

## Chemistry Welcomes New Faculty

Dr. Shawn Campagna joined the faculty in August of this past year as the newest Assistant Professor in Organic Chemistry.

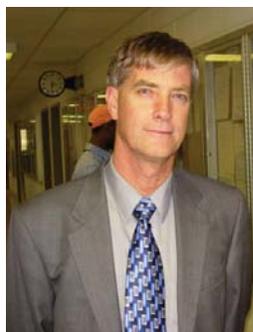
He received his Ph.D. from Princeton University in 2006, after working with Prof. Martin F. Semmelhack on a joint project with Profs. Bonnie L. Bassler and Frederick M. Hughson to characterize the chemical properties of an inter-species bacterial signaling molecule, autoinducer-2. He then worked as a post-doctoral fellow with Prof. Joshua D. Rabinowitz at the Lewis-Sigler Institute for Integrative Genomics at Princeton University where he developed mass spectrometric methods for the identification of natural products from whole cell extracts.

Research in his lab will use organic synthesis, combinatorial methods, and analytical techniques, such as tandem liquid chromatography-mass spectrometry and nuclear magnetic resonance, to answer biologically relevant questions at the molecular level and to further the understanding of biometric catalysis.

## In this Issue...

- New Faculty Addition
- Double duty for Bursten
- Xue named *Creative* chemist
- New addition to the Center for Mass Spectrometry in 2007
- Graduates & Recognitions
- Survey of Alums - Get involved!

## Message from the Department Head



### What's happening in Chemistry?

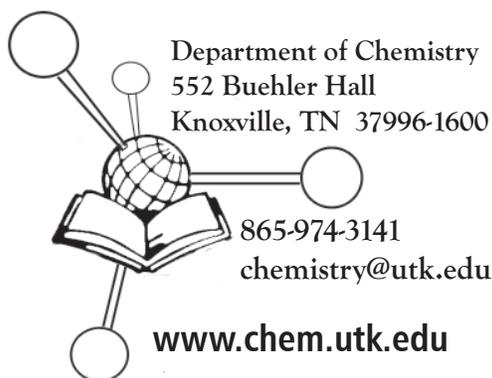
There have been many good things happening in the Department over the last several months. We had one of the most successful and largest entering graduate classes enter last fall at 38 (40 if you include those that came in January). Given that our normal entering class size is between 20 and 25, last year was a bonus for us – and needed. As the last couple of issues of J. Chem. Tenn. have described, the department has been adding a number of new, young faculty over the past several years – Mike Best and Frank Vogt in 2005, Shane Foister in 2006 and Shawn Campagna in 2007. I am very happy to announce the addition of two new assistant professors to the faculty in the fall of 2008: Dr. Jon Camden will join the analytical division and is interested in developing hyper Raman spectroscopy as a new analytical technique. Dr. David Jenkins will join the ranks of inorganic chemists in the fall and is interested in both novel binuclear metal carbene complexes and spin crossover materials. You will see much more about David and Jon in future issues of J. Chem. Tenn. but please join me in welcoming both to the department.

Besides welcoming new students and faculty to the department I want to also congratulate the dean of the college, Dr. Bruce Bursten on assuming the office of President of the American Chemical Society in January. There is a feature article inside on Dr. Bursten's vision for the ACS in the coming year that should be of interest to all.

Finally let me point out a new addition to our mass spectrometry facility that is fast becoming a real star among our students and faculty: the DART MS. Almost from the moment this instrument was put into service, it has become a real blessing to students for obtaining rapid high resolution, MS data on organic compounds with almost no sample prep whatsoever. Take a look at the article by Josh Streufert and Samson Francis about how the DART has affected one research project in Dr. Dave Baker's program. Many other changes are occurring in our MS facility as we transform it into a student accessible, high throughput, small and large molecule MS facility. More on that in the near future.

Let me sign off so that you can get into the interesting articles that we have put together. In the future we plan to put out J. Chem. Tenn. issues on a more frequent, more regular basis so stay tuned.

-Craig Barnes  
Professor and Head



## Dean Bursten sees double duty as ACS president

The College of Arts and Sciences' own dean, Bruce Bursten, has been chosen president of the American Chemical Society. Bursten will serve a 1-year term as president and previously served a 1-year term as president-elect before becoming president in January of 2008. With more than 160,000 members, ACS is the world's largest scientific society.

"Bruce's election is both a significant personal achievement and a feather in the cap of the University of Tennessee," said Chancellor Loren Crabtree. "This level of national and international leadership will help spotlight the university and Bruce's leadership of the College of Arts and Sciences, as well as raise the university's profile in the science and research community." ACS was founded in 1876, and among its past presidents are many Nobel Prize winners, including famed chemist Linus Pauling.

"This is both thrilling and humbling to me," said Bursten. "Chemistry is central to nearly all our global challenges and solutions. ACS must help drive us toward new and essential scientific discoveries and must serve as a strong and vocal proponent of the beauty and power of chemistry."

As the leader of ACS, Bursten will play a key role in outreach, membership, and policy aspects of the society, as well as help manage its business operations. He will also serve as a member of the society's board of directors for the next 3 years.

Bursten cited better communication by the chemistry community and science-education issues as the most important goals of his term. "At a time when we face critical shortages in energy and we are making great strides in research in advanced materials and chemical biology, it is important to communicate to the public the importance of chemistry to society," said Bursten. He also said that he will examine ways ACS can help increase the number of undergraduate students studying chemistry, a focus of his work in the College of Arts and Sciences.

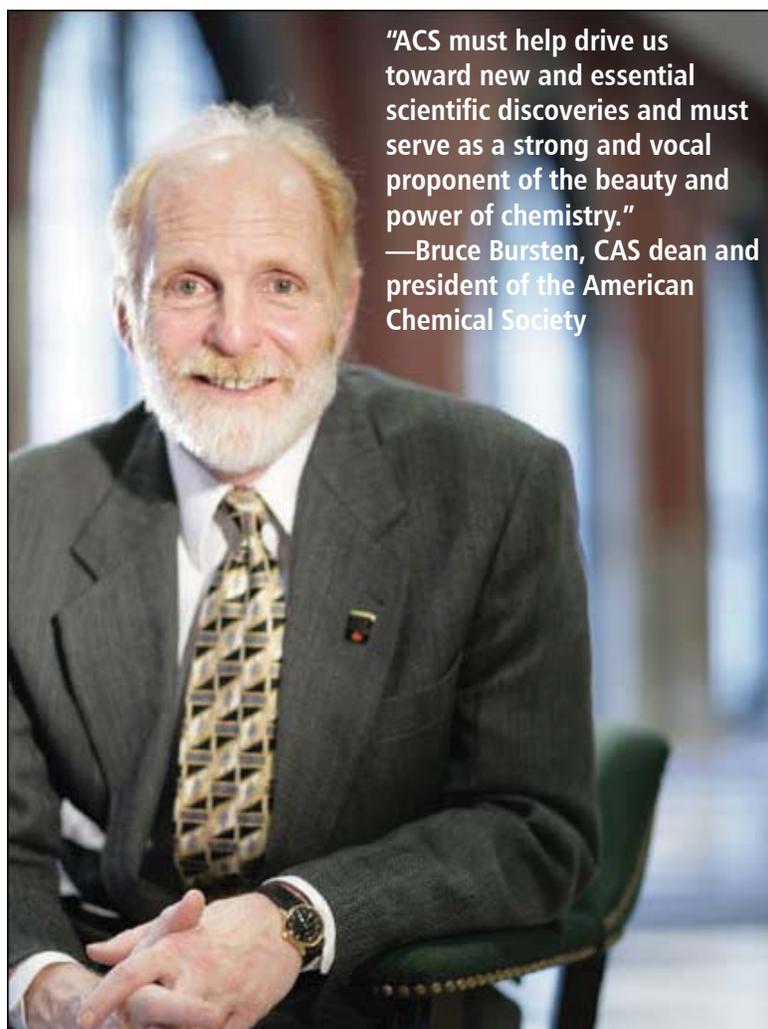
"Bruce certainly joins an elite group in achieving this most recent honor, which is especially significant in coming from his peers in the American Chemical Society," said UT President John Petersen, also an inorganic chemist and an ACS member. "I join Chancellor Crabtree in congratulating Bruce on this success."

Bursten came to UT in 2005 after a 25-year career at the Ohio State University, where he was a distinguished university professor of chemistry and had chaired the chemistry department. He earned a bachelor's degree from the University of Chicago and a Ph.D. from the University of

Wisconsin—Madison.

He then completed a 2-year National Science Foundation post-doctoral fellowship at Texas A & M.

Bursten's field of interest is inorganic chemistry, especially theoretical and computational studies of the chemical structures of and bonding in a variety of metal-containing molecules. Much of his current research involves theoretical studies of compounds near the bottom of the periodic table—uranium, for example—that are key to studying nuclear energy. He has been the author or co-author of more than 150 research papers, and he is the coauthor of a leading general chemistry textbook.



"ACS must help drive us toward new and essential scientific discoveries and must serve as a strong and vocal proponent of the beauty and power of chemistry."  
—Bruce Bursten, CAS dean and president of the American Chemical Society

# Xue receives NSF Special Creativity Award

Dr. Ziling (Ben) Xue, Zeigler Professor of Chemistry, received a rare two-year National Science Foundation (NSF) award for Special Creativity in research. According to the NSF, this award is only given to "its most creative investigators to provide them with an extended opportunity to attack adventurous, 'high-risk', opportunities in their research."

Dr. Xue was awarded this two-year extension for special creativity on his research project, "Probing Novel Reactivities of Transition Metal Complexes and Mechanistic Pathways in Formation of Microelectric Materials", which investigates metal oxide as a substrate material in electronics and chip manufacturing. Xue and his group study the fundamental chemistry related to the preparation of metal oxides which are used as gate insulators in the next-generation micro-processors. Research like this is important in creating smaller processor chips which have a higher performance and lower power requirement.

In January 2007 Intel and IBM announced initial production of 45 nanometer processor chips. The production of such a revolutionary chip has come about because of breakthroughs in research of gate insulators. Breakthroughs in this type of advanced materials research has been called, "...the most significant change in the materials used to manufacture silicon chips since Intel pioneered the modern integrated-circuit transistor more than four decades ago." (John Markoff, New York Times; January 27, 2007).

For more information on Dr. Xue's award or his research visit the Department of Chemistry's web site at <http://www.chem.utk.edu>

## Board of Visitors

The Board of Visitors (BoV) of the Department is a group of individuals from among our alumni and industry that committed to helping the department succeed in all of its missions and activities. This group was first founded by Gleb Mamantov during his tenure as head of the department. We would like to recognize members of Board of Visitors for their continued effort in guiding the direction of the department to succeed in meeting the goals of academic and research excellence and service to the university and community.

- **John Sanders** – Senior Research Associate, Eastman Chemical Company, Kingsport, TN
- **W.D. (Dub) Shults** - Associate Director ORNL, Analytical Sciences Division (Retired)
- **Diane Schmidt** - The Proctor & Gamble Company, Member of the Board of Directors, ACS (District II)
- **Warren Schmidt** – Shell Chemical Company
- **Marc Strand** – Research Associate, Eastman Chemical Company, Kingsport, TN
- **Eric Eastwood** - Honeywell FM&T, LLC, Kansas City
- **Gerald Devault** - Group leader for advanced technology at the Y-12 National Security Complex
- **Larry Brotherton** – President, ORTEC Inc. - Larry and Ortec have supported recruiting activities of the department at national and regional ACS meetings
- **Michelle Buchanan** - Associate Lab Director of Physical Sciences, ORNL
- **Harry Harmon** - Westinghouse Corp (Retired)
- **Arlene Garrison** - Associate Vice President for Research, University of Tennessee, Knoxville
- **Rod Cole** - consultant, analytical chemistry and pharmaceuticals
- **Ed McDaniel** (emeritus board Member) – established the Hilton A. Smith Graduate Fellowship Fund which recognizes excellence and achievement among our graduate students
- **Julian Parker, III**
- **Presand Deshpande** - Bristol-Meyers Squibb Co.
- **Steve Johnson** - President, Gryphus Diagnostics, LLC
- **Phil Britt** - Director, Physical Sciences Division Oak Ridge National Laboratory

## Opening up to new technologies...

The October 8, 2007 edition of *Chemical and Engineering News* highlighted open-air ionization as an emerging technique in mass spectrometry with a wide range of uses from art preservation to ensuring pharmaceutical drug integrity.

This Fall, the Department of Chemistry updated it's Center for Mass Spectrometry with the purchase and installation of a new JEOL AccuTOF™ Mass Spectrometer outfitted with an orthogonal electrospray source (ESI) and direct-analysis-in-real-time (DART) source.

The JEOL AccuTOF-DART™ enables accurate mass measurement of components at both low and high concentrations. Conventional time-of-flight (TOF) systems have used a TDC (Time-to-Digital Converter) which only operates over a narrow dynamic range. In contrast, the AccuTOF™ employs an ADC (Analog-to-Digital Converter) which provides a wide dynamic range exceeding 4 orders of magnitude, comparable to that of magnetic sector or quadrupole mass spectrometers. The AccuTOF™ also maintains high sensitivity for full spectral acquisition, an order of magnitude higher than that of magnetic sector or quadrupole MS.

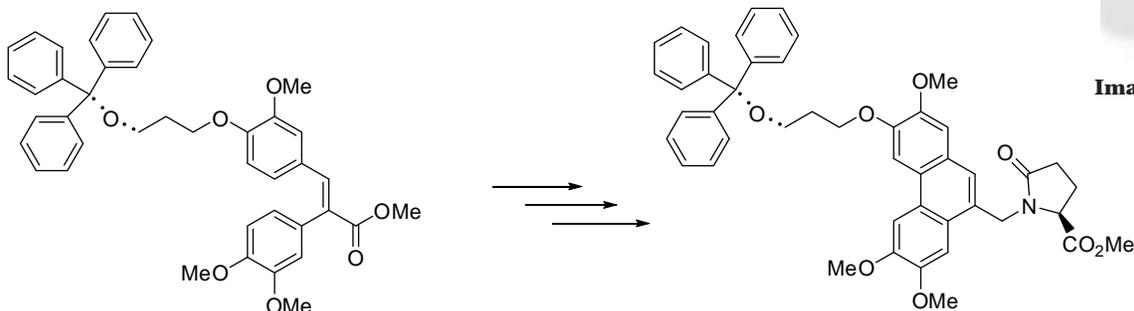
Dr. Shawn Campagna describes the Department's new DART-TOF MS "...as a robust high mass accuracy instrument that will allow our students an opportunity to obtain their own publication quality MS data. This instrument shows promise for making MS experiments as routine as student run NMR experiments."



Direct Analysis in Real Time (DART™)  
US Patent Numbers 6,949,741 and 7,112,786

Image courtesy of JEOL Ltd. [www.jeol.com](http://www.jeol.com)

### Recent results illustrate the power and convenience of the AccuTOF-DART™



Chemical Formula:  $C_{22}H_{25}O_6$ <sup>+</sup>  
Exact Mass: 385.1651  
DART : 385.16518

Chemical Formula:  $C_{27}H_{30}NO_7$ <sup>+</sup>  
Exact Mass: 480.2022  
DART : 480.20581

One part of my research in Dr. Baker's laboratories focuses on the synthesis of a "tethered" derivative of DCB-3503, a previously synthesized anti-tumor agent. The transformation shown above incorporates a five-step synthetic sequence which normally involves purification at each step by silica gel chromatography followed by characterization using NMR and MS. Previous to the arrival of the DART MS, it took almost a week and a half to effect and verify the transformations above. Using the Dart has dramatically shortened the time required to obtain MS data in my research. I was able to verify the identity of each intermediate in the sequence above myself and reduce the time required to a mere four days. This has quickened the pace of my research tremendously and facilitated the deployment of multiple synthetic strategies in the space of a single month, a feat that would have otherwise taken much longer. Even in the first half year of operation, the DART MS system has become an invaluable tool to synthetic organic chemists in our efforts toward drug and natural product synthesis.

Samson Francis (5th year graduate student)

# Honors Day 2007

*Recognizing outstanding Academics, Service and Teaching*

The Department of Chemistry held its annual Honors Day Awards Ceremony on Thursday April 26, 2007 as the culmination of the '06-'07 academic year. Dr. Robert Holub, Provost and Vice Chancellor for Academic Affairs was the guest speaker. Awards were given to outstanding Undergraduates in Analytical, Organic and Physical Chemistry along with general awards and recognitions for achievement and scholarship. Graduate awards were given in specific areas of chemistry as well as overall service, teaching, research and merit awards.

## Undergraduate Awards

**CRC Press General Chemistry Award** - Wesley Crabtree

**The C.W. Keenan Outstanding General Chemistry Student Award** - Sarah Sasscer & Casey Williams

**Judson Hall Robertson Memorial Award in Analytical Chemistry** - Tim Wesley & David Randle

**Analytical Chemistry Division, ACS, Undergraduate Award** - Matthew Walworth

**C.A. Buehler Chemistry Scholarship** - Heather Bass

**Undergraduate Award in Physical Chemistry** - Chinenye Usoh

**D.A. Shirley Award in Organic Chemistry** - Chinenye Usoh

**East Tennessee Section, ACS, Undergraduate Award** - Kathlyn Marzolf

## Graduate Awards

**Carol Moulton ACGS Service Award** - Tray Allen, Julia Covington, and Josh Streufert

**John E. Bloor Award in Physical Chemistry** - Peter Yaron

**D.A. Shirley Graduate Award in Organic Chemistry** - Matthew Smith

**Anthony T. Balchunas Award** - Peter Chapman

**UT Scholarly Activity Research Incentive Fund Research Assistant** - Royce Dansby-Sparks & Matthew Smith

**East Tennessee Section, ACS, Graduate Fellow** - Julia Covington

**Hilton A. Smith Graduate Fellowship** - Royce Dansby-Sparks

**First Year Achievement Award** - Josh Abbott, Manpreet Cheema, Costyl Njiojob, Michael Peretich, and Luciana Vergara

**The C.W. Keenan Outstanding Graduate Teaching Award** - Michael Kris Gilbert

**Outstanding Teaching Award** - Meredith Cable, Samson Francis, Jeremiah Harden, and Jeremiah Woodcock

**Outstanding Service Award** - Matthew Smith

**Research Merit Awards** - Peter Chapman, Jiang Xueguang, and Paige Landry

**The Burchfield Burridge Warner Graduate Fellowship in Chemistry** - Robert "Bo" Luttrell

**Gleb Mamantov Graduate Chemistry Scholar** - Dejin Li

**Eugene John Barber Fellowship in Chemistry** - Richard Mayes

**Chancellor's Award for Extraordinary Professional Promise** - Nathan Carrington

**SAACS Outstanding Chemistry T.A. Award** - Samson Francis

We cordially invite you to join us for Honors Day 2008, April 24, 2008 at 3:30 PM in Buehler Hall.

For more information check our website at [www.chem.utk.edu](http://www.chem.utk.edu).



*"One that beareth a torch standeth in the shadow to give light to others."*

## Chemistry Graduates for Fall 2006 and Spring/Summer 2007

### Fall 2006

#### Ph.D.

Tarab J. Ahmad  
Maolin Chen  
Raynelle M. Connatser  
Richard E. Cook  
Brandon S. Farmer  
James K. Rice  
Lance A. Riddle  
Aaron L. Smith

#### M.S.

Chunlan Chen  
Elizabeth A. Stewart

#### B.S.

Charles T. Wolohon  
David W. Stout

### Spring 2007

#### Ph.D.

Jinbo Cao  
Ming-Yung Lee  
He Qui  
Amber Wellman  
Peter Yaron

#### M.S.

Shraddha Deodar  
Amanda Jones

#### ACS Certified B.S.

Thomas Moore  
Kristan Parson  
Chinenye Usho

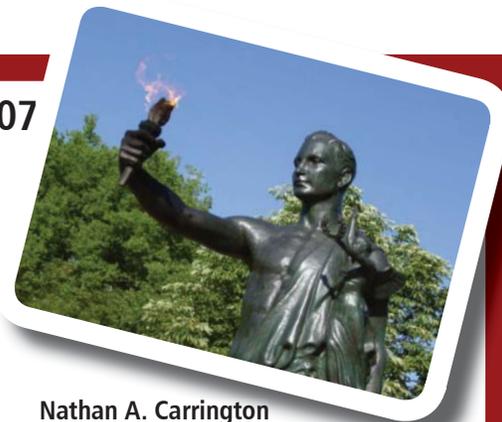
#### B.S.

Joseph Barbarito  
Edwin Lee  
Kathlyn Marzolf  
Heather Stooksbury  
Clark Moore

### Summer 2007

#### Ph.D.

Michael A. Blanchard  
Scott T. Borella



Nathan A. Carrington  
Abhujut A. Naravane  
Deepli Pradeep Kumar  
Jeffrey D. Steill

#### M.S.

Eloise M. Joyce  
Teerapat Rojsajakul

*A special thanks...*

To Dr. Larry Brotherton (1974) and Ortec Inc. for cosponsoring a Graduate Reception at this year's SERMACS meeting in Greenville, South Carolina. Many thanks for your time and support Larry!

## Calling all Alums!

*We need your input!*

The Department will undergo a 10 year program review in September of 2008. In order to have a comprehensive picture of the Department we have composed an Alumni Survey to be completed by both bachelariate graduates and those who obtained advanced degrees here at UTK. In addition to this announcement in J.Chem.Tenn we will be sending invitations to participate to alumni via e-mail. If you wish to participate please visit the web site below or contact Josh Streufert at (865) 974-6976 or [jstreufe@utk.edu](mailto:jstreufe@utk.edu).

<http://www.chem.utk.edu/AlumniSurvey/>

