EASTERN MICHIGAN UNIVERSITY™
CHEMISTRY DEPARTMENT NEWSLETTER
SPRING 2007

New Science Complex Approved by Board of Regents

The EMU Board of Regents unanimously voted to proceed with the renovation of the existing Mark Jefferson building and new construction to make the Mark Jefferson Science Complex at its regular meeting Jan. 19, 2007.

The estimated cost of the entire project is $100 million. The plan encompasses $26.7 million for renovation of the 180,802 square foot building and $73.3 million for 151,000 square feet of new construction.

The project will be primarily funded through the sale of bonds. The majority of the repayment of the bonds will be funded from the four percent tuition and fee increase approved by the Board for this purpose in fall 2005.

"The scope of this renewal project will rehabilitate Mark Jefferson's infrastructure. Furthermore, this renovation will renew a mix of laboratory and classroom spaces to support general education/basic studies curriculum, undergraduate and graduate programming and faculty/student research," said Janice M. Stroh, vice president of business and finance for EMU. "With these improvements, the University will be able to expand its curriculum to meet the needs of today's scientific educators and to be competitive among universities of comparable size and instructional mission." Our own Wade Tornquist, Associate Dean of the College of Arts and Sciences, has been instrumental in shepherding the project to this point.

Welcome New Faculty!

The chemistry department welcomed two new faculty members, Amy Flanagan Johnson and Gregg Wilmes, this fall. Their contributions to the department have already been seen both in the classroom and in the research laboratories.

Amy Flanagan Johnson came to us from the University of North Carolina at Pembroke, where she had been teaching while completing her Ph.D. dissertation. She received her bachelor's degree from Knox College in Galesburg, IL, and earned her Ph.D. from Purdue University. Amy specializes in chemical education and her research focuses on knowledge transfer, the nature of science, and the enhancement of student metacognition through journaling. She is the recipient of a Provost's New Faculty Award to study knowledge transfer in general chemistry courses. When not working on course materials or research, Amy enjoys watching movies with her husband, Greg, spending time with her two dogs Molybdenum and Matilda (Magnesium was vetoed as a potential name by her non-scientist husband) and enjoying the fact that she is no longer writing her dissertation.

Gregg Wilmes came to us from Berkeley, CA, where he was doing postdoctoral research at the University of California, Berkeley, and the Lawrence Berkeley National Laboratory. He attended the University of Notre Dame as an undergraduate and received his Ph.D. from Stanford University. He is teaching mostly organic courses at EMU, and his research interests generally revolve around the synthesis and study of polymeric materials. He received a Provost's New Faculty Award to study the formation of block copolymer micelles using Nuclear Magnetic Resonance spectroscopy. In his free time, Gregg enjoys cooking, skiing, backpacking, complicated board games, and long distance phone calls to California.

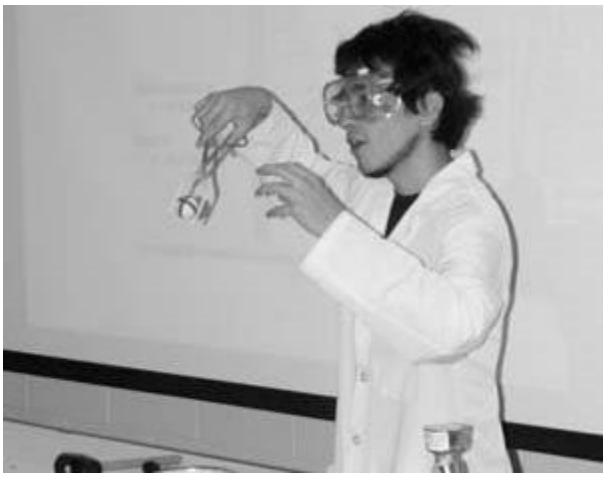
Fall Picnic Held at Spike Farm

A cherished tradition drew to a close this fall with the final Departmental Picnic at the Spike Farm hosted by Professor Emeritus Clark Spike and his wife Avis. The Spikes have generously provided a beautiful environment for the Chemistry faculty, staff, students, and family for many years. We would like to extend our gratitude for all of their hospitality.

Emeritus Professors Yamauchi, Work, and Williamson discuss the joys of retirement.

Saturday at the Lab

On Saturday, October 7 members of the Chemistry Department and Chemistry Club (along with some help from Biology) welcomed the community to Mark Jefferson Hall to prove how much fun science can be.



Undergraduate Eddie Marrero shows the power of liquid nitrogen.

Prof. Mike Brabec makes ice-cream the new-fashioned way.

Analytical Position Filled

The Chemistry Department undertook a successful search this past year for an Assistant Professor position in Analytical Chemistry. Gavin Edwards, currently teaching at Eastern Illinois University, will be joining us next fall. He is originally from Wales and received his B.S. and Ph.D. form the University of Leicester. Dr. Edwards is primarily interested in environmental and atmospheric chemistry.

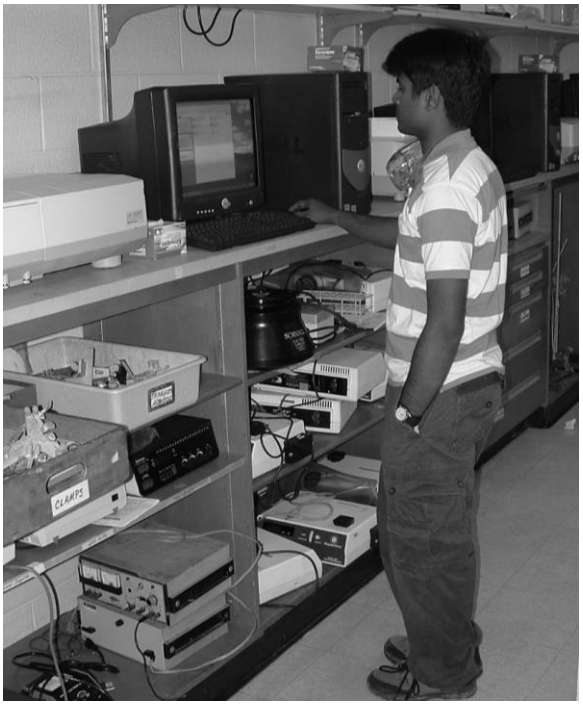
KRESGE CHALLENGE

EMU was awarded the Kresge Foundation Science Initiative grant in March 2006, which gave the Departments of Chemistry and Biology the opportunity to purchase some much needed scientific equipment. The Kresge Foundation will grant EMU $250,000 with the stipulation that we need to raise $1M by September of this year in order to receive the next and final installment of another $250,000.

The equipment that has already been purchased has greatly improved our ability to introduce students to the appropriate use of modern instrumentation. Specifically, we have been able to modernize our biochemistry, physical chemistry, and organic chemistry laboratories. Below is a description of how the instrumentation is being used in our senior-level Biochemistry Laboratory (CHEM453).

(1) **Modernization of Equipment**: Before the acquisition of new equipment, students who wanted to investigate enzyme kinetic parameters had to use a stopwatch and a low-tech spectrophotometer to capture the raw data, use graph paper to determine enzyme activity for each of twelve reactions (each reaction requires at least ten data points), and then replot the data on graph paper (or using Excel) to determine the parameters. This grant has allowed us to purchase modern spectrophotometers and now students can directly monitor enzyme reactions, eliminating laborious manual data acquisition. They can also manipulate the data and obtain Michaelis-Menten kinetic parameters with software tools to produce professional-quality graphs. The students can export these graphs into a laboratory report. These improvements have freed up time during the laboratory period and at home so that students can participate in more productive experiences to broaden and deepen their training.

(2) **Application of Biotechnology**: The Kresge grant complements recently-awarded NSF funding that allowed us to add a biotechnology component to the instructional biochemistry laboratory (CHEM453). Spectrophotometers (Kresge), a table-top preparatory centrifuge (Kresge), a shaking incubator (Kresge), French-Pressure lysis equipment (Kresge), a DNA sequencer (NSF), and 10-liter fermentor (used equipment from the University of Michigan) are important pieces of infrastructure that allow for student training in biotechnology, where bacteria are used as bioreactors to express large amounts of protein to investigate protein structure and function.



(3) **Pedagogical advances**: Leading scientific organizations, such as the American Association for the Advancement of Science (AAAS), endorse the idea that science should be "learned the way that it is practiced". The institution of a modern laboratory in biotechnology has allowed the transformation of the biochemistry laboratory course from one that involves a series of unrelated cookbook laboratory exercises to an integrated suite of technologies and methodologies that are used to pursue novel research projects. Students use on-line software applications to propose amino acid substitutions in proteins that will provide information on protein structure and function, create the mutation using the cDNA for the protein, transform bacteria with the plasmid containing the cDNA, express high quantities of the enzyme in the bacteria, purify the enzyme, and characterize its enzymatic properties to provide support for the hypothesis.

This grant opportunity has elevated our laboratory training of biochemistry students and it will make them more competitive when they apply to positions in the workplace and in graduate schools. Kresge support for technological advancements will also allow faculty to more effectively leverage federal funding to develop pedagogies that support recruitment and retention of students in the sciences, such as that recently developed from NSF funding for the CSIE program.

FACULTY ACTIVITIES IN THE DEPARTMENT

Publications

2006 saw several publications by departmental faculty. Student coauthors are underlined.

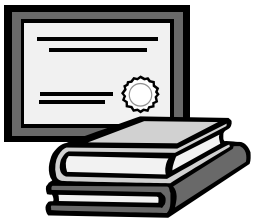
- "Surface Analysis of a Black Coating from Little Lost River Cave, Idaho" R. Perumplavil and R. A. Armitage. In *Archaeological Chemistry: Analytical Techniques and Archaeological Interpretation,* M. Glascock, Ed. ACS Symposium Series, Washington, D.C. In press, 2006.
- "Characterization of building materials from the brick chapel at Historic St. Mary's City" R. A. Armitage, L. Minc, S.D. Hurry, and M. Doolin. In *Archaeological Chemistry: Analytical Techniques and Archaeological Interpretation,* M. Glascock, Ed. ACS Symposium Series, Washington, D.C. In press, 2006.
- "Pyrolysis GC/MS and THM-GC/MS Studies of a Black Coating from Little Lost River Cave, Idaho" S. Fezzey and R. A. Armitage. *Journal of Analytical and Applied Pyrolysis,* **77** (2006): 102-110.
- "Characterization of Bricks and Tiles from 17th-Century Maryland" R. A. Armitage, L. Minc, D. V. Hill, and S. D. Hurry in *Proceedings of the 34th International Symposium on Archaeometry*, J. Perez-Arantegui, Ed. Institucion ‹‹Fernando el Catolico››: Zaragoza, Spain, 2006, pp 387-392.
- "Deletion of All Cysteines in Tachyplesin I Abolishes Hemolytic Activity and Retains Antimicrobial
- Activity and LPS Selective Binding" A. Ramamoorthy, S. Thennarasu, A. Tan, K. Gottipati, S. Sreekumar, D. L. Heyl, F. Y.P. An, and C. E. Shelburne. In *Biochemistry*, **45** (2006): pp. 6529-6540.
- "The Metal Exchange Reaction between NiMIDA and Copper(II)" L. Kolopajlo. In *Journal of Coordination Chemistry,* **59** (2006): pp. 891-899.
- "Coronary heart disease: How do the benefits of omega-3 fatty acids compare with those of aspirin, alcohol/red wine, and statin drugs?" H. Basu, S. Pernecky, A. Sengupta, and G. U. Liepa. In *Journal of the American Oil Chemists Society*, **83** (2006) pp. 985-997.
- "Factors affecting the relative stability of a series of iminium cation stereoisomers" P. Hsuen, M. Lukowski, H. A. Lindsay, and M. C. Milletti. In *Journal of Molecular Structure: THEOCHEM*, **806**, (2007): pp. 223-230.
- "Cosmetic Chemistry Experiments For High School: I" L. Kolopajlo. In *MSTA Journal*, Spring 2006. pp. 16-29.
- "Chem 101 Lab Manual." D. Phillips and L. Kolopajlo. Hayden-McNeil Publishing 2006.
- "Protein Kinase A Phosphorylation of the Multifunctional Protein CAD Antagonizes Activation by the MAP Kinase Cascade." Damian H. Kotsis, Elizabeth M. Masko, Frederic D. Sigoillot, Roberto Di Gregorio, Hedeel I. Guy-Evans and David R. Evans (2007) *Molecular Cellular Biochem*. Jan 6; [Epub ahead of print]
- "Protein Kinase C modulates the phosphorylation of the multifunctional protein CAD by MAP kinase." (2007) Frederic D. Sigoillot, Damian H. Kotsis, Monica A. Bame, Elizabeth M. Masko, David R. Evans, Hedeel Guy Evans, *Front. Biosci*. In press.

Sabbaticals

Deborah Heyl-Clegg is on sabbatical during the 2006-2007 academic year. She is working with Dr. A. Ramamoorthy at the University of Michigan studying peptide-lipid interactions in an effort to understand the exact mechanism of membrane destruction of antimicrobial peptides and amylin, a peptide responsible for beta cell destruction in type II diabetes.

Travel and Presentations

Don Snyder traveled to London in March 2006 for meetings with P. Vadgama, Director of the IRC Institute for Biomedical Materials, Queen Mary – University of London, to discuss preparation of joint funding applications, and the status of patent applications, related to continuation of their joint impedance-based biosensor research project. Dr. Snyder also made a presentation in February 2006 to visiting Office of Naval Research program review officers to report results on the ONR-sponsored project *Interdigitated Electrode Array-Based Impedance Studies for Sensor Design and Polymer Thin Film Characterization*.



STUDENT AWARDS, 2006

Bert W. Peet Award	Wan Hsin Lim
ACS Huron Valley Section Undergraduate Award	Kathleen J. Panter
American Institute of Chemists Award	Robert D. Anderson
Collins' Endowed Scholarship in Chemistry	Benjamin F. Johnson
Maurice Decoster Endowed Chemistry Scholarship	Devin A. Foether and Allison M. Rogalski
John Sullivan Endowed Scholarship	Michael A. Kallio
Hypercube Scholar Award	Powen Hsueh
Huron Valley Publishing Scholarship	Edwin L. Marrero
Sandra J. Lobbestael Chemistry Endowed Scholarship	Mark A. Lukowski
Elva Mae Nicholson Endowed Scholarship	Bryan G. Perria
Donald B. Phillips Memorial Scholarship	Lauren R. Tougas
CRC Press Freshman Chemistry Achievement Award	Tiffany D. Crosby
Perry S. Brundage Scholarships	Matthew L. Brady, Brittany M. Sabo, Matthew Clark, and Jennifer Vanderklipp
Biochemistry Achievement Award	Elizabeth S. Quintus
Toxicology Achievement Award	Carrie A. Oswald
ACS Organic Chemistry Achievement Award	Nusibah K. Altayib
ACS Division of Analytical Chemistry Award	James P. Grinias
John J. Contario Analytical Chemistry Award	James P. Grinias
ACS Huron Valley Section Graduate Student Award	Jamie A. Brown-Sinha
Chemistry Department Teaching Assistant Awards	Nimita D. Dave and Kathryn R. Lawrence
Chemistry Department Graduate Research Award	Kiran Gottipati
Ronald M. Scott Memorial Scholarship	Mahender Budrapu
Dean's Award for Research Excellence	Madhavi Lokireddy

Undergraduate Symposium Presentations in Chemistry

A number of Chemistry students gave presentations at the undergraduate Symposium held in McKenny Union in late March of 2006. Their research represents the array of activities involved with the science being performed by our talented undergraduates.

Claire Tornow, Professor Maria Milletti, sponsor. "Theoretical Investigation of the Mechanism of Lipid Peroxidation of Arachidonic Acid"

Jacob McIvor, Professor Steven Pernecky, sponsor. "Identification of Tobacco Smoke Products that Inhibit Nitric Oxide Synthase"

Carrie Oswald and Mary McPhail, Professor Steven Pernecky, sponsor. "Purification and Analysis of Animal b-Type Cytochromes Expressed in Bacteria"

Mark Lukowski, Professor Maria Milletti, sponsor. "Investigations of Factors that Influence Kinetic and Thermodynamic Stability in Iminium Cations"

Powen Hsueh, Professors Maria Milletti and Arthur Howard, sponsors. "Synthesis and Stereochemical Analysis of Perhydropyrrolo[1,2-a]Imidazoles"

Melissa Dipert, Professor Timothy Brewer, sponsor. "The Temperature and Solvent Effects on Luminescent Properties of Ruthenium Complexes"

Michele Lawrence and Brahmlin Sethi, Professor Debbie Heyl-Clegg, sponsor. "Inhibition of a-Amylase by Synthesized Peptides Based on Tendamistat"

James P. Grinias, Professor Heather Holmes, sponsor. "Development and testing of a Multibed Sorbent Trap for Gas Chromatography-Mass Spectrometry"

Edwin Marrero, Professor Harriet Lindsay, sponsor. "Substituent Effects on Diastereoselectivity in the Microwave-Assisted Aza-Cope Mannich Reaction"

Allison Rogalski, Professor Debbie Heyl-Clegg, sponsor."Kinetic Analysis of a Synthesized Inhibitor of α-Amylase".

Brahmlin Sethi, Professor Debbie Heyl-Clegg, sponsor." The Synthesis and Antimicrobial Activity of a Peptide Analog of LL-37".

Amanda Schalk and Patricia Sinawe, Professor Harriet Lindsay, sponsor. "Application of a Microwave-Assisted Aza-Cope Rearrangement -- Mannich Cyclization to the Synthesis of Pyrrolizidine Alkaloids"

Graduate Research Fair Presentations in Chemistry

Three Chemistry students gave presentations at the Graduate Research Fair Symposium held in McKenny Union in late March of 2006.

Rajesh Penumatcha, Professor Debbie Heyl-Clegg, sponsor. "Synthesis of an Isotopically Labeled Analog of the Antimicrobial Peptide LL-37"

R. Aaron Vogt, Professor Timothy Brewer, sponsor. "Solvent Dependant Effects of Dichloro-Ruthenium Hexahydrate Solutions"

Aditi Munmun Sengupta, Professor Steven Pernecky and Dr. Hemendra Basu, Sponsors**.** "A Novel Analytical Method Using the Methylation Agent TMSD for Characterization of Prostaglandin Methyl Esters by GC-MS"