of undergraduate majors at the freshmen level from fall to spring (87 students versus 67 students, 77% retention, 23% loss) illustrates that there is likely an issue with retention between Chem 1411 and Chem 1412 (our general chemistry courses). However, this is lower than the estimated retention rate of Chem 1411 nationwide, 30-40%.

Students in organic chemistry I (Chem 211) are more likely to stay in the program for organic chemistry II. There is a smaller drop off in numbers of students from the spring sophomore level to fall junior level (80% retention). The retention rate is likely due to the fact that organic students had been screened by Chem 1411 and Chem 1412 already.

The trends in classification is difficult to analyze (this analysis does not take into consideration students that transfer. Further analysis is needed to identify the causes of attrition and the keys to retention then strategies can be developed to address these issues.

Classification

	2006			**2007**			**2008**			**2009**			**2010**		
	S	SS	F	S	SS	F	S	SS	F	S	SS	F	S	SS	F
Freshman			11	11	1	12	8	3	10	10	1	14	6	1	19
Sophomore			12	15	2	9	9	8	10	13	4	13	14	2	10
Junior			9	3	4	9	8	1	8	3	2	9	9	0	10
Senior			9	10	3	6	6	7	11	13	6	9	9	8	10
Total Undergraduates			41	39	10	36	31	19	39	39	13	45	38	11	49
Post-Bac			0	0	0	0	0	0	0	0	0	0	0	1	0
Graduate Master's Students)															
Master's			11	12	9	13	13	11	11	17	15	14	14	22	36
Total Students			52	51	19	49	44	30	50	56	28	59	52	34	85

Classification

	2011			**Total**			
	S	SS	F	S	F	S	SS
Freshman	11	1	21	21	87	67	7
Sophomore	6	3	6	7	60	64	19

Junior	6	4	6	7	51	36	11
Senior	13	7	6	9	51	60	31
Total Undergraduates	36	15	39	44	**249**	**227**	**68**
Post-Bac				3			
Master's	46	30	54	48			
Total Students	82	45	93	95			

E. STUDENT GRADUATION RATES

Although the department has experienced increased enrollment of minority students at the undergraduate level in the last 2-3 years, as mentioned in section III A, this has not yet materialized in increased numbers of chemistry degrees conferred to minority students, according to the table below. Thus, although enrollment in the chemistry program is ~26% minority from 2007-2011, only 5.3% of the degrees awarded from the department from 2007-2010 have gone to minority students. Year 2011 degrees conferred data is not available as of this writing however; thus it is possible that these students may still be in the pipeline. It is possible, however, that this is a retention issue and thus the retention of the minority students in the program is an issue that the department must be mindful of and proactive towards.

At the graduate level, the degrees conferred are heavy on international students and not enough domestic students, either minority or not. This issue is common to all chemistry graduate programs in US. In fact, our program has been successful in recruiting high school teachers to pursue the non-thesis option of the MS degree in Chemistry program. It is likely that the program can be expanded to target industry professional besides the high school teachers if the internship opportunities can be arranged and implemented. It would be ideal to recruit more minority under the same non-thesis option.

Degrees Conferred by Demographic Characteristics and Degree Level

	FY 08	**FY 09**	**FY 10**	**FY 11**	**FY 12**	**Total**	**%**
Undergraduates							
American Indian/Alaskan	0	0	0	0	0	0	0.0
Asian/Pacific Islander	0	0	0	1	0	1	4.0
Black Non-Hispanic	0	0	0	0		1	4.0
Hispanic American	0	0	0	0	1	1	4.0
Other-International	0	1	1	1	1	4	16.0
White Non-Hispanic	3	4	5	3	4	18	72.0
Total Undergraduates	3	5	6	5	6	25	
Graduate (Master's Students)							
American Indian/Alaskan	0	0	0	0	0-	0	0.0
Asian/Pacific Islander	0	0	1	0	1	2	7.1
Black Non-Hispanic	0	0	0	0	0	0	0.0

Hispanic American	1	1	0	0	1	3	10.7
Other-International	2	3	5	0	8	18	64.3
White Non-Hispanic	0	1	2	1	1	5	17.9
Total Graduates	3	5	8	1	11	28	

According to the previous 5-yr program review report, the average graduation rate, based on the number of degrees awarded and the sum of the number of students each Fall semester, from 2000-06 was 28.6%. As shown in the table below, the graduation rate from 2007 to 2102 is 31.8% which is slightly better than 28.6%.

As mentioned in the earlier section (III B), the average time to degree of the MS program is 2.06 years which is comparable to the national average for MS thesis degrees. Out of 28 MS degrees conferred in the last five years 4 of them were non-thesis. Full-time non-thesis MS degrees normally require less than 2.0 years. However, all non-thesis students in the department in the last five years were part-time which normally needs more time to finish their MS degrees and would increase the average time to degree of the Department.

Graduation rates for Master's Candidates from FY 2007 to FY 2012

Cohort Year	Number of Students	Number of Graduates in FY	Percentage (%)
Fall 2007	11	3	27.3
Fall 2008	13	5	38.5
Fall 2009	11	8	72.7
Fall 2010	14	1	7.1
Fall 2011	39	11	28.2
Total	**88**	**28**	**31.8**

F. STUDENT ENROLLMENT

Over the years, the department has worked hard to increase the enrollment of the graduate program. One approach is careful examination of the application data to determine how many are converted into enrolled students. A close examination of the fall data from 2007 to 2011 given in the table below there has been a steady increase in the number of applications to our program in 2007-2009.

TAMUC Chemistry Applications, Acceptances & Matriculations Data

Fall Data	**2007**	**2008**	**2009**	**2010**	**2011**
Applications	12	26	22	53	134
Acceptances	4	4	6	29	43
Matriculations	4	3	3	23	13
Spring Data	**2008**	**2009**	**2010**	**2011**	**2012**
Applications	16	12	15	61	87
Acceptances	3	7	4	33	30
Matriculations	2	7	4	13	12

Summer Data	2008	2009	2010	2011	2012
Applications	5	2	28	5	25
Acceptances	2	1	12	1	18
Matriculations	1	1	7	1	12
Total FY Data	33	40	65	119	246
Applications	9	11	22	63	91
Acceptances	8	11	14	40	37
Matriculations					

However, there were large increases in 2010 and 2011. Since a large percentage of our applicants are international students, they are highly dependent on obtaining the necessary student visas to study here. Often time, students did not get their visas or get it in a timely manner to start their studies here. This may account for the large number of students who do not enroll, even though they are accepted. Regarding the aspect of accepted students, in the fall of 2011, a large number of students applied to our program and 32% were accepted. The reason for this low percentage of acceptance is that most were students with a pharmacy degree and the department had to carefully screen to determine the most suited students for our program and based on the number of thesis faculty available in the department. The high matriculation rate in Fall 2010 is due to many transfer students from other institutions in US and there was no visa issue.

G. GRADUATE PLACEMENT

The placement of MS graduates from FY 08- FY 12 is summarized in the table below. There were total 28 graduates in this period including 7 pursuing PhD programs, 9 went to industry, 3 HS teachers and 7 unknown. There is a trend for the MS graduates pursuing industrial jobs due their interest in pharmaceutical industry. There were also 3 HS teachers who received non-thesis MS degrees in Chemistry and they continue to teach in high schools or serve as administrators of their ISDs.

The implementation of the internship course for the students of the non-thesis option has been an issue due to lack of industry contact in the region. Network with alumni and set up an alumni board in the department could be an effective way to provide more internship opportunities for MS students. Internship opportunities will not only increase their practical skills but also the chance to land jobs fit their trainings.

The department encourages and financially support students take every opportunity to attend conferences and make presentations in the conferences. Almost every student has the opportunity to

Year of Grad	Degree	Program Emphasis	1st Job
FY 08	3	Thesis option	1 PhD program & 2 unknown
FY 09	5	Thesis option	1 PhD, 3 Industry & 1 unknown
FY10	8	Thesis option& non-thesis options	5 PhD, 1 Industry & 1 unknown
FY 11	1	Thesis option	1 unknown
FY 12	11	Thesis & non-thesis options	1 PhD, 5 Industry, 3 HS & 2 unknown

attend 3-4 conferences, including ACS SWRM and DFW local meetings, Texas A&M system Pathway to Doctoral Symposium and on-campus Sigma Xi conferences and possible ACS national meetings every year. Most of the conferences provide career placement services and are the best places to exchange information on career options with other students.

It is believed that, overall, the department has successfully prepared the graduates to continue their careers in either academia or industry. The graduation rate will be improved by the mentoring and retention strategies to be discussed in the action plan section. It will also be improved by higher research productivity for recruiting quality students.

H. NUMBER OF DEGREES CONFERRED ANNUALLY

The number of graduate degrees awarded over the years has fluctuated a lot in the last five years. But, in general, the number is increasing. In average, the number of graduate degrees awarded (28/5 = 5.6) at TAMUC per year is higher than all the peer institutions listed, such as Sam Houston State University (15/5 = 3), Colorado State University-Pueblo (14/4=3.5) or Pittsburg S. University (17/4 =4.25). Sam Houston State University had unusual high productivity of baccalaureate degrees due to the well-known forensic chemistry and the criminal justice programs. In addition, there were 9 students who finished their master's degrees in fall 2012 at A&M-Commerce.

Degrees awarded, compared to peer institutions.

TAMUC	**2007-08**	**2008-9**	**2009-10**	**2010-11**	**2011-12**
Baccalaureate	2	5	6	5	6
Master's	3	5	8	1	11
Pittsburg State University	**2007-08**	**2008-9**	**2009-10**	**2010-11**	
Baccalaureate	7	5	13	9	
Master's	3	4	4	6	
TAMU-Kingsville	**2007-08**	**2008-9**	**2009-10**	**2010-11**	
Baccalaureate	NA	NA	NA	NA	
Masters	NA	NA	NA	NA	
Sam Houston State University	**2007-08**	**2008-9**	**2009-10**	**2010-11**	
Baccalaureate	10+6	9+8	20+15	18+11	11+12
Master's	1	4	4	1	5
Colorado State University-Pueblo	**2007-08**	**2008-9**	**2009-10**	**2010-11**	
Baccalaureate	9	4	8	5	
Masters	2	5	3	4	

SECTION IV: PROGRAM CURRICULUM AND DURATION IN COMPARISION TO PEER PROGRAMS

Chemistry MS Curriculum and Program Profile

Admission Requirements and student orientation

There are presently two options that students can pursue in the chemistry graduate program: Option 1 and Option 2. For both options, applicants must submit the minimum document requirements to the graduate school, i.e., official undergraduate transcripts and Graduate Record Examination (GRE) scores. International students must submit financial statements, and for students, whose native language is not English, must submit scores from the Test of English Language as a Foreign Language (TOEFL). There are additional department requirement that must also be submitted, these include statement of career goals, letters of recommendation and a possible interview by phone or in person if the admission committee deems necessary. Based on the input from the admissions committee, the department head recommends to the Graduate School students who should be accepted, and informs the graduate school also of students who have been rejected. For students who have been rejected the department head typically seeks additional input from the faculty before a final decision is made. Holders of BS or MS degrees in discipline closely related to chemistry, such as Chemical Engineering or Pharmacy are considered provided an appropriate plan for such students to meet the minimum chemistry requirement is in place.

Chemistry Graduate Curriculum for Option I

The MS Option 1 program requires completion of eight courses plus six hours of Chem 518 Thesis (30 semester hours). In addition, students are required to enroll in Chemistry 501 each semester they are in residence completing degree requirements. The course requirements include: Thesis (6 semester hours); four courses (12 semester hours) of the following five core courses must be taken: CHEM 513 - Organic Mechanism and Structure, CHEM 521 - Chemical Thermodynamics, CHEM 531 - Advanced Inorganic Chemistry, CHEM 541 - Advanced Analytical Chemistry, and CHEM 514 – Biochemistry. Other four elective courses may be substituted for the aforementioned six core courses upon consent of the department head and/or a majority vote of all Chemistry faculty. A student who does not wish to pursue a higher graduate degree in chemistry, upon consultation with department head, may substitute other courses better suited to meet their career objectives. Substitutions can be made from some of the graduate courses in physics, chemistry, biology, mathematics, etc.

Chemistry Graduate Curriculum for Option II (Non-Thesis)

For this option, implemented in 2008, there are three different tracks that students can pursue.

Track I is designed for students pursuing a Professional Chemistry degree with concentration in Analytical Chemistry, Biochemistry, Inorganic Chemistry, Organic Chemistry or Physical Chemistry. Students can take four core courses from the following seven courses: CHEM 513 - Organic Mechanism and Structure, CHEM 514 – Biochemistry, CHEM 521 - Chemical Thermodynamics, CHEM 527 - Chemical and Biochemical Characterization Methods I, CHEM 531 - Advanced Inorganic Chemistry, CHEM 541 - Advanced Analytical Chemistry, and CHEM 547 - Advanced Instrumental Analysis I. Electives can be taken from the following courses: CHEM 515 - Synthetic Organic Transformations, CHEM 522 - Quantum Chemistry, CHEM 528 - Chemical and Biochemical Characterization Methods II, CHEM 529 - Workshop in Chemistry, CHEM 533 - Chemical Kinetics and Reaction Mechanisms, CHEM 536 - Organometallic Chemistry, CHEM 548 - Advanced

Instrumental Analysis II, CHEM 581 - Nuclear Science, CHEM 589 - Independent Studies in Chemistry and Biochemistry, and CHEM 597 - Special Topics in Chemistry and Biochemistry. There are two required Courses for this option: CHEM 595 - Research Literature and Techniques, and CHEM 501 - Graduate Seminar. The details of the non-thesis curricula are attached as Appendix D.

Track II is designed for individuals pursuing a Professional Chemical Business career.
The curriculum of the Professional Chemical Business degree is similar to the curriculum of the Professional Chemistry degree as shown in Appendix A. However, two courses from the College of Business will be used to replace two core courses listed in the core curriculum of the Professional Chemistry degree and two more replacing electives. Depending on the individual situation, some courses may be used to replace the specified courses listed towards graduation. The courses need to be pre-approved by the Department Head/Graduate Adviser before they are taken .

Track III is designed for individuals who want to pursue a career in Professional Chemical Education. The curriculum of the Professional Chemical Education degree is similar to the curriculum of the Professional Chemistry degree as shown in Appendix A. However, two courses from the College of Educational can be used to replace two core courses listed in the core curriculum of the Professional Chemistry degree and two more replacing electives. Depending on the individual situation, some courses may be used to replace the specified courses listed towards graduation. The courses need to be pre-approved by the Department Head/Graduate Adviser before they are taken.

For option II and three tracks, a comprehensive Exam is required at the end of the program. For which the student must pass before they can graduate.

As shown in Table below, the graduate enrollment was steady from 2007 to 2009. However, in 2010 the enrollment jumped from 14 to 39, 178% increase due to large international students enrolled in the program. In 2011, the graduate enrollment increased from 39 to 54, a 38% increase. These increases resulted in 11 MS degrees awarded in FY 2012. On the other hand, it also put a tremendous pressure on faculty to advise MS theses which do not count toward faculty teaching load until theses are awarded. The increase of faculty number in Fall 2012 did help to ease the burden of faculty in supervising theses. However, continue increase of tenure track/tenured faculty is still needed to maintain the quality of MS theses and student training.

Based on the information provided by peer institutions, the graduate program in chemistry at A&M-Commerce is a large program, which is comparable to only Pittsburg State University which had >30% more faculty than the Chemistry at A&M-Commerce . They have had a steady enrollment over the years, but only advantage of our program is that we have grown to reach our present enrollment and we have the potential to grow even larger if adequate faculty lines are provided.

Majors Enrollment data compared with peer institutions

TAMUC	2007	2008	2009	2010	2011
Undergraduates	36	39	45	49	39
Graduates	13	11	14	39	54
Sam Houston S. University					
Undergraduates	238	257	279	322	264
Graduates	0	0	2	0	0
Texas A&M-Kingsville					
Undergraduates	49	52	53	48	47

Graduates					
Pittsburg State University					
Undergraduates	52	41	48	57	62
Graduates	40	43	50	47	51
Colorado State University- Pueblo					
Undergraduate	80	80	90	72	73
Graduate	n/a	n/a	n/a	n/a	3

SCH Comparison with peer Institutions.

As shown in the tables below, there has been a steady increase in both graduate and undergraduate semester credit hour. The increase in undergraduate SCH is 29.6% from 2007 to 2011 which is matching pretty well with the university enrollment increase. The increase in graduate SCH, however, is much more significant, 241% from 2007 to 2011 and an average ~60% per year. This is due to our increasing graduate enrollment and since the majority of our students are in option 1 (thesis) and are enrolled throughout the year, including the summers where they are involved in research, the credit hour production remains high through the entire year.

Fall semester credit hour production.

	2007	2008	2009	2010	2011
Lower Undergraduate	504	563	529	509	516
Upper Level Undergraduate	404	479	400	549	596
Graduate	190	90	150	322	460

Spring semester credit hour production.

	2008	2009	2010	2011	2012
Lower Undergraduate	476	493	391	469	557
Upper Undergraduate	511	399	479	606	568
Graduate	115	142	134	459	406

Summer semester credit hour production.

	2008	2009	2010	2011	2012
Lower Undergraduate	42	69	155	118	226
Upper Undergraduate	57	72	162	155	121
Graduate	36	48	129	110	297
Total Annual Undergraduate SCH	**1994**	**2075**	**2116**	**2406**	**2584**
Total Annual Graduate SCH	**341**	**280**	**313**	**891**	**1163**

SECTION V: PROGRAM FACILITIES AND EQUIPMENT

The Chemistry Department moved into the 3rd floor of the Science Building in January 2006, in which the Chemistry Department occupies approximately 35,000 square feet of teaching laboratories, research laboratories, stockrooms, and offices, not counting classroom space which is all on the first floor. With the tremendous growth of the graduate program in the last 2-3 years and the large majority of the graduate students pursuing theses, the lab space and office space are not enough to provide adequate training for students.

In addition to the existing equipment the Department purchased ~$1.3M worth of new instruments and equipment in 2006, including a 400-MHz NMR spectrometer, 16 UV-vis spectrophotometers, four HPLC instruments, TGA/DSC, AA and many other advanced equipment. The College of Arts and Sciences at the time hired an equipment technician to maintain the instruments in the building, but has not had a designated person for instrumentation since 2010. However, CoSEA will open the search to hire an instrument technician to be on staff in Fall 2013.

On the other hand, the repair services of NMR, IM-TOF-MS, TGA/DSC, GC-MS and other high-end equipment requires are normally very expensive ranging from $10k to $35k each time. Although the to-be-hired instrument tech would be very helpful to minimize the breakdown of the equipment, it is imperative to have a separate line item for instrument repair when they do break down.

SECTION VI: PROGRAM FINANCE AND RESOURCES

The department's operating expenses fluctuate quite a bit over the last five years based on the table below. Overall, the increase from FY 08 to FY 12 is 22.4%, average ~5.5% per year. However, in FY 13, as in the past few years, each department was forced to give back 1.5% for re-allocation. Chemistry department is to cut ~$10,000. Chemistry department will be forced to cut the operation budget because there is no other fund can be cut. $10,000 will be 1/3 of the current departmental operating budget which will severely hamper the effectiveness of the department to reach out and support students and alumni.

Department Expenses
FY08 through FY08

Operating Account (Account #)

Wages	**FY08**	**FY09**	**FY10**	**FY11**	**FY12**
Wages	4,544.65	11,882.50	11,316.22	8,685.79	5,182.64
Travel	2,663.53	1,282.89	4,504.19	3,343.12	3,262.70
Supplies	6,791.89	6,160.64	1,183.63	2,108.06	3,356.86
Operating	10,828.20	13,500.91	3,439.09	10,405.59	18,594.53
Total	24,828.27	32,826.94	20,443.13	24,542.56	30,396.73

Wages include GAT/GANT/Student Workers
Travel includes teaching & Professional
Operating includes Advertising, Telecommunications, postal, reproduction, equipment, etc.

SECTION VII: PROGRAM ADMINISTRATION

At the start of each semester, the graduate advisor meets with each new student and carefully goes over their application package and the results of screening exams, which each student must take prior to the start of the first semester. A decision is then made about any deficiencies that exist and need to be fulfilled by taking undergraduate courses if necessary. Students are also advised about graduate courses that should be taken.

If a student is appointed as a graduate assistant, they are advised about duties. For students who are appointed as a Graduate Assistant - Teaching (GAT), they are assigned to work closely with the Instructor of record for the particular course and also with the Laboratory Coordinator to come up with a lesson plan and duties for the course or lab. For Graduate Assistant, who supervise laboratories and/or also have stockroom duties, they are trained by the Department Laboratory Coordinator on matters, such as safety, rules and regulations that relate to duties. The research mentors of graduate students, who are appointed Graduate Assistant – Research, supervise the GAR research progress.

Students are also advised on research opportunities in the department for their thesis. During the first semester, each student receives advice from the gradate advisor and department head that they should schedule an appointment with each professor to discuss research opportunities. The selection of an advisor must be completed before the start of the student's second semester in the program. Once there is a mutual decision between the student and the professor, the student's progress is mainly guided by the advisor, with input from the graduate advisor, especially on the selection of courses, registration, and graduation requirements. An advisory committee is also appointed for each student in Option 1, and this committee consists of two additional faculty members who also assist in overseeing and providing advice on the student's research progress. At the end of each semester, the entire faculty reviews each student's performance, including student evaluations of lab teaching, and the department head uses the input in appointing graduate assistants, along with duties, for the following year.

The department encourages and supports the participation of students in various professional development activities, such as attending and presenting their research results at local, regional and national scientific meetings. At these meetings, students get the opportunity to meet peers across the region and country and expand their network of professionals. Another major benefit of students being involved in these activities is that they also get the opportunity to meet professors and other professionals from across the region and country where important information about PhD programs and other professional opportunities can be gained.

As shown in the table in section III F, the applications, acceptances and of new MS students of FY 08 to FY 12 are summarized. The acceptance rate (acceptances/applications) has been pretty much the same, about 1/3, over the years. However, the rate of enrollment (matriculations/acceptance) has been decreasing, from close to 100% in FY 08 & 09 to ~40% in FY 12. This is likely due to the increasing total number of students accepted and the competition from other state institutions. On the other hand, to compete for students the financial package that the Chemistry Department can offer will make a big difference. The financial package includes GA stipend, tuition waiver or remission, other scholarships, living cost, etc.

As mentioned above, the chemistry department relies on GA positions to recruit and retain graduate students and to support the lower level teaching labs taught by faculty. The GA support from the university steadily increased rapidly from 2008 to 2012, as shown in the table below. The additional support for GAs is a major factor that contributed to the growth of the graduate program because it

helped in recruiting students. Another benefit of the increase of the GA position was to spread the laboratory teaching duties among a greater number of graduate students, which allowed these students to focus more on course work and research. A goal of the department is to reduce the laboratory teaching duties of a GA to two 4-hour labs for each GANT while each of them completes 10 hours of courses including research and seminar each semester. The department has been quite successful in achieving this goal. However, the stipend of Chemistry GA of A&M-Commerce ($889/mo) is 45-55% lower than the peer institutions ($1,491-$1,637/mo) in the Dallas-Fort Worth region, which makes recruiting graduate students much more challenging. Over the last few years, the GAs have been increasingly employed to help with the teaching of the upper level labs, which in turn has allowed faculty who teach these courses to have less contact hours to meet the 15-h/wk requirement of ACS guidelines. It also allows faculty more time for competitive research and time to make improvements to their teaching mission.

In addition, the rapid increase of GAs serving as GATs which are instructors of record on lower level teaching labs starting in 2011. This arrangement further reduced the contact hours of full time faculty. However, it also added burden to the department to manage GAs instructing students directly.

Graduate Assistants Equivalencies Non-teaching (GANT); Graduate Assistants Teaching (GAT Research Assistants - Research (GAR) Employed in the Department from 2008-2102

	2008			2009			2010			2011			2012		
	F	**S**	**SS**	**F**	**S**	**SS**	**F**	**S**	**SS**	**F**	**S**	**SS**	**F**	**S**	**SS**
GANT	6	5	2	7	3	2	7	0	0	3	1	1	2	0	1
GAT	1	0	0	0	5	0	1	6	2	11	12	3	13	17	2
GAR	0	3	2	0	1	0	2	4	1	2	4	3	1	6	12
Total	**7**	**8**	**4**	**7**	**9**	**2**	**10**	**10**	**3**	**16**	**17**	**7**	**16**	**23**	**15**

The faculty of the Chemistry Department has developed Student Learning Outcomes (SLOs) for evaluating the MS and BS in Chemistry programs. The following lists the SLOs of both MS and BS programs and the procedures used by the department to evaluate them. The details are included as Appendix C.

1. The Student Learning Outcome
2. How the SLO links to the curriculum
3. Methods for observing student learning
4. Criteria for measuring student performance and targets
5. Achievement summary for the last 5-years
6. How the data for the SLO is used to enhance the program

MS GRADUATE STUDENT LEARNING OUTCOMES

STUDENT LEARNING OUTCOME #1: Students should have an advanced understanding of at least four of the following five areas of chemistry-analytical, biochemistry, inorganic, organic and physical chemistry areas. They should have in depth knowledge and skills in their major area(s) of research.

STUDENT LEARNING OUTCOME #2: Students should be able to communicate scientific results in writing and as oral presentations at American Chemical Society meetings, conference proceedings and journal publications.

STUDENT LEARNING OUTCOME #3: Students should present at least one public seminar to demonstrate in-depth knowledge in literature and skills in literature search.

BS UNDERGRADUATE STUDENT LEARNING OUTCOMES

The faculty of the Chemistry Department has developed three Student Learning Outcomes (SLOs) for evaluating the BS Chemistry programs. The following lists these SLOs and show how the department evaluates them.

1. The Student Learning Outcome
2. Achievement summary for the last 5-years
3. How the data for the SLO is used to enhance the program

STUDENT LEARNING OUTCOME #1: *Students should have a working knowledge of the main areas of chemistry: organic, inorganic, analytical, and physical.*

STUDENT LEARNING OUTCOME #2: *Students should be able to perform and understand innovative research.*

STUDENT LEARNING OUTCOME #3: *Students should be able to communicate the results of their experiments and research to chemists and non-chemists.*

SECTION VIII: PLANNING AND EVALUATION PROCESSES

Based on the previous 5-yr program review the action plan was to focus on improving the graduate program while enhancing the undergraduate program to feed into the graduate program. There were 3 objectives in this plan, including (i) reduce the teaching load of faculty to enhance and sustain the quality of teaching, research and service, (ii) implement and grow the 3-yr MS program to improve the enrollments of upper level undergraduate program and graduate program, and (iii) redesign the curriculum and the degree options of the graduate program to better recruit, retain and prepare marketable graduate students,

As reported in the progress report in 2009 the 1st objective "Reduce the teaching load of faculty to sustain and enhance quality teaching, research and service" was accomplished by (a) Offer double numbering courses, and (b) Hire an instructor/adjunct to teach service courses.

The courses that were cross-listed include:

Chem 415, Inorganic Chemistry and Chem 531 Advanced Inorganic Chemistry
Chem 441, Instrumental Analysis and Chem 541 Advanced Analytical Chemistry
Chem 351 Physical Chemistry I and Chem 521 Thermodynamics
Chem 497 Instrument Analysis II and Chem 548 Advanced Instrument Analysis II
Chem 441, Instrumental Analysis and Chem 547 Advanced Instrument Analysis I
Chem 497 Special Topic: Catalytic Reactions and Chem 597 Special Topic: Catalytic Reactions
Chem 352 Physical Chemistry II and Chem 533 Chemical Kinetics and Mechanism
Chem 497 Special Topic: Research Techniques I and Chem 597 Special Topic: Advanced Research Techniques I
Chem 497 Special Topic: Research Techniques II and Chem 597 Special Topic: Advanced Research Techniques II

While this approach was very effective is reducing the faculty contact hours, the concerns of achieving two sets of learning outcomes were realistic. The department required the instructors to revise the syllabi to present two sets of approaches to achieve two sets of learning outcomes. On the other hand, due to the fast increase of graduate enrollment in 2010 and 2011, the double numbering courses were not effective in 2011 & 2012 in reaching the goals of student learning of both undergraduate and graduate courses and reducing teaching load of faculty. It was recommended to have additional full time faculty to separate the courses and reduce the teaching load eventually to 9 contact hours per full-time faculty. One possibility is to have the stockroom manager teaching some of the freshman level courses and laboratories with additional GA support for the stockroom. This recommendation became a reality when the stockroom manager retired in 2010 and a lab coordinator/instructor was hired in Fall 2010. This effort also partially fulfilled the 2nd approach "Hire an instructor/adjunct to teach service courses". In addition, 1-3 adjuncts were used to teach freshmen level courses and labs in the last few years which helped reduce the faculty teaching load.

The 2nd objective "Implement and grow the 3-yr MS program to improve the enrollments of the upper level undergraduate program and the graduate program" was started in 2008.

The 3-yr MS program was progressing well taking the advantage of the REU (Research Experience for Undergraduates) programs in 2006-2012 which recruited average 4 transfer majors per year. However, many of them decided to finish their BS degree sand moved on to the PhD programs, especially the PhD program of Texas A&M-College Station. Another challenge is the high quality of MS thesis expected from research advisers, which tend to delay the graduation. So, the students who stayed to finish the MS degree needed more than 1 to 1.5 years to finish their MS theses which did not allow the transfer students to finished both BS and MS degrees in 3 years after their transfer from community colleges.

On the other hand, funding to support education/research is critical to recruit, retain and graduate those transfer students, for both BS and MS degrees. Chemistry department has been productive in obtaining funding to this purpose, especially the external funding. The external funding from NSF secured since 2007 includes:

Welch Research Grant, $250,000, 6/1/07-5/31/12, PI: Allan Headley

NSF MRI: Acquisition of a IM-Q-TOF Mass Spectrometer, $310,000, 8/15/08- 7/31/11, PI: Laurence Angel, Co-PI: Frank Miskevich, Stephen Starnes, Nenad Kostic, William Whaley, Serge vonDuvillard

NSF S-STEM: Scholarships and Research Experiences for Transfer Students to Excel in Science and Engineering, $593,700, 8/15/08-7/31/13, PI: Ben Jang, Co-PI: Bao-An Li, Matthew Elam, Jeffrey Kopachena.

Welch Departmental Grant, $105,000, 6/1/09-5/31/12, PI: Ben Jang

NSF CCLI: Achieving Student Mastery of Chromatographic and Spectroscopic Methods in Organic Chemistry through a University/Community College Partnership, $181,192, 6/1/09-5/31/12, PI: Ben Jang, Co-PI: William Whaley, Stephen Starnes

NSF REU: Research Experience for 2-year College Undergraduates in Chemistry at Texas A&M University-Commerce, $219,000, 8/1/09-7/31/13, PI: Ben Jang, Co-PI: Stephen Starnes

NSF DUE: Building the Capacity of STEM Teacher Preparation at Texas A&M University-Commerce, $174,200, 9/1/11-8/31/13, PI: Ben Jang, Co-PI: Tom Faulkenberry, Stephen Starnes.

Welch Departmental Grant, $50,000, 6/1/12-5/31/14, PI: Ben Jang

NSF CHEM: Development and Study of Chiral Organocatalysts for Asymmetric Reactions, $329,679, 7/1/12-6/30/15, PI: Allan Headley, Co-PI: Bukuo Ni

Overall, in terms of funding, Chemistry Department is in a great position to push the 3-yr MS program to be much more successful than the current status.

The 3rd objective ”Redesign the curriculum and the degree options of the graduate program to better recruit, retain and prepare marketable graduate students” was implemented in Fall 2008. Three Professional MS degrees in chemistry were approved and implemented, including Professional MS Chemistry degree, Professional MS Chemical Business degree and Professional MS Chemical Education degree, as mentioned in Section IV. In 2010-2012, there were 4 students completed Professional MS degrees, all in Chemical Education. There are several students in the pipeline to complete their Professional MS degrees in the near future. However, as discussed earlier, the internship opportunities need to be arranged to further promote the professional MS degrees, especial the Professional MS Chemistry degree and the Professional MS Chemical Business degree. Contact and network of alumni should be fully utilized for this purpose.

In summary, the evaluation and implementation of the action plan of the previous 5-yr program review has been effective. The MS program has been growing tremendously in the last 2-3 years. However, it put a lot of pressure on tenured/tenure track faculty to mentor and supervise a large number of thesis and research students to maintain quality education/training.

SECTION IX: ACTION PLAN

Based on the results of the current 5-yr program review, the proposed action plan includes the following 4 objectives: (i) Reduce the teaching load of tenured/tenure track faculty via reducing the load in supervising research and thesis students, (ii) Enhance the retention of lower level undergraduates and the recruitment of high quality graduate students, (iii) Effectively implement the current teacher preparation program (Broadfield science major in Chemistry) to increase undergraduate degree production, (iv) expand the undergraduate program to include new degree program(s) to increase recruitment and maintaining a viable striving undergraduate, and (v) Reach out to alumni to establish the network for internship opportunities and additional resources.

(i) Reduce the teaching load of tenured/tenure track faculty via reducing the load in supervising research and thesis students

The average number of research students supervised per faculty per academic year (not counting summer research) was 31.6 in FY 2011-12. With two additional tenured/tenure track faculty in FY 2012-13, the number dropped to 15.1 which is still high. Instead of turning away students interested in doing research, if there will be two additional tenured/tenure track faculty in the next two years, the number could be decreased to 10.5 students/faculty. This is very critical to maintain high quality education/training, so graduates would be competitive for job placement and career advancement.

(ii) Enhance the retention of lower level undergraduates and the recruitment of high quality graduate students

As discussed in section III D, the retention rate of chemistry freshmen to sophomores could be an issue. Started in fall 2012 faculty, who teaches lower level major courses, has been reaching out to students of lower level courses, including Chem 1411, 1412, 211 and 212 to encourage participation of undergraduate research. It served two purposes, not only for the retention of chemistry majors but also for the recruitment of students to major in chemistry or double major in chemistry. Research experience not only can enhance student learning in the classroom, but also provide the network to mentor and support younger students. So far, it has been effective. The approach will continue to be used in FY 2013-14. However, it does add the burden to the faculty.

The Department has begun to set aside GA/GAR positions, specific for research groups, for recruitment of high quality graduate students for the thesis option. With current tuition remission and the Supplemental Graduate Assistant Funding from Graduate School, the recruitment of high quality graduate students is relatively easier to be realized, even with a large disadvantage in GA stipend. However, personal connection to the faculty of each potential graduate student is the key to successfully recruit each individual to study MS in Chemistry at A&M-Commerce. The current GRE average of graduate students is slightly above 1000. Within 3 years, by Fall 2016, the average of GRE should be above 1150.

(iii) Effectively implement the current teacher preparation program (Broadfield science major in Chemistry) to increase undergraduate degree production

The current NSF DUE project, led by Drs. Jang & Starnes, focuses on capacity building of science and math teacher preparation, especially the secondary teachers. In March 2013, a

phase I proposal will be submitted to NSF to establish the Noyce scholarship program for the next five years. At the end of the 5-yr program, there will be 40 certified secondary teachers produced by the program. It is expected the average production of Chemistry teaching majors will at least 5 per year by the end of 2018. On the other hand, the 4 new courses, Chem 341, 342, 421 and 422 specifically designed for teaching students, would require a half-time (50%) adjunct to teach two courses per semester, four courses per academic year. Currently they are taught by faculty as independent studies on top of the regular teaching load.

(iv) Expand the undergraduate program to include new degree program(s) to increase recruitment and maintaining a viable striving undergraduate program.

Based on the ever changing interest of the next generation of high school and college students, environmental chemistry program, for both undergraduates and graduates, would more likely be the program that captures their attention with minimum resources and personnel needed. Based on the current collaboration between El Centro College and A&M-Commerce and the existing environmental science program at A&M-Commerce, the additional courses, such as air pollution, analytical chemistry/instrumentation course specifically for air, liquid and solid wastes, will be needed. Curriculum of environmental chemistry degree can be developed and approved by Fall 2015 to have the first cohort. Additional adjunct to teach one course per semester and two courses per academic year is required. If this position can be combined with the position for the teacher preparation program, a full time position may be needed. A new Forensic chemistry program may also be helpful to build a striving chemistry undergraduate program. However, it will require more resources.

(v) Reach out to alumni to establish the network for internship opportunities and additional resources.

Alum is the great network and support group for the graduates and the Department. To re-establish a close connection with alumni requires an effective strategy and entensive follow up. It is planned to establish a chemistry alumni board, working closely with the university alumni association, in the first 12 months. The potential members of the chemistry alumni board include chemistry or STEM alumni ambassadors and other distinguished alumni or recent graduates who knows the department well. Once the board is establish, each board member is to reach out all alumni via personal visits, phone calls, emails and reunion host by the Department. The alumni network will provide additional resources to support some of the previous objectives.

SECTION X: SUMMARY OF PROGRAM REVIEW

The Chemistry Department grew quickly in the past 5 years, especially the MS program. It is believed that the growth was mainly due to the increased GA funding from the CoSEA, the external funding obtained by faculty and the increased publication and presentations generated by high quality faculty research.

The main strength of the program includes the following:

- Quality chemistry faculty with productive publication and presentation record.
- Extensive external and internal research/education funding to support the training of both graduate and undergraduate students, total $2.883 Million from 2007 to 2012.
- Strong growth in enrollment of the graduate program in 2010-2012 and the potential in the future.
- The total scholarship awards for undergraduates increased over 140% from 2007 to 2012. The increase of graduate scholarships is even more dramatic, more than 600%, in the same period.
- The number of graduate degrees awarded is the highest among the 5 peer institutions listed over the last five years.

The main weakness of the program is as follows:

- The faculty teaching load including the supervision of research and thesis students is too high to ensure quality training,
- The internship opportunities of the professional MS degree program have not been established to provide students practical training and the network for better job placement and career advancement.
- The degree production of the undergraduate program is only achieving the THECM minimum requirement.
- The quality of the graduate students need to be improved to sustain the quality and the growth of the graduate program.

As discussed in the action plan, the following actions are recommended to further enhance the program and continue the sustainable growth.

(i) Reduce the teaching load of tenured/tenure track faculty via reducing the load in supervising research and thesis students,
(ii) Enhance the retention of lower level undergraduates and the recruitment of high quality graduate students,
(iii) Effectively implement the current teacher preparation program (Broadfield science major in Chemistry) to increase undergraduate degree production,
(iv) Expand the undergraduate program to include new degree program(s) to increase recruitment and maintaining a viable striving undergraduate.
(v) Reach out to alumni to establish the network for internship opportunities and additional resources.

APPENDIX A FACULTY CURRICULUM VITAE

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

Professional Experience
Aug 2007 – Present, 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.

Awards
Texas A&M University – Commerce 2011 Provost Award: Research and Creative Activity.

Teaching
Quantitative and Instrumental Analysis, Advanced Analytical Chemistry, Instrumental Chemistry, Advanced Instrumental Analysis I, Advanced Instrumental Analysis II, Physical Chemistry II, Advanced Research Techniques and Design I, Advanced Research Techniques and Design II, General and Quantitative Chemistry I, General and Quantitative Chemistry II, General Chemistry Tutorial I, General Chemistry Tutorial II, Undergraduate Research, Graduate Thesis, Chemical Science and Profession, Graduate Seminar.

Research
Developing ion mobility - mass spectrometry techniques for peptide, protein and nanocluster research.

External Research Funding Acquired
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.

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.

Internal Research Funding Acquired
PI, Research Enhancement Grant, Texas A&M University-Commerce, $17,506, 2010-2011
PI, Research Enhancement Grant, Texas A&M University-Commerce, $14,916, 2009-2010
PI, Integrated Research Proposal, Texas A&M University-Commerce, $30,000, 2008-2009

PI, Research Enhancement Grant, Texas A&M University-Commerce, $12,614, 2008-2009

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

1. **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.*, in press.

2. **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.

3. **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.

4. **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.

5. **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.

6. **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.

7. **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.

Graduate students*; undergraduate students are underlined.

Oral and Poster Presentations at American Chemical Society Meetings since joining TAMU-Commerce

1. **Structural analysis of methanobactin using ion mobility – mass spectrometry**
By 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.

2. **Interactions of Zn2+ on insulin oligomer formation and stability: Analysis using ESI-IM-MS**
By **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.

3. **Study of the stability of insulin oligomers in the presence and absence of zinc(II) using mass spectrometry**
By **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.

4. **Synthesis and extraction procedure of C2H2 type zinc finger proteins for analysis by ion-mobility mass spectrometry**
By **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.

5. **Gene Cloning of zinc finger (zif268) and identification by ion mobility mass spectrometry**
By **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.

6. **Examining the effectiveness of IM-MS coupled with CID to determine metal ion binding sites on a series of small proteins and peptides**
By **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).

7. **Ion-mobility mass spectrometry study of Pd-ubiquitin**
By 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).

8. **Ion mobility - mass spectrometry study of metal ion labeling of the conformational and charge states of lysozyme**
By **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).

9. **Metal complexes as artificial proteases in Proteomics: Using $[Pd(en)(H_2O)_2]^{2+}$ to selectively cleave proteins in zwitterionic detergents**
By **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).

10. **Chemistry of Transition Metal Cations & Phenylalanine-Containing Peptides Investigated by Mass Spectrometry**
By **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).

11. **Palladium Complexes as Tools for Membrane Proteomics**
By 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).

12. **Proteomics of the Cellular Membrane**
By **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).

13. **A Biomimetric Study of the Active Site of Carbonic Anhydrase**
By **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).

Names in bold are the presenter; graduate students*; undergraduate students are underlined.

Seminars Presented at Universities since joining TAMU-Commerce

Methanobactin Analysis via Ion Mobility Mass Spectrometry Yuri Kim, and DongWon Choi. **Laurence A. Angel** *Chemistry Seminar, Baylor University, February 2012.*
Methanobactin Analysis via Ion Mobility Mass Spectrometry Yuri Kim, and DongWon Choi. **Laurence A. Angel** *Research Symposium TAMU-Commerce, April 2012.*
Gold Nanocluster Analysis via Ion Mobility Mass Spectrometry Amala Dass and **Laurence A. Angel** *Research Symposium TAMU-Commerce, April 2011.*
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.*
Names in bold are the presenter; graduate students*; undergraduate students are underlined.

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

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" 10th Annual TAMUS Pathways Student Research Symposium, Texas A&M University at Galveston, Galveston, Texas, 2012.
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" 10th Annual TAMUS Pathways Student Research Symposium, Texas A&M University at Galveston, Galveston, Texas, 2012.
Swetha Bathula*, Chirag Savla*, DongWon Choi, Laurence A. Angel "Quantification and characterization of hydrophobic and hydrophilic lipids of *Chlamydomonas Reinhardtii*" 10th Annual TAMUS Pathways Student Research Symposium, Texas A&M University at Galveston, Galveston, Texas, 2012.
Ramakrishna Sesham*, Mahesh Babu Nasani*, Laurence A. Angel "Copper Binding Studies of Methanobactin" 10th Annual TAMUS Pathways Student Research Symposium, Texas A&M University at Galveston, Galveston, Texas, 2012.
Yuri Kim, Virginia Giganti and Laurence A. Angel, "Gene cloning of zif268 and identification by ion mobility mass spectrometry" 9th Annual TAMUS Pathways Student Research Symposium, Texas A&M University, College Station, 2011.
Tiffany Culver and Laurence A. Angel, **"**Interactions of Zn^{2+} on insulin oligomer formation and stability: Analysis using ESI-IM-MS" 9th Annual TAMUS Pathways Student Research Symposium, Texas A&M University, College Station, 2011.
Porntip Leeprapaiwong* and Laurence A. Angel**, "**Proteomics of the cellular membrane." 8th Annual TAMUS Pathways Student Research Symposium, West Texas A&M, 2010.
Amy Davis and Laurence A. Angel**, "**Proteomics of the cellular membrane." 7th Annual TAMUS Pathways Student Research Symposium, Texas A&M – Commerce, 2008.
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" 7th Annual TAMUS Pathways Student Research Symposium, Texas A&M – Commerce, 2008.
Brandon Utley* and Laurence A. Angel, "Chemistry of transition metal cations & phenylalanine-containing peptides investigated by mass spectrometry" 7th Annual TAMUS Pathways Student Research Symposium, Texas A&M – Commerce, 2008.
Ronald Rainey, **Mickey Matthews**, and Laurence A. Angel, "A biomimetric study of the active site of carbonic anhydrase" 7th Annual TAMUS Pathways Student Research Symposium, Texas A&M – Commerce, 2008.

Names in bold are the presenters; graduate students*; undergraduate students are underlined.

Presentations at TAMU-Commerce Research Symposium

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.

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.

Yuri Kim, Virginia Giganti and Laurence A. Angel, "Gene cloning of zif268 and identification by ion mobility mass spectrometry" TAMUC Research Symposium 2011.

Tiffany Culver and Laurence A. Angel, "Interactions of Zn^{2+} on insulin oligomer formation and stability: Analysis using ESI-IM-MS" TAMUC Research Symposium 2011.

Porntip Leeprapaiwong* and Laurence A. Angel, "Palladium complexes as proteomics reagents for the study of the cellular membrane" TAMUC Research Symposium 2011.

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.

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.

Amy Davis, Porntip Leeprapaiwong*, Virginia Giganti and Laurence A. Angel, "Proteomics of the cellular membrane." TAMUC Research Symposium 2009.

Brandon Utley* and Laurence A. Angel, "Chemistry of transition metal cations & phenylalanine-containing peptides investigated by mass spectrometry" TAMUC Research Symposium 2009.

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.

Ronald Rainey, Mickey Matthews, and Laurence A. Angel, "A biomimetric study of the active site of carbonic anhydrase" TAMUC Research Symposium 2008.

Names in bold are the presenter; graduate students*; undergraduate students are underlined.

Supervision of Students Conducting Research

MS graduated thesis students

Archana Gujarri, "Mass Spectrometry study of tetraglycine associated with selected metal ions (II): manganese, iron, cobalt, nickel, copper and zinc.", (graduated Spring 2012)

Porntip Leeprapaiwong, "Palladium complexes as proteomics reagents for the study of the cellular membrane", (graduated Spring 2012)

Sriramu Kundoor, "An ion mobility - mass spectrometry study of leucine-enkephalin (YGGFL) and ubiquitin associated with selected metal ions" (graduated Fall 2011)

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)

Brandon Utley, "Chemistry of transition metal cations & phenylalanine-containing peptides investigated by mass spectrometry" (graduated Summer 2009)

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)

Current MS graduate research students

Ramakrishna Sesham and **Mahesh Babu Nasani,** Structural characterization of methanobactin and siderophores produced by methanotrophs.

Srilakshmi Injeti and **Uday Kumar Boga Raga,** The stability of insulin oligomers: Analysis using ESI-IM/MS

Sruthi Konakanchi and **Sahithi Cheruku,** Metal ion labeling of the conformations and charge states of lysozyme.

Kiran Kumar Nalla and **Chiranjeevi Ravichetti,** Determining metal ion binding sites of ubiquitin using IM-MS/MS and computational modeling.

Bathula Swetha and **Chirag Savla** Developing methods for the characterization of algae lipids using HPLC-MS techniques.

Supervision of BS Undergraduate Research

Yuri Kim and **Virginia Giganti** Gene cloning of zif268 and identification by ion mobility mass spectrometry

Tiffany Culver, Interactions of Zn^{2+} on insulin oligomer formation and stability: Analysis using ESI-IM-MS

Ronald Rainey and **Mickey Matthews**, A biomimetric study of the active site of carbonic anhydrase.

Amy Davis, Porntip Leeprapaiwong and **Virginia Giganti** Proteomics of the cellular membrane.

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

Amy Davis and **Lida Vatanpour**, summer 2008.

Thandar Su Myint and **Tam Phan,** summer 2009.

Alex Best, **Hossein Ganjizadeh** and **Josh Galloway,** summer 2010.

Yuri Kim and Tiffany Culver, summer 2011.

Sean Hurlburt, summer 2012.

Student Research Awards

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.

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.

Amy Davis won 3rd prize in the category of undergraduate research poster at the 2009 Texas A&M University – Commerce Science Symposium.

Collaborations

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

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

Reviewed Journal Manuscripts

1. "Travelling Wave Ion Mobility Mass Spectrometry Study of Low Generation Polyamidoamine Dendrimers" *Journal of The American Society for Mass Spectrometry*. (2012)
2. "Peptides as complexing agents. Factors influencing the structure and thermodynamic stability of peptide complexes." *Coordination Chemistry Reviews*. (2011)
3. "Gas phase acidity of substituted benzene" *Chemical Physics Letters.* (2010)
4. "Using Multivariate Statistical Methods to Model the ESI Response of GXG Tripeptides based on Multiple Physicochemical Parameters" *Rapid Communications in Mass Spectrometry*. (2009)

Reviewed National Science Foundation Proposals

1. National Science Foundation Grant proposal - Chemical Measurements and Imaging "CAREER: Next-Generation Ion Mobility-Mass Spectrometry of Protein-ligand and Multiprotein Complexes". (2011)

Doctoral, Masters, and Honors Committees Served On

Ekua Maame Anderson, MS committee, Chemistry, Committee Chair: Dr. Lance Whaley, 2008.
Josamalen Ramos, MS committee, Chemistry, Committee Chair: Dr. Stephen Starnes, 2009.
Ying Ji, MS committee, Chemistry, Committee Chair: Dr. Ben Jang, 2009.
John Coon, MS committee, Biology, Committee Chair: Dr. Frank Miskevich, 2009.
Emmanuel Williams, MS committee, Biology, Committee Chair: Dr. Jeff Kopachena, 2010.
Ruth Whitely, PhD defense, Psychology, Graduate Council Representative, Committee Chair: Sandra Kimbrough, 2010.
Anjeanette Newville, PhD defense, Supervision, Curriculum & Instruction-Higher Education, Graduate Council Representative, Committee Chair: Dr. Leah Wickersham, 2010.
Nathaniel Hanson, BSc Honors committee, Chemistry, Committee Chair: Dr. Ben Jang, 2011.
Lakshmi Koya, MS committee, Chemistry, Committee Chair: Dr. Stephen Starnes, 2011. **Himajarani Surapaneni**, MS committee, Chemistry, Committee Chair: Dr. Stephen Starnes, 2011. **Melissa Hawthorne**, PhD defense, Educational Psychology, Grad. Council Rep., Com. Chair: Dr. Karin Tochkov, 2012.
Juana Rivas, BSc Honors committee, Chemistry, Committee Chair: Dr. Ben Jang, 2012.
Jeffrey Sun, BSc Honors committee, Chemistry, Committee Chair: Dr. Stephen Starnes, 2012.
Prathima Kavuri, MS committee, Chemistry, Committee Chair: Dr. Stephen Starnes, 2012.
Ting Zhou, MS committee, Chemistry, Committee Chair: Dr. Ben Jang, 2012.
Lin Chen, MS committee, Chemistry, Committee Chair: Dr. Stephen Starnes, 2012.
Karthik Akinapelli, MS committee, Chemistry, Committee Chair: Dr. Stephen Starnes, 2012.
Anusha Bommidi, MS committee, Chemistry, Committee Chair: Dr. Stephen Starnes, 2012.

Services to the Department, College, and University 2007 – 2012

Member of the SACS Education Committee 2012 –Present. Developing and documenting the principles of accreditation foundations for quality enhancement. Primary responsibility section 3.4.10 Responsibility for curriculum.

Member of the CoSEA College Curriculum Committee 2012 –Present. Developing and documenting the principles of the CoSEA College curriculum.

Responsible program coordinator/Chair for student learning outcomes evaluation for the chemistry undergraduate programs 2011- 2012. Organized and implemented student learning evaluations for the BS Chemistry degree programs.

Chemistry Undergraduate Program Advisor 2012. Advised students on course selections relating to BS Chemistry degrees.

Search committee member for the Head of Biological and Environmental Sciences 2012 - Present. Screening and interviewing applicants.

Chair for the search committee for the Assistant/Associate Professor for Inorganic Chemistry tenure-track position, February – May 2012. Organized and implemented the search procedures for an inorganic chemist. Arranged meetings to screen and interview applicants.
Search committee member for the Instructor/Stockroom Manager Chemistry position, February – May 2012. Screened and interviewed applicants.

Served on the Student Appeals Committee, January, 10th, 2012. Listened to student academic appeals and made decision relating to their degrees.

Member of the CoSEA Institutional Effectiveness Committee charged with developing program assessment criteria to meet the standards of SACS. Committee member developing and implementing degree and course assessment criteria.

Member of the Computational Science (CPS) committee for developing a proposal for introducing a new Ph.D Computational Science program to TAMU-Commerce. Developed the computational science program initiative with project descriptions at the interface of chemistry, biology and computer science.

Member of the Science safety committee a group charged with implementing improved standards and best practices into all aspects of safety for the Science Building. Committee member developing the science safety standards as applied to the Science Building.

Member of the K-12 group for developing the proposal "Improving Science Education in the North-East Texas Region " NSF GK-12 grant, $2,844,584, Dr. Li, Dr. Reid, Dr. Kopachena and Dr. Angel (Co-PI) Developed the chemistry contribution to the proposal based on instrumental and computational chemistry projects designed for high school students.

Organized the chemistry department's trip and drove students to the American Chemical Society regional meeting in Austin, TX in November 2011. Arranged for 30 students from TAMUC to attend the ACS meeting.

Organized the chemistry department's trip and drove students to the American Chemical Society regional meeting in New Orleans, LA in November 2010. Arranged for 28 students from TAMUC to attend the ACS meeting.

Organized the chemistry department's trip and drove students to the American Chemical Society regional meeting in Little Rock, Arkansas in 2008. Arranged for 26 students from TAMUC to attend the ACS meeting.

Worked with chemistry department faculty to organize classes and increase the department's student body. Implemented strategies and outreach programs to increase the Chemistry department's student body.

Search committee member for the Assistant/Associate Professor for Biochemistry tenure-track position, 2009. Screened and interviewed applicants.

Search committee member for the Visiting Professor for Chemistry 1-year position, 2009. Screened and interviewed applicants.

Faculty representative for the Chemistry Department at the TAMU-Commerce Mane events 2008 - 2012. Gave presentations, advised students, registered students and gave guided tours of the chemistry department.

Coordinated the chemistry departmental library funds with the Science Reference Librarian and ordered books for the department. (2008-2012) Collected book purchase requests and liaised with the library to purchase books from the chemistry library fund.

Organized chemistry demonstrations for the High School Science Event held in the Science Building 2009. Prepared chemistry demonstrations for high school students open evening event.

Curriculum Vitae

Personal Data

Name:	**Allan D. Headley**	
Citizenship:	United States	972-772-3076 (home)
Home Address:	1911 Kings Pass, Heath, TX 75032	469-338-9373 (cell)
	E-mail: allanheadley@hotmail.com	
Business Address:	Department of Chemistry	Tel: 903-468-8106
	Texas A&M University-Commerce	Fax: 903-468-6020
	Commerce, TX 75429-3011	
	E-mail: allan.headley@tamuc.edu	
	http://faculty.tamuc.edu/aheadley/default.aspx#Allan%20Headley	

Education

Postdoc., 1983 (Chemistry)	University of California, Irvine, CA
Ph.D., 1982 (Chemistry)	Howard University, Washington, D. C.
B.A., 1976 (Chemistry)	Washington Adventist University (formerly, Columbia Union College), Takoma Park, MD

Academic Positions

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

Administrative Positions

- Dean, Graduate Studies & Research, Texas A&M University-Commerce (2004- 2012)
- Chief Research Officer, Texas A&M University-Commerce (2004- 2012)
- Chief Research Compliance Officer, Texas A&M University-Commerce (2004- 2012)
- Associate Dean, The Graduate School, Texas Tech University (1999 – 2004)
- Program Director, The National Science Foundation, Arlington, VA (2002 – 2003)
- Associate Chair, Department of Chemistry & Biochemistry, Texas Tech (1996 – 1999)

Professional Activities

- Ad hoc reviewer for various chemistry journals, including the Journal of Organic Chemistry, Tetrahedron, Tetrahedron Letters, Organic Letters, Chemical Reviews.
- Ad hoc reviewer for various funding agencies, including the National Science Foundation, US Department of Defense, American Chemical Society Petroleum Research Fund.
- Ad hoc reviewer for various fellowship programs, including the Graduate Research Fellowship Program (NSF), National Defense Science and Engineering Graduate Fellowship (Department of

Defense); Science, Mathematics & Research for Transformation (National Defense Education Program).

Appointments

- Graduate Record Examination (GRE) Diversity, Equity and Inclusion Committee (2009 - 2012)
- Council of Graduate Schools (CGS) Membership Committee (2008 - 2012)
- Graduate Dean, Federation of North Texas Area Universities (2004 – 2012; Lead Graduate Dean 2008 – 2010)
- Texas Higher Education Coordinating Board, Graduate Education Advisory Committee (2005-2008)
- American Association of State Colleges and Universities Grants Resource Center Advisory Board (2005 – 2007)

Society Memberships

- American Chemical Society - Chair-Elect (1993); Chair (1994) and Immediate Past-Chair (1995) of the South Plains Local Section, member since 1980
- National Organization for the Professional Advancement of Black Chemist and Chemical Engineers, member since 1981

Honors and Awards

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

Research Interests

- Design and synthesis of chiral ionic liquids; organic catalysis and asymmetric synthesis; quantitative structure-property/activity relationships; *ab Initio* calculations and molecular modeling.

Teaching Experience

Undergraduate Courses	Graduate Courses
General Chemistry	Advanced Organic Chemistry
Organic Chemistry (Honors and non-Honors)	Physical Organic Chemistry
Physical Chemistry	Reaction Mechanism (Special Topics)
Biochemistry	

Collaborators and Affiliations

- *Graduate Advisor*: Professor Martin Feldman, Howard University, Washington, DC.
- *Postdoc Mentor*: Professor Robert W. Taft (deceased).
- *Developmental Leave Collaborator*: Professor Lionel A. Carreira, University of Georgia, Athens, GA.

Students Supervised

- *Postdocs supervised*: Dr. Jaewook Nam, Dr. Bukuo Ni, Dr. Yupu Qiao.
- *Doctoral Dissertations Supervised: Dr.* Stephen Starnes; Dr. Raji Ganesan; Dr. Saibabu Kotti.
- *Doctoral Dissertation Supervisory Committees*: Cody Timmons; William Shumway; Justin Westfall; Sun Hee Kim; Huang Xiaowu; Hong Qin; Maria Ham; Martin Dettle (Animal Science); Robert Hanes; Longgui Zhong; Kathy Khuler; Jae-Wook Nam; Yon Soon Kim; Lufeng Guam;

Gregory Unruh; Sang-Rok Do; Jong Chan Lee; Howard Merken; Daniel Thomson (Animal Science); Dan Knight; Sang-Rok Do; Marty Utterback; Tom Robison; Yon Soon Kim; Ron Bediger; John Knoebach, David Rankin (Educational Administration); Oscene Barrett (External Examiner, The University of the West Indies, Jamaica).

- *Master Theses Supervised:* Nichole Jackson; Eric Cheung; Satish Kumar, Jianbin Wu; Dhruba Sarkar; Subrata Ghosh; Zilong Zheng; Poornima Chintala, Anusha Bommidi.
- *Present Graduate Students*: Kritti Dhungana, Sripragna Burugupalli, Gowtham Kondamuri, Nicole Thomas, Maha Maljowni, Navid Rivas.
- *Visiting Graduate Students:* Emmy M. Omar (Universiti Putra Malaysia, Selangor, Malaysia, summer, 2010).
- *Undergraduate Research Students Supervised*: Shenyl Porter; Regina Sandoval; Kimberly Kehoe; Casey Frizzel; Sharon Williams; Binita Patel; Rita Corona; Brittney McDaniel; Syam. B.Challapalli; Patricia Malone; Sean Jackson; Stephen Starnes; Mike McMurry; Erica Parker: Kritti Dhungana; Nichole Thomas.
- *Present Undergraduate Students*: Landon Randolph.

Refereed Publications over the past 5 years

1. Emmy M. Omar, Mohd Basyaruddin A. Rahman, Bukuo Ni, Allan D. Headley. *Chemical Engineering Journal* (Submitted). *Optimization of microwave-assisted Michael addition reaction catalyzed by L-proline in ionic liquid medium using response surface methodology.*
2. Ghosh, S. K*; Qiao, Y, Ni, B.; Headley, A. D. *Organic Lett*. (Submitted) **2012**. *Asymmetric Michael Reactions Catalyzed by a Highly Efficient and Recyclable Quaternary Ammonium Ionic Liquid Supported Organocatalyst in Aqueous Media.*
3. Ghosh, S. K*.; Dhungana, K.;* Headley, A. D.; Ni, B. *Org. Biomol. Chem*. **2012**, 10, 8322-8325. *Highly Enantioselective and Recyclable Organocatalytic Michael Addition of Malalonates to* α,β*-Unsaturated Aldehydes in Aqueous Media.*
4. Qiao, Y,; He, J.; Ni, B.; Headley, A. D. Adv. Syn. & Cat. **2012**, 354, 2849-2853. *Asymmetric Michael Reaction of Acetaldehyde with Nitroolefins Catalyzed by Highly Water-Soluble Organocatalysts in Aqueous Media.*
5. Chintala, P*.; Ni, B.; Headley, A. D.; Gosh, S. K.*; Long, E. *Advanced Synthesis & Catalysis*, **2011**, 353, 2905-2909. *The Application of a Tunable Recyclable Organocatalytic System to the Domino Michael/Henry Reaction in Aqueous Media*.
6. Sarkar, D.*; Kurt Harman, K.; Headley, A. D. *Tetrahedron Asymmetry,* **2011**, 22, 1051-1054. *Chiral Amine Organocatalysts for the syn-Aldol Reaction involving Benzaldehydes and Hydroxyacetone.*
7. Sarkar, D.*; Bhattarai, R.; Headley, A. D.; Ni, B. SynLett, **2011**, 12, 1993-2997. *A Novel Recyclable Organocatalytic System for the Highly Asymmetric Michael Addition of Aldehydes to Nitroolefins in Water*.
8. Omar, E. M.; Dhungana, K.*; Headley, A. D.; Rahman, M. B. A. *Letters in Organic Chemistry* **2011**, 8(3), 170-175. *Ionic Liquid-Supported (ILS) (S)-Pyrrolidine Sulfonamide for Asymmetric Michael Addition Reactions of Aldehydes with Nitroolefins.*
9. Zhang, Q.; Parker, E.; Headley, A. D.; Ni, B. *Syn. Let*. **2010**, 16, 2453-2456. *A Practical and Highly Efficient Hydroacylation Reaction of Aldehydes with Azodicarboxylates in Water.*
10. Headley, A. D.; Ni, B. *Chem. Eur. Jour*. **2010**, 16, 4426-4436. *Ionic Liquid-Supported (ILS) Catalysts for Asymmetric Organic Synthesis*.

11. Wu, J*.; Ni, B.; Headley, A. D.; Org. Let. **2009**, 11(15), 3354-3356. *Di(methylimidazole)prolinol Silyl Ether Catalyzed Highly Michael Addition of Aldehydes to Nitroolefins in Water*.
12. Ni, B.; Zhang, Q.; Garre, S.*; Headley, A. D. *Advanced Synthesis & Catalysis*, **2009**, 351, 875-880. *Ionic Liquid (IL) as an Effective Medium for the Highly Efficient Hydroacylation Reaction of Aldehydes with Azodicarboxylates*.
13. Ni, B.; Zhang, Q.; Dhungana, K.*; Headley, A. D. *Org. Let***. 2009**, 11(4), 1037-1040. *Ionic Liquid-Supported (ILS) (S)-Pyrrolidine Sulfonamide, a Recyclable Organocatalyst for the Highly Enantioselective Michael Addition to Nitroolefins*.
14. Garre, S.*; Parker, E.; Ni, B.; Headley, A. D. *Org. Biomol. Chem*. **2008**, 6, 3041-3043. *Design and Synthesis of Bistereogenic Chiral Ionic Liquids and their Use as Solvents for Asymmetric Baylis-Hilman Reactions*.
15. Zhang, Q.; Ni, B.; Headley, A. D. *Tetrahedron* **2008**, 64, 5091-5097. *Asymmetric Michael Addition Reactions of Aldehyde with Nitrostyrenes Catalyzed by Functional Chiral Ionic Liquids*.
16. Ni, B.; Zhang, Q.; Headley, A. D. *Tet. Let*. **2008**, 49, 1249-1252. *Pyrrolidine-Based Chiral Pyridinium Ionic Liquids (ILs) as Recyclable and Highly Efficient Organocatalysts for the Asymmetric Michael Addition Reactions.*
17. Ni, B.; Zhang, Q.; Headley, A. D. *Tet. Asymmetry* **2007**, 18, 1443-1447. *Highly Enantioselective Michael Addition of Ketones to Nitroolefins Catalyzed by (S)-Pyrrolidine Arenesulfonamide.*
18. Headley, A. D.; Ni, B. *Aldrichimica ACTA*, **2007** 40(4), 107-117. *Imidazolium Ionic Liquids: Synthesis and their Influence on the Outcome of Organic Reactions.*
19. Ni, B.; Zhang, Q.; Headley, A. D. *Green Chemistry* **2007**, 9, 737-739. *Functionalized Chiral Ionic Liquid as Efficient Organocatalyst for Asymmetric Michael Addition to Nitroalkenes*.
20. Ni, B.; Garre, B*.; Headley, A. D. Tet. Lett. **2007**, 48, 1999-2002. *Design and Synthesis of Fused-Ring Chiral Ionic Liquids from Amino acid Derivatives.*
21. Wang, Y-N*.; Ni, Bukuo.; Headley, A. D.; Li, G. *Adv. Synth. Catal*. **2007**, 349, 319 – 322. *Ionic Liquid, [bmim][N(SO_2CF_3)$_2$] Resulted in the First catalyst-Free Aminohalogenation of Electron-Deficient Alkenes*.
22. Headley, A. D.; Kotti, S. R. R. S.*; Ni, B. *Heterocycles*. **2007**, 71(3), 589-596. *Solvation Effects on Imidazolium Salts with Alkyl Side Chains*.

*Graduate students; undergraduate students are underlined.

Recent Invited Lectures

- *A New Class of Recyclable Water-Soluble Chiral Organocatalysts for Asymmetric Reactions*. The Mona Symposium on Natural Products and Medicinal Chemistry, University of the West Indies, Mona, Jamaica, January 3-6, **2012**.
- *New Recyclable Organocatalysts for the Synthesis of Chiral Compounds*. Texas A&M University-Commerce, Commerce, TX, November 18, **2011**.
- *A New Class of Ionic Liquid-Supported Organocatalysts for Asymmetric Reactions*. International Symposium on Organic Synthesis and Drug Development, Nanjing University, Nanjing, China, October 13-16, **2010**.
- *Recyclable Chiral Ionic Liquid-Supported Catalysts for Asymmetric Reactions*. Texas A&M University-Commerce, Commerce, TX, October 1, **2010**.
- *Recyclable Chiral Ionic Liquid-Supported Catalysts for Asymmetric Reactions*. Louisiana State University, Baton Rouge, LA, April 30, **2010**.

Co-Author of Recent Significant Presentations

1. *Novel Chiral Primary and Secondary Amine-Based Organocatalysts Derived From 1,1′-Bi-2-Naphthol and Amino Acids For Asymmetric Aldol Reactions,* Anusha Bade*,Yupu Qiao, Bukuo Ni, Allan D. Headley. Texas A&M University System Pathways 10th Annual Student Research Symposium, Galveston, TX. November 9, **2012**.
2. *Highly Enantioselective Catalysis of Michael Addition of Oxyaldehydes to Nitroolefins,* Sripragna Burugupalli*, Yupu Qiao, Bukuo Ni, Allan D. Headley. Texas A&M University System Pathways 10th Annual Student Research Symposium, Galveston, TX. November 9, **2012**.
3. *Highly Enantioselective Catalysis of Michael Additional of Oxyaldehydes to Nitroolefins*, Sripragna, B.*; Qiao, Y.; Ni, B.; Headley, A. D. North Texas Life Science Research Symposium, Fort Worth, TX. November 3, **2012.**
4. *Novel Chiral Primary and Secondary Amine-Based Organocatalysts Derived from 1,1'-Bi-2-Napthol and Amino Acids for Asymmetric Aldol Reactions*, Bade.*; Qiao, Y.; Ni, B.; Headley, A. D. North Texas Life Science Research Symposium, Fort Worth, TX. November 3, **2012.**
5. *Direct Catalytic Enantioselective Aldol Reaction via a Novel Series of Organocatalysts*. Bade, A.*; Chintala, P*; Ni, B.; Headley, A. D. 67th Southwest Regional Meeting of the American Chemical Society, Austin, TX, Nov 9-12, **2011**.
6. *Novel Chiral Primary and Secondary Amine Catalyzed Asymmetric Direct Aldol Reactions.* Bade, A.*;, Qiao, Y.; Ni, B.; Headley, A. D. 24th International Symposium of Chiral Discrimination, Fort Worth, TX, June 10-13, **2012**.
7. *Computational Analysis, Design and Synthesis of Pyrrolidine Based Chiral Organocatalysts for the Michael Addition Reactions*. Dhungana, K.*; He, J.; Ni, B.; Headley, A. D. 24th International Symposium of Chiral Discrimination, Fort Worth, TX, June 10-13, **2012.**
8. *Diarylprolinol Silyl Ether, A Highly Effective Chiral Organocatalyst for the Asymmetric Michael Addition in Water.* Subrata Ghosh, S.*; Zilong Zheng, *Allan D. Headley, Bukuo Ni, 65th Southwest Regional Meeting of the American Chemical Society, El Paso, TX, November 4-7, **2009**.
9. *Design of Primary Amino Acids Based Organocatalysts for Asymmetric Direct Syn-Aldol Reaction.* Dhruba Sarkar,* Kurt Harman, Subrata Ghosh,* Bukuo Ni, Allan D. Headley, 65th Southwest Regional Meeting of the American Chemical Society, El Paso, TX, November 4-7, **2009**.
10. *Ionic liquid-supported (ILS) (S)-pyrrolidine sulfonamide, an effective organocatalyst for the enantioselective Michael addition to nitroolefins.* Bukuo Ni, Qianying, Zhang; Kritanjali Dhungana,* Allan D. Headley, 238th ACS National Meeting, Washington, D.C., August 16-20, **2009**.
11. *Efficient Hydroacylation Reaction of Aldehydes and Azodicarboxylates in Water*. Erica Parker, Qianying, Zhang, Satish Garre,* Bukuo Ni, and Allan D. Headley, 64th Southwest Regional Meeting of the American Chemical Society, Little Rock, AR, October 1-4, **2008**.
12. *Design and Synthesis of Pyrrolidine Based Chiral Ionic Liquid from Proline Derivative.* Kritanjali, Dhungana,* Jianbin Wu,* Bukuo Ni, and Allan D. Headley, 64th Southwest Regional Meeting of the American Chemical Society, Little Rock, AR, October 1-4, **2008**.
13. *Ionic Liquid (ILs) as An Effective Medium for the Highly Efficient Hydroacylation Reaction of Aldehydes with Azodicarboxylates.* Bukuo Ni, Qianying, Zhang; Satish Garre,* and Allan D. Headley, 64th Southwest Regional Meeting of the American Chemical Society, Little Rock, AR, October 1-4, **2008**.

Selected Administrative Presentations

1. *Assessment of Graduate Programs at Comprehensive Universities*, Council of Southern Graduate Schools, 41st Annual Meeting, Jacksonville, FL., February 23-26, **2012**.
2. *Assessment and Review of Master's Programs,* Council of Graduate Schools Workshop 51th Annual Meeting, Scottsdale, AZ, December 7-10, **2011**.
3. *Evaluation of Master's Programs*, Council of Graduate Schools Workshop, 50th Annual Meeting, Washington, DC, December 1, **2010**.
4. *Leaders for Community Colleges: The Role of Master's Focused Institutions,* Council of Graduate Schools 48th Annual Meeting, Washington, DC, *December 3 - 6, **2008**.*
5. *Recruiting Historically Underrepresented Populations into the Sciences*, 3rd Annual Lone Star Colloquium, Lubbock, TX, March 28-29, **2008**.
6. *Joint Research Projects and Technology*, Association of Texas Graduate Deans Annual Meeting, Lubbock, TX. October 27, **2005**.
7. *Promoting a Culture of Graduate Education for the Twenty-First Century*, Albany State University, Albany GA, August 15, **2003**.
8. *Building Alliances Among Historical Black Colleges and Universities,* Council of Historical Black Graduate Schools, Tampa, FL. February 21, **2003**.
9. *National Science Foundation Graduate Research Fellowship Program, An Update,* Fellowship Roundtable Meeting, National Research Council, Washington, DC, May 10, **2002**

Extramural Research grant activity over the past five years

Source	Title of Project	Period Covered	Amount
Welch Foundation	Ionic Liquid Supported Catalysts for Asymmetric Reactions	Denied	$150,000
Petroleum Research Fund	Development and Application of Organocatalysts for Asymmetric Reactions	Denied	$65,000
National Science Foundation	Development and Study of Chiral Organocatalysts for Asymmetric Reactions	2012-2015	$329,679
Welch Foundation	Ionic Liquid Supported Catalysts for Asymmetric Reactions	Continuous support 2007 -2012	$250,000

Vita
Ben W.-L. Jang

EDUCATION/TRAINING

B.S., Chemistry, National Taiwan University, Taipei, Taiwan
DSc., Applied Chemistry, University of Texas at Arlington, Arlington, TX
Postdoctoral, Heterogeneous Catalysis, Research Triangle Institute, RTP, NC

PROFESSIONAL EXPERIENCE

9/2011-present Program Director, NSF project, Building the Capacity of STEM Teacher Preparation at Texas A&M University-Commerce, Project Period 9/1/2011-8/31/2013

5/2009-present Program Director, NSF CCLI (TUES) Project at Texas A&M U.-Commerce, Project Period: 6/1/09-5/31/13.

8/2008-present Program Director, NSF STEM Scholarship Program at Texas A&M U.-Commerce, 8/15/08-7/31/13.

8/2007-present Professor, Department of Chemistry, Texas A&M U.-Commerce.

5/2007-present Head, Department of Chemistry, Texas A&M U.-Commerce.

3/2006-present Program Director, "Research Experience for Undergraduates" Site of National Science Foundation at Texas A&M U.-Commerce, renewed for 3 more years, Project Period: 3/15/06-7/31/13.

6/2005-8/2005 DOE HERE Program for Faculty Summer Research Participation at the Oak Ridge National Lab.

7/2003-8/2004 Assistant Head, Department of Chemistry, Texas A&M U.-Commerce.

9/2001-7/2007 Associate Professor, Department of Chemistry, Texas A&M U.-Commerce.

3/94 to 6/2001 Project Manager/Research Chemist, Center for Engineering and Environmental Technology, Research Triangle Institute, RTP, NC.

FUNDED PROJECTS

PI, Welch Foundation, Departmental Grant, **$50,000**, 6/1/2012-5/31/2014
PI, NSF DUE, Building the Capacity of STEM Teacher Preparation at Texas A&M University-Commerce, **$174,200**, 9/1/11-8/31/13.
PI, ACS-PRF SE grant, **$4,500**, 2/2010-5/2010.

PI, Interdisciplinary Research Incentive award -Texas A&M U.-Commerce, **$29,883**, 9/2009-8/2010.
PI, NSF REU Site at Texas A&M U.-Commerce, **$219,000**, 6/1/09-7/31/13.
PI, NSF CCLI project at Texas A&M U.-Commerce, **$180,577**, 6/1/09-5/31/13.
PI, Welch Foundation, Departmental Grant, **$105,000**, 6/1/2009-5/31/2012
PI, NSF S-STEM project at Texas A&M U.-Commerce, **$593,700**, 8/15/08-7/31/13.
PI, User Project to Center for Nanophase Materials Sciences of the Oak Ridge National Lab, No-cost use of any equipment at ORNL up to 30 days, (estimated value: **$50,000**) 07/01/08-6/30/09.
PI, User Project to Center for Nanophase Materials Sciences of the Oak Ridge National Lab, No-cost use of any equipment at ORNL up to 30 days, (estimated value: **$50,000**) 08/01/07-7/31/08.
PI, User Project to Center for Nanophase Materials Sciences of the Oak Ridge National Lab, No-cost use of any equipment at ORNL up to 30 days, (estimated value: **$50,000**) 08/01/06-7/31/07.
PI, Advanced Research Project-THECB, **$100,000,** 5/15/2006-1/15/2009.
PI, NSF Research Experience for Undergraduates project, **$191,340**, 3/15/2006- 8/31/2009.
Co-investigator, Welch Foundation, Departmental Grant, **$105,000**, 6/1/2006-5/31/2009
PI, Research Enhancement Grant-Texas A&M U.-Commerce, **$8,948**, *9/2005-8/2006*.
PI, Organized Research Grant-Texas A&M U.-Commerce, **$8,000**, *9/2004-8/2005*.
PI, Mini-Grants-Texas A&M U.-Commerce, **$500**, *3/2004-8/2004*
PI, Faculty Development Grant-Texas A&M U.-Commerce, **$400**, *2/2004-8/2004.*
PI, Organized Research Grant-Texas A&M U.-Commerce, **$5,900**, *9/2003-8/2004*.
PI, ACS-PRF SE grant, **$3,600**, 2*/2003-5/2003*.
PI, Texas Excellence Fund Grant, **$9,000,** *11/2002-8/2003*.
PI, Texas Excellence Fund Grant, **$11,700,** 9/2002-8/2003.
PI, Organized Research Grants-Texas A&M U.-Commerce, **$7,500**, *9/2002-8/2003*
PI, ACS-PRF SE grant, **$2,000**, *7/2000-10/2000*.
Co-PI, "Direct Synthesis of Acetic acid from Carbon dioxide and Methane" funded by EPA; R-827124, **$233,700**, *12/1998-12/2001.*
Co-I, "Pollution prevention in Industrial Condensation Reactions" funded by EPA-Eastman Chemical; R-825331; **$340,000**, *10/1996-12/1999.*
PI, three confidential commercial projects, total **$134,000,** 6/*1996-5/2001*.
PI, "Comprehensive Evaluation of Catalytic Hydroreduction and Nonthermal Plasma as Alternative Technologies for Detoxification of Chemical Wastes" funded by Army Research Office, **$879,200**, DAAH04-95-K-0001, *4/1995-12/2001*.
Co-PI, "Synthesis of Acrylates and Methacrylates from Coal-derived Syngas" DOE **$1,252,200**, DE-AC22-94PC94065, *9/1994-10/1999*

TEACHING EXPERIENCES

Has started implementing NSF POGIL (Process Orientated Guided Inquiry for Learning) approach to teach Physical Chemistry I & II since Fall 2003. The approach has influenced the teaching approaches of general and organic chemistry in the Chemistry Department. Courses taught since 2001 are as follows:

Chem 101 Chemical calculations I

Chem 102 Chemical calculations II
Chem 1411 General Chemistry I and Laboratory
Chem 1412 General Chemistry II and Laboratory
Chem 351 Physical Chemistry I and Laboratory
Chem 352 Physical Chemistry II and Laboratory
Chem 397 Special Topics: Survey of Thermodynamics
Chem 401 Chemical Science and Profession
Chem 415 Inorganic Chemistry
Chem 418 Undergraduate Research
Chem 489 Synthesis of Catalytic Materials
Chem 489 Heterogeneous Catalysis
Chem 489 (Chem 341) Theory & Application of Advanced chemistry I
Chem 489 (Chem 342) Theory & Application of Advanced Chemistry II
Chem 489 (Chem 421) Design and Implementation of Chemistry Laboratory I
Chem 489 (Chem 4220 Design and Implementation of Chemistry Laboratory II
Chem 490 Honors Thesis
Chem 491 Honors Readings
Chem 497 Special Topics: Advance Research
Chem 497 Research Techniques and Design I
Chem 497 Research Techniques and Design II
Chem 501 Graduate Seminar
Chem 518 Thesis
Chem 521 Thermodynamics
Chem 531 Advanced Inorganic Chemistry
Chem 533 Kinetics and Mechanism
Chem 541 Advanced Analytical Chemistry
Chem 589 Reactor Design, Installation and Catalytic Study
Chem 589 Advanced Chemistry I Laboratory
Chem 595 Research Literature and Techniques
Chem 597 Heterogeneous Catalysis
Chem 597 Advanced Physical Chemistry
Chem 597 Advanced Research Techniques and Design I
Chem 597 Advanced Research Techniques and Design II
Chem 597 Advanced Chem I

UNIVERSITY COMMITTEE SERVICES

Search Committee, Director of Pre-Award Services, Oct. 2012-present
Nomination Committee, Chancellor's Academy of Teacher Educators, Oct. 2012-present
Faculty Mentor Initiative Fall 2010-present
Adviser for the International Fellowship Association at A&M-Commerce, Jan. 2010-present
Facility Advisory Committee, Dec. 2009-present
Adviser for the Taiwanese Student Association at A&M-Commerce, Sept. 2009-present
Faculty Senate, Budget Committee, Sept. 2006- present.
International Student Committee, Sept. 2004-present
Member of the Academy-Regents' Initiative of A&M-Commerce, Sept. 2002-present
Adviser for the Chinese Student Association at A&M-Commerce, Sept. 2001-present

Graduate Council, Sept. 2005-Aug 2011
Chair of the Curriculum Committee, Sept 2010-Aug 2011
Search Committee, Dean of COSEA, April-June 2011
Panelist/Speaker, Junior Faculty Workshop 2009 & 2010.
Search Committee of the Director of International Student Services, Oct. 2007-Jan. 2008.
University Strategic Planning Committee, Dec. 2006-April 2007
Science and Technology Center Dedication Committee, June 2005-April 2006
Search Committee of Dean of Arts and Sciences, October 2004-March 2005
Hazardous Material Task force, September 2004-January 2006
Committee of New Science and Technology Building, Sept 2002-Nov. 2005
Founding Vice–Chair of the Math and Science Research Council, Nov. 2001- Oct. 2003
Honors Committee in Fall 2002 and Spring of 2003.
Search Committee of Botonist faculty position of Biology department, September 2001-May 2002.

PROFESSIONAL ASSOCIATIONS

External reviewer, Program Review of Chemistry Department of Texas A&M U.-Kingsville, Oct 2012-present.
Guest Editor of a special issue of Catalysis Today Journal, June 2012-present.
Chair, International Advisory Board, 2012 International Symposium on Plasmas for Catalysis and Energy Materials (ISPCEM-2012), Sept. 21-24, 2012, Tianjin, China.
Guest Editor of a special issue of Energy and Environmental Sciences Journal, June 2009-May 2010.
Chair of the Organization Committee for the "Green Chemistry for Fuels of the Future" symposium, ACS National Meeting, San Francisco, CA, March 2010.
Chair of the Organization Committee for the "Green Chemistry for Sustainable Energy Supply and Conversion" symposium, ACS National Meeting, New Orleans, LA, April 2008.
Guest Editor of a special issue of Green Chemistry Journal, 2005-2007.
Co-Chair of the Organization Committee for the "Green Chemistry for Fuel Synthesis and Processing" Symposium of ACS National Meetings, San Francisco, CA, September 2006
Newscorrespondent for the Applied Catalysis Journal B: Environmental, 1998-2005.
Guest Editor of 6 issues of Catalysis Today Journal from 1999 to 2005.
Chair of the Organization Committee for "Catalysis and Plasma Technology" Symposium of ACS National Meetings, New Orleans, March 2003.
Chair of the Organization Committee for "Plasma Technology and Catalysis" Symposium of ACS National Meetings, Washington DC, August 2000.
Member of the American Chemical Society since 1990.

AWARDS AND HONOR

Nomination of 2012 PAESMEM award
The Trezzie Pressley "Ceaseless Industry" Award, 2011

H.M. Lafferty Distinguished Faculty Award for Scholarship and Creative Activity, 2007.
Faculty Development Leave Award (Texas A&M U.-Commerce), 2006-2007.
Nomination for the Neil L. Humfeld Distinguished Faculty Award for Service, 2005.
Distinguished Service Award (Texas A&M U.-Commerce) in March 2002.
Sigma Xi Award (UT-Arlington Chapter) as the Outstanding Doctoral Student, 1992.

JOURNAL EDITING

"Advances in Plasma and Catalysis" *Catal. Today*, **2013** (currently in manuscript collection stage).
"Green Chemistry for Fuels of the Future" Symposium, *Energy and Environ. Sci.*, **2010,** 3.
"Green Chemistry for Fuel Synthesis and Processing" *Green Chemistry*, **2007,** *9***.**
"Plasma Technology and Catalysis" *Catal. Today*, **2004**, *89(1-2)*.
"Catalysis and Plasma Technology" *Catal. Today*, **2002**, *72*.
"Environmental Catalysis-Green Chemistry" *Catal. Today*, **2000**, *55(1-2)*.
"Environmental Catalysis-Fundamental and Applied NOx Control Studies" *Catal. Today*, **1999**, *54(4)*.
"Environmental Catalysis-VOC Control and Catalytic Combustion" *Catal. Today*, **1999**, *54(1)*.
"Environmental Catalysis-Emission Control" *Catal. Today*, **1999**, *53(4)*.

PATENTS AND PATENT APPLICATIONS

*: Graduate student at TAMUC
B. W.-L. Jang and C. Ratanatawanate* "RF Non-Thermal Plasma Techniques for Catalyst Development to Improve Process Efficiencies" US Patent Application, filed in September 2007 and published in June **2009**.

B. W.-L. Jang and C. Ratanatawanate* "RF Non-Thermal Plasma Techniques for Catalyst Development to Improve Process Efficiencies" Patent Cooperative Treaty (PCT) Application, filed in March, **2006**.

B. W.-L. Jang and C. Ratanatawanate* "RF Non-Thermal Plasma Techniques for Catalyst Development to Improve Process Efficiencies" US Provisional Patent Application, filed in March, **2005**.

B. W.-L. Jang, Y. He, D.J. Houpt and R.B. Timmons, "Catalytic Hydrodehalogenation of Polyhalogenated Hydrocarbons" US Patent, No. 5,276,240, **1994**.

Y. He, W.-L. Jang and R.B. Timmons, "Zeolite Catalyzed Conversion of Acetylene" US Patent, No. 5,118,893, **1992**.

RECENT PUBLICATION

*: Graduate student of TAMUC; underlined: undergraduate student of TAMUC

De-Zhi Zhao, Chuan Shi, Xiao-Song Li, Ai-Min Zhu, Ben W.-L. Jang, "Enhanced effect of water vapor on complete oxidation of formaldehyde in air with ozone over MnOx catalysts at room temperature" *J. Hazard. Mat.* **2012,** http://dx.doi.org/10.1016/j.jhazmat.2012.09.009

X. Liu, Y. Li, J. Lee, C. Hong, C. Mou, and B. Jang, "Selective hydrogenation of acetylene in excess ethylene over SiO2 supported Au-Ag bimetallic catalyst" *Appl. Catal. A*, **2012**, *439-440*, 8

X. Liu, C. Mou, S. Lee, Y. Li, J. Secrest, B. Jang, "Room temperature O2 plasma treatment of SiO2 supported Au catalysts for selective hydrogenation of acetylene in the presence of large excess of ethylene", *J. Catal*. **2012**, *285(1)*, 152

Yanan Li and Ben W.-L. Jang " Non-thermal RF plasma effects on surface properties of Pd/TiO_2 catalysts for selective hydrogenation of acetylene" *Appl. Catal. A*, **2011**, *392*, 173.

Yanan Li and Ben W.-L. Jang "Investigation of Metal Precursor-Support Interaction Induced by Calcination and O_2 Plasma Treatments" *Ind. & Eng. Chem. Res.*, **2010**, *49* (18), pp 8433–8438.

Yanan Li and Ben W.-L. Jang" Inducing metal-support interaction via non-thermal plasma technology for catalyst design and fuel synthesis" *Am. Chem. Soc., Div. of Fuel Chem. PREPRINTS*, **2010,** *55(1)*.

Jang BWL, Glaser R, Dong MD, et al. **"**Fuels of the Future" *Energy Environ. Sci.*, **2010**, 3, 253**.**

Ying Ji*, Chunkai Shi, Amir Karimloo, Jessica Elizalde and Ben Jang "Selective hydrogenation of acetylene over alumina supported Pd and Pd-Mg catalysts" Proceedings of the 21th North American Catalysis Society Meeting, at San Francisco, CA, June 7-12, **2009**.

Ben W.-L. Jang, Michael Helleson, Chunkai Shi, Adam Rondinone, Viviane Schwartz, Chengdu Liang and Steve Overbury "Characterization of Al_2O_3 Supported Nickel Catalysts Derived from RF Non-thermal Plasma Technology" *Topic in Catal.*, **2008,** 49 (3-4), 145-152.

Ben Jang, Chunkai Shi and Michael Helleson "RF Non-thermal Plasma Technology for the Development of Supported Metal Catalysts" Proceedings, 6th International Symposium of Non-thermal Plasma Technology, Wanli, Taiwan, May 12-16, **2008**.

Ben Jang, Chunkai Shi and Michael Helleson "Recent Advances of Catalyst Development using Non-thermal Plasma Technology" *Am. Chem. Soc., Div. of Fuel Chem. PREPRINTS*, **2008,** *53(1)*.

Chang-Jun Liu, Ben W.-L. Jang and Roger Glaeser, Editorial, "Green Chemistry for fuel synthesis and processing" *Green Chem.* **2007**, *9*, 525.

Chunkai Shi, Ryan Hoisington and Ben W.-L. Jang "Promotion effects of air and H2 non-thermal plasmas on TiO2 supported Pd & Pd-Ag catalysts for selective hydrogenation of acetylene" *Ind. & Eng. Chem. Res.*, **2007**, *46*, 4390.

Michael Helleson, Monyka Macias, Chalita Ratanatawanate*, Ben Jang, Adam Rondinone and Steve Overbury "Characterization of Supported Nickel Catalysts Derived from RF Non-thermal Plasma Technology" Proceedings of the 20th North American Catalysis Society Meeting, at Houston, June 17-22, **2007**.

Chunkai Shi and Ben W.-L. Jang "Selective hydrogenation of acetylene on non-thermal plasma derived Pd-based catalysts" *Am. Chem. Soc., Div. of Petrol Chem. PREPRINTS,* **2006,** *51(2).*

Chalita Ratanatawanate*, Monyka Macias and Ben W.-L. Jang "Comparison of supported Ni catalysts derived from RF non-thermal plasma for benzene hydrogenation" *Am. Chem. Soc., Div. of Fuel Chem. PREPRINTS,* **2006,** *51(2).*

Chunkai Shi and Ben W.-L. Jang "Non-thermal RF Plasma Modifications on Pd/γ-Al2O3 for Selective Hydrogenation of Acetylene in the Presence of Ethylene" *Ind. & Eng. Chem. Res.*, **2006**, *45*, p5879.

C. Liu, J. Zou, K. Yu, D. Cheng, Y. Han, J. Zhan*, C. Ratanatawanate*, B. Jang "Plasma Application for More Environmentally-friendly Catalyst Preparation" *Pure and Applied Chemistry*, **2006**, *78(6)*, p1227.

B.K. Chang, B.W.-L. Jang, S. Dai and S. Overbury "Transient Studies of the Mechanisms of CO Oxidation over Au/TiO_2 using time-resolved FTIR Spectroscopy and Product Analysis" *J. Catal.* **2005**, *236(2)*, p392.

Chalita Ratanatawanate, Monyka Macias, and Ben Jang "The Promotion Effect of Non-thermal RF Plasma on Ni/Al_2O_3 for Benzene Hydrogenation" *Ind. & Eng. Chem. Res.*, **2005**, *44*, p9868.

A.A. Nikolopoulos, B.W-L. Jang, J.J. Spivey "Acetone Condensation and Selective Hydrogenation to MIBK on Pd and Pt Hydrotalcite-Derived Mg-Al Mixed Oxide Catalysts" *Appl. Catal. A,* **2005**, *296*, p128.

B.W.-L. Jang "Control Formation of Layer Support for the Deposition of Ultra Small Gold Particles and Their Interactions and Beyond" *Appl. Catal. B,* **2005***, 60(3-4),* pN8*.*

Ai-Min Zhu, Kliff Pittman, Monyka Macias and Ben W.-L. Jang "Selective Removal of Acetylene from Ethylene via RF Plasma Derived Pd Catalysts" Proceedings of the 17th International Symposium on Plasma Chemistry, **2005**.

Chalita Ratanatawanate, Monyka Macias, Ai-Min Zhu and Ben Jang *"*Hydrogenation of aromatics via rf plasma derived Ni catalysts**"** *Am. Chem. Soc., Div. of Petrol Chem. PREPRINTS,* **2005**, *50(1)* p357.

Shao-Hang Chu, Joseph W. Paisie, and Ben W.-L. Jang "PM data analysis - A comparison of two urban areas: Fresno and Atlanta" *Environmental Atmosphere*, **2004**, *38*, p3155.

Jason Zhan, Monyka Macias, Dustin Knight and Ben W.-L. Jang "Study of RF Plasma Effect on Metal Dispersion and Sintering Resistance of Alumina Supported Metal Catalysts" *Am. Chem. Soc.*, *Div. of Petrol. Chem. PREPRINTS*, **2004,** *49(1)*, p32.

Jason Zhan, Praveen Boopalachandran, Ben W.-L. Jang, Jai Cho and Richard B. Timmons "RF Plasma Modification of Supported Pt Catalysts for CO_2-CH_4 Reforming" *Am. Chem. Soc.*, *Div. of Fuel Chem. PREPRINTS*, **2004**, *49(1)*, p176.

B.W.-L. Jang, T. Hammer and C. Liu; Preface of the "Plasma Technology and Catalysis" *Catal. Today*, **2004**, *89(1-2)*, p1.

Ben W.-L. Jang "Low Pressure RF Plasma for Surface decontamination of Artillery Shell Casings: I. Dinitrotoluene (DNT)" *Ind. & Eng. Chem. Res.*, **2003**, *42*, p2767.

B.W.-L. Jang "Plasma Technology and Catalysis Symposium" *Appl. Catal. B: Environmental,* **2003***, 44(2),* pN1*.*

C. Liu, G. Vissokov and B.W.-L. Jang "Catalyst Preparation Using Plasma Technologies" *Catal.*

Today, **2002**, *72*, p173.

B. W.-L. Jang, J.G. Reynolds, M. Boutonnet and J.J. Spivey; Preface of the "Catalysis and Plasma Technology" *Catal. Today*, **2002**, *72*, p171.

A.A. Nikolopoulos, G.B. Howe, B.W-L. Jang, R. Subramanian, J.J. Spivey, D.J. Olsen, T.J. Devon and R.D. Culp, "Novel Noble-Metal-Based Catalysts for Liquid-Phase Acetone Condensation", *Catalysis of Organic Reactions* (M.E. Ford, ed., Marcel Dekker, Inc.) **2001**, *48*, p533.

Kevin A. Frankel, Ben W-L. Jang, George W. Roberts, and James J. Spivey "Deactivation of Hydrodechlorination Catalysts:II-Experiments with 1,1-Dichloroethylene and 1,1-Dichloroethane", *Appl. Catal.,* **2001**, A: *209*, p401.

B.W.-L. Jang "Process for Desulfurization of Naphtha" *Appl. Catal. B: Environmental,* **2001***, 32(4),* pN9*.*

Kevin A. Frankel, Ben W-L. Jang, George W. Roberts, and James J. Spivey "Deactivation of Hydrodechlorination Catalysts:I-Experiments with 1,1,1-Trichloroethane", *Appl. Catal.*, **2001**, *205*, p263.

B.W.-L. Jang "Catalysis and Plasma Technology Symposium" *Appl. Catal. B: Environmental,* **2001,** *29(4),* pN18*.*

A.A. Nikolopoulos; B. W.-L. Jang R. Subramanian; J.J. Spivey; D.J. Olsen; T.J. Devon and R.D. Culp; "Environmental-Benign Liquid-Phase Acetone Condensation using Novel Hetergeneous Catalysts" *ACS Symposium Series,* Green Chemistry, **2000**, *767*, p194.

Meltem Öcal, Rachid Oukaci, Geroge Marcelin, Ben W-L. Jang and James J. Spivey "Steady-state isotopic transient kinetic analysis on Pd-supported hexaaluminates used for methane combustion in the presence and absence of NO**",** *Catal. Today,* **2000***, 59*, p205.

B.W.-L. Jang and J.J. Spivey "Catalytic Hydrodesulfurization and Hydrodechlorination of Chloroethyl Ethyl Sulfide" *Catal. Today*, **2000**, *55*, p3.

RECENT PRESENTATION

*: Graduate student of TAMUC; underlined: undergraduate student of TAMUC

Yanan Li, Bin Zhu and Ben W.-L. Jang "Recent Advances of the Non-thermal Plasma Technology for Catalyst Development and Design" to be presented at the 245th ACS National Meetings, New Orleans, LA, April 7-11, **2013**.

Nathaniel Hanson*, Shahin Amin, Mihira Vasana*, and Ben W.-L. Jang "Heterogeneous Catalysis of Biodiesel using Ultrasound Techniques with carbonaceous based acid catalysts" to be presented at the 245th ACS National Meetings, New Orleans, LA, April 7-11, **2013**.

Kristine Jang*, Ting Zhou* and Ben W.-L. Jang "Promotion effects of nonthermal Ar plasma on Silica supported Pd catalysts with ionic liquids for selective hydrogenation of acetylene" to be presented at the 245th ACS National Meetings, New Orleans, LA, April 7-11, **2013**.

Nate Hanson* and Ben Jang "Ultrasound assisted heterogeneous catalysis using starch derived acid catalysts for bio-diesel synthesis" Texas A&M System Pathway Symposium, Corpus Christi, TX, Nov 10, **2012**.

Ting Zhou* and Ben Jang "Selective hydrogenation of acetylene over Pd on Bmim ionic liquid loaded SiO_2 support" Texas A&M System Pathway Symposium, Corpus Christi, TX, Nov 10, **2012**.

Kristine Jang*, Ting Zhou* and Ben Jang "Selective hydrogenation of acetylene over Pd on Emim ionic liquid-loaded supports" Texas A&M System Pathway Symposium, Corpus Christi, TX, Nov 10, **2012**.

Luis Pena* and Ben Jang "Investigation of Gallium promoted Pd/TiO_2 Catalysts for the Selective Hydrogenation of Acetylene in the Presence of Ethylene" Texas A&M System Pathway Symposium, Corpus Christi, TX, Nov 10, **2012**.

Nate Hanson* and Ben Jang "Ultrasound assisted heterogeneous catalysis using starch derived acid catalysts for bio-diesel synthesis" ACS 68th SWRM, Baton Rouge, LA, Nov 4-7, **2012**.

Kristine Jang*, Ting Zhou* and Ben Jang "Selective hydrogenation of acetylene over Pd on Emim ionic liquid-loaded supports" ACS 68th SWRM, Baton Rouge, LA, Nov 4-7, **2012**.

Luis Pena* and Ben Jang "Investigation of Gallium promoted Pd/TiO_2 Catalysts for the Selective Hydrogenation of Acetylene in the Presence of Ethylene" ACS 68th SWRM, Baton Rouge, LA, Nov 4-7, **2012**.

Patricia Rhodes, Victory Dixon and Ben Jang"Catalytic hydrogenation of acetylene in ethylene rich feeds utilizing promoted palladium supported on SiO_2 and Al_2O_3" ACS 68th SWRM, Baton Rouge, LA, Nov 4-7, **2012**.

Ting Zhou* and Ben Jang "Selective hydrogenation of acetylene over Pd on Bmim ionic liquid loaded SiO_2 support" ACS 68th SWRM, Baton Rouge, LA, Nov 4-7, **2012**.

Luis Pena* and Ben Jang "Investigation of Gallium promoted Pd/TiO_2 Catalysts for the Selective Hydrogenation of Acetylene in the Presence of Ethylene" North Texas Research Symposium, Fort Worth, TX, Nov 3, **2012**.

Ben Jang "Catalyst Design and Development of Using RF Non-thermal Plasma" ISPCEM 2012, Tianjin, China, Sept. 21-24, **2012**

Stephen Starnes, Bukuo Ni, Ben Jang, Lance Whaley, Larry Brough and Fred Jury "University/Community College Collaboration in Professional Development Experiences and Research-based Laboratories to Engage Community College Organic Chemistry Students" ACS 236th National Meetings, Philadelphia PA, August 19-23, **2012**.

James Wheeler, Jr. and Ben Jang **"**Selective Hydrogenation of Acetylene in Ethylene over Au Catalysts" Annual Research Symposium, TAMU-Commerce, Commerce TX, April 5, **2012**

Kristine Jang, Juana Rivas, and Ben Jang **"**Selective Hydrogenation of Acetylene over Pd on [Bmim][PF_6^-] and [Bmim][BF_4^-]-loaded SiO_2 support Annual Research Symposium, TAMU-Commerce, Commerce TX, April 5, **2012**

Ting Zhou* and Ben Jang "Selective Hydrogenation of Acetylene over Pd on Ionic Liquid loaded SiO_2 Support" Annual Research Symposium, TAMU-Commerce, Commerce TX, April 5, **2012**

Nate Hanson* and Ben Jang "Ultrasound assisted heterogeneous catalysis using starch derived acid catalysts for bio-diesel synthesis" 45th ACS DFW MiM, Irving TX, April 21, **2012**.

James Wheeler, Jr. and Ben Jang **"**Selective Hydrogenation of Acetylene in Ethylene over Au Catalysts" 45th ACS DFW MiM, Irving TX, April 21, **2012**.

Ting Zhou* and Ben Jang "Selective hydrogenation of acetylene over Pd on ionic liquid loaded supports" 45th ACS DFW MiM, Irving TX, April 21, **2012**.

Ben Jang "Au, A Surprising Catalyst and Its Application in Selective Hydrogenations" National Chia-Yi University, Chia-Yi Taiwan, January 4, **2012**

Patricia Rhodes and Ben Jang "Selective Hydrogenation of Acetylene in Ethylene over Pd-Ag Catalysts" Texas A&M System Pathway Symposium, College Station, TX, Nov 11, **2011**.

Luis Pena*, Victoria Dixon and Ben Jang "Promotion Effect of Gallium on Supported Pd Catalysts for the Selective Hydrogenation of Acetylene" Texas A&M System Pathway Symposium, College Station, TX, Nov 11, **2011**.

Stephen Starnes, Bukuo Ni, Ben Jang, Larry Brough and Fred Jury "Texas A&M University-Commerce/Community College Partnerships. Engaging Community College Organic Chemistry Students in Instrumentation and Research based Laboratories to Impact Their Career Choices" ACS 67th SWRM, Austin TX, Nov 8-11, **2011**.

James Wheeler, Arjun Malipeddi*, Ben Jang and Wen-Yuan Lin "Selective Hydrogenation of Acetylene in Ethylene over Au Catalysts" ACS 67th SWRM, Austin TX, Nov 8-11, **2011**.

Luis Pena*, Victoria Dixon and Ben Jang "Investigation of the Promoter Effect of Gallium on Supported Pd Catalysts for the Selective Hydrogenation of Acetylene in the Presence of Ethylene" ACS 67th SWRM, Austin TX, Nov 8-11, **2011**.

Nathaniel Hanson*, Shahin Amin and Ben Jang "Ultrasound assisted heterogeneous catalysis using starch derived acid catalysts for bio-diesel synthesis" ACS 67th SWRM, Austin TX, Nov 8-11, **2011**.

Ting Zhou*, Navid Rivas and Ben Jang "Investigation of silica supported ionic liquid with Pd for selective hydrogenation of acetylene in ethylene" ACS 67th SWRM, Austin TX, Nov 8-11, **2011**.

Patricia Rhodes, Jeremiah Secrest and Ben Jang "Plasma effect on Pd/SiO_2 and $Pd-Ag/SiO_2$ catalysts for selective hydrogenation of acetylene" ACS 67th SWRM, Austin TX, Nov 8-11, **2011**.

Ting Zhou*, Navid Rivas, Kristine Jang, Sam Kjos and Ben Jang "Development of ionic liquid supported Pd catalysts for hydrogenation" ACS 67th SWRM, Austin TX, Nov 8-11, **2011**.

Nathaniel Hanson, Navid Rivas and Ben Jang "Development of carbon based heterogeneous acid catalysts for bio-oil conversion to bio-diesel" ACS 66th SWRM & 62nd SERMACS, New Orleans, LA, Dec. 1-4, **2010**.

Jeremiah Secrest, Patricia Rhodes and Ben Jang **"**Selective Hydrogenation of Acetylene with Au/SiO2 Catalyst" ACS 66th SWRM & 62nd SERMACS, New Orleans, LA, Dec. 1-4, **2010**.

Qianying Zhang*, Nathaniel Hanson and Ben Jang **"**Development of cellulose based catalysts for biodiesel conversion" ACS 66th SWRM & 62nd SERMACS, New Orleans, LA, Dec. 1-4, **2010**.

Nathaniel Hanson and Ben Jang "Heterogeneous catalysis of bio-diesel using starch based carbonaceous solid acid catalysts " 8th Annual Texas A&M University System Pathway Research Symposium, Canyon, TX, October 22-23, **2010**.

Jeremiah Secrest, Patricia Rhodes and Ben Jang "Selective Hydrogenation of Acetylene in the presence of ethylene over Au/SiO2 Catalyst" 8th Annual Texas A&M University System Pathway Research Symposium, Canyon, TX, October 22-23, **2010**.

Nathaniel Hanson, Qianying Zhang* and Ben Jang "Efficient production of high grade biodiesel using a model reaction with various types of starch derived catalysts " 43rd ACS DFW Annual Meeting-in-Miniature, Dallas, TX, April 17, **2010**.

Qianying Zhang*, Nathaniel Hanson* and Ben Jang "Development of cellulose-based heterogeneous catalysts for biodiesel conversion" 43rd ACS DFW Annual Meeting-in-Miniature, Dallas, TX, April 17, **2010**.

Yanan Li and Ben W.-L. Jang" Inducing metal-support interaction via non-thermal plasma technology for catalyst design and fuel synthesis" 239th ACS National Meetings, San Francisco, CA, March 21-25, **2010.**

Nathaniel Hanson, John Roylance, Qianying Zhang* and Ben W.-L. Jang "Development of Starch-Based Heterogeneous Catalysts for Bio-Oil Conversion to Biodiesel" 65th ACS SWRM, El Paso, TX, Nov. 4-7, **2009**.

Yanan Li and Ben W.-L. Jang "Investigation of non-thermal RF plasma effects on the surface properties of TiO_2 supported Pd catalysts" 65th ACS SWRM, El Paso, TX, Nov. 4-7, **2009**.

Luis Pena*, Virginia Giganti, Angella Namutebi, Yanan Li, and Ben W.-L. Jang "Investigation of the Promoter Effects On TiO2 Supported Pd Catalysts for the Selective Hydrogenation of Acetylene in the Presence of Ethylene" 65th ACS SWRM, El Paso, TX, Nov. 4-7, **2009**.

Yanan Li, Ying Ji* and Ben Jang "Reduction of supported Pd nitrate catalysts by RF non-thermal plasmas" 21st North American Catalysis Society Meeting, San Francisco, CA, June 7-12, **2009**.

Ying Ji*, Chunkai Shi, Jessica Elizalde, Amir Karimloo and Ben Jang "Selective hydrogenation of acetylene over alumina supported Pd and Pd-Mg catalysts " 21st North American Catalysis Society Meeting, San Francisco, CA, June 7-12, **2009**.

Ying Ji* and Ben Jang **"**Selective hydrogenation of acetylene over silica supported Pd and Pd-Mg catalysts **"** 42nd ACS DFW Annual Meeting-in-Miniature, Denton, TX, May 2, **2009**.

Ying Ji*, Jessica Elizalde, Kristine Jang, Nate Hanson and Ben Jang "Selective Hydrogenation of Acetylene Over Supported Pd and Pd-Mg Catalysts" ACS SWRM at Little Rock, AR, Oct. 1-4, **2008**.

Amir Karimloo, Ying Ji*, Nate Hanson and Ben Jang "Characterization of Alumina Supported Pd and Pd-Mg Catalysts for Selective Hydrogenation of Acetylene" ACS SWRM at Little Rock, AR, Oct. 1-4, **2008.**

Ying Ji*, Jessica Elizalde and Ben Jang "Characterization of Silica and Titania Supported Pd and Pd-Mg Catalysts for Selective Hydrogenation of Acetylene" ACS SWRM at Little Rock, AR, Oct. 1-4, **2008.**

Ben Jang, Chunkai Shi and Michael Helleson "RF Non-thermal Plasma Technology for the Development of Supported Metal Catalysts" 6th International Symposium of Non-thermal Plasma Technology, Wanli, Taiwan, May 12-16, **2008.**

Saraj Albanoon*, Chunkai Shi and Ben W.-L. Jang "Investigation of Promoted Pd Catalysts for Selective Hydrogenation of Acetylene in the Presence of Ethylene**"** 41th ACS DFW Annual Meeting-in-Miniature, Dallas, April 19, **2008**.

Ben Jang, Chunkai Shi and Michael Helleson "Recent Advances of Catalyst Development using Non-thermal Plasma Technology" 235th ACS National Meetings, New Orleans, LA, April 6-10, **2008.**.

Chunkai Shi, Ryan Hoisington and Ben W.-L. Jang "Investigation of RF plasma effects on supported Pd catalysts for selective hydrogenation of acetylene" ACS SWRM at Lubbock, TX, Nov. 4-7, **2007**.

Michael Helleson, Chunkai Shi, and Ben W.-L. Jang "Characterization of Ni/Al2O3 derived from RF non-thermal plasma" ACS SWRM at Lubbock, TX, Nov. 4-7, **2007**.

Giang Quach and Ben W.-L. Jang "Investigation of the properties of supported Pd nitrate catalysts" ACS SWRM at Lubbock, TX, Nov. 4-7, **2007**.

Michael Helleson, Chunkai Shi, and Ben W.-L. Jang "Characterization of Ni/Al2O3 derived from RF non-thermal plasma" Texas A&M Pathway Symposium at Stephenville, TX, Nov. 2-3, **2007**.

Michael Helleson, Monyka Macias, Chalita Ratanatawanate*, Ben Jang, Adam Rondinone and Steve Overbury "Characterization of Supported Nickel Catalysts Derived from RF Non-thermal Plasma Technology" the 20th North American Catalysis Society Meeting, Houston, June 17-22, **2007**.

Ryan Hoisington, Chunkai Shi and Ben W.-L. Jang "Characterization of RF Plasma Treated Palladium Catalyst on Titania Support" 40th ACS DFW Annual Meeting-in-Miniature, Forth Worth, April 28, **2007**.

Michael Helleson and Ben W.-L. Jang "Characterization of Ni Supported on Layered Silica Catalysts for Benzene Hydrogenation**"** 40th ACS DFW Annual Meeting-in-Miniature, Forth Worth, April 28, **2007**.

Darryl Encino, Elida Bonilla, and Ben W.-L. Jang "Supported metal catalysts derived from RF nonthermal plasma for hydrogenation reaction" 233th ACS National Meetings, Chicago, IL, March 25-29, **2007**.

Monyka Macias, Michael Helleson, Elida Bonilla and Ben W.-L. Jang "Characterization of the Promoting Effects of RF Plasma Treatments on Ni/Al2O3" ACS SWRM in Houston, TX, Oct. 19-22, **2006**.

Chunkai Shi, Ryan Hoisington, Darryl Encino and Ben W.-L. Jang "Investigation of RF plasma effects on supported Pd catalysts for selective hydrogenation of acetylene" ACS SWRM at Houston, TX, Oct. 19-22, **2006**.

Chalita Ratanatawanate, Michael Helleson and Ben W.-L. Jang "Ni Supported on Layered Silica Catalysts for Benzene Hydrogenation" ACS SWRM in Houston, TX, Oct. 19-22, **2006**.

Chunkai Shi and Ben W.-L. Jang "Characterization of plasma- [redacted] Al_2O_3 with unique catalytic properties for selective hydrogenation of acetylene" 232th ACS National Meetings at San Francisco, CA, September 10-14, **2006**.

Chunkai Shi and Ben W.-L. Jang "Selective hydrogenation of acetylene on non-thermal plasma derived Pd-based catalysts" 232th ACS National Meetings at San Francisco, CA, September 10-14, **2006**.

Chalita Ratanatawanate, Monyka Macias and Ben W.-L. Jang "Comparison of supported Ni catalysts derived from RF non-thermal plasma for benzene hydrogenation" 232th ACS National Meetings at San Francisco, CA, September 10-14, **2006**.

Ben Jang "RF Non-thermal Plasma Technology for Catalyst Design and Development" Invited Lecture to the College of Chemistry, Peking University, Beijing, China, May 19, **2006**.

Ben Jang "RF Non-thermal Plasma Technology for Catalyst Design and Development" Invited Lecture to the College of Chemical Engineering and Technology, Tianjin University, Tianjin, China, May 17, **2006**.

Ben Jang "RF Non-thermal Plasma Technology and Heterogeneous Catalysis" Invited Lecture to the Department of Engineering Physics, Tsinghua University, Beijing, China, May 12, **2006**.

Chunkai Shi and Ben W.-L. Jang "Selective Hydrogenation of Acetylene over Pd/Al_2O_3 Catalyst with Plasma treatment" ACS SW-SE Joint Regional Meeting at Memphis, TN, Nov. 1-4, **2005**.

Kliff Pittman and Ben Jang "Hydrogenation of Acetylene in Excess of Ethylene Using a Palladium Catalyst with Plasma Treatment" ACS SW-SE Joint Regional Meeting at Memphis, TN, Nov. 1-4, **2005**.

Monyka Macias and Ben Jang "Promoting Effect of RF Plasma on Ni/Al_2O_3 Catalyst" ACS SW-SE Joint Regional Meeting at Memphis, TN, Nov. 1-4, **2005**.

Chalita Ratanatawanate, Monyka Macias and Ben Jang "Development of Nickel Catalysts via the RF Plasma Technology for Benzene Hydrogenation" ACS SW-SE Joint Regional Meeting at Memphis, TN, Nov. 1-4, **2005**.

Ai-Min Zhu, Monyka Macias, Kliff Pittman and Ben W.-L. Jang "Selective Removal of Acetylene from Ethylene via RF Plasma Derived Pd Catalysts" 17th International Symposium on Plasma Chemistry, Toronto, Canada. August 7-12, **2005**.

Chalita Ratanatawanate, Monyka Macias, Ai-Min Zhu and Ben Jang **"**Improved Activity and Stability of Ni/Al_2O_3 Catalysts for Benzene Hydrogenation via RF Plasma Modifications" 19th North American Catalysis Society Meeting, Philadelphia, PA, May 23-27, **2005**.

Chalita Ratanatawanate, Monyka Macias, Ai-Min Zhu and Ben Jang "Hydrogenation of aromatics via rf plasma derived Ni catalysts**"** presented at the 229th ACS National Meetings at San Diego, CA, March 13-17, **2005**.

Chalita Ratanatawanate, Monyka Macias and Ben Jang "Characteristics and Activity of Plasma-Modified Ni/Al2O3 Catalysts for Benzene Hydrogenation" presented at the ACS SW Regional Meeting at Fort Worth, TX, Sept. 29-October 2, **2004**.

Ben Jang, Jason. Zhan and Monyka Macias "Promoting Effect of RF Plasma on alumina supported metal catalysts" presented at the 227th ACS National Meetings at Anaheim, CA, March 28-April 1, **2004**.

Jason Zhan, Monyka Macias, Dustin Knight and Ben W.-L. Jang "Study of RF Plasma Effect on Metal Dispersion and Sintering Resistance of Alumina Supported Metal Catalysts" presented at the 227th ACS National Meetings at Anaheim, CA, March 28-April 1, **2004**.

Jason Zhan, Praveen Boopalachandran, Ben W.-L. Jang, Jai Cho and Richard B. Timmons "RF Plasma Modification of Supported Pt Catalysts for CO_2-CH_4 Reforming" presented at the 227th ACS National Meetings at Anaheim, CA, March 28-April 1, **2004**.

Ben W.-L. Jang "Plasma Technologies for Catalyst Development" Invited Speaker for Seminar at the Chemistry Department of Texas A&M U.-College Station, March 5, **2004**.

Jason Zhan, Monyka Macias and Ben W.-L. Jang "Study of Plasma Effect on Dispersion and Sintering Resistance of Nickel and Platinum Supported on Alumina" presented at the Pathway Conference of the A&M System at Galveston, TX in November, **2003**.

Jason Zhan, Monyka Macias and Ben W.-L. Jang "Study of Plasma Effect on Dispersion and Sintering Resistance of Nickel and Platinum Supported on Alumina" presented at the ACS SW Regional Meeting at Okalahoma City, OK in October, **2003**.

Dustin Knight, Praveen Boopalachandran, Jason Zhan and Ben W.-L. Jang "Synthesis of Mesoporous Metal Oxides" presented at the ACS SW Regional Meeting at Okalahoma City, OK in October, **2003**.

Jason Zhan, Praveen Boopalachandran, Ben W.-L. Jang, Jai Choi and Richard B. Timmons "Plasma effect on Properties of supported Pt catalysts" presented at the 225th ACS National Meeting in New Orleans, LA on March 23-27, **2003**.

Praveen Boopalachandran, Jason Zhan and Ben W.-L. Jang "Synthesis of Mesoporous Alumina for NOx Reduction" presented at the ACSSW Regional Meeting at Austin, TX in Nov. **2002**.

B.W.-L. Jang, C.R. Savage, R. B. Timmons, S. Levy, and L. Stosky "Radio Frequency Non-Thermal Plasma Decontamination of Munitions" presented at the NDIA Conference at Lexington, KY in May, **2002**.

Vita
Bukuo Ni

EDUCATION

1999,9-2004,7 Ph.D in Organometallic Chemistry, Shanghai Institute of Organic Chemistry (SIOC), Chinese Academy of Sciences
1995,9 -1999,7 B.S. in Chemistry, Department of Chemistry, Zhejiang University, Hangzhou, China

PROFESSIONAL EXPERIENCE

2012 - present Assistant Professor, Department of Chemistry, TAMU-Commerce
2010-2011, 12 Interim Assistant Professor, Department of Chemistry, TAMU-Commerce
2008,1-2010,8 Research Assistant Professor, Department of Chemistry, Texas A&M University-Commerce
2005,1-2007,12 Postdoctoral Research Associate, Department of Chemistry, Texas A&M University-Commerce
2004,7-2005,1 Senior Scientist, Sundia (Shanghai) MedTech Company Ltd. Shanghai, P. R. China

TEACHING EXPERIENCES

Courses taught since 2008 are as follows:
(1) CHEM 536: Organometallic Chemistry
(2) CHEM 531: Advanced Inorganic Chemistry
(3) CHEM 513: Organic Mechanism and Structure
(4) CHEM 527: Chemical and Biochemical Characteristic Methods I
(5) CHEM 528: Chemical and Biochemical Characteristic Methods II
(6) CHEM 597: Specific Topic: Organic Chemistry
(7) CHEM 501 Graduate Seminar
(8) CHEM 518: Thesis
(9) CHEM 589: Organic Synthesis
(10) CHEM 415 and 415L: Inorganic Chemistry
(11) CHEM 201: Organic Chemistry Tutorial
(12) CHEM 101 and 102: General Chemistry Tutorial
(13) CHEM 212L: Organic Chemistry Lab

AFFLIATIONS

American Chemical Society (ACS)

PROFESSONAL SERVES

(1) I am currently serving as a reviewer for numerous journals, such as *J. Am. Chem. Soc.; Org. Lett.; Chemical Reviews*; *Adv. Synth. Catal.; Chem. Commun.*; *Synlett.*; *Tetrahedron*; *Tetrahedron Lett.*; *Lett. Org. Chem.; Magnetic Resonance in Chemistry,* and *Chirality*.

(2) Serve as a reviewer for national-wide proposals

A. ACS-PRF "Synthesis of beta-Ketoesters via a Benzoylquinine-Catalyzed Ketene-Claisen Condensation" (2012)

B. ACS-PRF "Stereoselective N-Heteroxyxlic Carbene (NHC) Catalyzed Oxidopyrylium Enolate [5+2] Cycloadditions toward Bridge, Polycyclic Ether" (2012)

(3) Serve as Editorial Board of Dataset Papers in Chemistry since 2012

GRANT SUPPORT

Prior Internal

1. "*Chiral Pyrrolidine-Catalyzed Asymmetric Organic Reactions*" Faculty Research Enhancement Project, $8,000, 2009, 9 - 2010, 8

External

1. "Development and Study of Chiral Organocatalysts for Asymmetric Reactions" National Science Foundation, $329,681, 2012, 6-2015, 5.

THESES DIRECTED

Graduate

(1) QianKun Chen, "Highly Enantioselective Organocatalytic Michael Addition of Ketones to Nitroolefins on Water" MS thesis, Fall 2012.
(2) Zilong Zheng, "Design and Synthesis of Recyclable Chiral Organocatalysts for Asymmetric Michael Reactions" MS thesis, Spring 2010.
(2) Subrata K. Ghosh, "Design and Synthesis of Recyclable Organocatalysts for Highly Asymmetric Michael Addition in Aqueous Media" MS thesis, Summer 2010 (Co-supervised with Dr. Headley).
(3) Dhruba Sarkar, "Study of Organocatalyzed Asymmetric Synthesis of Aldol Reaction and Michael Addition Reactions" MS thesis, Summer 2010 (Co-supervised with Dr. Headley).
(4) Jianbin Wu, "Design and Synthesis of Chiral Organocatalysts for Asymmetric Michael Addition Reactions" MS thesis, Spring 2009 (Co-supervised with Dr. Headley).

Undergraduate (Research)

Mahsa Fardin, Erica Parker, Simranjit Kaur, kritanjali dhungana, Ben Perkins, Kurt Harman, Ramesh Bhattarai, Elizabeth Long, and Junpeng He.

PUBLICATIONS IN PEER-REVIEWED SCIENTIFIC JOURNALS SINCE JOINED TAMU-C

*: Graduate student of TAMUC; underlined: undergraduate student of TAMUC

1. Highly Asymmetric Henry Reaction Catalyzed by Chiral Copper(II) Complexes
   Bukuo Ni and Junpeng He *Tetrahedron Lett.* **2012** in press.
2. Highly Enanatioselective and Recyclable Organocatalytic Michael Addition of Malonates to α,β-Unsaturated Aldehydes in Aqueous Media
   Subrata K. Ghosh*, Kritanjali Dhungana*, Allan D. Headley, Bukuo Ni *Org. Biomol. Chem*. **2012**, *10*, 8322.
3. Asymmetric Michael Reaction of Acetaldehyde with Nitroolefins Catalyzed by Highly Water-Compatible Organocatalysts in Aqueous Media
   Yupu Qiao, Junpeng He, Bukuo Ni, Allan D. Headley *Adv. Synth. Catal.* **2012**, *354*, 2849.
4. The Application of a Recyclable Organocatalytic System to the Asymmetric Domino Michael/Henry Reaction in Aqueous Media

Poornima Chintala*, Subrata K. Ghosh*, Elizabeth Long, Allan D. Headley, Bukuo Ni *Adv. Synth. Catal.* **2011**, *353*, 2905.

5. A Novel Recyclable Organocatalytic System for the Highly Asymmetric Michael Addition of Aldehydes to Nitroolefins in Water
   Dhruba Sarkar*, Ramesh Bhattarai, Allan D. Headley, Bukuo Ni *Synthesis* **2011**, 1993.
6. Highly Active Water-Soluble and Recyclable Organocatalyst for the Asymmetric 1,4-Conjugate Addition of Nitroalkanes to α,β-Unsaturated Aldehydes
   Subrata K. Ghosh*, Zilong Zheng*, and Bukuo Ni *Adv. Synth. Catal.* **2010**, *352*, 2378.
7. Diarylprolinol Silyl Ether Salts as New, Efficient, Water Soluble, and Recyclable Organocatalysts for the Asymmetric Michael Addition in Water
   Zilong Zheng*, Ben Perkins, and Bukuo Ni *J. Am. Chem. Soc.* **2010**, *132*, 50. Highlighted by ***SYNFACTS***.
8. A Practical and Highly Efficient Hydroacylation Reaction of Aldehydes with Azodicarboxylates in Water
   Qianying Zhang, Erica Parker, Allan D. Headley, and Bukuo Ni *Synlett* **2010**, 2453.
9. Ionic Liquid-Supported (ILS) Catalysts for Asymmetric Organic Synthesis
   Bukuo Ni and Allan D. Headley *Chem. Eur. J.* **2010**, *16*, 4426.
10. Di(methylimidazole)prolinol Silyl Ether Catalyzed Highly Michael Addition of Aldehydes to Nitroalkenes in Water
    Jianbin Wu*, Bukuo Ni, and Allan D. Headley *Org. Lett.* **2009**, *11*, 3354. Highlighted by ***SYNFACTS***.
11. Highly Efficient Hydroacylation Reaction of Aldehydes with Azodicarboxylates in Ionic Liquid as Media
    Bukuo Ni, Qianying Zhang, and Allan D. Headley *Adv. Synth. Catal.* **2009**, *351*, 875.
12. Ionic Liquid-Supported (ILS) (S)-Pyrrolidine Sulfonamide, a Recyclable Organocatalyst for the Highly Enantioselective Michael Addition to Nitroolefins
    Bukuo Ni, Qianying Zhang, Kritanjali Dhungana, and Allan, D. Headley *Org. Lett.* **2009**, *11*, 1037.
13. Design and Synthesis of Distereogenic Chiral Ionic Liquids and Their Use as Solvents for Asymmetric Baylis-Hillman Reactions
    Satish Garre*, Erica Parker, Bukuo Ni and Allan D. Headley *Org. Biomol. Chem*. **2008**, *6*, 3041 Highlighted by ***SYNFACTS***.
14. Asymmetric Michael Addition Reactions of Aldehydes with Nitrostyrenes Catalyzed by Functionalized Chiral Ionic Liquids
    Qianying Zhang, Bukuo Ni, and Allan D. Headley *Tetrahedron* **2008**, *64*, 5091.
15. Pyrrolidine-Based Chiral Pyridinium Ionic Liquids (ILs) as Recyclable and HighlyEfficient Organocatalysts for the Asymmetric Michael Addition Reactions.
    Bukuo Ni, Qianying Zhang, and Allan D. Headley *Tetrahedron Lett*. **2008**, *49*, 1249**.**
16. Chiral Imidazolium Ionic Liquids: their Synthesis and Influence on the Outcomes of Organic Reactions
    Allan D. Headley and Bukuo Ni *Aldrichimica Acta* **2007**, *40*, 107.
17. Functionalized Chiral Ionic Liquid as Recyclable Organocatalyst for Asymmetric Michael Addition to Nitrostyrenes.
    Bukuo Ni, Qianying Zhang, and Allan D. Headley *Green Chem.* **2007**, *9*, 737.
18. Design and Synthesis of Fused-Ring Chiral Ionic Liquids from Amino acid Derivatives.
    Bukuo Ni, Satish Garre*, and Allan D. Headley *Tetrahedron Lett.* **2007**, *48*, 1999.

19. Highly Enantioselective Michael Addition of Ketones to Nitroolefins Catalyzed by (S)-Pyrrolidine Arenesulfonamide
    Bukuo Ni, Qianying Zhang, and Allan D. Headley *Tetrahedron: Asymmetry* **2007**, *18*, 1443.
20. Ionic Liquid, [bmim][$N(SO_2CF_3)_2$], Resulted in the First Catalyst-Free Aminohalogenation of Electron-Deficient Alkenes.
    Yi-Ning Wang, Bukuo Ni, Allan D. Headley and Guigen Li *Adv. Synth. Catal*. **2007**, *349*, 319.
21. Solvation Effects on Imidazolium Salts that Contain Alkyl Side Chains.
    Allan D. Headley, S. R. S. Saibabu Kotti, and Bukuo Ni *Heterocycles* **2007**, *71*, 589.
22. Design and Synthesis of Novel Pyridinium Chiral Ionic Liquids Tethered to a Urea Functionality.
    Bukuo Ni, Qianying Zhang, and Allan D. Headley *J. Org. Chem*. **2006**, *71*, 9857.
23. Novel Imidazolium Chiral Ionic Liquids that Contain a Urea Functionality.
    Bukuo Ni and Allan D. Headley *Tetrahedron Letters*, **2006**, *47*, 7331.
24. The Design and Synthesis of C-2 Substituted Chiral Imidazole-Based Ionic Liquids from Amino Acid Derivatives.
    Bukuo Ni, Allan D. Headley, and Guigen Li *J. Org. Chem.* **2005**, *70*, 10600.

PRESENTATIONS, COLLOQUIA, AND INVITED TALKS

*: Graduate student of TAMUC; <u>underlined</u>: undergraduate student of TAMUC

1. <u>He, Junpeng</u>; Dhungana, Kritanjali*; Ni, Bukuo "Synthesis of chiral primary amines and their use as organocatalysts for asymmetric michael addition" 67th Southwest Regional Meeting of the American Chemical Society, Austin, TX, United States, November 9-12 (2011)
2. Qiao, Yupu; Ni, Bukuo; Headley, Allan D. "Highly water-soluble recyclable organocatalysts for the asymmetric reactions in aqueous media" 67th Southwest Regional Meeting of the American Chemical Society, Austin, TX, United States, November 9-12 (2011)
3. Bade, Anusha*; Chintala, Poornima*; Ni, Bukuo; Headley, Allan D. "Direct catalytic enantioselective Aldol reaction via a novel series of organocatalysts" 67th Southwest Regional Meeting of the American Chemical Society, Austin, TX, United States, November 9-12 (2011)
4. Ni, Bukuo; Ghosh, Subrata K.*; Dhungana, Kritanjali*; Headley, Allan D. "Development of effective, water-woluble and recyclable oganocatalyst for the asymmetric Michael addition" Joint 66th Southwest and 62nd Southeast Regional Meeting of the American Chemical Society, New Orleans, LA, United States, December 1-4 (2010).
5. Chintala, Poornima*; <u>Long, Elizabeth</u>; Ni, Bukuo; Headley, Allan. D. "Water-soluble and Recyclable Organocatalyst for Tandem Michael/Henry Reaction in Aqueous Media" Joint 66th Southwest and 62nd Southeast Regional Meeting of the American Chemical Society, New Orleans, LA, United States, December 1-4 (2010).
6. Ni, Bukuo; Ghosh, Subrata*; Dhungana, Kritanjali*; Headley, Allan D. "Highly active water-soluble and recyclable organocatalyst for the asymmetric 1,4-conjugate addition of carbanion to α,β-unsaturated aldehydes" 240th ACS National Meeting, Boston, MA. August 22-26, 2010 (poster).
7. Ghosh, Subrata*; Zheng, Zilong*; Headley, Allan D.; Ni, Bukuo "Diarylprolinol Silyl Ether, A Highly Effective Chiral Organocatalyst for the Asymmetric Michael Addition in Water" 65th Southwest Regional Meeting of the American Chemical Society, El Paso, TX, United States, November 4-7 (2009).

8. Sarkar, Dhruba*; Harman, Kurt; Ghosh, Subrata*; Ni, Bukuo; Headley, Allan "Design of Primary Amino Acids Based Organocatalysts for Asymmetric Direct Syn-Aldol Reaction" 65th Southwest Regional Meeting of the American Chemical Society, El Paso, TX, United States, November 4-7 (2009).
9. Ni, Bukuo; Zhang, Qianying; Dhungana, Kritanjali; Healdey, Allan D. "Ionic liquid-supported (ILS) (S)-pyrrolidine sulfonamide, an effective organocatalyst for the enantioselective Michael addition to nitroolefins" 238th ACS National Meeting, Washington, DC. August 16-20, 2009 (poster).
10. Ni, Bukuo; Zhang, Qianying; Garre, Satish*; Headley, Allan D. "Ionic Liquid (ILs) as An Effective Medium for the Highly Efficient Hydroacylation Reaction of Aldehydes with Azodicarboxylates" 64th Southwest Regional Meeting of the American Chemical Society, Little Rock, AR, United States, October 1-4, 2008 (poster).
11. Dhungana, Kritanjali; Wu, Jianbin*; Ni, Bukuo; Headley, Allan D. "Design and Synthesis of Pyrrolidine Based Chiral Ionic Liquid from Proline Derivative" 64th Southwest Regional Meeting of the American Chemical Society, Little Rock, AR, United States, October 1-4 (2008).
12. Parker, Erica; Zhang, Qianying; Garre, Satish; Ni, Bukuo; Headley, Allan D. "Efficient Hydroacylation Reaction of Aldehydes and Azodicarboxylates in Water" 64th Southwest Regional Meeting of the American Chemical Society, Little Rock, AR, United States, October 1-4 (2008).
13. Ni, Bukuo; Zhang, Qianying; Headley, Allan D. "Pyrrolidine-Based Chiral Pyridinium Ionic Liquids (ILs) as Recyclable and Highly Efficient Organocatalysts for the Asymmetric Michael Addition Reactions" 63rd Southwest Regional Meeting of the American Chemical Society, Lubbock, TX, United States, November 4-7, 2007 (Oral)
14. Zhang, Qianying; Ni, Bukuo; Headley, Allan D. "Functionalized Chiral Ionic Liquid as Recyclable Organocatalyst for Asymmetric Michael Addition to Nitrostyrenes" 63rd Southwest Regional Meeting of the American Chemical Society, Lubbock, TX, United States, November 4-7 (2007).
15. Garre, Satish*; Headley, Allan D.; Ni, Bukuo "Design and Synthesis of Novel Fused-ring Chiral Ionic liquids" 62nd Southwest Regional Meeting of the American Chemical Society, Houston, TX, United States, October 19-22, 2006 (Oral)
16. Ni, Bukuo; Zhang, Qianying; Headley, Allan D "Design and Synthesis of Novel Pyridinium Chiral Ionic Liquids Tethered to a Urea Functionality" 62nd Southwest Regional Meeting of the American Chemical Society, Houston, TX, United States, October 19-22 (2006).
17. Ni, Bukuo; Headley, Allan D.; Li, Guigen "The Design and Synthesis of C-2 Substituted Chiral Imidazolium Ionic Liquids from Amino Acid Derivatives" 57th Southeast/61st Southwest Joint Regional Meeting of the American Chemical Society, Memphis, TN, United States, November 1-4, 2005 (poster).

Stephen D. Starnes - Curriculum Vitae

Chemistry Department
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Education

The Scripps Research Institute, La Jolla, CA

Postdoctoral Research Assistant (September 1998-August 2000)

Research area: Molecular recognition, self-assembly, porphyrin and phthalocyanine chemistry
Research Advisor: Julius Rebek, Jr.

Texas Tech University, Lubbock, TX

Ph.D., Organic Chemistry (June 1998)

Dissertation title: "Unnatural Amino Acids: Synthesis and Structure-Property Relationship Studies," Research Advisor: Professor Allan D. Headley

Texas Tech University, Lubbock, TX

B.S., Chemistry, *Magna Cum Laude*, GPA: 3.83/4.0 (May 1993)

Academic Positions & Teaching Experience

Texas A&M University at Commerce, Commerce, TX

Interim Department Head, Chemistry Department, January 2010 – June 2010.
Assistant Professor, Chemistry Department, July 2005-present

- Instructor for general and organic chemistry and graduate level organic chemistry
- Science Education
- Implementing POGIL and PLTL in the classrooms
- Working to transform chemistry education for the preparation of teachers
- Research interests in molecular recognition, sensor development, environmental remediation.
- Undergraduate academic advisor (Fall 2008-present)

New Mexico State University, Las Cruces, NM

Assistant Professor, Department of Chemistry and Biochemistry, Aug. 2000-July 2005

- Instructor for nine semesters of undergraduate organic chemistry
- Instructor for three semesters of graduate level physical organic chemistry
- One publication over porphyrin-based anion sensors
- One NIH-BRIN research grant, $150,000.00 direct
- Directed two Masters theses.

Texas Tech University, Lubbock, TX

Instructor (Summer 1998)

- Instructed second semester undergraduate organic chemistry lecture course.

Lab and Lecture Teaching Assistant (1993-1998)

- **Instructed recitation sessions for six semesters of organic chemistry and one semester of general**

chemistry laboratory courses. Four semesters experience instructing help sessions five times a week to

supplement a lecture course.

- Assisted in the development, implementation, and publication of a combinatorial chemistry laboratory experiment for the second semester organic chemistry laboratory course.

Professional and Academic Association Membership (current):

American Chemical Society, Member 1994-present

Golden Key National Honor Society, Member

Kappa Mu Epsilon (Mathematics Honor Society), Member

Research Interests & Experience

Texas A&M University at Commerce, Commerce, TX

I have two main research interests.

1. The molecular recognition of anions of synthetic, biological, biomedical and environmental interest. I aim to develop synthetic anion receptors that will find use in environmental remediation efforts or in sensor design. I also aim to design anion receptors that serve as organocatalysts and therapeutic agents.
2. The development of new supramolecular synthons. I am working to better characterize the halogen-bonding non-bonded interaction. I aim to utilize this interaction for crystal engineering, sensor design, environmental remediation and molecular recognition applications.

The Scripps Research Institute, La Jolla, CA

Postdoctoral Research Assistant (September 1998-August 2000)

Research Advisor: Julius Rebek, Jr.

- Synthesized and characterized phthalocyanine compounds designed to self-assemble as discrete dimers. Investigated their molecular recognition properties.
- Synthesized novel porphyrin-resorcinarene hybrids for molecular recognition, catalysis and energy transfer applications.

Texas Tech University, Lubbock, TX

Graduate Research Assistant (May 1993-1998)

Research Advisor: Allan D. Headley

- Initiated a project for the asymmetric synthesis of conformationally constrained cysteine analogs.
- Analyzed the conformational potential energy surface of unnatural amino acids as a function of their

substituents using *ab initio* techniques.

- Synthesized unnatural amino acids and examined their tautomerism, conformation, and aggregation in solution using spectroscopic techniques.

Awards, Honors, & Scholarship

- Texas A&M University-Commerce, Student Recognition Award for Teaching Excellence, Spring 2012
- Paul W. Barrus Distinguished Faculty Award for Teaching, Texas A&M University-Commerce, 2012
- **Donald C. Roush Excellence in Teaching Award, New Mexico State University, 2004**
- Patricia Christmore Faculty Teaching Award, New Mexico State University, 2003-2004
- **Song Prize, award for best dissertation, Texas Tech University, 1998**
- **Outstanding Doctoral Teaching Assistant Award, Texas Tech, 1996-1997**
- Top Graduate in Chemistry, 1993, Texas Tech University

Committee Service

TAMU-C (2005 – present)

Chemistry Department Head Search Committee (Fall 2005 – Spring 2006)
Analytical Chemistry Faculty Search Committee (Fall 2006 -Spring 2007)
Chair, Chemistry Faculty Search (Fall 2007 – Spring 2008)
Education Destination Committee (Fall 2007)
Coordinating committee Pathways 2008 symposium (Spring 2008-Fall 2008)
Strategic Enrollment Management Committee (Fall 2008 – Spring 2009)
Chair, Chemistry Faculty Search (Spring 2009)-search cancelled

Faculty Senate (Fall 2007 – present), Chair of Undergraduate Recruitment and Retention Committee, member of the Executive Committee Fall 2011-present.
Pre-professional Committee (Fall 2008 – present)
Greater Texas Foundation Proposal Committee, Spring 2008 (proposal aimed at acquiring a Master's of Science Education program for middle school teachers), $3 million dollar proposal. Meetings to discuss proposal ideas / direction.
Chemistry department scholarship committee (Fall 2010 – present)
Recycling Committee, (Fall 2010 – present)
Athletic Council, (Fall 2010 – present)
Chair, Lab coordinator/ Instructor search committee (Spring 2012)
Inorganic faculty search, committee member (Spring 2012)
Academic Life subcommittee of the Faculty Senate (Fall 2012 – present)
University Studies Committee (Fall 2012 – present)

Service

TAMU-C (2005 – present)

Support of research initiatives for students outside of TAMU-C

1. Participated in the ACS SEED program as a research mentor summer 2006 and 2007.
2. Mentor for students in the REU program at TAMU-C, summer 2006, 2007, 2008, 2009, 2010, 2011.
3. Co-PI on NSF CCLI grant which involves chemistry professional development activities for area community college students in chemistry. Fall 2009 – 2012.
4. Undergraduate academic advisor (Fall 2008 – Spring 2011).
5. Graduate advisor (Fall 2011 – present).

Research Students Trained

High School (3) : Chelsea Childers, Samuel Franklin, Carlos Kee
Undergraduate (52): Zak Nixon, Shiloh Free, Amulya Yadlapalli, Kellen Carroll, Alexandra von Ausdall, Sandy Lomeli, Johnathan Bailey, Patrick Roberts, Kyle Fort, Carlos Kee, Colleen Favaro, Anna Vladimirova, Marc Vaz, Chaz Cardenas, Hikma Jemal, Aisha Hassan, Mae Frankson, Sharin Vora, Jeffrey Sun, Solomon Bortey, Eli Hunt, Ramesh Bhattarai, Megan Hubbard, Colt Smithson, Rakesh Doshetty, Carlos Tovias, Christina Castle, Khoa Nguyen, Andy Nguyen, Ava Karimi, Khanh Truong, Ryan Moffitt, Spencer Guess, Tyler Henderson, Will Liam, Olga Martinez, Ryan Hinson, Aaron D. Key, Brandi L. Kennard, Caramy Spencer, Charles J. Nam, Devin S. McCune, Dorian T. McCradic, Jacob A. Cranfield, James M. Rogers, Janet M. Varela, Jared Shugart, John M. Pollock, Katrina M. Schoenfeld, Mehul J. Rathod, Syeda M. Rizvi, Vanessa M. Jackson
Graduate (14): Joey Ramos, Lakshmi Koya, Prathima Kavuri, Himajarani Surapaneni, Anusha Bommidi, Anvesh Dasari, Karthik Akinapelli, Lin Chen, MingHsun Yang, Vijay Nandipati, Xiaowen Wu, Elvis Boaten, Anupama Singh, Sirisha Makineni
High School Teachers (1): Helen Wilson

Funding

TAMU-C (2005 – present)
Proposals Funded
External (PI)

1. American Chemical Society Project SEED, which funds stipends for under-privileged high school students for summer research experience, $7,963.00 for 7 students (only 5 students were accepted into the program), summer 2006.
2. Project SEED, American Chemical Society, Spring 2007, funded $7500.00, accepted $4500.00. I provided one research project for this grant. Drs. Jang and Whaley also provided a project.
3. I was the project director on a grant titled Operation Spark (three years, January 1, 2006 – December 31, 2008), $192,941.00 direct costs.
4. ACS Project SEED, submitted February 4, 2008. Funded, $3,750.00 (3 students) but not accepted because matching funds were not obtained and faculty were not in position to receive students.

Internal (PI)

5. 2006-2007 TAMU-C Faculty Research Enhancement Grant, $6,666.00, September 1, 2006 – August 31, 2007.
6. 2008-2009 TAMU-C Faculty Research Enhancement Grant, funded, $7,320.00, September 1, 2008 – August 31, 2009.
7. Helped a graduate students of mine obtain summer RA support. Joey Ramos, 2008 Summer RA Support for a graduate student, submitted March 3, 2008 to TAMU-C graduate school. "Synthesis and study of a porphyrin-based receptor for nitrate and carbonate," $4,000.00
8. Travel support request, Dean's Teaching Initiative, POGIL 3-day workshop at Linfield College, Oregon, June 20-22, 2008. $500.00 submitted March 14, 2008.
9. Helped a graduate students of mine obtain summer RA support. MingHsun Yang, summer 2011 RA support from graduate school, "The Synthesis of Chiral Organocatalysts for Asymmetric Reactions," $4000.00.
10. Faculty Development Grant, $700.00, to attend Chirality 2012 conference and 244th National ACS meeting in Philadelphia, PA. Funded Spring 2012.
11. Helped a graduate students of mine obtain summer RA support, Submitted March 19, 2012, for Anupama Singh Balaji, $4000.00, "Structural Studies of Chiral Host-Guest Complexes and Second Generation Receptors."

External (Co-PI)

12. I contributed a project to the National Science Foundation REU proposal (Research Experience for Undergraduate Students), which received funding (Summer 2006-Summer 2008).
13. Co-PI, NSF-MRI: Acquisition of a IM-Q-TOF Mass Spectrometer. Proposal number 0821247, submitted Jan. 24, 2008, awarded 8/15/08, $342, 014.
14. NSF-CCLI, Proposal Number: 0837526, Proposal Title: Achieving Student Mastery of Chromatographic and Spectroscopic Methods in Organic Chemistry through a University/Community-College Partnership, Principal Investigator: Ben Jang, Co-PI (s): Stephen Starnes, William Whaley. This award is effective June 1, 2009 and expires May 31, 2012. $193,011.

This project involves bringing community college students onto the TAMU-C campus to do four research-based experiments with these students throughout an academic year with a goal of stimulating these students interest in pursuing a career in chemistry.

15. NSF-REU: Research Experience for 2-year College Undergraduates in Chemistry at Texas A&M University-Commerce, $266,037, 3/15/09-2/28/12, PI: Ben Jang, Co-PI: Stephen Starnes.
16. NSF DUE-1136295, "Building the Capacity of STEM Teacher Preparation at Texas A&M University-Commerce," PI: Ben Jang, Co-PI Stephen Starnes, Co-PI Thomas Faulkenberry, $174,020, September 1, 2011 - August 31, 2013.

This project involves the development of new courses to better prepare students for a career as a high school chemistry teacher. Part of the program includes a summer camp at TAMU-C for community college and high school chemistry students to foster their interest in teaching.

Proposals Not Funded

External (PI)

1. The Welch Foundation, Proposal title: "Chiral Porphyrins", $100,000.00, submitted January 2011.
2. The Welch Foundation, Proposal title: "Porphyrins with Introverted Functionality", $150,000.00, submitted January 2012.
3. NSF-RUI, PI. "RUI: Click Chiral Porphyrins: Receptors for Chiral Anions and Amines," submitted November 2011, $244,638.

Internal (PI)

4. College of Arts and Sciences – summer research support for Anna Vladimirova, an undergraduate research student in my lab. "Synthesis and study of a porphyrin-based receptor for chiral anions", $1,000.00, Summer 2008.
5. College of Arts and Sciences – summer research support for Kyle Fort, an undergraduate research student in my lab. "Synthesis and study of a receptor for environmentally important anions," $1,000.00, Summer 2008.
6. Faculty Research Enhancement Proposal, Title: Chiral Porphyrins: The Recognition of Chiral Guests, $13,015.00, submitted February 21, 2011.

External (Co-PI)

7. NSF-CCLI, Proposal Number: 0633739, Proposal Title: Achieving Student Mastery of Chromatographic and Spectroscopic Methods in Organic and Biological Chemistry through a University/Community-College Partnership, Received by NSF: 05/10/06, $199,991 Principal Investigator: William Whaley, Co-PI: Stephen Starnes.
8. NSF-CCLI, Proposal Number: 0737416, Proposal Title: Achieving Student Mastery of Chromatographic and Spectroscopic Methods in Organic and Biological Chemistry through a University/Community-College Partnership, Received by NSF: 05/09/07, $199,965 Principal Investigator: William Whaley, Co-PI: Stephen Starnes.
9. NSF-MRI, Co-PI. PI: Anil Chourasia and Ben Jang. Proposal to obtain an XRD (x-ray crystallography), submitted January 2010. Proposal title: Acquisition of an X-ray Diffrractometer. $310,000.00.
10. NSF-MRI, PI: Anil Chourasia and Ben Jang. Co-PI Stephen Starnes. Proposal title: "MRI: Acquisition of an X-ray Diffractometer," submitted January 2011, $310,000.00.
11. NSF-DGE: Science Master's Program in Chemical Business (SMP-Chemical Business), submitted 11-20-09, $693,642. PI: Ben Jang, CoPI: Stephen Starnes
12. NSF-REU, CoPI, "Research Experience for 2-Year Undergraduates in Chemistry at Texas A&M University- Commerce," $302,250, Submitted August 2011.

13. NSF-TUES, CoPI, "University/Community College Partnerships: Engaging Community College Organic Chemistry Students in Instrumentation and Research-based Laboratories to Impact Their Career Choices," $497,108, submitted January 2012.

Presentations

TAMU-C (2005 – present)

1. "Shape Selective Anion Recognition by Metalloporphyrin Hosts," 63rd Southwestern Regional Meeting of the American Chemical Society, November 4-7, 2007, Lubbock, TX.
2. **"**Anion Recognition by Meso- and β-Functionalized Metalloporphyrin Hosts," 3rd Joint International Symposium of Macrocyclic and Supramolecular Chemistry, Las Vegas, Nevada, July 13-18, 2008.
3. "Texas A&M University-Commerce/Community College Partnerships: Engaging Community College Organic Chemistry Students in Instrumentation and Research based Laboratories to Impact Their Career Choices," Stephen D. Starnes, Bukuo Ni, Ben Jang, Larry Brough, Fred Jury, 67th Southwest Regional Meeting of the American Chemical Society, Austin TX, November 9-12, 2011.
4. "Click Chiral Porphyrins," Stephen D. Starnes, 67th Southwest Regional Meeting of the American Chemical Society, Austin TX, November 9-12, 2011.
5. Stephen D. Starnes "Click Porphyrins: Hosts for Chiral and Non-Chiral Guests," Texas A&M-Commerce Annual Research Symposium, April 5, 2012.
6. Stephen D. Starnes "Click Chiral Porphyrins: Hosts with Introverted Functionality," The 24th International Conference on Chirality (Chirality 2012), Fort Worth, Texas, June 10-13, 2012.
7. Stephen D. Starnes "Porphyrins with Introverted Functionality: Hosts for Chiral and Non-chiral guests," 244th National Meeting of the American Chemical Society, Philadelphia, PA, August 19-23, 2012.
8. Stephen D. Starnes "A university/community college collaboration in professional development experiences and sequential research-based laboratories to engage community college organic chemistry students," 244th National Meeting of the American Chemical Society, Philadelphia, PA, August 19-23, 2012.

Invited Lectures

TAMU-C (2005 – present)

1. "Click Porphyrins: Hosts for Chiral and Non-Chiral Guests", presented to Department of Chemistry, Texas Christian University, January 24, 2012.
2. "Click Porphyrins: Hosts for Chiral and Non-Chiral Guests", presented to Department of Chemistry, Southern Methodist University, January 27, 2012.
3. "Click Porphyrins: Hosts for Chiral and Non-Chiral Guests", presented to Department of Chemistry, Texas Wesleyan University, February 10, 2012.
4. "Click Porphyrins: Hosts for Chiral and Non-Chiral Guests", presented to Department of Chemistry, University of Texas at Dallas, March 2, 2012.
5. "Click Porphyrins: Hosts for Chiral and Non-Chiral Guests", presented to Department of Chemistry and Biochemistry, Texas Tech University, April 4, 2012.
6. "Porphyrin Hosts for Chiral and Non-Chiral Guests", presented to Department of Chemistry and Physics, LeTourneau University, November 15, 2012.

Meetings, Conferences and Workshops Attended

TAMU-C (2005 – present)

1. NSF Workshop "NSF Day at UTD", UT-Dallas, September 15, 2005.
2. 57th Southeast / 61st Southwest Joint Regional Meeting of the American Chemical Society, Memphis, TN, November 1–4, 2005
3. 62nd Southwest Regional Meeting of the American Chemical Society, Houston, TX, October 19-22, 2006.
4. 5th Annual Pathways to the Doctorate Student Research Symposium, November 2-3, 2007, Tarleton State University, Stephenville, TX.
5. 63rd Southwestern Regional Meeting of the American Chemical Society, November 4-7, 2007, Lubbock, TX.
6. 3rd Joint International Symposium of Macrocyclic and Supramolecular Chemistry, Las Vegas, Nevada, July 13-18, 2008
7. 64th Southwestern Regional Meeting of the American Chemical Society, October 1-4, 2008, Little Rock, Arkansas, oral presentation.
8. TAMU Junior Faculty Workshop, Texas A&M University Commerce, November 6-7, 2008.
9. Freshman Success Seminar, Texas A&M-Commerce, May 2, 2008.
10. POGIL Instructional Methods 3-Day Workshop. Linfield College (McMinnville, OR) June 20-22, 2008.
11. 6th Annual Pathways to the Doctorate Student Research Symposium, November 7-8, 2008, Texas A&M-Commerce, Commerce, Texas.
12. College & Career Readiness Faculty Collaborative Science Symposium, February 28, 2009, Omni Corpus Christi Hotel Marina Tower, Corpus Christi, Texas
13. The Texas A&M University System 8th Annual Pathways Student Research Symposium, West Texas A&M, Canyon, Texas, October 22-23, 2010.
14. TAMU-C Junior Faculty Workshop, November 10, 2010.
15. 62nd Southeastern / 66th Southwest Regional Meeting of the American Chemical Society in New Orleans, LA November 30-December 4, 2010.
16. Master's And Specialist Advisors' Roundtable, April 14, 2011-- noon through 1:30
    Masters' and Specialist Thesis Roundtable, April 14, 2011--1:45-3:00 p.m.
17. Master's And Specialist Advisors' Roundtable, October 19, 2011-- noon through 1:30
    Masters' and Specialist Thesis Roundtable, October 19, 2011--1:45-3:00 p.m.
18. 67th Southwest Regional Meeting of the American Chemical Society, Austin TX, November 9-12, 2011.
19. The Texas A&M University System 9th Annual Pathways Student Research Symposium, Texas A&M University, College Station, Texas, November 11, 2011.
20. Stephen D. Starnes "Click Porphyrins: Hosts for Chiral and Non-Chiral Guests," Texas A&M-Commerce Annual Research Symposium, April 5, 2012.
21. Stephen D. Starnes , The 24th International Conference on Chirality (Chirality 2012), Fort Worth, Texas, June 10-13, 2012.
22. Stephen D. Starnes, 244th National Meeting of the American Chemical Society, Philadelphia, PA, August 19-23, 2012.

Grant Panel Review Work

1. NSF-CCLI grant review committee, Washington D.C., July 12-14 2009.
2. NSF-SSTEM Scholarships committee, Washington D.C., November 4-6 2009.
3.

Editorial Work

Editor, Chem Gems and Joules column for *The Southwest Retort*: Wrote a monthly column for *The Southwest Retort*, a publication serving part of the Texas chemical community. Fall 2005-Spring 2006.

Publications

TAMU-C (2005 – present)

1. Whaley, W. L.; Rummel, J. D.; Zemenu, E.; Li, W.; Yang, P.; Rodgers, B. C.; Bailey, J.; Moody, C. L.; Huhman, D. V.; Maier, C. G.-A.; Sumner, L. W.; Starnes, S. D.. Isolation and characterization of osajin and pomiferin: Discovery laboratory exercises for organic chemistry. *Chemical Educator*, **2007**, 12(3), 179-184.
2. MariJo Wienkers, Josmalen Ramos, Hikma Jemal, Chaz Cardenas, Paul Wiget, Alfreda Nelson, Shiloh Free, Jun Wu, Rebecca Roach, Marius Vulcan, Kristopher Waynant, Kyle Fort, Anna Vladimirova, Jeffery Sun, Samuel Eli Hunt, Dmitry M. Rudkevich, Stephen D. Starnes "Enhanced Shape-Selective Recognition of Anion Guests through Complexation- Induced Organization of Porphyrin Hosts," *Org. Letters*, **2012**, 14, 6, 1370-1373.
3. Wu, Xiaowen; Starnes, Stephen D. "L-Nipecotic Acid-Porphyrin Derivative: A Chiral Host with Introverted Functionality for Chiral Recognition," *Org. Letters,* **2012**, 14, 14, 3652-3655.

Full publication list

1. Headley, A. D.; McMurry, M. E.; Starnes, S. D. "Effects of Substituents on the Acidity of Acetic Acids," *J. Org. Chem.* **1994**, 59, 7, 1863-1866.
2. Headley, A. D.; Starnes, S. D.; Wilson, L. Y.; Famini, G. R. "Analysis of Solute/Solvent Interactions for the Acidity of Acetic Acids by Theoretical Descriptors," *J. Org. Chem.,* **1994**, 59, 26, 8040-8046.
3. Headley, A. D.; Starnes, S. D.; Cheung, E. T.; Malone, P. L. "Solvation Effects on the Relative Basicity of Propylamines," *J. Phys. Org. Chem.,* **1995**, 8, 1, 26-30.
4. Headley, A. D.; Starnes, S. D. "The Effects of Branching on the Tautomeric Equilibrium of Amino Acids," *J. Am. Chem. Soc.,* **1995**, 117, 36, 9309-9313.
5. Headley, A. D.; Starnes, S. D. "Conformational Analysis of N-Methylglycine and N,N-Dimethylglycine by *ab Initio* Calculations," *J. Mol. Struct.* (THEOCHEM) **1996**, 370, 2-3, 147-155.
6. Headley, A. D.; Starnes, S. D. "Conformational Analysis of Amino Acid Tautomers," *Trends Org. Chem.*, **1998**, 7, 75-84.
7. Headley, A. D.; Starnes, S. D. "Theoretical Studies of the Gas Phase Tautomerization of N,N-Dimethylglycine," *J. Mol. Struct.* (THEOCHEM) **1998**, 453, 247-253.
8. Headley, A. D.; Starnes, S. D. "Theoretical Studies of the Gas Phase Tautomerization of Sarcosine," *J. Mol. Struct.* (THEOCHEM) **1999**, 467, 2, 95-101.
9. Headley, A. D.; Starnes, S. D. "Association of *p*-Toluyldimethylglycine in Water," *J. Phys. Org. Chem.* **1999**, 12, 290-292.
10. Birney, D. M.; Starnes, S. D. "Parallel Combinatorial Esterification: A Simple Experiment for Use in the Second Semester Organic Chemistry Laboratory," *J. Chem. Ed.*, **1999**, 76, 11, 1560-1561.
11. Starnes, S. D.; Rudkevich, D. M.; Rebek, J., Jr. "A Cavitand-Porphyrin Hybrid," *Org. Lett.* **2000**, 2, 14, 1995-1998.

12. Lützen, A.; Starnes, S. D.; Rudkevich, D.; Rebek, J., Jr. "A Self-Assembled Phthalocyanine Dimer," *Tetrahedron Lett*., **2000**, 41, 20, 3777-3780.
13. Headley, A. D.; Starnes, S. D. "Ab Initio Study of Anomeric Effect in 2,2-Difluoroglycine," *J. Mol. Struct.* (THEOCHEM) **2000**, 507, 281-287.
14. Headley, A. D.; Starnes, S. D. "Theoretical Analysis of Fluoroglycine Conformers," *J. Comput. Chem.*, **2000**, 21, 6, 426-431.
15. Starnes, S. D.; Rudkevich, D. M.; Rebek, J. Jr. "Cavitand-Porphyrins," *J. Am. Chem. Soc.* **2001**, 123, 4659-4669.
16. Headley, A. D.; Starnes, S. D., "Conformational Analysis of α-Trifluoroalanine: A Theoretical Study," *J. Mol. Struct.* (THEOCHEM) **2001**, 572, 1-3, 89-95.
17. Starnes, S. D.; Arungundram, S.; Saunders, C. H. "Anion Sensors Based on β,β'-Disubstituted Porphyrin Derivatives," *Tetrahedron Lett.* **2002**, 43, 7785-7788.
18. Starnes, S. D.; Birney, D. M. " Parallel Combinatorial Esterification: An Experiment for the Second Semester Organic Chemistry Laboratory", accepted, Chemical Education Resources: Modular Laboratory Program in Chemistry.
19. Whaley, W. L.; Rummel, J. D.; Zemenu, E.; Li, W.; Yang, P.; Rodgers, B. C.; Bailey, J.; Moody, C. L.; Huhman, D. V.; Maier, C. G.-A.; Sumner, L. W.; Starnes, S. D.. Isolation and characterization of osajin and pomiferin: Discovery laboratory exercises for organic chemistry. *Chemical Educator*, **2007**, 12(3), 179-184.
20. MariJo Wienkers, Josmalen Ramos, Hikma Jemal, Chaz Cardenas, Paul Wiget, Alfreda Nelson, Shiloh Free, Jun Wu, Rebecca Roach, Marius Vulcan, Kristopher Waynant, Kyle Fort, Anna Vladimirova, Jeffery Sun, Samuel Eli Hunt, Dmitry M. Rudkevich, Stephen D. Starnes "Enhanced Shape-Selective Recognition of Anion Guests through Complexation- Induced Organization of Porphyrin Hosts," *Org. Letters*, **2012**, 14, 6, 1370-1373.
21. Wu, Xiaowen; Starnes, Stephen D. "L-Nipecotic Acid-Porphyrin Derivative: A Chiral Host with Introverted Functionality for Chiral Recognition," *Org. Letters,* **2012**, 14, 14, 3652-3655.

Advisory Work

Undergraduate Honors Thesis

Chair:

1. Jeffery Sun, defended Honors Thesis April 27, 2012. Highest Honors. Thesis title: "The Synthesis and Recognition Properties of Zn-Tetraphenylporphyrin: (1S,2S)-1,2-Diaminocyclohexane Sulfonamide Derivative."
2. James Rogers, anticipated graduation and thesis defense May 2014.

Non-chair:

1. Jeremiah Secrest, Honors Thesis Committee, Thesis defense April 27, 2011.
2. Mary Mason, Honors Thesis Proposal defense, spring 2011.

Masters Theses Directed

TAMU-C (2005 – present)

1. Josmalen Ramos, "Synthesis and Characterization of Face-To-Face Porphyrin in Anion Recognition, " summer 2009.
2. Lakshmi Koya, "Porphyrin-Proline Hybrids: Hosts for Chiral Guest Recognition," November 3, 2011.
3. Himajarani Surapaneni, "4-Hydroxy proline-porphyrin hybrids: chiral porphyrins for anion recognition", November 4, 2011.

4. Prathima Kavuri, "1,2-Diamine and 1,2-Amine Alcohol-Porphyrin Hybrids: Chiral Recognition for Anion Recognition," March 30, 2012.
5. Lin Chen, "Chiral Nitrogen Heterocyclic Porphyrin Compounds for Chiral Recognition," August 2012.
6. Karthik Akinapelli, "Synthesis of Chiral Porphyrins and Structural Studies of their Host:Guest Complexes," September 14, 2012.
7. Vijay Nandipati, "3-Aminopyrrolidine-Porphyrin Receptors: Chiral Porphyrins for Anion Recognition," Masters candidate, defended October 19, 2012.
8. Anusha Bomiddi, "Synthesis and Study of Enhanced Shape Selective Anion Hosts," Masters candidate, defended October 24, 2012.
9. MingHsun Yang, "Proline Sulfonamide-Porphyrin Derivatives: ^{19}F-NMR and UV Detection of Chiral Recognition for Anions and Amines," Masters candidate, defended November 1, 2012.

Non-Thesis, Chair:

1. Chem 595 advisor for Mr. Cody Wommack, Fall 2006.
2. Chem 595 (Research Literature and Techniques) advisor for Mr. Angus Evans, *Ionic Liquids,* Spring 2006.
3. Chem 595 (Research Literature and Techniques) advisor for Mrs. Helen Wilson, *"Porphyrins: Structure, Properties, and Applications in Medicine, Research, Catalysis, Sensing, and Chiral Recognition,"* Summer 2012.

Masters Theses Committee Work

TAMU-C (2005 – present)

1. Jeremy Rummel, Department of Chemistry, Texas A&M-Commerce, defended August 2005.
2. Pei Yang, Department of Chemistry, Texas A&M-Commerce, defended August 2005.
3. Chalita Ratanatawanate, Chemistry, Masters candidate, defended summer 2005.
4. Satish Garre, Masters candidate, defended Fall 2007.
5. Joseph Harvey, Masters candidate, defended Spring 2008.
6. Seraj Albanoon, Masters candidate, defended Spring 2008.
7. Margie Garcia-Steiner Dissertation Proposal Defense, October 24, 2008, Graduate School Representative
8. Adelene Martell Cheatham, Masters candidate, defended Spring 2008.
9. Brandon Utley, Masters candidate, defended summer 2009.
10. Hsin-Yi Tsai, Masters candidate, defended summer 2009.
11. Zilong Zheng – Masters candidate, defended Spring 2010.
12. Subrata Ghosh – Masters candidate, defended June 16, 2010.
13. Dhruba Sarkar – Masters candidate, defended June 16, 2010.
14. Qianying Zhang - Masters candidate, defended June 23, 2010.
15. Stephen Dahlem, Masters candidate, defended Spring 2010.
16. Tianran Shi, Masters candidate, defended October 29, 2010.
17. Nicole Rech, Masters candidate, defended November 17, 2010.
18. Sriram Kundoor, Masters candidate, defended October 27, 2011.
19. Archana Gujjari, Masters candidate, defended March 22, 2012.
20. Porntip Leeprapaiwong, Masters candidate, defended March 26, 2012.
21. SriLakshmi Injeti, Masters candidate, defended October 25, 2012.
22. Kiran Nalla Masters candidate, defended October 26, 2012.

Student Abstracts – Poster and Oral Presentations
(presenter in bold, graduate student*, undergraduate)

Presentations at local, regional, and national scientific conferences by students of Dr. Starnes' research group.

TAMU-C (2005 – present)

1. Free, S., **Ramos, J**.*, Carroll, K., Wienkers, M.*, Farrow, M., Roach, R., Nelson, A., Vulcan, M.*, Rudkevich, D., Starnes, S. D. "The Synthesis and Anion Recognition Properties of Meso-Functionalized Metalloporphyrins," 62nd Southwest Regional Meeting of the American Chemical Society, Houston, TX, October 19-22, 2006.
2. Bailey, Johnathan; **Fort, Kyle**; Starnes, Stephen "The Synthesis and Chiral Anion Recognition Properties of a Metalloporphyrin Host," 5th Annual Pathways to the Doctorate Student Research Symposium, November 2-3, 2007, Tarleton State University, Stephenville, TX.
3. **Kee, Carlos**; Foley, Meredith; Smith, Bradley; Starnes, Stephen "Fluorescence Sensing of Anion Binding to a β, β-substituted Porphyrin Host," 5th Annual Pathways to the Doctorate Student Research Symposium, November 2-3, 2007, Tarleton State University, Stephenville, TX.
4. Roberts, Patrick; **von Ausdall, Alexandra**; Starnes, Stephen "Anion Recognition Properties of a Quartenary Ammonium Appended Metalloporphyrin Host," 5th Annual Pathways to the Doctorate Student Research Symposium, November 2-3, 2007, Tarleton State University, Stephenville, TX.
5. **Ramos, Joey***; Free, Shiloh; Wienkers, MariJo*; Wu, Jun; Wiget, Paul; Nelson Alfreda; Roach, Rebecca; Vulcan, Marius*; Waynant, Kristopher*; Carroll, Kellen; Rudkevich, Dmitry M; Starnes, Stephen "Shape Selective Anion Recognition by Metalloporphyrin Hosts," 5th Annual Pathways to the Doctorate Student Research Symposium, November 2-3, 2007, Tarleton State University, Stephenville, TX.
6. Bailey, Johnathan; **Fort, Kyle**; Starnes, Stephen "The Synthesis and Chiral Anion Recognition Properties of a Metalloporphyrin Host," 63rd Southwestern Regional Meeting of the American Chemical Society, November 4-7, 2007, Lubbock, TX.
7. **Kee, Carlos**; Foley, Meredith; Smith, Bradley; Starnes, Stephen "Fluorescence Sensing of Anion Binding to a β, β-substituted Porphyrin Host," 63rd Southwestern Regional Meeting of the American Chemical Society, November 4-7, 2007, Lubbock, TX.
8. Roberts, Patrick; **von Ausdall, Alexandra**; Starnes, Stephen "Anion Recognition Properties of a Quartenary Ammonium Appended Metalloporphyrin Host," 63rd Southwestern Regional Meeting of the American Chemical Society, November 4-7, 2007, Lubbock, TX.
9. **Josmalen Ramos***, Shiloh Free, MariJo Wienkers*, Jun Wu, Paul Wiget, Alfreda Nelson, Rebecca Roach, Marius Vulcan*, Kristopher Waynant*, Kellen Carroll, Dmitry M. Rudkevich, and Stephen D. Starnes "Shape Selective Anion Recognition by Metalloporphyrin Hosts," Dallas - Fort Worth Section of the American Chemical Society 41st Annual "Meeting-in-Miniature", April 19, 2008, Southern Methodist University, Dallas Texas.
10. **Josmalen Ramos***; Kyle Fort; Anna Vladimirova; Alexandra von Ausdall; Shiloh Free; Johnathan Bailey; Kellen Carroll; MariJo Wienkers*; Jun Wu; Paul Wiget; Alfreda Nelson; Rebecca Roach; Marius Vulcan*; Kristopher Waynant*; Maribel Farrow; Dmitry M. Rudkevich; Stephen D. Starnes "Anion Recognition by Meso- and β-Functionalized Metalloporphyrin Hosts," Annual Research Symposium 2008, TAMU-C, April 24, 2008.
11. **Ramos, Joey***; Starnes, Stephen "Anion Recognition Properties of a Bis-Metalloporphyrin Host," 64th Southwestern Regional Meeting of the American Chemical Society, October 1-4, 2008, Little Rock, Arkansas, oral presentation.

12. **Bailey, Johnathan**; Vladimirova, Anna; Starnes, Stephen "The Synthesis and Chiral Anion Recognition Properties of a Chiral Bis-Urea Metalloporphyrin Host," 64th Southwestern Regional Meeting of the American Chemical Society, October 1-4, 2008, Little Rock, Arkansas.
13. **Cardenas, Chaz**; Starnes, Stephen "Anion Recognition Properties of a Quartenary Ammonium Appended Metalloporphyrin Host," 64th Southwestern Regional Meeting of the American Chemical Society, October 1-4, 2008, Little Rock, Arkansas.
14. **Jemal, Hikma;** Starnes, Stephen, "Anion Recognition Properties of a Meso-Sulfonamide/urea Pair Functionalized Porphyrin Receptor," 64th Southwestern Regional Meeting of the American Chemical Society, October 1-4, 2008, Little Rock, Arkansas.
15. Ramos, Joey*; **Fort, Kyle; Vladimirova, Anna**; Cardenas, Chaz; Jemal, Hikma; Free, Shiloh; Wienkers, MariJo*; Wu, Jun; Wiget, Paul; Nelson Alfreda; Roach, Rebecca; Vulcan, Marius*; Waynant, Kristopher*; Carroll, Kellen; Rudkevich, Dmitry M; Starnes, Stephen "Shape Selective Anion Recognition by Metalloporphyrin Hosts," 64th Southwestern Regional Meeting of the American Chemical Society, October 1-4, 2008, Little Rock, Arkansas.
16. **Ramos, Joey***; Starnes, Stephen "Anion Recognition Properties of a Bis-Metalloporphyrin Host," 6th Annual Pathways to the Doctorate Student Research Symposium, November 7-8, 2008, Texas A&M-Commerce, Commerce, Texas.
17. **Bailey, Johnathan**; Vladimirova, Anna; Starnes, Stephen "The Synthesis and Chiral Anion Recognition Properties of a Chiral Bis-Urea Metalloporphyrin Host," 6th Annual Pathways to the Doctorate Student Research Symposium, November 7-8, 2008, Texas A&M-Commerce, Commerce, Texas.
18. **Cardenas, Chaz**; Starnes, Stephen "Anion Recognition Properties of a Quartenary Ammonium Appended Metalloporphyrin Host," 6th Annual Pathways to the Doctorate Student Research Symposium, November 7-8, 2008, Texas A&M-Commerce, Commerce, Texas.
19. **Jemal, Hikma;** Starnes, Stephen, "Anion Recognition Properties of a Meso-Sulfonamide/urea Pair Functionalized Porphyrin Receptor," 6th Annual Pathways to the Doctorate Student Research Symposium, November 7-8, 2008, Texas A&M-Commerce, Commerce, Texas.
20. Ramos, Joey*; **Fort, Kyle**; **Vladimirova, Anna**; Cardenas, Chaz; Jemal, Hikma; Free, Shiloh; Wienkers, MariJo*; Wu, Jun; Wiget, Paul; Nelson Alfreda; Roach, Rebecca; Vulcan, Marius*; Waynant, Kristopher*; Carroll, Kellen; Rudkevich, Dmitry M; Starnes, Stephen "Shape Selective Anion Recognition by Metalloporphyrin Hosts," 6th Annual Pathways to the Doctorate Student Research Symposium, November 7-8, 2008, Texas A&M-Commerce, Commerce, Texas.
21. **Vaz, Marc**; Waynant, Kris; Starnes, Stephen "Anion Recognition Properties of TREN Urea and Sulfonamide Derivatives and TREN's CH Analog," 6th Annual Pathways to the Doctorate Student Research Symposium, November 7-8, 2008, Texas A&M-Commerce, Commerce, Texas.
22. **Ramos, Joey***; Starnes, Stephen "Synthesis and Characterization of Novel Face-to-Face Porphyrin," 65th Southwestern Regional Meeting of the American Chemical Society, November 4- 6, 2009, El Paso, Texas, oral presentation.
23. **Bailey, Johnathan**; Vladimirova, Anna; Starnes, Stephen "The Synthesis and Chiral Anion Recognition Properties of a Chiral Metalloporphyrin Host" 65th Southwestern Regional Meeting of the American Chemical Society, November 4-6, 2009, El Paso, Texas, oral presentation.

24. **Cardenas, Chaz**; Starnes, Stephen "Anion Recognition Properties of Metalloporphyrin Hosts Appended with Urea and Quartenary Ammonium Side-Arms" 65th Southwestern Regional Meeting of the American Chemical Society, November 4-6, 2009, El Paso, Texas, oral presentation.
25. Jemal, Hikma; **Hunt, Samual Eli**; Starnes, Stephen, "Anion Recognition Properties of a Chiral Amino Acid Appended Porphyrin" 65th Southwestern Regional Meeting of the American Chemical Society, November 4-6, 2009, El Paso, Texas, oral presentation.
26. **Jemal, Hikma**; Hunt, Samual Eli; Starnes, Stephen, "Anion Recognition Properties of a Chiral Amino Acid Appended Porphyrin" 7th Annual Pathways to the Doctorate Student Research Symposium, November 13-14, 2009, Texas A&M-International, Laredo, Texas.
27. **Surapaneni, Himajarani***; Frankson, Mae; Starnes, Stephen "The Synthesis and Recognition Properties of Zn-TPP-L-Isoleucine Derivative." The Texas A&M University System 8th Annual Pathways Student Research Symposium, West Texas A&M, Canyon, Texas, October 22-23, 2010.
28. **Koya, Lakshmi***; Nguyen, Khoa; Starnes, Stephen "Chiral Recognition Properties of a Zn-TPP-L- Prolinamide Derivative" The Texas A&M University System 8th Annual Pathways Student Research Symposium, West Texas A&M, Canyon, Texas, October 22-23, 2010.
29. **Hunt, Eli**; Jemal, Hikma; Starnes, Stephen, "Anion Recognition Properties of a L-Phenylalanine Appended Zn-Porphyrin" The Texas A&M University System 8th Annual Pathways Student Research Symposium, West Texas A&M, Canyon, Texas, October 22-23, 2010.
30. **Sun, Jeffery**; Tovias, Carlos; Starnes, Stephen "Synthesis and Recognition Properties of Chiral Sulfonamide Zn-TPP Receptor." The Texas A&M University System 8th Annual Pathways Student Research Symposium, West Texas A&M, Canyon, Texas, October 22-23, 2010.
31. **Castle, Christina**; Starnes, Stephen "The Synthesis and Recognition Properties of two Proline-Porphyrin Hybrids with Chiral Guests" The Texas A&M University System 8th Annual Pathways Student Research Symposium, West Texas A&M, Canyon, Texas, October 22-23, 2010.
32. **Surapaneni, Himajarani***; Frankson, Mae; Starnes, Stephen "The Synthesis and Recognition Properties of a Zn-Tetraphenylporphyrin-L-Isoleucine Derivative." 62nd Southeastern / 66th Southwest Regional Meeting of the American Chemical Society in New Orleans, LA November 30-December 4, 2010.
33. **Koya, Lakshmi***; Nguyen, Khoa; Starnes, Stephen "The Synthesis and Chiral Recognition Properties of a Zn-Tetraphenylporphyrin-L-Prolinamide Derivative." 62nd Southeastern / 66th Southwest Regional Meeting of the American Chemical Society in New Orleans, LA November 30-December 4, 2010.
34. **Hunt, Eli**; Jemal, Hikma; Starnes, Stephen, "Anion Recognition Properties of a L-Phenylalanine Appended Zn-Porphyrin" 62nd Southeastern / 66th Southwest Regional Meeting of the American Chemical Society in New Orleans, LA November 30-December 4, 2010.
35. **Sun, Jeffery**; Tovias, Carlos; Starnes, Stephen "The Synthesis and Recognition Properties of a Zn-Tetraphenylporphyrin:(1R,2R)-1,2-Diaminocyclohexane Sulfonamide Derivative." 62nd Southeastern / 66th Southwest Regional Meeting of the American Chemical Society in New Orleans, LA November 30-December 4, 2010.
36. **Castle, Christina**; Starnes, Stephen "The Synthesis and Recognition Properties of two Proline-Porphyrin Hybrids with Chiral Guests" 62nd Southeastern / 66th Southwest

Regional Meeting of the American Chemical Society in New Orleans, LA November 30-December 4, 2010.

37. Guess, Spencer; Starnes, Stephen "SAMP and RAMP Porphyrin Derivatives: Chiral Anion Recognition," 67th Southwest Regional Meeting of the American Chemical Society, Austin TX, November 9-12, 2011.
38. **Truong, Khanh**; Kavuri, Prathima*; Starnes, Stephen, "Zn-Porphyrin N-Tosyl-1,2-diphenylethylene Diamine Hybrids: Chiral Anion Recognition," 67th Southwest Regional Meeting of the American Chemical Society, Austin TX, November 9-12, 2011.
39. **Kavuri, Prathima***; Sun, Jeffery; Tovias, Carlos; Truong, Khanh; Starnes, Stephen "The Synthesis and Recognition Properties of a Zn-Tetraphenylporphyrin: Chiral 1,2-Diamines and 2- Aminoalcohol Derivatives," 67th Southwest Regional Meeting of the American Chemical Society, Austin TX, November 9-12, 2011.
40. **Karimi, Ava**; Koya, Lakshmi*; Wilson, Helen*; Truong, Khanh; Starnes, Stephen "The Synthesis and Recognition Properties of Zn-Tetraphenylporphyrin: Proline derivatives," 67th Southwest Regional Meeting of the American Chemical Society, Austin TX, November 9-12, 2011.
41. **Surapaneni, Himaja***; Starnes, Stephen "The Synthesis and Recognition Properties of Zn-Tetraphenylporphyrin: 4-Hydroxy-proline Derivatives," 67th Southwest Regional Meeting of the American Chemical Society, Austin TX, November 9-12, 2011.
42. **Chen, Lin***; Starnes, Stephen "The Synthesis and Recognition Properties of Zn-Tetraphenylporphyrin: 2,2,3-Trimethyl-5-benzyl-4-imidazolidinone Derivatives," 67th Southwest Regional Meeting of the American Chemical Society, Austin TX, November 9-12, 2011.
43. von Ausdall1, Alexandra S*.; Baxter, Kim; Crittenden; Andrew; Pena, Luis; Bradley, Terrence; **Kolawole, Elizabeth**; Kennard, Brandi; **Bell, Yonwi**; Brandt, Erica, Jang, Ben, Starnes, Stephen ""Who Is Chemistry?" a Celebration of Diversity," 67th Southwest Regional Meeting of the American Chemical Society, Austin TX, November 9-12, 2011.
44. **Truong, Khanh**; Kavuri, Prathima*; Starnes, Stephen, "Zn-Porphyrin N-Tosyl-1,2-diphenylethylene Diamine Hybrids: Chiral Anion Recognition," 9th Annual Pathways Student Research Symposium, College Station, TX, November 11, 2011.
45. **Kavuri, Prathima***; Sun, Jeffery; Tovias, Carlos; Truong, Khanh; Starnes, Stephen "The Synthesis and Recognition Properties of a Zn-Tetraphenylporphyrin: Chiral 1,2-Diamines and 2- Aminoalcohol Derivatives," 9th Annual Pathways Student Research Symposium, College Station, TX, November 11, 2011.
46. **Karimi, Ava**; Koya, Lakshmi*; Wilson, Helen*; Truong, Khanh; Starnes, Stephen "The Synthesis and Recognition Properties of Zn-Tetraphenylporphyrin: Proline derivatives," 9th Annual Pathways Student Research Symposium, College Station, TX, November 11, 2011.
47. **Surapaneni, Himaja***; Starnes, Stephen "The Synthesis and Recognition Properties of Zn-Tetraphenylporphyrin: 4-Hydroxy-proline Derivatives," 9th Annual Pathways Student Research Symposium, College Station, TX, November 11, 2011.
48. **Chen, Lin***; Starnes, Stephen "The Synthesis and Recognition Properties of Zn-Tetraphenylporphyrin: 2,2,3-Trimethyl-5-benzyl-4-imidazolidinone Derivatives," 9th Annual Pathways Student Research Symposium, College Station, TX, November 11, 2011.
49. **Xiaowen Wu**,* Stephen D. Starnes "Nipecotic Acid-Porphyrin Derivatives: Chiral Anion Recognition," Texas A&M-Commerce Annual Research Symposium, April 5, 2012.

50. **Anusha Bommidi***, Stephen D. Starnes "Porphyrin Hosts for the Shape-Selective Recognition of Anion Guests," Texas A&M-Commerce Annual Research Symposium, April 5, 2012.
51. **Karthik Akinapelli***, Stephen D. Starnes "Synthesis of Chiral Porphyrins and Structural Studies of their Host:Guest Complexes," Texas A&M-Commerce Annual Research Symposium, April 5, 2012.
52. **Xiaowen Wu***, Stephen D. Starnes "Nipecotic Acid-Porphyrin Derivatives: Chiral Anion Recognition," The 24th International Conference on Chirality (Chirality 2012), Fort Worth, Texas, June 10-13, 2012.
53. **Khanh Truong**, Stephen D. Starnes "Synthesis of Chiral Porphyrins and Structural Studies of their Host:Guest Complexes," 244th National Meeting of the American Chemical Society, Philadelphia, PA, August 19-23, 2012.
54. **Karthik Akinapelli***, Stephen D. Starnes "Synthesis of Chiral Porphyrins: Stereoselective Recognition of Mandelate Isomers," North Texas Life Science Research Symposium, UNT Health Science Center, Fort Worth, TX, Nov. 3, 2012.
55. **Anusha Bommidi***, Stephen D. Starnes "Enhanced Shape-Selective Recognition of Anion Guests by Porphyrin Hosts," North Texas Life Science Research Symposium, UNT Health Science Center, Fort Worth, TX, Nov. 3, 2012.
56. **Vijay Nandipati***, Stephen D. Starnes "Chiral Pyrollidine-Porphyrin Hybrids: Prediction of Enantiopreference in Guest Binding a Priori Based on Host Design," North Texas Life Science Research Symposium, UNT Health Science Center, Fort Worth, TX, Nov. 3, 2012.
57. **Karthik Akinapelli***, Stephen D. Starnes "Synthesis of Chiral Porphyrins: Stereoselective Recognition of Mandelate Isomers," 10th Annual Pathways Student Research Symposium, Galveston, TX, November 9-10, 2012.
58. **Anusha Bommidi***, Stephen D. Starnes "Enhanced Shape-Selective Recognition of Anion Guests by Porphyrin Hosts," 10th Annual Pathways Student Research Symposium, Galveston, TX, November 9-10, 2012.
59. **Vijay Nandipati***, Stephen D. Starnes "Chiral Pyrollidine-Porphyrin Hybrids: Prediction of Enantiopreference in Guest Binding a Priori Based on Host Design," 10th Annual Pathways Student Research Symposium, Galveston, TX, November 9-10, 2012.

Awards Received by my Research Students

1. Joey Ramos, Discipline winner, graduate 2nd place in the physical sciences at the 2007 Pathways symposium (abstract 5 above).
2. Joey Ramos, 2008 Summer RA Support for a graduate student, submitted March 3, 2008 to TAMU-C graduate school. "Synthesis and study of a porphyrin-based receptor for nitrate and carbonate," $4,000.00
3. Joey Ramos, graduate 1st place overall winner in the Masters student division at the 2008 Pathways symposium (abstract 16 above).
4. Jeffery Sun, Discipline winner, undergraduate, 2nd place in the physical sciences at the 2010 Pathways symposium (abstract 30 above).
5. Jeffery Sun selected to present a poster over his research in Austin, February 14, 2011 at the Undergraduate Research Day at the Capitol: Transforming Texas Through Undergraduate Research.
6. Jeffery Sun was awarded a $500.00 research grant in the TAMU-C fall 2010 mini undergraduate research grant competition.

7. Eli Hunt was awarded a $500.00 research grant in the TAMU-C spring 2011 mini undergraduate research grant competition.
8. MingHsun Yang, summer 2011 RA support from graduate school, “The Synthesis of Chiral Organocatalysts for Asymmetric Reactions,” $4000.00
9. Xiaowen Wu, Best graduate presentation in the College of Science, Agriculture and Engineering, 2012 Annual Research Symposium, Texas A&M-University Commerce (abstract 49 above).
10. Khanh Truong was awarded a $500.00 research grant in the TAMU-C spring 2012 mini undergraduate research grant competition.
11. Khanh Truong was awarded a $500.00 travel grant in the TAMU-C spring 2012 undergraduate travel grant competition.
12. Karthik Akinapelli, 3rd place in graduate presentation in the North Texas Life Science Research Symposium, UNT Health Science Center, Fort Worth, TX, Nov. 3, 2012. (abstract 54 above).

APPENDIX B

Unfunded Proposals

Proposals submitted without funded.

1. PI, National Science Foundation – Chemistry of Life Processes. PD 09-6883, Selective Metal Ion Recognition of Methanobactin Peptides , $572,356, 2012. Laurence Angel, (PI), DongWon Choi, (Co-PI), Touradj Solouki, (Co-PI).

2. PI, The Welch Foundation – Proposal on Basic Chemical Research. Identifying DNA Sequence Recognition Factors of Zinc Fingers Using IM-MS, $150,000, 2012. Laurence Angel, (PI).

3. PI, Research Corporation for Science Advancement – Multi Investigator Cottrell College Science Award. Structural and Functional Analysis of Methanobactin Using Ion-Mobility Mass Spectrometry $150,000, 2011. Laurence Angel, (PI), DongWon Choi, (PI).

4. PI, The Welch Foundation – Proposal on Basic Chemical Research. Ion Mobility-Mass Spectrometry Studies of Protein and Peptide Complexes, $150,000, 2011. Laurence Angel, (PI).

5. 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, (PI), Derek Harter, (Co-PI), Sang Suh, (Co-PI), Laurence Angel, (Co-PI). $291,600, 2010.

6. PI, National Institute of Health – Biomarker Discovery and Validation , Challenge Topic: Comprehensive Biomolecular Mass Spectrometry. $710,000, 2009. Laurence Angel, (PI), Nenad Kostic, (PI), Frank Miskevich, (PI).

7. PI, Research Corporation for Science Advancement – Single Investigator Cottrell College Science Award. Ion Mobility-Mass Spectrometry Studies of Protein and Peptide Metal Ion Complexes $35,000, 2009. Laurence Angel, (PI).

8. PI, Texas Higher Education Coordinating Board – Norman Hackerman Advanced Research Program. Complexes of Opioid Peptides $50,000, 2009. Laurence Angel, (PI).

9. Co-PI, National Science Foundation "Improving Science Education in the North-East Texas Region "NSF K-12 grant, $2,844,584, Bao-an Li, (PI) Mark Reid, (Co-PI), Jeffrey Kopachena, (Co-PI), and Laurence Angel, (Co-PI).

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

11. The Welch Foundation, Proposal title: "Chiral Porphyrins", $100,000.00, submitted January 2011.

12. The Welch Foundation, Proposal title: "Porphyrins with Introverted Functionality", $150,000.00, submitted January 2012.

13. NSF-RUI, PI. “RUI: Click Chiral Porphyrins: Receptors for Chiral Anions and Amines,” submitted November 2011, $244,638.

14. Petroleum Research Fund, Proposal title: “Development and Application of Organocatalysts for Asymmetric Reactions”, $65,000.00, submitted 2012.

15. The Welch Foundation, Proposal title: “Recyclable Chiral Ionic Liquid-Supported Catalysts for Asymmetric Reactions”, $100,000.00, submitted 2012.

The following 40 proposals are from Dr. Ben Jang.

PI, “REU Site: Research Experience for 2-year College Undergraduates at Texas A&M U.-Commerce”, NSF CHE, **$358,950**, September 2012.
Co-PI, “LeoTEACH-Noyce”, NSF DUE, **$193,062**, March 2012
PI, “Investigation of Novel Supported Gold Metal and Alloy Catalysts Prepared by Non-thermal Plasma Technology” Welch Foundation, **$150,000**, January 2012.
PI, “International Collaboration in Chemistry: Investigation of Novel Supported Au metal and Alloy catalysts Prepared by Non-thermal Plasma Technology”, NSF CHE, **$375,374**, January 2012.
Co-PI, “MRI: Acquisition of an Inductively Coupled Plasma Optical Emission Spectrometer to Improve Multi-Disciplinary Elemental Research and Education”, NSF MRI, **$177,492**; January 2012.
PI, “University/Community College Partnerships: Engaging Community College Organic Chemistry Students in Instrumentation and Research-Based Laboratories to Impact Their Career Choices”, NSF DUE, **$497,108**, January 2012.
Co-PI, “Leaders Engaged in Advancing STEM Disciplines, NSF DRL, **$365,775**, January 2012
PI, “International Collaboration in Chemistry: Investigation of Novel Supported Gold Metal and Alloy Catalysts Prepared by Non-thermal Plasma Technology”, NSF CHE, Pre-proposal, November 2011.
PI, “Chemistry Departmental Grant” Welch Foundation, **$25,000**, October 2011.
PI, “REU Site: Research Experience for 2-Year Undergraduates in Chemistry at Texas A&M University- Commerce”, NSF CHE, **$305,250**, August 2011,
PI, “Building the Capacity of STEM Teacher Preparation at Texas A&M University-Commerce “, NSF DUE, **$174,020**, March 2011.
Co-PI, “MRI: Acquisition of an X-ray Diffractometer”, NSF MRI, **$310,000**, January 2011.
PI, “Investigation of non-thermal plasma technology for controlling the Au particle size of SiO_2 supported Au & Au-Ag catalysts”, Welch Foundation, **$100,000**, January 2011
Co-PI, “STEM Technology, Research, Education, and Access through Mobile Systems (STREAMS) in Rural Northeast Texas (GK-12) “, NSF DGE, **$2,042,278**, June 2010.
Co-PI, “MRI: Acquisition of an X-ray Diffractometer”, NSF MRI, **$310,000**, April 2010.
PI, “Investigation on plasma effects on metal support interaction of heterogeneous catalysts”, Welch Foundation, **$150,000**, January 2010.
Co-PI, “Nanoparticles of Reducible Metal Oxides”, NHARP-THECB, **$189,000**, January 2010.
PI, NSF-PHY, **$157,510**, October 2009.
Co-PI, NSF-DUE, **$999,775**, September 2009.
PI, NSF-CBET, **$273,151**, September 2009.
PI, CNMS-ORNL, no-cost uses of state-of-the-art equipments with professional assistance, July 2009.
PI, NSF-CHE, **$252,035**, July 2009.
PI, ACS-PRF, **$4,500**, April 2009.
PI, Welch Foundation, **$150,000**, January 2009.
Co-PI, NSF-STEP, **$922,067**, September 2008.
PI, Welch Foundation, **$105,000**, September 2008.

PI, NSF-CBET, **$172,268**, September 2008.
PI, NSF-REU, **$266,268**, August 2008
PI, NSF-CHE, **$165,668**, July 2008.
PI, NSF-CCLI, **$193,011**, May 2008.
PI, CNMS-ORNL, no-cost uses of state-of-the-art equipments with professional assistance, March 2008.
PI, ARP-THECB, **$120,000**, January 2008.
PI, Welch Foundation, **$150,000**, January 2008.
PI, ACS-PRF, **$65,000**, November 2007.
PI, S-STEM, NSF, **$593,700**, November 2007.
PI, Pre-proposal to Chemistry-NSF, no budget, November 2007.
PI, Pre-proposal to Advanced Research Projects-THECB, **$120,000**, October 2007.
Co-PI, STEP proposal to NSF, **$999,985**, Sept. 2007.
PI, CBET-NSF, **$348,583**, March 2007.
PI, Welch Foundation, **$150,000**, February 2007

APPENDIX C

STUDENT LEARNING OBJECTIVES

The faculty of the Chemistry Department has developed Student Learning Outcomes (SLOs) for evaluating the MS and BS in Chemistry programs. The following discussion lists these SLOs and shows how the department evaluates them.

1. The Student Learning Outcome
2. How the SLO links to the curriculum
3. Methods for observing student learning
4. Criteria for measuring student performance and targets
5. Achievement summary for the last 5-years
6. How the data for the SLO is used to enhance the program

MS GRADUATE STUDENT LEARNING OUTCOMES

STUDENT LEARNING OUTCOME #1: Students should have an advanced understanding of at least four of the following five areas of chemistry-analytical, biochemistry, inorganic, organic and physical chemistry areas. They should have in depth knowledge and skills in their major area(s) of research.

Links to curriculum and program activity: Courses that support this SLO are Chem 513 Organic Mechanism and Structure, Chem 514 Biochemistry, Chem 521 Chemical Thermodynamics, Chem 531 Advanced Inorganic Chemistry, Chem 541 Advanced Analytical Chemistry and Chem 547/548 Advanced Instrumental Analysis I and II. Normally, different faculty will be teaching each of these courses.

Action plan: strategies / methods for observing student learning: Each faculty as the instructor of the above courses will evaluate students throughout the semester via quizzes, exams, projects and presentations. At the end of the course, a standardized American Chemical Society exam may be used to evaluate student learning in comparison to students at other US universities or colleges. A faculty committee and the Department Graduate Adviser will meet at the end of the study of each individual student to discuss and make recommendations based on the student's performance in standardized and comprehensive exams, projects, presentations and their written thesis and thesis defense.

Criteria for success measures and targets: Non-thesis students should pass all four courses included in the comprehensive exam. Thesis students will be evaluated based on their knowledge in chemistry and research area(s), instrumental & communication skills, and quality of thesis. The target is to have 90% of students to pass in two tries.of the oral defense.

ACHIEVEMENT SUMMARY:

A. A total of 31 MS students graduated in the period of 2007-2012 with 28 students graduating with a Thesis degree and 3 students graduating with a non-Thesis degree during this period.
B. We will keep records on the number of students applying for graduation each semester, and then track the number who actually graduate. For the 2007- 2012 period the number of students who applied for graduation was 33 [not matching with the table below] and the number who actually graduated was 3?. There has been a sharp increase in graduating students in 2012 due to a much larger enrollment in the MS Chemistry degree starting in 2010.

Academic Year	Number of graduate students applying for graduation	Number of graduate students graduating
2007 - 2008	2	2
2008 - 2009	3	3
2009 - 2010	6	6
2010 - 2011	1	1
2011 - 2012	11	11
Total 2007 - 2012	23	23

PROGRAM ENHANCEMENT:

A. New graduate students in the chemistry program who do not have sufficient chemistry coursework in their background are required to take 2-3 upper level undergraduate chemistry courses in the core areas of study in their first semester at A&M Commerce. These upper level chemistry courses include the core areas of analytical, instrumental, biochemistry, and physical chemistry.
B. Two new graduate courses in chemistry, Advanced Chemistry I and Advanced Chemistry II, were developed for students who need additional foundational work in chemistry to better prepare the students for the core graduate courses in chemistry. In the past these courses were designed as special topics courses (Chem 597). Currently, they have been designated as Chem 503 Advanced Chemistry Survey I and Chem 504 Advanced Chemistry Survey II as part of the normal curriculum for graduate students who need more foundational knowledge. The courses will be offered during the summer sessions in order to better prepare graduate students for more specialized graduate courses. These courses, however, will not count towards the degree requirements for a thesis student. These courses will count towards the degree requirements for non-thesis students, who traditionally do not go into a research career.

STUDENT LEARNING OUTCOME #2: Students should be able to communicate scientific results in writing and as oral presentations at American Chemical Society meetings, conference proceedings and journal publications.

Links to curriculum and program activity: Courses that support this SLO are Chem 597 Research Techniques and Design, Chem 501 Graduate Seminar, and Chem 518 Thesis. Each faculty in the department runs his own innovative research group. Students are guided by the faculty member to perform laboratory techniques to solve a particular scientific problem. Students present their methods and results in scientific reports and with presentations at group meetings and departmental seminars. Faculty will analyze and make recommendations each semester based on student progress and achievements.

Action plan: strategies / methods for observing student learning: Data and outcomes will be recorded and shared in scientific reports, powerpoint presentations and scientific analysis programs. Faculty will observe and monitor student's progress and achievements by assessing their work during research group meetings (Chem 518, Chem 597) and departmental seminars (Chem 501). The faculty will also assess students by their ability to develop research reports (Chem 518, Chem 597). Each year the department attends the regional meeting of the American Chemical Society and the Texas A&M University Systems Symposium where students present their research as either a poster or oral presentation.
Criteria for success measures and targets: Each semester faculty will meet to judge the success and achievement of student participation in seminars, report writing and American Chemical Society conferences. Participation and success rate target is 90%.

ACHIEVEMENT SUMMARY:

A. The development of research reports for Chem 518 (Thesis) and Chem 597s (Advanced Research Techniques and Design I & II) are evaluated using a scoring matrix [appendix?]to supply students with feedback on their progress. Each semester faculty evaluates graduate student performance using these questions as a criterion. This semester a focus question was added for evaluation: Was the introduction to the report developed to include a detailed background to the research area?

B. Each 10-week Summer semester, students can submit a short research proposal to the Office of Graduate Studies and Research to compete for a $4,000.00 summer graduate research assistantships (GARs). The number of students awarded summer GAR assistantships is used as a criterion to evaluate student research success. The number of students that were award a GAR during the last 5-years was 15.

C. The number of students who coauthored a peer-reviewed publication, presented their research at a regional or national conference, and presented at the Texas A&M - Commerce Annual Research Symposium during FY 2007-12 are shown below. Although the number of annual publications remain relatively constant (~7), the number of annual off-campus presentation increases dramatically, from 9 in FY2007-08 to 36 in FY 2011-12, while the annual on-campus presentation increases from 3 to 8 in the last 5 years.

The numbers of graduate students involved in presenting research by academic year 2007 - 2012.

Year	Number of graduate students who coauthored a published manuscript	Number of graduate student presentations at regional or national conferences	Number of graduate student presentations at A&M-Commerce research symposium
2007 - 2008	6	9	3
2008 - 2009	3	25	5
2009 - 2010	7	14	6
2010 - 2011	5	20	9
2011 - 2012	7	36	8
Total 2007 - 2012	28	104	31

PROGRAM ENHANCEMENT:

A. The course Chem 597s Research Techniques and Design I & II were developed to better train Master students to be effective in research. The course is designed to teach the student all of the specific techniques they will need to excel in their area of research. Students will also gain improved communication skills through report writing and oral presentations throughout the course.
B. Faculty assessment of student lab reports from CHEM 518 (Thesis) and 597s (Research Techniques and Design I & II) will be now done using the attached grading form[appendix?]. It was decided that each semester one of the questions from the grading matrix will be an included in the SLO objectives and student's performance based on this SLO will be assessed at a faculty meeting. If the SLO is met, another question from the grading form will be included in the following semester to help assess student learning. The chemistry department has been successful at involving graduate students in quality research programs. The department will continue with a target of 90% of graduate students who start at thesis continuing on to the completion of the thesis.

STUDENT LEARNING OUTCOME #3: **Students should present at least one public seminar to demonstrate in-depth knowledge in literature and skills in literature search.**

Links to curriculum and program activity: Courses that support this SLO are Chem 597 Research Techniques and Design, Chem 501 Graduate Seminar, and Chem 518 Thesis. Each faculty in the department mentors graduate students in his/her own innovative research group for Chem 518 and Chem 597. Faculty, on the other hand, rotates to instruct Chem 501 every semester.

Action plan: strategies / methods for observing student learning: Project results or literature review will be presented in Chem 501 seminars. Literature review results will be reported in the group meetings, on campus meetings and off campus conferences. Faculty will observe and monitor student's presentations in the meetings/seminars mentioned above.

Criteria for success measures and targets: Each semester faculty will meet to judge the success and achievement of student participation in seminars. 100% of students should deliver a literature review in Chem 501 and be included in poster or oral presentations in group meetings or at campus meetings such as the Texas A&M – Commerce Research Symposium. 90% of students should successfully present their literature review results at off-campus conferences such as the Texas A&M System Pathways Research Symposium, or the Southwest Regional American Chemical Society meeting.

ACHIEVEMENT SUMMARY:

A. Presentations on the A&M Commerce campus as part of a Texas A&M – Commerce Annual Research Symposium or Chemistry 501.

B. 35 graduate students completed Chem 501 and gave a seminar on a scientific research paper during the period FY 2007-2012. Students were accessed by faculty and students using a scoring matrix. Faculty decided to use the following SLO question to evaluate the quality of the presentation: Was the topic described and detailed for an audience with a broad background in various subdisciplines in chemistry? This question was included in the scoring matrix used by faculty and students to assess the seminar.

C. Presentations, with graduate student's name in bold, on campus as part of the 2012 Texas A&M University - Commerce Annual Research Symposium included.

1. **Xiaowen Wu**, Stephen D. Starnes "Nipecotic Acid-Porphyrin Derivatives: Chiral Anion Recognition," Texas A&M-Commerce Annual Research Symposium, April 5, 2012.
** Xiaowen Wu was awarded the top Masters student presenter in the College of Science, Agriculture and Engineering.

2. **Anusha Bommidi**, Stephen D. Starnes "Porphyrin Hosts for the Shape-Selective Recognition of Anion Guests," Texas A&M-Commerce Annual Research Symposium, April 5, 2012.

3. **Karthik Akinapelli**, Stephen D. Starnes "Synthesis of Chiral Porphyrins and Structural Studies of their Host:Guest Complexes," Texas A&M-Commerce Annual Research Symposium, April 5, 2012.

4. **Ting Zhou**, Navid Rivas, Ben Jang "Selective hydrogenation of acetylene over Pd on ionic liquid loaded SiO2 support" Annual Research Symposium at Texas A&M U.-Commerce, Commerce, TX, April 5, 2012.

5. **Kristine Jang**, Juana Rivas, Ben Jang “Selective hydrogenation of acetylene over Pd on [Bmim][PF6-] and [Bmim][BF4-]-loaded SiO2 support” Annual Research Symposium at Texas A&M U.-Commerce, Commerce, TX, April 5, 2012.

6. **Nathaniel Hanson**, Shahin Amin, Ben W.L. Jang “Heterogeneous catalysis of Bio-diesel using starch based catalysts under experimental application of ultrasound” Annual Research Symposium at Texas A&M U.-Commerce, Commerce, TX, April 5, 2012.

7. **Archana Gujarri** and Laurence A. Angel, "Mass Spectrometry study of tetraglycine associated with selected metal ions (II): manganese, iron, cobalt, nickel, copper and zinc." TAMU-Commerce Research Symposium 2012.

8. **Sruthi Konakanchi** and Laurence A. Angel, "Ion Mobility – Mass Spectrometry Study of Metal Ion Labeling of the Conformational and Charge States of Lysozyme" TAMU-Commerce Research Symposium 2012.

B. Another assessment stated on the SLO is how many of our graduate students give seminars outside of the TAMU-Commerce campus. The criteria for success are 90% of students presenting research projects at off campus conferences. Students presented at conferences that included the Southwest Regional Meeting of the American Chemical Society, International Conference on Chirality, and Texas A&M System Annual Pathways Student Research Symposium. All graduate students did at least two presentations in Chem 501s and/or other on-campus or off-campus symposia/conferences.

PROGRAM ENHANCEMENT:

CHEM 501 will be assessed each semester using the grading form attached. Each semester one of these questions will be included in the SLO objectives and students performance assessed at a faculty meeting. If the SLO is met, another question from the form will be included in the following semester to help assess student learning. The chemistry department has been successful at involving graduate students in seminars, chemistry events, and presentations at conferences. The action plan will be to continue this during FY 2012-13 and in the future.

BS UNDERGRADUATE STUDENT LEARNING OUTCOMES

The faculty of the Chemistry Department has developed three Student Learning Outcomes (SLOs) for evaluating the BS Chemistry programs. The following lists these SLOs and show how the department evaluates them.

1. The Student Learning Outcome
2. Achievement summary for the last 5-years
3. How the data for the SLO is used to enhance the program

STUDENT LEARNING OUTCOME #1: ***Students should have a working knowledge of the main areas of chemistry: organic, inorganic, analytical, and physical.***

ACHIEVEMENT SUMMARY:

Each semester assessment reports are made by the faculty teaching the core classes of analytical, inorganic, organic and physical chemistry and the faculty meets to discuss the findings. The evaluation includes results from American Chemical Society standardized exams and evaluated topic questions included in the midterm and final exams for the course. Examples are included in the appendix

PROGRAM ENHANCEMENT:

The results of the American Chemical Society exams and evaluated topic questions are used to assess the strengths and weaknesses of students' knowledge. During the faculty program enhancement meeting the faculty decide on strategies for improving the overall effectiveness of the teaching methods in the core courses.

STUDENT LEARNING OUTCOME #2: ***Students should be able to perform and understand innovative research.***

ACHIEVEMENT SUMMARY:

Undergraduate research reports are graded with a scoring matrix that is shown in the syllabus at the beginning of the class [example?]. At the faculty program enhancement meeting the faculty evaluates the undergraduate students' performance using one of these questions as a criterion. For the Spring 2012 semester the question for evaluation was chosen as: Was the introduction to the report developed to include a detailed background to the research area? [Any result?]

Another criterion for success is the number of undergraduate students involved in developing publishable research. The following is a list of manuscripts developed in Spring 2012. The complete number of undergraduate students involved in research can be ???

Manuscripts published or developed in 2012 with undergraduate students:

1. MariJo Wienkers, Josmalen Ramos, Hikma Jemal, Chaz Cardenas, Paul Wiget, Alfreda Nelson, Shiloh Free, Jun Wu, Rebecca Roach, Marius Vulcan, Kristopher Waynant, Kyle Fort, Anna Vladimirova, Jeffery Sun, Samuel Eli Hunt, Dmitry M. Rudkevich, Stephen D. Starnes "Enhanced Shape-Selective Recognition of Anion Guests through Complexation- Induced Organization of Porphyrin Hosts," *Org. Letters* **2012**, 14, 6, 1370-1373.

2. X. Liu, C. Mou, S. Lee, Y. Li, J. Secrest, B. Jang, Room temperature O2 plasma treatment of SiO2 supported Au catalysts for selective hydrogenation of acetylene in the presence of large excess of ethylene, *J. Catal.* **2012**, *285 (1),* 152-159.

3. Laurence A. Angel, Yuri Kim, Alan A. DiSpirito, and DongWon Choi, "Methanobactin Analysis via Ion Mobility Mass Spectrometry" *J. Inorg. Biochem.* to be submitted. (May 2012)

The number of undergraduate students who are involved in presenting research by academic year 2007 - 2012.

Year	Number of undergraduate students who coauthored a published manuscript	Number of undergraduate student presentations at regional or national conferences	Number of undergraduate student presentations at A&M-Commerce research symposium
2007 - 2008	3	27	3
2008 - 2009	3	31	7
2009 - 2010	2	37	5
2010 - 2011	3	6	7
2011 - 2012	15	11	8
Total 2007 - 2012	26	112	30

PROGRAM ENHANCEMENT:

Faculty assessment of students lab reports form CHEM 418 will be now done using the attached grading form [appendix?]. It was decided that each semester one of the questions from the grading matrix will be an included in the SLO objectives and students' performance based on this SLO will be assessed at a faculty meeting. If the SLO is met, another question from the grading form will be included in the following semester to help assess student learning. The chemistry department has been successful at involving undergraduate students in quality research programs. The department will continue with a target of 80% of undergraduate students being involved in research during FY 2012-13.

STUDENT LEARNING OUTCOME #3: ***Students should be able to communicate the results of their experiments and research to chemists and non-chemists.***

ACHIEVEMENT SUMMARY:

Each semester upper level undergraduate students participate in CHEM 401: Chemical Science and Profession and give a seminar on a scientific research paper. Students are assessed for five areas of their presentation using a scoring matrix form. For the Spring 2012 semester faculty decided to use the following SLO question to evaluate the quality of the presentation: Was the topic described and detailed for an audience with a broad background in various subdisciplines in chemistry? The question is assessed by faculty and students present at the seminar and at the faculty program enhancement meeting. Another assessment stated on the SLO is how many of our undergraduate students give seminars outside of the TAMU-Commerce campus. The criteria for success are 80% of students presenting research projects at off campus conferences. The department achieves this SLO every academic year. The following is a list of undergraduate seminars presented at off campus conferences in FY 2011-12**, total 25 presentations by 13 undergraduate students**.

1. Khanh Truong, Stephen D. Starnes "Synthesis of Chiral Porphyrins and Structural Studies of their Host:Guest Complexes," 244th National Meeting of the American Chemical Society, Philadelphia, PA, August 19-23, 2012.

2. Karimi, Ava; Koya, Lakshmi; Wilson, Helen; Truong, Khanh; Starnes, Stephen "The Synthesis and

Recognition Properties of Zn-Tetraphenylporphyrin: Proline derivatives," 9th Annual Pathways Student Research Symposium, College Station, TX, November 11, 2011.

3. Truong, Khanh; Kavuri, Prathima; Starnes, Stephen, "Zn-Porphyrin N-Tosyl-1,2-diphenylethylene Diamine Hybrids: Chiral Anion Recognition," 9th Annual Pathways Student Research Symposium, College Station, TX, November 11, 2011.

4. Karimi, Ava; Koya, Lakshmi; Wilson, Helen; Truong, Khanh; Starnes, Stephen "The Synthesis and Recognition Properties of Zn-Tetraphenylporphyrin: Proline derivatives," 67th Southwest Regional Meeting of the American Chemical Society, Austin TX, November 9-12, 2011.

5. Truong, Khanh; Kavuri, Prathima; Starnes, Stephen, "Zn-Porphyrin N-Tosyl-1,2-diphenylethylene Diamine Hybrids: Chiral Anion Recognition," 67th Southwest Regional Meeting of the American Chemical Society, Austin TX, November 9-12, 2011.

6. Culver, Tiffany L.; Konakanchi, Sruthi; Injeti, Srilakshmi, Angel, Laurence A. " Interactions of Zn^{2+} on Insulin Oligomer Formation and Stability: Analysis Using ESI-IM-MS," 67th Southwest Regional Meeting of the American Chemical Society, Austin TX, November 9-12, 2011.

7. Kim, Yuri; Choi, DongWon; Angel, Laurence A. "Gene Cloning of Zinc Finger (Zif268) and Identification by Ion Mobility Mass Spectrometry," 67th Southwest Regional Meeting of the American Chemical Society, Austin TX, November 9-12, 2011.

8. Giganti, Virginia; Kim, Yuri; Hanna, Michael; Angel, Laurence A. "Synthesis and Extraction Procedure of C2H2 Type Zinc Finger Proteins for Analysis by Ion-Mobility Mass Spectrometry," 67th Southwest Regional Meeting of the American Chemical Society, Austin TX, November 9-12, 2011.

9. Kim, Yuri; Choi, DongWon; Angel, Laurence A. "Gene Cloning of Zinc Finger (Zif268) and Identification by Ion Mobility Mass Spectrometry," 9th Annual Pathways Student Research Symposium, College Station, TX, November 11, 2011.

10. Culver, Tiffany L.; Konakanchi, Sruthi; Injeti, Srilakshmi, Angel, Laurence A. " Interactions of Zn^{2+} on Insulin Oligomer Formation and Stability: Analysis Using ESI-IM-MS," 9th Annual Pathways Student Research Symposium, College Station, TX, November 11, 2011.

11. Nathaniel Hanson, Shahin Amin, Ben W.L. Jang "Heterogeneous catalysis of Bio-diesel using starch based catalysts under experimental application of ultrasound" 45th DFW ACS MiM, Dallas TX, April 21, 2012.

12. James Wheeler and Ben Jang "Selective Hydrogenation of Acetylene in Ethylene over Au Catalysts" 45th DFW ACS MiM, Dallas TX, April 21, 2012.

13. Ting Zhou and Ben Jang "Selective hydrogenation of acetylene over Pd on ionic liquid loaded supports" 45th DFW ACS MiM, Dallas TX, April 21, 2012.

14. James Wheeler and Ben Jang "Selective Hydrogenation of Acetylene in Ethylene over Au Catalysts" Annual Research Symposium at Texas A&M U.-Commerce, Commerce, TX, April 5, 2012.

15. Ting Zhou, Navid Rivas, Ben Jang "Selective hydrogenation of acetylene over Pd on ionic liquid loaded SiO2 support" Annual Research Symposium at Texas A&M U.-Commerce, Commerce, TX, April 5, 2012.

16. Kristine Jang, Juana Rivas, Ben Jang “Selective hydrogenation of acetylene over Pd on [Bmim][PF6-] and [Bmim][BF4-]-loaded SiO2 support” Annual Research Symposium at Texas A&M U.-Commerce, Commerce, TX, April 5, 2012.

17. Nathaniel Hanson, Shahin Amin, Ben W.L. Jang “Heterogeneous catalysis of Bio-diesel using starch based catalysts under experimental application of ultrasound” Annual Research Symposium at Texas A&M U.-Commerce, Commerce, TX, April 5, 2012.

18.Luis Pena, Victoria Dixon and Ben Jang “Promotion Effect of Gallium on Supported Pd Catalysts for the Selective Hydrogenation of Acetylene” 9th Annual Texas A&M University System Pathway Research Symposium, College Station, TX, November 10, 2011.

19.Ting Zhou, Navid Rivas and Ben Jang “Investigation of silica supported ionic liquid with Pd for selective hydrogenation of acetylene in ethylene” ACS 67th SWRM, Austin TX, Nov 8-12, 2011.

20.Nathaniel Hanson, Shahin Amin and Ben Jang “Ultrasound assisted heterogeneous catalysis using starch derived acid catalysts for bio-diesel synthesis” ACS 67th SWRM, Austin TX, Nov 8-12, 2011.

21. Luis Pena, Victoria Dixon and Ben Jang “Investigation of the Promoter Effect of Gallium on Supported Pd Catalysts for the Selective Hydrogenation of Acetylene in the Presence of Ethylene” ACS 67th SWRM, Austin TX, Nov 8-12, 2011.

22.Ting Zhou, Navid Rivas, Kristine Jang, Sam Kjos and Ben Jang “Development of ionic liquid supported Pd catalysts for hydrogenation “ACS 67th SWRM, Austin TX, Nov 8-12, 2011.

23. Patricia Rhodes and Ben Jang “Selective Hydrogenation of Acetylene over Pd/SiO_2, $Pd-Ag/SiO_2$, and Plasma Treated Catalysts” ACS 67th SWRM, Austin TX, Nov 8-12, 2011.

24. James Wheeler, Arjun Malipeddi, Ben Jang and Wen-Yuan Lin “Selective Hydrogenation of Acetylene in Ethylene over Au Catalysts” ACS 67th SWRM, Austin TX, Nov 8-12, 2011.

25. von Ausdall1, Alexandra S.; Baxter, Kim; Crittenden; Andrew; Pena, Luis; Bradley, Terrence; Kolawole, Elizabeth; Kennard, Brandi; Bell, Yonwi; Brandt, Erica, Jang, Ben, Starnes, Stephen [33]Who Is Chemistry?[2] a Celebration of Diversity,[2] 67th Southwest Regional Meeting of the American Chemical Society, Austin TX, November 9-12, 2011.

The 'Who is Chemistry' presentation at the recent regional ACS meeting described a large event that was held at TAMUC and included many undergraduate students in the organization.

PROGRAM ENHANCEMENT:

CHEM 401 will be assessed each semester using the scoring matrix. Each semester one of these questions on the grading form will be an included in the SLO objectives and students performance assessed at a faculty meeting. If the SLO is met, another question from the form will be included in the following semester to help assess student learning. The chemistry department has been successful at involving undergraduate students in seminars, chemistry events, and presentations at conferences. Encouraging students to participate in off-campus conferences will continue in the future.

University Response to Chemistry Program Review

June 2013

As a result of the Chemistry program reviewers' report, on June 18, 2013, Dr. Mary Beth Sampson (Associate Graduate Dean), Dr. Dan Edelman (Associated Provost), Dr. Grady Blount (College of Science, Engineering, and Agriculture Dean), and Dr. Ben Jang (Chemistry Department Head) met to discuss and create a response to the report. The following is Texas A&M University-Commerce's response to the Chemistry Program Review.

Based on the 2007-2012 five-year program review and reviewer reports, this response includes the following objectives: Develop the five-year strategic plan as a guide for the Department. Reduce the teaching load of tenured/tenure track faculty via hiring of new faculty and the consideration of supervising research and thesis students as part of the teaching load, Enhance the retention of lower level undergraduates and the recruitment of high quality graduate students, Effectively implement the current teacher preparation program (Broadfield Science major in Chemistry) to increase undergraduate degree production, Expand the undergraduate program to include new degree program(s) to increase recruitment efforts , and Reach out to alumni to establish a network for internship opportunities, workforce feedback, and additional resources.

Program Overview and Vision

Develop a five-year strategic plan as a guide for the Department

The department head will work with all faculty to develop a five-year strategic plan for the department with annual action plans and specific focus areas. Each focus area will have designated faculty to lead and coordinate the efforts. The results of the annual action plans will be discussed among the faculty during each summer semester and the results will be used to inform and guide subsequent annual plans.

Faculty Productivity

Reduce the teaching load of tenured/tenure track faculty via hiring of new faculty and the consideration of supervising research and thesis students as part of the teaching load

The average number of research students supervised per faculty per academic year (not including summer research) was 31.6 in FY 2011-12. With two additional tenured/tenure track faculty in FY 2012-13, the number dropped to 15.1 which is still high. In fall 2013, the Chemistry Department allocated a biochemistry faculty position. This position will decrease the average number of research students supervised per faculty to about 8.6. However, to further reduce the research student/faculty ratio to about 5, the department has requested two additional tenure track faculty positions for the fall 2014 semester.

A reasonable research student/faculty ratio, especially in the experimental science discipline, is critical to maintaining high quality education/training of the students. The department head will identify comparable ratios at our peer and aspiring institutions.

Enhance the retention of lower level undergraduates and the recruitment of high quality graduate students

As discussed in Section III D of the five-year program review report, the retention rate of chemistry freshmen to sophomores could be an issue. Since Fall 2012, faculty teaching lower level major courses are reaching out to students in lower level courses (including Chem 1411, 1412, 211 and 212) to encourage participation in undergraduate research. This has served two purposes: (1) increased retention of chemistry majors, and (2) enhanced recruitment of students to major in chemistry or double major in chemistry. Research experiences enhance student learning in the classroom, and also provide networks to mentor and support younger students. So far, it has been effective. The approach will continue to be used in FY 14. However, it does add the burden to the faculty. To minimize the burden to faculty, quality graduate students are a must to assist faculty in training and mentoring undergraduate research students.

The Department has begun to set aside graduate assistantship (GA) positions, specifically for research groups, and for recruitment of high quality graduate students for the thesis option. With current tuition remission and the Supplemental Graduate Assistant Funding from the Graduate School, the recruitment of high quality graduate students is relatively easier to be realized, even with a large disadvantage in GA stipend relative to our peer and aspiring institutions However, personal connection to the faculty of each potential graduate student have been a key to successfully recruiting individuals to study the MS in Chemistry at A&M-Commerce. The current GRE average of graduate students is slightly above 1000. Within 3 years, by Fall 2016, the average of GRE should be above 1100.

Increase its Number of Graduates

Effectively implement the current teacher preparation program (Broadfield science major in Chemistry) to increase undergraduate degree production

The current National Science Foundation *DUE* project, led by Drs. Jang & Starnes, focuses on capacity building of science and math teacher preparation, especially the secondary teachers. In March 2013, a phase I proposal was submitted to NSF to establish the Noyce scholarship program for the next five years. At the end of the 5-yr program, there will be 40 certified secondary teachers produced by the program. It is expected that the average production of Chemistry teaching majors will be at least 5 per year by the end of 2018. On the other hand, the 4 new courses, Chem 341, 342, 421 and 422 specifically designed for teaching students, will require at least a half-time (50%) adjunct to teach two courses per semester/four courses per academic year. Currently they are taught by faculty as independent studies on top of the regular teaching load. Ideally, this adjunct position can also teach freshman or sophomore level lecture and labs. With this position recruiting and retention will be implemented more effectively

Expand the undergraduate program to include new degree program(s) to increase recruitment efforts

Based on the ever changing interests of the next generation of high school and college students, an environmental chemistry program, for both undergraduates and graduates, is the most likely avenue as a program that captures their attention with minimum resources and personnel needed. Based on the current informal collaboration between El Centro College and A&M-Commerce and the existing environmental science program at A&M-Commerce, the additional courses, such as air pollution, analytical chemistry/instrumentation course specifically for air, liquid and solid wastes, chemical hygiene, etc. will be needed. Curriculum for an environmental chemistry degree can be developed and approved by Fall 2015 to have the first cohort. Additional faculty requested in item #2 should be recruited with these teaching capabilities in mind.

A new *Forensic Chemistry* program may also be helpful to build a striving chemistry undergraduate program. However, it will require more resources.

Executive Summary

Reach out to alumni to establish a network for internship opportunities, workforce feedback, and additional resources.

Alumni are a great network and support group for the graduates and the Department. To re-establish a close connection with alumni requires an effective strategy and extensive follow up. It is planned to establish a chemistry alumni board, working closely with the university alumni association, in the first 12 months. The potential members of the chemistry alumni board include chemistry or STEM alumni ambassadors and other distinguished alumni or recent graduates who know the department well. Once the board is established, each board member is to reach out to all alumni via personal visits, phone calls, emails and host a reunion by the Department. The alumni network will provide additional resources to support some of the previous objectives.