ChemNotes

{TUFTS UNIVERSITY CHEMISTRY DEPARTMENT}

2000 • FALL

Christy DiCologero looking into the ultra-high vacuum chamber.

DUAL MISSION

Research and Education

The Tufts University Department of Chemistry continues its commitment to the dual mission of education and research.

RESEARCH

Arthur L. Utz

Professor Utz joined the Tufts Chemistry Department in 1994 following graduate training at the University of Wisconsin-Madison and a postdoctoral appointment at the Massachusetts Institute of Technology. He was recently promoted to the rank of Associate Professor of Chemistry. His research group at Tufts conducts experiments that reveal the mechanistic basis for important reactions occurring on the surface of transition metal catalysts.

In many chemical reactions, reagents take part in a richly choreographed script that brings reactants together, allows some chemical bonds to break while others form, and then produces new chemical species as the reaction proceeds. A mechanistic understanding of this chemical dance provides the insight necessary to manipulate and control the outcome of the reaction. Modern organic chemistry provides a striking example of this approach.

Unfortunately, such understanding is rarely, if ever, available for reactions on solid surfaces. It is generally known that heterogeneous catalysts lower activation energies by forming new adsorbate-surface bonds while other bonds break. It is much less clear which molecular contortions accompany this transformation of reactants into products.

Continued on page 2

Chair's Corner

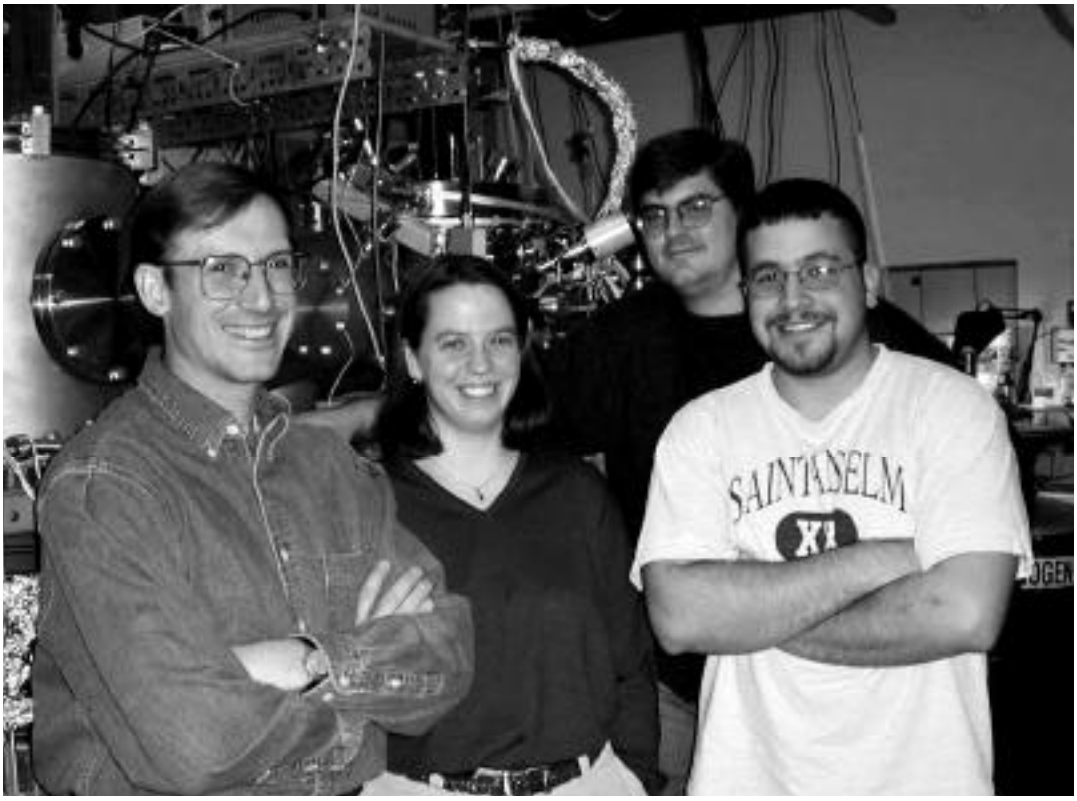
MARY SHULTZ

This fall Professor d'Alarcao stepped down as chair of the department to take a well-deserved sabbatical leave. The department has taken some significant steps forward under Professor d'Alarcao's leadership. We expanded the regular offerings in our introductory chemistry program with the implementation of the Chemistry 11/12 sequence (more about this below). This year we graduated a record number of Ph.Ds with eleven students graduating — nearly one-quarter of the total for Arts and Sciences. These eleven students came from eight different research groups. The department remains strongly committed to both sides of its dual mission of research and teaching. Importantly for the future of the department, we are extremely pleased to announce that Professor Utz has achieved tenure, becoming a permanent part of our faculty. Congratulations!

The chemistry 11/12 sequence has just completed its first two cycles and early results are very positive. Chemistry 11/12 was designed as an introductory chemistry course for those with strong preparation. This class features seminar style presentations by practitioners of the art designed to illustrate how the chemistry

Continued on page 8

Insights gained from this work have led to a strategy that controls chemistry on surfaces.



Utz group: Art Utz (1.) with graduate students Christy DiCologero, Richard Smith and Deno DelSesto.

Pioneering experiments conducted in the Utz group have provided chemists with a new way to probe how dynamical motions drive reactions at the gas-surface interface.[1] These experiments use infrared laser light to impart molecules with a precisely known molecular motion prior to their impact with the surface. Tuning the light into resonance with different absorption transitions selects the molecular motion under study. Sensitive analytical techniques then quantify the efficacy of that motion in promoting dissociation and adsorption of the gas-phase reagent onto a surface. Those motions that best promote reactivity resemble the critical molecular deformations needed to access the transition state for the reaction.

Initial experiments explore the mechanism for methane dissociation on a nickel surface.In a typical industrial reactor one methane molecule reacts for every billion molecules incident on a catalyst surface.The mechanistic origin for this low reactivity has been the subject of extensive debate. On one hand, C-H bond extension would appear necessary to produce the surface-bound CH3 and H dissociation products. Alternately, the reaction barrier may arise from the need to bend the tetrahedral methane molecule and expose the central carbon atom to the nickel orbitals that form the Ni-CH3 bond. In both of these pictures,energy required to distort the methane molecule into a favorable geometry for reaction contributes to the activation barrier.

State-resolved experiments provide a direct experimental test of these ideas. Infrared laser excitation of a C-H stretching vibration prepares reactants whose C-H bonds are already stretched as they approach the surface. This excitation enhances methane dissociation on nickel by a factor of 1600 relative to molecules in their ground vibrational state. [2,3] Laser excitation of a bending vibration is less effective than C-H stretch excitation in promoting reactivity. The differing efficacy for these two forms of vibrational energy leads to three important conclusions regarding methane dissociation: 1) the high activation barrier arises, at least in part, from a need to stretch a C-H bond, 2) bending excitation is less important than stretching excitation and 3) energy deposited into different vibrational motions can influence reactivity in different ways.

1 P. R. McCabe, L. B. F. Juurlink and A.L. Utz, *A molecular beam apparatus for eigenstate-resolved studies of gas-surface reactivity,* Rev. Sci. Instrum., **71**, 42 (2000).

2 L. B. F. Juurlink, P. R. McCabe, R. R. Smith,C.L.DiCologero and A.L. Utz, *Eigenstate-Resolved Studies ofGas-Surface Reactivity: CH4 (n3) Dissociation on Ni(100),* Phys.Rev. Lett., **83**, 868 (1999).

3 L. B. F. Juurlink, R. R. Smith, P. R. McCabe, C. D. DiCologero and A.L. Utz, *in preparation,*

These experiments are not limited to studies of vibrational effects. Preparing reactants in selected rotational states reveals how molecular rotation and orientation influence reactivity.[4] Such experiments suggest that the surface may exert a torque and reorient, or "steer incident," methane molecules from unfavorable approach geometries into orientations more favorable for reaction. Experiments are currently underway to further test this idea.

Insights gained from this work have led to a strategy that controls chemistry on surfaces.[5] The laser excitation process results in a highly collimated stream of reactive molecules impinging on the surface. This innovation, which is the subject of a U.S. patent application, could find important uses in semiconductor and materials processing where such a source of reagents would permit etching or growth of surface structures with extremely steep walls.

Research in the Utz group is supported by a grant from the National Science Foundation.
You can learn more about this work, take a virtual laboratory tour, and find recent publications at the Utz group website,
http://www.tufts.edu/~utz/index.html


Krishna Kumar using Chime® to display molecular structures.

EDUCATION

Teaching with Technology

A new initiative called "Teaching with Technology at Tufts" (TTT) sponsored by Academic Technology and the Center for Teaching Excellence brings technology into the classroom. In its first year, six fellowships were competitively awarded to diverse projects ranging from The Sungeati Epic (History) to Molecular Visualization (Chemistry and Biology). **Krishna Kumar** was one of the six fellows for 1999. His project titled "Scientific Visualization in Organic and Biological Chemistry" has led to the development of a web site which allows interactive learning. A representative database of three dimensional organic molecules has been compiled and these can be rotated and examined in three dimensions on any personal computer across campus. Furthermore, enzyme and chemical kinetics are explained by intuitive plots with user controlled data input. The site is now being expanded to include tutorials on enzyme and protein structure, again with molecular models that allow examination in 3-D space. This initiative serves to exemplify how the much hyped concept of interactivity can be applied to genuine pedagogic ends.

Critical thinking in general chemistry

Jonathan Kenny has been involved in the initiative to teach critical thinking in General Chemistry courses for scientists and non-scientists.The aims are to claim the students' attention during their introduction to science and to teach them the types of thinking they will need to develop scientific minds. They learn the use of metaphor, testing of hypotheses and inductive/deductive reasoning. In Spring 2000 semester, Kenny taught "Critical Thinking and Writing" in Chem 8, an environmental chemistry course for nonscience students. Student journals, with entries based on articles from current periodicals, form a major component in this course. The journals help students accomplish several important pedagogic goals, including connecting classroom learning to real-world issues and events, establishing connections between students' own disciplines and the natural sciences, especially chemistry and using the integrative power of regular writing assignments to help students establish their command of the course material.

A critical thinking component, which utilizes Giere's six-step program for evaluating theoretical hypotheses was added to the course. In addition to using this program to evaluate a common article assigned to the whole class, students are invited to use it regularly in their journal entries, when the article they have selected is amenable to such an analysis.

The journals help students accomplish several important pedagogic goals, including connecting classroom learning to real-world issues.

4 L. B. F. Juurlink, R. R. Smith and A.L. Utz, *The role of rotational excitation in the activated dissociative chemisorption ofvibrationally excited methane on Ni(100),* Trans. Faraday Soc., *in press,* (2000).

5 L. B. F. Juurlink, R. R. Smith and A.L. Utz, *Controlling Surface Chemistry with Light:Spatially Resolved Deposition ofRovibrational-State-Selected Molecules,* J. Phys.Chem. B, **104**, 3327 (1999).

Faculty and Staff News

Michelle DeBakey joined the staff in the front office last May. A graduate of Emerson College, Michelle brings to the department a very interesting background. She is an independent film maker currently working on a video documentary called *Quality of Life*. She has utilized this expertise to become a valuable resource for media-related projects.

Dave Wilbur, Instrumentation Specialist, also joined the department last May. His substantial NMR experience has added quality to the department's research endeavors. Since his arrival, he has developed training sessions for the NMR and SEM and supervised the successful installation the EPR.

David Walt initiated the Outreach Program in 1989 to introduce students to science at an early stage in their education.Initially, Walt took a few volunteers from the organic chemistry class and visited local elementary schools.The program has since expanded and is now under the direction of **Sarah Iacobucci**, manager of the teaching laboratories. Experiments are selected to demonstrate chemical principles with safety as a key criterion for selection.There are multiple benefits to the program including an opportunity for Tufts undergraduates to learn about teaching while providing an enriching science experience for elementary school students. Women are especially encouraged to volunteer for the project to serve as role models for young girls.

Chris Morse, lecturer for the Chemistry Department, is also currently serving as the Graduate Training Coordinator at Tufts. This position is the second-in-command at the Center for Teaching Excellence and is designed to create and organize all faculty development opportunities for current graduate students.The goal is to make them better educators and more attractive candidates in the academic community.

The American Chemical Society theme for 1999 was "Celebration of Color." As an invited speaker, **Mary Shultz** spoke about bringing colorful, cutting edge research into the introductory chemistry curriculum with nanoscaled materials. Gold, the color, arises from squeezing the nearly free electrons in the metal into a small space.The regular array of the atoms in the cluster, and the essentially free electrons make this an excellent system for teaching many fundamental properties of electrons. As computer components scale to smaller and smaller size to increase speed and reliability, the structures are predicted to approach nanoscale within the decade. Hence, understanding conductors and contacts on this scale is a subject of intense investigation.

At the Gordon conference on vibrational spectroscopy which featured an evening devoted to Sum Frequency Spectroscopy, **Mary Shultz** presented her group's recent work on probing the structure of water and ammonia at the aqueous/air interface.

Professor Shultz also gave an invited presentation at the March ACS meeting in San Francisco which featured the research projects completed by students from the undergraduate physical chemistry laboratory – synthesis of gold quantum dots and discovering a transition state analogue for alcohol dehydrogenase. She also gave a presentation at the Telluride Conference on Water titled,

Scenes from the summer cookout to welcome new graduate students.

"Water in the confined space of the Air/Water Interface" and chaired a session on condensed water in the atmosphere.

David Walt is in his fifth year as the executive editor for *Applied Biochemistry and Biotechnology*.

Clemens Richert won the ORCHEM 2000 award from the Organic Division of the German Chemical Society. He was also a speaker at the Frontiers of Chemistry Symposium at Seeon, in July.

At the ACS Meeting in San Francisco, **Elena Rybak-Akimova** gave an invited lecture at the symposium on molecular mechanics of coordination compounds.

Krishna Kumar is the Tufts University nominee for the PEW Science Scholar Award.

Sam Kounaves chaired the Gordon Research Conference on Chemical Sensors in Ventura CA. He also gave an invited lecture on Planetary Chemical Analysis: In-Situ Electroanalysis of the Soil on Mars). Kounaves and his research team, who have been involved in the research and development of MECA, a robotic chemical laboratory for analysis of the soil on Mars have been awarded two new grants from NASA.The grants were awarded by NASA's Space Life Sciences Division Advanced Human Technology Program (AHST) in support of research and development of technologies that will allow humans to explore and live in space safely and efficiently.

Subsurface Contaminant Monitoring Using Laser Fluorescence was written by **Jonathan Kenny** and co-authored by **Jane Pepper**, **Andrew O. Wright**, and **Yu-Min Chen**. The book was published by Lewis Publishers in January 2000.

Karl Illinger spent his sabbatical leave, Spring 2000, exploring *ab initio* computational methods to analyze the infrared radiative properties of technological gases. Building upon previous work on the fluoroethanes, he extended these studies to more complex molecules of the type that are currently entering the arena of chlorofluorocarbon replacements. While these replacements evade the problem of ozone depletion in the stratosphere caused by chlorofluorocarbons,they retain the intense absorption in the infrared,and hence remain potential greenhouse-effect gases. His research has previously shown that *ab initio* calculations of the instantaneous infrared forcing ($W\ m^{-2}\ ppbV^{-1}$) are competitive with experimentally determined values. Furthermore, *ab initio* computations at a sufficiently high level of the theory, in addition to providing reliable numerical estimates, also permit an analysis of how molecular properties vary with molecular structure. His recent work has further demonstrated the cogency of a model for infrared radiative properties based on atomic polar tensor analysis. The ability to predict infrared radiative, as well as other, molecular properties by *ab initio* computations can then serve as the scientific basis for the molecular engineering of technological gases.

Student News

Undergraduates

Chemistry Major Awards 1999–00

The R.M. Karapetoff Cobb Award
Shari Cohen
Melissa Passino

The M.D. Angell & H.B. Durkee Scholarship
Rebecca Noll

The Durkee Scholarship
Michael Hilinski
David Stitelman

The Max Tishler Prize Scholarship
Shari Cohen
Nicholas Spinelli

Howard Sample Prize in Physics
David Stitelman

Audrey Butvay Gruss Science Award
Rebecca Noll

The Theresa McDermott Carzo Award
Susan Meaney

The Prize Scholarship of the Class of 1882
Bradley McGregor

Graduate Students

At The Gordon Conference on Vibrational Spectroscopy, **Carolyn Gin** (Shultz) presented a poster featuring water and ammonia in small clusters in CCl_4.
Danielle Simonelli (Shultz) gave an invited talk at the ACS meeting in Washington D.C.on "Ammonia at the *Air/Water Interface — a Probe for Water.*"

Last summer, the Chemistry Department teamed up with the Wright Center for Science Education and hosted a workshop for twenty-five master teachers from all over the United States. **Magdalena Tsakova**, from the American College of Sofia in Bulgaria,led the workshop giving an international perspective to the quest of exciting young minds about the study of chemistry. In the chemistry department, **Professor Shultz**, several graduate students, **Colleen Bleczinski, Christine Jaworek, Cheryl Schnitzer, Danielle Simonelli**, and local high school student Kimberly Shultz led participants in hands-on experiments using color, toys, and other tricks to excite secondary students about chemistry.

Semester Achievement Awards

Spring 1999
TEACHING ASSISTANT:
William Connors
STAFF: Minh Nguyen
FACULTY: Arthur Utz

Fall 1999
TEACHING ASSISTANT:
Georgia Marnera and David Turner
STAFF: Michelle DeBakey and David Wilbur
FACULTY: Chris Morse

Spring 2000
TEACHING ASSISTANT:
Henning Groenzin
STAFF: Minh Nguyen
FACULTY: Marc d'Alarcao

Doctoral Degrees Awarded

1999

Rich Breitkopf (Haas) "Novel MOCVD Routes to Solid State Ionic Materials"
Todd Dickinson (Walt) "Cross-Reactive Fiber-Optic Sensor Arrays in the Design of an Artificial Nose"
Karri Michael (Walt) "Development of High-Density Optical Fiber Arrays: New Designs and Applications in Microscopy, Microfabrication and Chemical Sensing"

2000

Charles Amass (Haas) "An NMR Study of Lithium Reactng with N, N'bis[2-(dimethylamino) ethyl]-N,N,-dimethyl 1,2-Benzenedimethanamine, A Model compound of Lithium-Graphite Intercalation.
Colleen Bleczinski (Richert) "Synthesis, Selection,and Characterization of Oligonucleotide Hybrids with Increased Target Affinity and Selectivity"
Christine Jaworek (d'Alarcao) "Synthesis of Inositol Phosphate Glycons"
Ludo Juurlink (Utz) "Eigenstate-Resolved Measurements of Methane Dissociation on Ni(100)"
Alexander Kornienko (d'Alarcao) "Practical Enantiospecific Synthesis of Differentially Protected Cyclitols"
Melissa Nolan (Kounaves) "Microfabricated Iridium Arrays: Failure Mechanisms, Investigation of the Hg-Ir Interface and their Use in Cu or Hg Determination"
Jane Pepper (Kenny) "Design and Application of a Multichannel laser-Induced Fluorescence System for Environmental Monitoring"
David Sarracino (Richert) "Inter-and Intramolecular Complexes of Single Stranded Oligonucleotides with Peptides and Peptide Analogs"
Cheryl Schnitzer (Shultz) "Sum Frequency Generation of Water on Inorganic Acid and Salt Solutions"
Sigurdur Smàrason (Robbat) "Advances in Cone Penetrometry and Fast Gas Chromatography/Mass Spectrometry for the Sampling and Analysis of Subsurface Pollutants"
Angela Zapata (Robbat) "Development and Performance Enhancement of a Microwave Induced Plasma Mass Spectrometer for Gas Chromatographic Detection"

Master's Degrees Awarded

1998–99

Christa Bock (Walt)
Roberto Bosco (Kenny)
Gregory Hall (Utz)
Georgia Marnera (d'Alarcao)
Laura Taylor (Walt)
David Turner (d'Alarcao)

1999–2000

Kendra Dombi (Richert)
William Connors (Richert)
Dahai Ren (Walt)
Christiane Struve (Shultz)
Xiarong Tang (Walt)
Charles Tetzlaff (Richert)

{ INSTRUMENTATION }

THE NATIONAL SCIENCE FOUNDATION GRANTED AN award for "Purchase of an EPR Spectrometer for Inorganic Chemistry Research", in 1999.This award from the Chemistry Research Instrumentation and Facilities (CRIF) Program of NSF was supplemented by matching funds from Tufts University and allowed the Chemistry Department to purchase a modern electron paramagnetic resonance (EPR) spectrometer from Bruker.

An electron paramagnetic resonance (EPR)spectrometer is used to obtain information about the molecular and electronic structure of molecules.The EPR method provides unique information about the electronic structure of molecules having unpaired electrons. Most transition metal compounds fall into this category. The method may also be used to obtain information about the lifetimes of free radicals which are often essential for the initiation of tumor growth and/or a variety of chemical reactions.

Dave Wilbur, Instrumentation Specialist, at the EPR spectrometer.

An EPR method provides an invaluable tool in characterizing paramagnetic compounds, in particular, free radicals and open-shell transition metal complexes. In coordination chemistry, the method is very helpful in determining the oxidation and spin state of the central metal ion, the geometry of its coordination sphere, the details of the electronic structure of the complex, and the extent of spin-spin interactions and/or spin delocalization in multinuclear compounds.The availability of an EPR technique is often critical for inorganic chemistry research, since the traditional NMR method fails for most of the paramagnetic samples because of enormous line broadening. The absence of an EPR instrument at Tufts University severely limited the progress in inorganic chemistry research, as well as in related areas of biomedical and materials science (the areas of focus at the Chemistry Department).

Junior faculty Elena V. Rybak-Akimova will be the primary user of this instrument, which will facilitate her studies on transition metal coordination chemistry and the design of selective redox reagents and catalysts. In addition, she will investigate magnetically coupled materials, five-coordinate species with a vacant site at the metal ion, and molecular tweezers.

The Chemistry Department has been highly successful in building on its strengths in the focus areas of environmental, materials, and biomedical chemistry. The Tufts administration and the department faculty continue to work together to produce an excellent research environment by attracting young scientists to the faculty and providing much needed infrastructure support, primarily in the form of fully renovated laboratories and physical facilities. While significant recent acquisitions have been made in the area of research instrumentation (e.g. new console for the NMR AM 300 spectrometer, electron microscope, MALDI TOF mass spectrometer, AA), in the area of characterization of paramagnetic compounds we have fallen behind.The new EPR spectrometer will significantly improve the infrastructure for chemistry research and strengthen the existing collaboration between the departments on the Medford campus.In fact, the need for an EPR spectrometer is even clearer, when the instrumentation currently available is considered in the context of related instrumentation available for chemistry research at other departments on campus. While there are numerous tools for characterization of organic molecules and organic/inorganic bulk materials in the department, the capabilities of characterizing individual paramagnetic molecules are limited. At the same time, extensive instrumentation for magnetic susceptibility measurements, including SQUID magnetometer, is available in the Physics Department and can be used for chemical research on magnetically coupled materials on a time-shared or collaborative basis. EPR data will complement the results of magnetic measurements and help in interpretation of ground and excited spin states in such materials. Electron paramagnetic resonance is also indispensable in collaborative research with the Biotechnology Center in the field of biomimetic materials, in particular, in catalytic peroxidase-mimicking oxidative polymerization of phenols.The mechanistic studies of the transition-metal catalyzed redox reactions are vitally important for several research projects currently underway in Rybak-Akimova's group. EPR spectrometer will provide the missing link between the kinetic data and their mechanistic interpretation, giving the much needed information on the electronic structure of catalytically active intermediates. The availability of an EPR instrument will also provide new insights into the current projects in several other research groups.

The instrument will be actively used in teaching and training of undergraduate and graduate students and postdoctoral researchers. All members of Rybak-Akimova's group will be involved in extensive EPR work in the course of their training. Students who will be

Continued on page 9

Class *notes*

1979 **Maria Campos Toft**, a graduate of Penn State College of Medicine, is an Assistant Professor of Pediatrics at UMDNJ University Hospital in Newark,N.J. She has five children (ages 3, 5,8,10, and 12), is a faculty member at UMDNJ and is very involved with her children's activities.

1994 **Eric Farbman** (BS 1994-MS 1995), a graduate of New Jersey Medical School is starting his neurology residency at the University of Pittsburgh Medical Center.

1994 **Jennifer Sloan** is currently employed at Ascent Pediatrics, a drug development company dedicated to addressing the unmet medical needs of children through the development of differentiated,proprietary products. Jennifer was married at Goddard Chapel in 1997 to Jeremy Slotnick, also a Tufts graduate.

Where are they now?

Melissa Nolan (Ph.D. 1999) Post-Doc, Northwestern University
Bizuneh Workie (Ph.D. 1996) Asst. Professor, Jackson State University
Wen Deng (Ph.D. 1995) – R&D Chemist, Copley Pharmaceutical,Inc.
Timothy Zhaohui Liu (Ph.D. 1994) Research Chemist, Perkin-Elmer-Biosystems
Stefanos K.Intzes UG Research 1999/2000 – University of Oxford Medical School.
Emily M. White UG Research 1996/97 – Ohio State University Chemistry Ph.D.Program
Steve Baldelli (Shultz) Post Doc w/ Somerjai, Berkeley
Colleen Bleczinski (Richert) Post Doc Columbia
Chris Jaworek (d'Alarcao) Faculty Position at Emmanuel College
Ludo Juurlink (Utz) Post doc in Holland

IN MEMORIAM

. . . . . .

CIRCA 1935

Thomas Glynn, Jr.

DIED AT THE AGE OF 86

IN RIDGEWOOD, N.J.

HE WAS

A CHEMIST AT LEVER

BROTHERS FOR

FORTY YEARS.

Chair's Corner

Continued form page 1

that students are learning is used in cutting-edge developments in the field. The first group of students through the sequence has just concluded the process of choosing majors and nearly one-quarter choose a major in our department – chemistry, biochemistry, or chemical physics. More than 85 percent of the alums of this class choose a major in one of the science or engineering disciplines. Although the direct goal of the course is to teach students chemistry, it appears that the combination of a higher level discussion made possible by the student's strong preparation and the prominence of the relevance of chemistry to current real world problems has also enticed a large portion of the class to delve further into the subject.

Mary Shultz

Our major challenges in the coming year are to add to the faculty and continue the process of raising funds for completion of the renovation of Pearson. For the faculty position, we seek candidates with research interests that augment our focus areas: biomedical,environmental, and materials. Alumni are often excellent sources of contacts for prospective faculty. I urge you to bring our search to the attention of individuals dedicated to dual careers in teaching and research.

If you are in the Boston area, I invite you to stop by to see first hand what support from friends of the department has done for the department. Several research labs have been renovated providing excellent facilities for the groups housed therein. The new classroom is the envy of the campus with a full array of AV equipment and comfortable surroundings. Acquisition of a major influx of modern equipment for the physical chemistry laboratory is nearly completed. This equipment is supported by a grant from the National Science Foundation, a grant greatly assisted by the modern facility. All but our most recent alums will have difficulty recognizing this facility and we thank all of you who contributed to make this possible. We also thank you in advance for your assistance in seeing us through the remainder of this renovation project.

Mary Shultz
Chair

Instrumentation

Continued from page 7

joining the group in the future will also acquire experience with the EPR technique. Although the instrument will primarily be used as a research tool, it will occasionally be used in teaching the Chem165 (Physical methods in Inorganic Chemistry) course – a graduate level course (open for advanced level undergraduates) developed by the Co-PI. As a result, a number of students will become aware of the real potential of the EPR method, and will appropriately use the technique in their research at Tufts, and in their future professional careers.

The students will enter the work force with a hands-on appreciation for the capabilities of the EPR technique, one of the most powerful methods of characterization of paramagnetic compounds and materials.

The Bruker EMX spectrometer, is a relatively simple, although very powerful research tool.The instrument is equipped with a temperature controller needed for low-temperature and variable-temperature experiments. In addition to excellent technical characteristics of the EMX spectrometers (in particular, homogeneity and stability of magnetic field, high resolution and sensitivity), the system has several other attractive features, including modular design which allows for a modification and upgrade of individual blocks and provides the flexibility over a long period of operation, and an IBM-compatible PC interface which greatly simplifies instrument operation and data processing. The use of MS Windows environment for the EMX spectrometer software makes the operation of the instrument intuitive and user-friendly, and provides an open interface to peripherals and other software packages.This is possible due to parallel processors (transputers) in each of the module, which perform real-time multi-function operations such as field sweeps without active PC participation.This architecture is particularly important for new or inexperienced users of the EPR spectrometer. The usually long learning curve for the students studying the EPR method is expected to become significantly shorter due to MS Windows interface used by every student on an everyday basis. As a result, more graduate and undergraduate students will operate the spectrometer and acquire experience and expertise in EPR technique.

Donors to the CHEMISTRY FUND for support of renovations

Ms. Carolyn Allen
Dr. Anthony Bevilacqua
Mr. Merrill Bleyle
Dr. Jon Michael Brooks
Dr. Richard Brown
Mr. Warren B. Brown
Ms.Janet Cares
Dr. Tae Cho
Dr. Richard Cottiero
Dr. Harold Freedman
Mr. Mitchell Goldman
Mr. Clifford Harrington
Dr. and Mrs. William Koster
Mr. Jack Krol
Dr. J.B. Liska
Dr. Bruce Marshall
Mr. John McGonagle
Dr. Robert O'Brien, Jr.
Ms. Mary Passalacqua
Mr. Joseph Peppe
Mr. Richard Popovic
Ms. Lisa Reindorf
Mr. Martin Robbins
Mrs. Elizabeth Tishler
Mr. John Young

The Tufts Chemistry WEB site!

http://chem.tufts.edu

OUR SITE PROVIDES INFORMATION SUCH AS COURSE LISTINGS, current course material, degree requirements, faculty/staff/student info, the graduate program,special events, links to other chemistry resources, an on-line historical archive, back issues of ChemNotes, and more detailed information about the exciting and ongoing research being carried out by our faculty. The hope is that this resource will provide information for prospective graduate students and alumni and will eventually contain links to many valuable chemistry resources within the department and throughout the world. Check us out and see what is currently going on in the department. You can access our site at: http://chem.tufts.edu

We are still collecting information for several new areas including "Alumni Page" where we would like to list as many of you as possible. We would like to include not only names and e-mail addresses but items of interest and WWW links to Alumni pages and your areas of current employment or involvement. So please write or e-mail us if you would like to be included. Let us know where you are and what you are doing!

The web site was created and is maintained by Professor Samuel Kounaves (skounave<at>tufts.edu).

Seminar Series

SEPTEMBER 12

Prof. Gregory Petsko
Brandeis University
The Trouble with Hydrogens

SEPTEMBER 19

Prof. John Warner,
UMass, Boston
Pollution Prevention using Molecular Recognition and Self Assembly:
An Example of Green Chemistry

SEPTEMBER 26

Prof. John Tully
Yale University
Chemical Dynamics at Surfaces

OCTOBER 3

Prof. Jeffrey Roberts
University of Minnesota
Chemistry at a High-Traffic Interface: Uptake of Small Organic Molecules by Liquid Sulfuric Acid

OCTOBER 17

Prof. James Rusling
University
of Connecticut
Active Biomolecular Films on Electrodes

OCTOBER 24

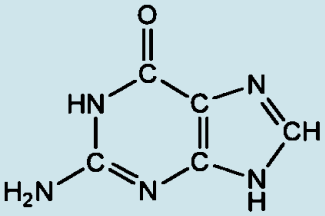
Prof. Sean Decatur
Mount Holyoke College
Probing Peptide Conformation and Dynamics via Isotope-Edited Infrared Spectroscopy

OCTOBER 31

Prof. Sanford Asher
University of Pittsburgh
Crystalline Colloidal Array Materials: Chemical Sensors and Electrooptical Applications

NOVEMBER 14

Prof. Robert Corn, University
of Wisconsin Madison
DNA Computing at Surfaces



NOVEMBER 21

Dr. David Casebier
Arqule
Combinatorial Chemistry Applied to Lead Optimization: Numbers are Not Enough

NOVEMBER 28

Prof. Ricardo Metz
UMass, Amherst
Photofragment Spectroscopy of Reaction Intermediates and Multiply Charged Ions

DECEMBER 5

Prof. Judith Herzfeld
Brandeis University
Recapturing the Conceptual Core of General Chemistry

Visitors are welcome

All seminars are held in the Pearson Chemistry Building, 62 Talbot Avenue in Medford, Room 106 at 4:30 p.m.unless otherwise noted. Refreshments are served in Pearson 102 thirty minutes prior to the seminar. For more information please contact 617-627-2634

NO POSTAGE
NECESSARY
IF MAILED
IN THE
UNITED STATES

BUSINESS REPLY MAIL

FIRST CLASS MAIL PERMIT NO. 3696 BOSTON, MA

Postage will be paid by addressee

Newsletter
Department of Chemistry
Tufts University
62 Talbot Avenue
Medford, MA 02155

6149 11/00
Printed on recycled paper

Alumni Reply Form

Name _____

University _____

University _____

University _____

Residence Address _____

City, State, Zip _____

Firm _____

Business Address _____

City, State, Zip _____

☐ This is a new address

Please complete and return this form for our alumni files. Include news of your current activities or suggestions for the next newsletter.

DegreeYear Adviser _____

DegreeYear Adviser _____

DegreeYear Adviser _____

Home phone _____

Position _____

Business phone _____

Name of spouse _____

☐ I do NOT wish to have this information in the newsletter.
(Unless you request otherwise, we will feel free to mention any of this in future newsletters.)

Please fold here and tape shut with business reply side facing out.

INFORMATION ABOUT YOURSELF:

cut on dotted line

TUFTS

TUFTS UNIVERSITY

ChemNotes

Department of Chemistry
62 Talbot Avenue
Medford, MA 02155

NONPROFIT
ORGANIZATION
U.S.POSTAGE
PAID
BOSTON,MA
PERMIT NO. 1161