DEPARTMENT OF CHEMISTRY AND BIOCHEMISTRY

J-1 INTERNSHIP PROGRAM

March 2014
The University of Oklahoma invites you to accept the challenge of becoming an agent for positive change in the 21st century. As our nation and world struggle with a multitude of problems ranging from growing energy needs to human health and welfare in a shifting climate, the Department of Chemistry and Biochemistry is taking a leading role in the discovery and development of new approaches to improve the human condition. With 33 faculty researchers representing diverse areas of expertise in the chemical and biochemical sciences, our department is interested in recruiting and training the best and brightest future leaders of tomorrow’s academic, industrial and government institutions.

Supporting this effort, the Department of Chemistry and Biochemistry is the new 160,000-square-foot Stephenson Life Sciences Research Center. More than 130 graduate student and postdoctoral researchers work side-by-side with faculty in a highly interactive environment to solve some of the most pressing challenges of our time. The Stephenson Life Sciences Research Center was created with an eye toward further growth, with several new faculty expected to be recruited during the next few years from cutting-edge disciplines. The center is home to several major core facilities and research support services, including mass spectrometry, Nuclear Magnetic Resonance and X-ray diffraction facilities.

Our faculty are among the top-funded researchers at OU, with numerous external research grants and contracts. Nine of our faculty hold distinguished or endowed professorships and 12 have received awards for excellence in teaching and/or research. The faculty are committed to offering new cross-disciplinary courses for our graduate students. The department encourages students to develop personalized research programs that cut across traditional barriers in the chemical sciences. For example, a student can opt to study biochemistry, conduct research in an organic chemistry laboratory and attend regular meetings in the analytical sciences. Our faculty work closely with each student to tailor a graduate program that specifically suits his or her needs and interests.

The J-1 program at the University of Oklahoma (OU) is administered by OU and the US Department of State. J-1 students often receive program funding from a government, a corporation, a non-profit foundation. A number of J-1 students come to OU as short-term exchange students for one or two semesters. The financial sponsor for these students is their home University. Exchange students at OU enjoy the benefit of a research experience without having to pay tuition and fees.

Prospective J-1 exchange students are encouraged to examine this brochure and become familiar with the participating faculty and their research interests, and are invited to contact them and learn more about their programs. All of us in the Department of Chemistry and Biochemistry look forward to answering any questions you may have about the Department and how you can contribute to becoming an agent for positive change.

George Richter-Addo
Professor and Chair
Department of Chemistry and Biochemistry
College of Arts and Sciences
The University of Oklahoma
The University of Oklahoma is Oklahoma’s flagship university and its Department of Chemistry and Biochemistry has achieved a national reputation for quality research. The department has 33 full-time faculty members and more than 110 graduate students.

The research and administrative functions of the department are housed in the new $80 million Stephenson Life Sciences Research Center, located on OU’s Research Campus. The completion of the 160,000-square-foot center was made possible by a generous $18 million gift from Charles and Peggy Stephenson. Completed in July 2010, it houses chemists, biochemists and other life sciences researchers.

The department is supported by a variety of research service units, including the Nuclear Magnetic Resonance Spectroscopy Laboratory, Mass Spectrometry Center, Macromolecular and Small Molecule X-ray Diffraction Laboratory, Electronics and Machine Shop, and the Glassblowing Teaching and Service Center.

The Ph.D. degree is awarded for excellence in research and scholarship; it signifies the creation of new knowledge through research and the acquisition of a thorough and comprehensive understanding of a research area, as well as the attainment of a high level of professional independence and competence.

A student should normally expect to spend approximately five years beyond the bachelor’s degree in the pursuit of the Ph.D. During this period of time, the student must: (1) successfully complete the appropriate coursework and examinations, (2) perform original research leading to the creation of new knowledge, and (3) submit and successfully defend the results of the original research, which will be presented as a dissertation.

Students may specialize in one of the following major areas of chemistry: analytical, biological, inorganic, organic, physical and chemical education, or in any combination of these.
Norman and Surrounding Areas — Highlights and Facts

- Located 20 miles (30 km) south of downtown Oklahoma City, Norman is part of the Oklahoma City metropolitan area. Norman has almost 111,000 full-time residents, making it the third-largest city in Oklahoma. The city was founded during the Land Run of April 1889 and formally incorporated in 1891.
- Norman lies in a temperate, sub-humid climate, with frequent variations in weather daily and seasonally.
- The new Stuart Wing of the Fred Jones Jr. Museum of Art provides an 18,000-square-foot expansion to house the museum’s collections acquired within the past 15 years, including the Eugene B. Adkins Collection, the James T. Bialac Collection, the Dr. and Mrs. Richard L. Sandor Photography Collection, the Priscilla C. and Joseph N. Tate Collection, the Roxanne P. and William H. Thams Collection and the Richard H. and Adeline J. Fleischaker Collection. These collections have further strengthened the museum’s holdings in the areas of Native American and Southwest art.
- OU is home to one of the two largest natural history museums in the world associated with a university. The Sam Noble Oklahoma Museum of Natural History has more than 7 million artifacts and contains 195,000 square feet on 40 acres of land. The museum exhibits include the largest Apatosaurus on display in the world and the oldest work of art ever found in North America — a lightning bolt painted on an extinct bison skull.
- Air transport is available at Will Rogers World Airport in Oklahoma City, located approximately 20 miles (30 km) north of Norman. The airport serves more than 3 million passengers per year.
- Cleveland Area Rapid Transit provides the Norman area with a user-friendly public transportation system. Transporting more than 1 million passengers annually, CART features six Norman city routes, three OU campus routes, a route that serves the Social Security office in Moore as well as commuter routes to rural east Norman and Oklahoma City. CART offers users mobility throughout the city, including access to many medical facilities, residential areas, retail businesses and restaurants.
The city hosts festivals and community events throughout the year, many of which are open to the public at no cost to them. Find out more information at www.visitnorman.com.

The Medieval Fair is a spring celebration of medieval-themed games, art and culture.

The Norman Music Festival is an annual weekend music festival held in the spring in downtown Norman. The festival highlights both local musicians and internationally acclaimed artists and features many forms and styles of music.

May Fair is an arts festival that features top area performers, fine art, crafts and food.

Jazz in June is a summer music festival that features both jazz and blues musical performances. Jazz in June also includes jazz educational clinics taught by professional musicians appearing in the festival and post-concert jam sessions at local venues, which bring headliners and local artists together.

The Summer Breeze Concert Series is held from spring to fall at various park venues across Norman.

The Midsummer Nights’ Fair is a nighttime arts festival that features art, music and food and is held on the lawn of the Firehouse Art Center.
The University of Oklahoma has established the Institute for Natural Products Applications and Research Technologies (INPART). Under the direction of Professor Robert H. Cichewicz, INPART is an alliance of collaborating scientists focused on the innovative use of secondary metabolites to generate new products for improving the human condition. The purpose of INPART is to find creative solutions that harness the power of natural products chemistry for generating new medicines that will improve human life. Using a combination of leading-edge technologies, INPART mines new natural products from fungi and bacteria and evaluates these compounds for their therapeutic applications.

In addition to its bioactive compound discovery operations, INPART plays a leading role in translating new natural products into viable drug leads. With researchers focused on a variety of essential roles spanning the drug development process pipeline (e.g., total organic synthesis of lead compounds, medicinal chemistry optimization, drug target identification, biomolecular protein-small molecule binding, and natural products biosynthesis), INPART works toward the creation of new therapeutic agents that address unmet medical needs.

The vision of INPART requires a broad range of research capabilities, both in terms of infrastructure and personnel. Accordingly, we place top priority on establishing a team of researchers who embrace collaborative science, are dedicated to maintaining a focus on addressing society’s most pressing health problems, and are committed to engaging in these activities through the development of cutting-edge technologies. INPART is an inclusive organization; all interested researchers are encouraged to participate. INPART is committed to providing an enabling environment that elevates the scientific potential of all its members.

INPART WILL USE MICROORGANISMS (FUNGI AND BACTERIA) TO GENERATE NEW NATURAL PRODUCTS FOR DEVELOPMENT INTO MEDICINES. NEARLY 50 PERCENT OF DRUGS IN CURRENT CLINICAL USE COME FROM NATURE, MAKING NATURAL PRODUCTS AN EXCELLENT RESOURCE FOR NEW DRUG DEVELOPMENT.

**PROJECTED INPART RESEARCH AND DEVELOPMENT OUTCOMES**
- Develop natural products for the treatment of debilitating ailments such as infections, cancer and neurodegenerative diseases.
- Create new enabling technologies that enhance the natural products drug discovery process.
- Develop entrepreneurial relationships with industrial partners to bring prospective drug leads from laboratory to market.
- Provide a one-of-a-kind resource for enhancing drug development at both the regional and national level.
- Train new researchers capable of leading academic and industrial drug discovery programs.
- Enhance the economic well-being of Oklahoma by creating medical products that serve as new sources of revenue for the state and local economies.
Center of Biomedical Research Excellence

The NIH-funded COBRE (structuralbiology.ou.edu), under the direction of Professor Ann West, comprises an active team of researchers who use the three-dimensional structures of biological macromolecules to shed light on their physiological functions. The “work horses” of a cell are an immense collection of macromolecules such as proteins and nucleic acids that are designed for specific functions to elicit appropriate physiological responses. To correctly perform their unique functions, these macromolecules must possess the correct three-dimensional structures that interact with their targets, such as those seen in drug-enzyme interactions. Indeed, it is the three-dimensional structures of proteins that give them their specific physiological functions!

Our COBRE researchers partner with colleagues in the OU Department of Microbiology and Plant Biology and the OU Health Sciences Center. The central theme is on X-ray crystallographic and computational approaches to understand the important relationship between structure and biological activity. The research has direct relevance to human diseases and conditions associated with aging, respiratory distress, host-pathogen interactions, bacterial and viral infections. The COBRE is a multidisciplinary enterprise that based on the research interests and expertise of center participants, includes biochemistry, bioinorganic chemistry, virology, parasitology, immunology, cell biology, enzymology, bacteriology, and computational biophysics.

Student training: Students in the COBRE research programs will, in addition to being trained in their specific research program area, gain hands-on training and expertise in the crystallization of biological macromolecules and in structure solution using X-ray crystallography. Career options include employment in drug development companies, academia, and in national laboratories.
Research Facilities

**Magnetic Resonance Spectroscopy Facility**
The facility is located near the east entrance of the new Stephenson Life Sciences Research Center. We provide training and access to all researchers who wish to use our Nuclear Magnetic Resonance and Electron Paramagnetic Resonance instrumentation. In addition to researchers within the Department of Chemistry and Biochemistry, we serve research groups throughout the university and the state of Oklahoma.

**VNMRS 500 MHz-NMR Spectrometer**
The 500 NMR spectrometer originally purchased as a VXR model in 1987 and was upgraded to a VNMRS model by the university in 2006. The spectrometer is a three-channel, 28 shims Varian VNMRS-500 equipped with two probes: triplet resonance $^1H\{^{13}C/^{15}N\}$ PFG probe, and a tunable indirect detection $^1H\{^{15}N-^{31}P\}$ PFG probe.

**VNMRS 400 MHz NMR Spectrometer**
The 400 MHz NMR originally purchased as a Varian Unity/Inova model in 1994 and was upgraded to the Varian VNMRS model in October 2007 under the NSF multi-user grant. The system is complete with robotic sample insertion, automatic tuning and variable temperature accessories. FTS air dryer provides dry air with a dew point of -85°C to the FTS preconditioning sample cooler. The system is equipped with two probes: an auto-tunable indirect detection $^1H\{^{15}N-^{31}P\}$ PFG probe and an auto-tunable Dual Broadband $^{15}N-^{31}P\{^1H\}$ PFG probe optimized for broadband detection. Both probes are compatible with the auto-tuning accessory.

**Mercury VX-300 NMR Spectrometer**
The 300 MHz NMR was purchased in 2000 under a NSF multi-user grant and operates with a 4-nuclei auto-switchable PFG probe. It can collect $^1H/^{19}F/^{13}C/^{31}P$ signals without retuning the probe. This instrument is designed for walk-up use and is primarily used by the synthetic chemistry groups.

**Bruker EMX EPR Spectrometer**
The EPR Spectrometer was purchased with a NSF multi-user grant. The spectrometer has an ER 073 magnet, an EMX 048T microwave bridge controller an EMX 120 Modulation Amplifier, and an ER 041 X G Microwave bridge. The spectrometer has both ER 4102 ST and ER 4103 TM cavities. Additionally, it is equipped for operation with liquid nitrogen and liquid helium.
Research Facilities

Mass Spectrometry

The facility operates, maintains and services numerous mass spectrometers and high performance liquid chromatographs. Services include for-fee sample analysis, user-run open-access instrumentation (after proper training), teaching and education, consulting, and collaborative research projects. We specialize in small molecules and metabolomics, large molecules and proteomics.

The unit is home to the University of Oklahoma Biocorrosion Center Mass Spectrometry Facility (http://biocorrosioncenter.ou.edu/) whose mission is to generate new knowledge and technology to diagnose and mitigate hydrocarbon biodegradation and carbon steel biocorrosion problems in the energy industry.

Mass Spectrometry Instrumentation

UHPLC / QTOF MS (mass resolution 40,000)
Consists of an Agilent 6538 high-mass-resolution QTOF mass spectrometer and an Agilent 1290 HPLC (1200 bar). The Mass Hunter data-control system includes qualitative and quantitative analysis as well as advanced metabolomics software (MassProfilerPro) and Proteomics software (Bioconfirm). The ultra-high mass resolution allows for the separation of more than 1,000 compounds in a single LC/MS run.

GC / QTOF MS (mass resolution 40,000)
Comprised of an Agilent 7890A gas chromatograph interfaced with the Agilent 6538 QTOF/MS. Ultra-high mass resolution for GC/MS is only now becoming commercially available. It is expected that it will dramatically increase the number of compounds that can be separated by GC/MS.

GC/ quadrupole MS
Consists of an Agilent 7890A gas chromatograph; an Agilent 5975C MSD with EI and CI ion sources, an Agilent 7693 autosampler and a ChemStation instrument control and data handling system.

HPLC / Quadrupole MS
Hewlett-Packard (HP) 1100 MSD equipped with ESI and APCI sources; includes an HP 1100 HPLC system.

MALDI TOF/TOF MS
ABSciex 4800 mass spectrometer most often employing (MALDI) Matrix Assisted Laser Desorption Ionization; includes Applied Biosystems 4000 Series Explorer data analysis software.

QTOF MS
Micromass/Waters QTOF-1 with ESI and APCI ion sources and a nanospray attachment.

HPLC / Ion-Trap MS
Comprised of Thermo/Finnigan LCQ with ESI and APCI sources and a HP 1100 HPLC system including autosampler.

GC / quadrupole MS
Agilent 7890A gas chromatograph; an Agilent 5975C MSD with EI and CI ion sources, an Agilent 7693 autosampler.

GC / Ion-Trap MS
Consists of Trace 2000 gas chromatograph; a Finnigan Polaris GCQ MS; includes Xcalibur data analysis software.

Consists of an HP/Agilent 6890A gas chromatograph; an HP/Agilent 5973C MSD with EI ion source.
Research Facilities

Macromolecular Crystallography Laboratory / Protein X-Ray Facility
The Macromolecular Crystallography Laboratory (MCL) was first established in 1999 with the purchase of a Rigaku RUH3R rotating anode X-ray generator coupled with an Raxis 4++ image plate detector. In 2009, NSF funding was secured for the purchase of robotics equipment for the development of a crystallization facility. The crystallization facility consists of a TTP Labtech Mosquito for the setting of low-volume crystallization trays and a Rigaku Desktop Minstrel Imaging system for the automated scanning of crystallization trays. The final piece of equipment is the Rigaku Alchemist II for the production of crystallization screens.

Small Molecule X-Ray Facility
This facility is located on the northeast corner of the second floor of the Stephenson Life Sciences Research Center. X-ray crystallography is an analytical method that is used to determine bonding arrangement of atoms in a crystalline solid. Our facility provides training in crystallographic methods and an analytical service to researchers at OU and other non-profit institutions.

Electronics Services
The unit is supported by a full-service Electronics and Machine Shop that is fully staffed and ready to work with faculty and students on any issue related to scientific research equipment. The staff provide expertise in many areas related to research instrumentation and are available to assist researchers with instant repairs and design.

Glass Blowing Shop
Services provided include the fabrication of custom-designed glass and quartz apparatus, modification and repair of laboratory apparatus as well as consultation on apparatus design. The shop carries a large inventory of glass tubing, ground joints, threads and stopcocks as well as commonly used quartz tubing and ground joints. Non-inventory glass and quartz tubing and parts will be ordered to complete your job requests. The hands-on glassblowing class (CHEM 4232) is taught in the Scientific Glassblowing Laboratory during the fall and spring semesters.

Stockroom
All university research groups and administrative staff are provided with immediate access to a wide range of laboratory consumables, chemicals and office supplies. The stockroom also coordinates hazardous waste pickup and surplus equipment pickup for the department. Special purchases and deliveries for all departmental units can also be coordinated through the stockroom.
Our group’s research interests lie primarily in the use of organic, organometallic and polymer chemistry to design, synthesize and characterize new materials with unique and potentially useful electronic properties. Electronic properties are meant here in a broad sense and, along with synthesis, special interest is given to the electronic (conductivity, photoconductivity and magnetic), optical (absorption, fluorescence), electrochemical (ionic conductivity, electropolymerization and redox behavior), and physical (structure, morphology) characterization of these materials.

Most recently, we have been involved in capitalizing on the high density of proton donor/acceptor moieties in linear poly(ethylenimine) (LPEI) as a scaffold for the fabrication of polymer electrolyte membranes for H2/O2 fuel cells. Further, by attaching redox active species to the LPEI and cross-linking it in the presence of enzymes, bio-anodes and bio-cathodes can be fabricated for use in glucose sensors and glucose/O2 biofuel cells. We are synthesizing structural variants of LPEI to explore structure/property relationships and investigate the factors that control speciation, electron and ion mobility in these systems. Since the nitrogen atoms in LPEI can coordinate to lithium cations, we have also been studying these materials as potential lithium-conducting solid polymer electrolytes for battery applications.

**Research keywords:**
energy conversion and storage; polymer chemistry; electrochemistry

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**Selected Publications**


Our research is focused primarily on microfabricated systems for bioanalysis. We are especially interested in developing and implementing new separation technologies onto microfluidic devices for DNA and protein analysis. Current active projects include: (1) Development of a hybrid chip-based and automated two-dimensional electrophoresis platform for high-speed, high-throughput and sensitive protein analysis. Our target is to separate more than 10,000 proteins in one run in less than two hours. (2) Nanocapillary for DNA separations in gel-free separations. With a nanocapillary we can separate DNA from a few base pairs to hundreds of thousands of base pairs in a single run. It can be an improved alternative technique for Pulsed-Field Gel Electrophoresis. This project is aimed at identifying a single bacterium for infectious diseases. (3) Nanomaterials: Fabrication, investigation and application of liquid behavior and mass transport in/through nanochannels. We have discovered the ion-enrichment and ion-depletion effect at micro-nanochannel interfaces. We have invented a new separation technique based on unique distributions of ions in nanoscale capillaries - the Nanochannel chromatography. We have developed a nanochannel membrane for fuel cell applications. (4) Inventing new micropumps for lab-on-chip devices. We have developed a flow battery or pressure power source that can be stacked to produce pressures of more than a thousand psi. The immediate goal is to integrate such a pressure power source, along with an injection valve and detector, on a microchip for HPLC separations.

Research keywords: development and application of microfluidic systems; bio-separation and bio-analysis; analytical Instrumentation

Selected Publications

Shaorong Liu
Professor

BS, 1982, Huazhong Normal University
PhD, 1995, Texas Tech University
Postdoc, 1996-1997, Northeastern University; 1997-1998, University of California at Berkeley

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Lab-on-chip Systems, Bioseparation and Bioanalysis

Our class 1000 cleanroom equipped with all instrument for glass chip fabrication

Chip devices produced in our lab

Replaceable cross-linked polyacrylamide for separation of real-world sample
Our current research is focused on two aspects: (1) the application of biology in nanotechnology and chemistry, and (2) the application of nanotechnology and chemistry in biology and medicine. Specifically, my research group (1) takes advantage of genetic engineering, mineralization and self-assembly of biological macromolecules to build inorganic or bio-inorganic hybrid nanostructures with defined macromolecular architectures and chemical/biological functionalities; (2) mimics the biological world to develop novel strategies for the controlled synthesis and assembly of bio-/nano-materials that can be used in energy, photonics and medicine; (3) identifies biomolecular probes that can specifically recognize materials, mammalian cells and tumor tissues for targeted drug/gene delivery and cancer therapy; AND (4) integrates biological recognition of biomolecular probes and physical/chemical/biological properties of nanomaterials to develop new strategies for bioimaging and analysis, bone regeneration, targeted drug/gene delivery, and targeted cancer treatment. The following techniques are routinely used in our research: bacterial and mammalian cell culture, molecular cloning, protein expression and purification, phage display, cell surface display, scanning electron microscopy, transmission electron microscopy, atomic force microscopy, bio-nanomaterials synthesis, and bioconjugation.

**Research keywords:** nanotechnology; nanomedicine; biomaterials

**Selected Publications**


Catalytic Nitrogenation of Hydrocarbons. The development of efficient C-N bond-forming reactions is critical to the construction of organonitrogen compounds, important synthetic intermediates and valuable end-products. In this project we are seeking metal-catalyzed nitrogenation reactions via selective C-H insertion, which employ convenient N-reagents, inexpensive catalysts, and involve novel coordinated N-species.

Catalytic Deoxydehydration of Carbohydrates and Polyols to Chemicals and Fuels. Our objective is to develop catalytic processes for the deoxydehydration (DODH) of biomass-derived carbohydrates and polyols to produce unsaturated alcohols and hydrocarbons, important as chemicals and fuels: polyol + reductant --> (LMO, catalyst) --> unsat + oxidized reductant + H2O. We are investigating the reactivity of polyoxometalocomplexes and practical reductants with polyols to establish structure/reactivity relationships and reaction mechanisms.

Catalyst Evolution by Dynamic Templating with Transition State Analogs. Catalysis of chemical reactions is essential to the practical operation of most chemical and biochemical processes. We are investigating a new approach to catalyst discovery, dynamic templating of metal complexes with transition state analogs, based on the hypothesis that the most stable metal-TSA complex will be the most active or selective catalyst. We are evaluating the central hypothesis for three important reactions: a) ester and amide hydrolysis; b) ketone transfer hydrogenation; and c) [4 + 2] cycloadditions.

Research keywords: organic synthesis methodology; catalysis; organometallic chemistry

Selected Publications
Polymer hydrogels are at the forefront of biomaterials for drug delivery and tissue implants. You will use NMR spectroscopy to understand 1) thermo-sensitive hydrogels and 2) functionalization chemistry. Our data provides new understanding of the thermodynamics and reveals that subtle changes in synthesis can dramatically alter phase transition properties.

Poly(N-isopropylacrylamide) (PNIPAAm) hydrogels and have been studied for a wide array of biomedical and separations applications due to their high water content. NMR is used to monitor PNIPAAm as it is transformed from a soluble to an insoluble polymer. Changes in the peak height intensity of the spectra provide quantitative insight into the phase transition process. Additionally, we are using NMR to answer questions chemical bond breaking/forming within PNIPAAm.

Students in our group have access to three NMR spectrometers for their research. Not only will they be experts in NMR spectroscopy, but students synthesis their own polymer samples. The result is a graduate education that provides a variety of skills required in the modern academic and industrial workplace.

Research keywords:
Polymer hydrogels, N-isopropylacrylamide, NMR spectroscopy

Selected Publications


Charles V. Rice, “Phase Transition Thermodynamics of N-Isopropylacrylamide Hydrogels” Biomacromolecules, 2006, 7, 2923-2925
Recent developments in mass spectrometry (MS) have significantly enhanced research in many areas. The research in our group includes:

(1) **Fragmentation of peptide radical ions.** Peptide radicals play important roles in chemistry and biology. Studies of the fragmentation can provide additional information on the properties of peptides and proteins, and impact new sequencing methodology for proteomics research.

(2) **Tissue imaging.** The objective is to apply the ambient ionization method to study biomolecules on tissues. By obtaining m/z of different species while concurrently moving samples we can plot the distribution of biomolecules (e.g., peptides, lipids, drugs) on tissues, with applications to medical studies (e.g., drug metabolism on different tissues, targeted cancer therapy).

(3) **Gas-phase ion-neutral reactions.** MS provides a solvent-free environment for gas-phase ion chemistry. We can inject reactant molecules into the ion-trap to investigate ion-neutral reactions, relevant to many areas such as astrochemistry, ionic liquid hypergolic fuels and biomolecule attack by highly reactive species.

Theoretical work, including molecular dynamic simulations and *ab initio* calculations, will be performed to gain a molecular level understanding of experimental results.

**Research keywords:** mass spectrometry, ion-neutral reaction, peptide radical fragmentation, imaging via mass spectrometry, computational chemistry.

**Selected Publications**


OU HAS A WARM AND VIBRANT COMMUNITY...

Oklahoma

OU is located in Norman, Oklahoma, just twenty minutes from Oklahoma City (OKC), the capital of Oklahoma. Our state is located in the center of the United States which makes it easy to travel to all parts of the country.

NORMAN, OK: Living in Norman allows you to experience the best of both worlds — a small town community with big city resources. It is a classic college town, with a thriving local music scene and boutique shopping on Campus Corner, a historic district within walking distance of campus. Living in Oklahoma allows you to experience four distinct seasons, with temperatures averaging from about 5°C in the winter to around 35°C in the summer.

OKC: Oklahoma City, a major metropolitan area, provides students with exciting entertainment options, including shopping and dining along a river canal and access to NBA games for our internationally-acclaimed Thunder basketball team. OKC also provides a great job market for internships and full-time positions. For more, visit ou.edu/go2/okc.

Global Community

OU is truly a global community, with international students from more than 100 countries represented. In fact, our International Programs Center was created to enrich the international experience on campus. You will have the opportunity to hear from notable international leaders and also get to know other students as part of our OU Cousins program, which pairs each participating international student with an American student to allow them to learn from and connect with each other. Our students are interested in making a lasting global impact — last year alone, OU students studied in more than 35 countries around the world.
CAMPUS PROFILE
FOR INTERNATIONAL STUDENTS

At the University of Oklahoma, you will experience a stimulating academic community where you are a hands-on participant in the learning process. Discover the benefits of a major research institution while receiving the personal attention and support you deserve. Become part of the OU family and connect yourself to enriching opportunities that will equip you to excel in our global society.

“My four years at OU have been the most wonderful adventure of my life. My favorite part of OU is its large and diverse community that allows for opportunities to be involved in many activities and to learn new cultures — experiences I would not have had in Thailand. I never felt like I was alone, though I am thousands of miles away from home, because the professors and students here made me feel very welcome. OU is a home away from home where I found my lifelong friends and my second family.”
— Monrada Yamkasikorn, Thailand, Class of 2013

FAST FIGURES
NORMAN CAMPUS ENROLLMENT
New freshmen.................................................4,052
Undergraduates..............................................19,900
Graduates.........................................................3,583

ACADEMICS
Student to instructor ratio .....................................18:1
Average class size ..............................................32 students
Full-time faculty.................................................2,600
Colleges..........................................................21
Undergraduate majors.........................................163
Graduate majors...............................................157
Doctoral majors...............................................81
First professional majors......................................28
Professional certificates.....................................28

NORMAN CAMPUS
With just over 20,000 students on our Norman campus, students enjoy access to stimulating academic programs in a supportive community and beautiful surroundings.

NORMAN CAMPUS COLLEGES
Architecture
Arts and Sciences
Atmospheric and Geographic Sciences
Continuing Education
Engineering
Gaylord College of Journalism and Mass Communication
Graduate International Studies
Jeannine Rainbolt College of Education
Joe C. and Carole Kerr McClendon Honors College
Law
Liberal Studies
Mewbourne College of Earth and Energy
Michael F. Price College of Business
University College
Weitzenhoffer Family College of Fine Arts

STUDENT LIFE
With more than 450 student organizations, including professional, social, religious, political and cultural groups, every student will have the opportunity to get involved at OU!

DIVERSITY
OU is truly a global community. We have students from all 50 states, more than 50 tribal affiliations and more than 100 countries represented on our campus.
Information about the J-1 Internship Program

The Department of Chemistry and Biochemistry participates in a J-1 Student Internship Program. All correspondence, including application materials, should be mailed to the following:

Department of Chemistry and Biochemistry  
University of Oklahoma  
101 Stephenson Parkway, SLSRC, Rm 1000  
Norman OK 73019-5251 USA  
Phone: (405) 325-4811  Fax: (405) 325-6111  
Visit us on the Web at http://chem.ou.edu  
email: chemintern@ou.edu

Checklist for applying to the Chemistry and Biochemistry J-1 Program:
1) Complete the internship application form and submit it with your application.  
http://chem.ou.edu/exchange-programs
2) Send photocopies of your transcripts to the Chemistry and Biochemistry Intern Program assistant at the address listed above or email chemintern@ou.edu  
3) Send photocopies of your TOEFL or IELTS score to the Chemistry & Biochemistry Intern Program Assistant  chemintern@ou.edu  
4) Ask three individuals who are familiar with your college work to write letters of recommendation concerning your likelihood for success in the program and have the letters mailed directly by the letter writers to the Chemistry and Biochemistry Intern Program Assistant  chemintern@ou.edu

Procedure for the formal application to the J-1 Internship Program:
1) Complete the Department of Chemistry and Biochemistry J-1 Internship Program Application  
http://chem.ou.edu/exchange-programs
2) Complete the University J-1 Intern Participant Information Form  
https://ouiss.wufoo.com/forms/j1-intern-participant-information-form/
3) Contact the OU International Student Services Office to assist completion of the forms and coordination between The University of Oklahoma and your own University

Additional Contact Information:

Tracy Shaw  
International Intern Coordinator  
International Student Services  
College of International Studies  
640 Parrington Oval, Room 224 Norman, OK 73019  
University of Oklahoma  
Phone: (405) 325-3337  
Fax: (405) 325-0197  
Internationalintern@ou.edu

The University of Oklahoma, in compliance with all applicable federal and state laws and regulations does not discriminate on the basis of race, color, national origin, sexual orientation, genetic information, sex, age, religion, disability, political beliefs, or status as a veteran in any of its policies, practices, or procedures. This includes, but is not limited to: admissions, employment, financial aid, and educational services. For questions regarding discrimination, sexual assault, sexual misconduct, or sexual harassment, please contact the Office(s) of Institutional Equity as may be applicable: Norman campus at (405) 325-3546/3549, the Health Sciences Center at (405) 271-2110, or the OU-Tulsa Title IX Office at (918) 660-3107. Please see www.ou.edu/eoo. The University of Oklahoma is an equal opportunity institution.