Table of Contents

Letter from the Chair ................................................................. 2
Department Faculty and Staff ...................................................... 4
News .......................................................................................... 5
  Koffolt Statue Dedication .......................................................... 5
  L.S. Fan Awarded Joseph Sullivant Medal ................................. 8
  L.S. Fan Wins E.V. Murphee Award ......................................... 8
  Martin Feinberg Receives Distinguished Scholar Award .......... 9
  Martin Feinberg Delivers Amundson Lectures ......................... 9
  Faculty Research Highlight ..................................................... 9
  John Corn Elected AIChE Fellow .............................................. 10
Undergraduate Program Updates
  General Program Description .................................................. 10
  2005 Accomplishments ........................................................... 11
  AIChE Student Chapter ............................................................ 12
  Chemical Engineering Students Compete in Energy Competition 13
  NSEC Summer Research Experience ....................................... 13
  2005 ABET Visit ...................................................................... 14
  New ChBE Webpage ............................................................... 15
  Bachelor of Science Graduates ............................................... 15
  Courses Offered ...................................................................... 17
  Internship and Cooperative Learning Experience Report ....... 20
  Financial Aid ......................................................................... 22
  Scholarship Recipients ............................................................ 23
  Trends in Enrollment .............................................................. 25
Graduate Program ........................................................................ 26
  Master’s of Science Degree Program ....................................... 26
  Doctor of Philosophy Degree Program .................................... 26
  Graduate Student Awards ....................................................... 26
  Graduate Student Fellowships ............................................... 27
  Graduate Students by Advisor ................................................. 28
  Graduate Degrees Granted ..................................................... 29
  Seminar Program .................................................................... 30
  Center for Multifunctional Polymer Nanomaterials and Devices 33
  CEGC (Chemical Engineering Graduate Council) Report ....... 33
  Chemical Hygiene Committee ............................................... 33
  Mission and Vision statement ................................................. 34
Faculty Activities ........................................................................ 35
  Research Areas ...................................................................... 35
  Awards and Honors ............................................................... 38
Special Activities ........................................................................ 40
  Lowrie Lectures ..................................................................... 40
  2005 Advisory Board Meeting ............................................... 40
  National Committee for the Renovation and Expansion of Koffolt Laboratory 41
Graduate Student Awards ........................................................... 26
Alumni Donors 2004 ................................................................. 43
Sponsors of Research ................................................................. 47
Financial Summary .................................................................... 48
Appendix A – Publications and Patents ...................................... 49
Appendix B –Current Projects and Grants ................................... 55

Editor, Sherry D. Stoneman - stoneman.3@osu.edu
Photography and Design by Geoffrey J. Hulse
Dear Alumni and Friends of the Department of Chemical and Biomolecular Engineering:

This has been an eventful year for the department as we recruited a large freshman class of nearly 100 and had a record number of PhD students graduate (19). To put things in perspective, we had 52 seniors graduate (with excellent employment opportunities) and expect that number to grow significantly over the next few years as our pipeline is pretty full. The 19 PhD students is a high fluctuation and would be typical of a department twice our size. If we ever had a steady state, our PhD graduates would total about 12 per year. Overall we continue to have excellent productivity in our teaching and research as can be observed from the data presented in this report. One of our undergraduates, Imogen Price, won a Goldwater national scholarship award and three of the four OSU Denman awards for undergraduate research in Engineering went to our undergraduates. Much more detail can be found on our departmental website under “news.” (http://www.che.eng.ohio-state.edu/)

Perhaps the most exciting event of this past year took place in mid November with the unveiling of a bronze statue of Joe Koffolt. This statue was a gift of the class of 1953 and the activities of the day were very heartwarming. We had more than 100 individuals in attendance who heard from our Provost, Dean, members of the Class of ’53, the sculptor, Bob Brodkey and Tom Koffolt. This was followed by a short video about Joe and then the screen was raised. Several alumni present participated in a luncheon roundtable of reminiscences of moments with Joe. We have a streaming video of all the day’s activities on our website.
Marty Feinberg recently presented three Amundson Lectures at the University of Houston at the celebration of Neal Amundson’s 90th birthday. Professor Amundson is among the most distinguished chemical engineering academicians and the invitation to speak on his research on reaction network theory is recognition of Professor Feinberg’s renown and his pioneering contributions to this field. L. S. Fan, who previously served as Department Chair for 9 years, was recognized both inside and outside of the university with awards of the Sullivant Medal, the university’s highest research award which is given only once every 5 years, and the ACS Industrial and Engineering Chemistry Murphree Award. The Sullivant Medal was presented to L. S. by President Holbrook at the Autumn graduation ceremony. Regarding a new face in the department, we welcome Lynn Flanagan as our new Department Administrator. She comes to us with excellent experience from her years of service in the Department of Orthopedics in our School of Medicine.

We are also moving forward with the Koffolt Renovation and Expansion project and have selected an architectural firm to carry out a feasibility study regarding the options before us. These options include renovating and expanding the current building, tearing down and rebuilding on the same site, or building on some other site on campus. The architects will give us the pros and cons and costs related to each of these options. All of this aims for a building completion by 2012. We were pleased to see the project for Koffolt Laboratory prominently presented to and accepted by the Board of Trustees in September. For all of our options the expected cost is approximately $60-70M with the department expected to raise about $20M of the cost. Thus we have some serious fund raising work in front of us. We are grateful to those alumni who are serving on our National Committee for the Renovation and Expansion of Koffolt Laboratory who will help to make this happen.

Best wishes for a happy and prosperous 2006.

Sincerely,

Stuart L. Cooper
Professor and Chair
Faculty and Staff

Professors
Bhavik R. Bakshi
Jeffrey J. Chalmers
Stuart L. Cooper
Liang-Shih Fan
Martin Feinberg
Winston Ho
Kurt W. Koelling
L. James Lee
Umit Ozkan
Michael E. Paulaitis
James F. Rathman
David L. Tomasko
Barbara Wyslouzil
Shang-Tian Yang

Emeritus Professors
Robert S. Brodkey
Christie J. Geankoplis
Edward R. Haering
Harry C. Hershey
H.C. (Slip) Slider
Edwin E. Smith
Thomas L. Sweeney
Jacques L. Zakin

Assistant Professor
Isamu Kusaka

Instructor
John Corn

Post Doctoral and Research Associates
Cheng-yi Chang – Research Associate
Bing Du – Post Doctoral Researcher
Wai Man (Raymong) Lau – Post Doctoral Researcher
Hsien Chen Ma – Visiting Scholar
Kristie Melnik – Research Associate
Ah-Hyung (Alissa) Park – Post Doctoral Researcher
Jindal Kirit Kumar Shah – Post Doctoral Researcher
Shinobu Tanimura – Post Doctoral Researcher
Xiaodong Tong – Post Doctoral Researcher
Liping Wang – Post Doctoral Researcher
W. Warsito – Post Doctoral Researcher
Rick Watson – Post Doctoral Researcher
Heui Seok Yi – Post Doctoral Researcher
Yang Zhao – Research Associate
Zhongkui Zhao – Post Doctoral Researcher
Arturas Ziemys – Post Doctoral Researcher

Administrative Staff

Academic Advisor
Mary Hoy

Assistant to the Chair & Alumni Liaison
Sherry D. Stoneman

Graduate Studies Coordinator
Angela Jones

Building Coordinator
Carl Scott

Design Engineer
Leigh Evrard

Fiscal & Human Resources Administrator
Lynn Flanagan

Laboratory Supervisor
Paul Green

Director, ChBE/MSE Joint Computing Lab
Geoff Hulse

Systems Analyst
Mike Davis

Systems Engineer
Dave Jones

Education Dir. and Admin., Nanoscale Science & Engineering Center & Integrative Graduate Education and Research Traineeship Program
Paula Stevenson

Administrative Associate, Wright Center for Innovation (WCI) and Center for Advanced Polymer and Composite Engineering (CAPCE)
Martha Leming

Accountant, NSEC and IGERT
Alice Shi

Assistant Editor, OSU Polymer Nanotechnology Programs
Stacy Brannan Doepker
Koffolt Statue Dedication

On November 10, 2005, the Department dedicated a bronze statue, commissioned by the Class of 1953, to honor the memory and achievements of its second Chair, Dr. Joseph H. Koffolt. Robert A. Bates (B.Sc. ChE 1953) explained how it came to be,

We had our Fiftieth Reunion in 2003, and as we were preparing for the Class Reunion, Don MacDougall, a fellow classmate and I agreed to take on the responsibility of getting the reunion going. Don did a lot of work with the previous class <seeing> how their reunion went. As part of the reunion we decided that we would like to...donate some money...because we felt that the University had been a great part of our lives and our success...The idea came up with Dave McCarthy in the College of Engineering about a statue of Joe and Dave thought that was a pretty good idea. Don and I talked about it and felt that that would be fitting <considering> how much Joe meant to us and so at our reunion we proposed this to our classmates...and we set a goal of $20,000...Although some people originally thought that maybe we should just give money to the Department, as we talked more and more over dinner at our fiftieth reunion, everyone got onboard and said that that would be a fitting tribute.

After consulting The Ohio State University Department of Art, Marty Shuter, an OSU graduate and part-time instructor was awarded the commission. The following alumni contributed to the statue fund:

Robert A. Bates
Roger L. Briggs
Donald Findlay
Paul R. Kumler
John Mahoney
Manoj Kumar Sanghavi
James Lloyd Wilson

Clyde Bazell
David E. Buskirk
Robert T. Hewitt
Wilfred C. Ling
William H. Potter
Harold L. Stelzer Jr.
Robert A. Wiseman

John Bishop
Louis O. Elsaesser
George E. Koch
Don MacDougall
Ernest Reinmuller
Michael Tallarico
William H. Wiseman

Over one hundred people attended the ceremony. This included alumni from each of the decades during which Joe taught at Ohio State, emeritus faculty, members of the University administration and a significant contingent of Koffolt family members. The dedication featured short presentations from Barbara Snyder, the University’s Provost; Bud Baeslack, Dean of the College of Engineering; Bob Bates, Class of 1953; Marty Shuter, the sculptor; Bob Brodkey, Professor Emeritus; and Tom Koffolt, Joe’s only child. Geoff Hulse designed a commemorative booklet featuring a biographical sketch of Joe (extracted from his history of the Department) and presented a short video depicting Joe’s career at Ohio State. Both streaming video of the ceremony and copies of the commemorative brochure are available on-line. A luncheon followed the dedication ceremony, after which a number of the alumni and faculty offered their reminiscences of Joe, many of them both humorous and heartwarming.

When the new Chemical and Biomolecular Engineering facility is constructed, it is anticipated that the statue will be incorporated into the lobby or other public space. In the meantime, the statue is currently on display within the third floor Unit Ops lab, overlooking a study area, where Joe will cast his benevolent gaze on the current crop of chemical engineering students.
Statue Dedication Participants

Bob Brodkey regales the audience with stories about Joe

Ed Haering and Bruce Pontius

Marty Feinberg and Mike Kukla

The statue is unveiled and Stuart Cooper concludes the ceremony as Tom Koffolt (on the right) observes the proceedings
L.S. Fan Awarded Joseph Sullivant Medal

L.S. Fan, Distinguished University Professor and the C. John Easton Professor of Engineering, has been named the recipient of the Joseph Sullivant medal, one of the university's highest honors. Professor Fan is one of the world's leading authorities on fluidization and multiphase flow, powder technology, and energy and environmental reaction engineering. He has invented processes that enable power plants to burn sulfur-rich coal in a more cost-effective, environmentally sound way.

Established in 1920 by Ohio State Professor of Physics Thomas C. Mendenhall, the Sullivant Medal is named for Sullivant, a member of the university's first Board of Trustees. The $10,000 prize is awarded every five years to recognize notable achievements by alumni or faculty members.

During his 27 years at Ohio State, Professor Fan has gained international renown for his invention of patented clean coal processes, including "OSCAR" (Ohio State Carbonation Ash Reactivation) and "CARBONOX," (Carbon-based NOx Reduction Technology). Both processes have been successfully demonstrated for flue gas cleaning in coal combustion with the projected economic impact of these processes at billions of dollars globally.

L.S. Fan Wins Prestigious E.V. Murphee Award

Professor L.S. Fan was awarded the American Chemical Society E.V. Murphee Award in Industrial and Engineering Chemistry. This award is to stimulate fundamental research in industrial and engineering chemistry, the development of chemical engineering principles and their application to industrial processes. Winners of this award must have accomplished outstanding research of a theoretical or experimental nature in the fields of industrial chemistry or chemical engineering.
Martin Feinberg Receives Distinguished Scholar Award

The Distinguished Scholar Award, established in 1978, recognizes exceptional scholarly accomplishments by senior professors who have compiled a substantial body of research, as well as the work of younger faculty members who have demonstrated great scholarly potential. The award is supported by the Office of Research with an honoraria provided by The Ohio State University Foundation.

Professor Feinberg’s research is interdisciplinary in nature, sitting at the juncture of chemical engineering, mathematics, and biology. Chemical reaction network theory, his best-known work, brings sophisticated and deep mathematical analysis to seemingly intractable problems in which many distinct molecular species react via large, complex networks of chemical reactions. Some of this work has been made accessible in a freely available computer program, the Chemical Reaction Network Toolbox. Feinberg joined Ohio State in 1997 and received his PhD in chemical engineering from Princeton.

Martin Feinberg Delivers Amundson Lectures

The Amundson Lectures are a set of invited lectures, sponsored by the Departments of Mathematics and Chemical Engineering at the University of Houston, in honor of Neal Amundson, considered by some to be the father of modern chemical reaction engineering. Although there had been annually a single Amundson lecture sponsored by Chemical Engineering in the past, this was the start of a more ambitious event, consisting of three lectures over three days by a single person. Feinberg was the inaugural lecturer for the new series. The lectures were as follows: “The Strange Relationship of Mathematics and Chemistry;” “Understanding Bistability in Complex Enzyme-Driven Reaction Networks;” and “An Unsolved Problem in Chemical Engineering.”

Faculty Research Highlight

Professor Umit Ozkan’s work in catalysis focuses on energy and environmental applications. For hydrogen energy to fulfill its potential for protecting the environment, providing more efficient energy sources, and decreasing our dependence on foreign oil, economical and efficient technologies for hydrogen production from renewable energy sources are needed. Photosynthesis uses solar energy to convert carbon dioxide from the atmosphere to carbohydrates. Theoretically, the net carbon dioxide emission resulting from hydrogen production through bio-mass or bio-mass derived liquids is zero since carbon dioxide is “recycled” back to the plants using solar energy. Bio-ethanol can be produced by fermentation of biomass to yield an ethanol in water mixture. Steam reforming of this bio-ethanol offers a highly attractive route for converting biomass to hydrogen. Dr. Ozkan and her research group are working on developing catalysts for bioethanol steam reforming and investigating the reaction pathways involved in the reaction. This project is supported by the Department of Energy.
Dr. Ozkan and her research group are also working on development of catalysts for hydrogen production from gasified coal in an effort to use the nation’s large coal reserves. Another project related to hydrogen production is selective oxidation of carbon monoxide in hydrogen streams. One of the catalysts they have recently developed is capable of oxidizing CO at very low temperatures with high selectivity. This finding will be quite important especially for removing CO from hydrogen streams to be used for PEM fuel cells since CO acts as a poison for the anode catalysts.

Her group is also involved in developing novel catalytic materials for Proton Exchange Membrane (PEM) and Solid Oxide Fuel Cells (SOFC). Studies that are related to PEM fuel cells are focusing on development of precious-metal free carbon-based nanostructures as cathode catalysts. For SOFC applications, Ozkan’s group is investigating increasing the oxygen activation and oxygen transport characteristics of the cathode materials so the solid oxide fuel cells, which require temperatures up to 1000°C, could operate at lower temperatures. Another area Dr. Ozkan’s group is actively working on is reduction of NOx emissions for lean-burn systems. These projects are funded through grants from NSF, DOE and the Ohio Department of Development.

John Corn Elected AIChE Fellow

John Corn, Lecturer in the Chemical and Biomolecular Engineering Department, has been elected by his peers to the grade of Fellow of the American Institute of Chemical Engineering. The grade of Fellow in AIChE is a special category of membership which identifies and honors Member chemical engineers who have made meaningful impacts on our profession. This is a great honor as the numbers of recipients are limited to no more than 10 percent of the AIChE membership having Member status for more than 10 years.

Undergraduate Program Updates

General Program Description

The Department of Chemical and Biomolecular Engineering provides a curriculum combining chemical and biological sciences with engineering analysis and design to produce graduates capable of applying problem-solving skills to a wide variety of industries ranging from traditional chemical manufacturing and consumer products to advanced materials, nanotechnology, and biotechnology.

Areas of study within the department include:

- Bioprocessing, bioseparations, biocatalysis, metabolic engineering
- Consumer products
- Drug design, discovery and delivery
- Electronics
The Biomolecular option in the program is designed to give interested majors significant exposure to biological science and engineering. This option is designed to help prepare students for careers in pharmacy, medicine, biochemical engineering and biomedical engineering.

2005 Accomplishments

Imogen Pryce, a senior in the department who will graduate in Spring 2006, was awarded a prestigious Barry M. Goldwater Scholarship. Goldwater Scholars were selected on the basis of academic merit from a field of 1,091 mathematics, science, and engineering students who were nominated by the faculties of colleges and universities nationwide. One hundred sixty-five of the Scholars are men, 155 are women, and virtually all are interested in attending graduate school.

The Denman Undergraduate Research Forum is held annually in the Ohio Union. The Denman Undergraduate Research Forum provides a means for undergraduate students to share their research with members and friends of the OSU community; recognizes the significant contributions to research by OSU undergraduates; and facilitates exchange between students, faculty, and the public. There are twelve different areas of study represented at Denman. Engineering is one of the categories and three of our undergraduates placed in the Engineering competition.

First Place - Angela Sparks
Topic: Synthesis and Application of High Reactivity Eggshell Sorbents for CO₂ Capture
Advisor: Dr. Liang-Shih Fan

Third Place: Maren Seibold
Topic: Analysis of Pharmaceutical/Polymer Solid Dispersions Produced by Supercritical Carbon Dioxide Assisted Extrusion
Advisor: Dr. David Tomasko

Fourth Place: Gary Seto
Topic: Efficient Seeding of Colon Cancer to Develop an In Vitro Three-Dimensional Model for More Accurate Drug Efficacy Studies
Advisor: Dr. Shang-Tian Yang

Undergraduate student awards that were presented at the 2005 Lowrie Banquet include:
AIChE Central Ohio Section Outstanding Student Award: Andrew Maynard
Outstanding Undergraduate Award for Research Excellence: Patrick Bennett
Megan Boreman
Drew Braden
Dong-Wook Kim
Maren Siebold
Gary Seto
Angela Sparks
Laurel French
Nicholas Lorenz
AIC Outstanding Undergraduate Student Award: Brian Chapman

Co-Op Award:
Dow Outstanding Junior Award:
AIC Outstanding Undergraduate Student Award:

AIChE Student Chapter

The goals of the AIChE Student Chapter at OSU are to foster the interests of students in Chemical and Biomolecular Engineering and to promote their welfare as prospective members of the profession through programs and relations with other Student Chapters and National AIChE; to promote fellowship among the members through various outings, activities, and trips; and to contribute to the development of Chemical Engineering at OSU through activities involving both students and faculty. In 2005 the AIChE student chapter participated in the AIChE national conference in Cincinnati, and the AIChE regional conference in Kalamazoo, as well as several of the AIChE Central Ohio Section meetings. The chapter also competed in the Chem-E-Car competition—John Corn serving as Advisor—and placed 5th nationally (see below). Publications included quarterly newsletters and the AIChE activities website while social and volunteer activities included organization of Science Olympiad, assistance with State Science Day, organizing the spring picnic and senior banquet, and hosting numerous speakers from industry and academia to discuss new technologies and career opportunities. The AIChE officers are as follows:

Elizabeth Curry, President
Tony Frost, Vice President/E-Council Rep
Imogen Pryce, Treasurer
Sandy Abraham, Secretary/E-Council Rep
John Daulton, Chem E Car President
Adam Peter, Chem E Car Vice President
Dieter von Diek, Chem E Car Treasurer
Daisy Fontaine, Membership Chair
Maria Arias, Historian
Zach Patterson, Philanthropy Chair
Danny Lundy, Publications Chair
Chad Bernard, Social Co-Chair
Caroline Yang, Social Co-Chair
The AIChE Student Chapter Advisors are Professors Barbara Wyslouzil and Bhavik Bakshi.

Chemical Engineering Students Compete in National Alternate Energy Competition

A team of Chemical Engineering students has won fifth place in the American Institute of Chemical Engineers' Chem-E-Car competition, a national contest in which universities from across the country explore alternate energy sources to power shoebox-sized cars. Competing against teams from 30 other universities, the Ohio State chemical engineering students powered their car with an aluminum-air fuel cell. The colleges invited to participate were the best from their respective regions, having placed first, second or third to qualify for the national competition.

Classroom knowledge was put to the test as the students were asked to make last-minute calculations as to how their car, based upon its unique chemical reaction, would carry a specified payload a given distance. The students were not given this information until one hour before the October 30 competition.

The Ohio State students were challenged to transport 300 milliliters of water for a distance of 79 feet. They finished fifth in the competition with their fuel cell, which was filled with a solution of potassium hydroxide as an electrolyte. Team members were seniors John Daulton, Dieter von-Deak, Elizabeth Curry, Troy Vogel and Chad Bernard and juniors Adam Peter and Sandy Abraham. Their advisor is John Corn, a lecturer in the Department of Chemical and Biomolecular Engineering.

NSEC Summer Research Experience

Nineteen undergraduates from universities across the United States spent their summer in 2005 as Research Experience for Undergraduates (REU) Fellows. They spent 40 hours a week conducting research with graduate students, postdoctoral researchers and faculty members to further Ohio State efforts in the burgeoning field of nanotechnology.

Students worked on projects for Ohio State's Nanoscale Science and Engineering Center, called the Center for Affordable Nanoengineering of Polymer Biomedical Devices. For nine weeks, they saw firsthand how chemistry, biology and engineering interface in nanoscale science. Their research could have many implications, for example, for developments in drug delivery, engineered tissue and manufacturing at the nanoscale level.
2005 ABET Visit

Every six years the undergraduate program undergoes a rigorous review to determine whether its status as an accredited program will continue. Accreditation decisions are made by ABET, Inc., the recognized accreditor for college and university programs in applied science, computing, engineering, and technology. ABET is a federation of 28 professional and technical societies representing these fields. The OSU Chemical and Biomolecular Engineering Program, along with all other programs in the College of Engineering, was reviewed in 2005.

Overall, the review of our program went very well. Although the formal decision by ABET will not be announced until Spring 2006, continuation of our status as an accredited program appears secure. The evaluation team was impressed by many aspects of our program, including the strong support we receive from alumni. They also commented very favorably on recent changes in our undergraduate advising system (Mary Hoy’s contributions were highlighted) and to our unit operations laboratory under the direction of John Corn.

The annual alumni survey is one of the key assessment tools used by our program. The alumni who participate in this survey help us greatly. Significant thanks are due to Dr. Jim Rathman, who coordinated ABET related efforts in the department. To request an...
electronic copy of the department’s self study report, please contact Mary Hoy at hoy.50@osu.edu.

**New ChBE Webpage Up and Running**

This summer the department updated all aspects of their undergraduate website at http://www.chbmeng.ohio-state.edu/undergrad/. Students have access to all the academic materials available in their advisor’s office, a list of what to do when they are preparing for graduation and information about how pursue undergraduate research in the department as well as a host of other resources. The pages now include information targeted toward future new first-year students as well as transfer students.

**Bachelor of Science Graduates**

A number of our graduates received Latin Honors, Distinction Honors or Honors in Engineering. Latin Honors are defined as follows: a cumulative grade point average (GPA) of 3.5-3.69 is Cum Laude; 3.70-3.89 is Magna Cum Laude; and 3.90-4.00 is Summa Cum Laude. A student who graduates “With Distinction” is an honors student (greater than a 3.4 GPA) who has completed a senior honors research thesis. A student who graduates “With Honors in Engineering” has completed a three-pronged program consisting of completing a required number of honors courses, participation in community service, leadership and outreach as well as participation in “investigational studies” which typically includes completing a research paper or thesis or completing a minor.

The following list of graduates from Autumn 2004 through Summer 2005 shows each graduate, the employer they are currently working with or graduate school they are attending as well as any honors the student received at graduation. Where placement information is unknown, that field has been left blank.

<table>
<thead>
<tr>
<th>Graduate &amp; Honors</th>
<th>Employer or Graduate Program</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Autumn 2004</strong></td>
<td></td>
</tr>
<tr>
<td>Adam Woeste, Cum Laude</td>
<td>Procter &amp; Gamble</td>
</tr>
<tr>
<td><strong>Winter 2005</strong></td>
<td></td>
</tr>
<tr>
<td>Raymond Newlin IV, Cum Laude</td>
<td>ATOFINA, Inc, Pennsylvania</td>
</tr>
<tr>
<td><strong>Spring 2005</strong></td>
<td></td>
</tr>
<tr>
<td>Russell Baird, Cum Laude; With Distinction</td>
<td>MS, ChBE, Ohio State</td>
</tr>
<tr>
<td>Patrick Bennett, Cum Laude</td>
<td>MS, ChBE, Ohio State</td>
</tr>
<tr>
<td>Megan Boreman, Cum Laude</td>
<td>Micron Technologies Inc</td>
</tr>
<tr>
<td>Drew Braden</td>
<td>PhD, ChBE, University of Wisconsin</td>
</tr>
<tr>
<td></td>
<td>Magna Cum Laude; With Distinction</td>
</tr>
</tbody>
</table>
Lauren Brinkman     General Mills
Nicole Brown      American Municipal Power
Boon Tat Choo      The Dial Corporation, CA
Evelyn Christanto
Chad Cramer       PhD, Nuclear Eng., Ohio State
Elizabeth Fanton     ExxonMobil, Fairfax, VA
Doug French, Magna Cum Laude
Sarah Hufft
Seth Huggins
Rita Juliana
Nicholas Knebel
Heath Litt
Katherine Nettler
Garrett Pavlovicz, Magna Cum Laude
Bryan Rumbaugh Jr.

Cum Laude; Honors in Engineering
Anheuser-Busch, St. Louis
DuPont
Amgen; Thousand Oaks, CA
Entrotech, Columbus, Ohio
Battelle Memorial Institute
RoviSys Co, Aurora, Ohio
CDM (Camp Dresser & McKee)
Babcock and Wilcox; Barberton, OH
Cytec Industries Inc, West Virginia
Maren Seibold  
Trinity Consultants, Washington  
*Summa Cum Laude; With Distinction*

Gary Seto, Summa Cum Laude; With Distinction  
Procter & Gamble, Cincinnati, Ohio  
*Summa Cum Laude; With Distinction*

Kate Severson  
ExxonMobil  
*Magna Cum Laude; With Distinction*

Neil Severt  
Ee Hui Tan

Brent Shroy  
Procter & Gamble; St. Louis, MO

Angela Sparks, With Disinction  
Essroc Italcementi Group Inc

Stefanie Sparks, With Disinction  

Shawn Tanagho  
US Patent & Trademark Office, VA

Scott Turner  
URS Corporation

Robert Urban, Magna Cum Laude  
Chemical Abstracts Service

Aaron Walker, Cum Laude  
American Electric Power

Scott Wendell  
Ecolab, Inc., Hebron

Jeremy Wilneff, Magna Cum Laude  
Cargill, Memphis, TN

*Summer 2005*

Alan Degenhart, Cum Laude  
Anheuser-Busch, Columbus

Tivon Favret  

Sarah Folsom  

Brandon Groves  

Brent Leaman,  
General Mills  
*Magna Cum Laude; Honors in Eng.*

Andrew Maynard, Cum Laude  
Sunoco Inc., Philadelphia, PA

Jay Shah, Cum Laude; With Distinction  
MS, ChBE, Ohio State

Donald Thompson, Cum Laude  
DuPont, Circleville, OH

Man-Leung Wong, Cum Laude  
PhD, ChBE, Ohio State

**Courses Offered**

**Winter 2005**

Chemical & Biomolecular Engineering 200 – Chemical Processes and Calculations I  
Dr. James Rathman, 25 students

Chemical & Biomolecular Engineering 201 – Chemical Processes and Calculations II  
Dr. Kurt Koelling, 46 students

Chemical & Biomolecular Engineering 509 – Thermodynamics II  
Dr. Isamu Kusaka, 51 students

Chemical & Biomolecular Engineering 522 – Transport Phenomena III  
Dr. S.T. Yang, 46 students
Chemical & Biomolecular Engineering 764 – Process Design
Dr. Bhavik Bakshi, 48 students

Chemical & Biomolecular Engineering 766 – Biotechnology and Bioprocess Engineering
Dr. Jeffrey Chalmers, 6 students

Chemical & Biomolecular Engineering 771 – Air Pollution
Dr. Barbara Wyslouzil, 13 students

Chemical & Biomolecular Engineering 776 – Polymer Conversion Operations
Dr. Kurt Koelling, 15 students

Chemical & Biomolecular Engineering 779 – Experimental Design
Dr. James Rathman, 49 students

Undergraduate Research - 13 students
Undergraduate Honors Thesis Research - 8 students

**Spring 2005**

Chemical & Biomolecular Engineering 201 – Chemical Processes and Calculations II
Dr. Jack Zakin, 23 students

Chemical & Biomolecular Engineering 420 & 520 – Transport Phenomena I
Dr. Martin Feinberg, 73 students

Chemical & Biomolecular Engineering 523 – Unit Operations
Dr. Barbara Wyslouzil, 45 students

Chemical & Biomolecular Engineering 610 – Kinetics
Dr. Umit Ozkan, 41 students

Chemical & Biomolecular Engineering 694I – Principles of Sustainable Engineering
Dr. Bhavik Bakshi, 11 students

Chemical & Biomolecular Engineering 750 – Professionalism
Dr. Stuart Cooper, 43 students

Chemical & Biomolecular Engineering 762 – Process Development
John Corn, 52 students

Chemical & Biomolecular Engineering 763 – AIChe Student Project Contest
John Corn, 3 students
Chemical & Biomolecular Engineering 764 – Process Design (Bioengineering Emphasis)
Dr. Jeffrey Chalmers, 6 students

Chemical & Biomolecular Engineering 769 – Biomedical Nanotechnology
Dr. Stephen Lee (Biomedical Engineering), 9 students

Chemical & Biomolecular Engineering 774 – Polymer Membranes
Dr. Winston Ho, 10 students

Chemical & Biomolecular Engineering 775 – Rheology
Dr. Robert Brodkey, 12 students

Undergraduate Research - 12 students
Undergraduate Honors Thesis Research - 9 students

Summer 2005

Chemical & Biomolecular Engineering 630 – Unit Operations Lab
John Corn, 34 students

Chemical & Biomolecular Engineering 715 – Particle Technology
Dr. L.S. Fan and Alissa Park, 10 students

Undergraduate Research - 14 students
Undergraduate Honors Thesis Research - 3 students

Autumn 2005

Chemical & Biomolecular Engineering 200 – Chemical Processes and Calculations I
Dr. David Tomasko, 54 students

Chemical & Biomolecular Engineering 420 – Transport Phenomena I
Dr. Isamu Kusaka, 4 students

Chemical & Biomolecular Engineering 508 – Thermodynamics I
Dr. Michael Paulaitis, 57 students

Chemical & Biomolecular Engineering 521 – Transport Phenomena II
Dr. Winston Ho, 63 students

Chemical & Biomolecular Engineering 624 – Process Dynamics and Controls I
Dr. Bhavik Bakshi, 42 students

Chemical & Biomolecular Engineering 717 – Colloids and Surfaces
Dr. James Rathman, 42 students
Chemical & Biomolecular Engineering 760 – Engineering Economics and Strategy
Dr. L.S. Fan, 43 students

Chemical & Biomolecular Engineering 761 – Chemical Process Plants
Dr. Jack Zakin, 8 students

Chemical & Biomolecular Engineering 765 – Principles of Biochemical Engineering
Dr. Jeffrey Chalmers, 18 students

Chemical & Biomolecular Engineering 773 – Introduction to High Polymer Engineering
Dr. Stuart Cooper, 6 students

Undergraduate Research - 8 students
Undergraduate Honors Thesis Research - 8 students


The Engineering Cooperative Education & Internship Program (ECEIP) helps undergraduate students to obtain career-related employment of two types: cooperative education (co-op) positions and internships.

A co-op experience provides the best opportunity to apply what is learned in the classroom in career-related positions by alternating quarters of full-time coursework with periods of paid, full-time employment. Internship involves one work period with an employer. A work period may last for one quarter or for two consecutive quarters. Summer internships are the most popular among students and employers.

The following is a list of companies that hired students for co-ops or internships, the students who accepted the offers and the quarters they were with each company.

*Abbott Laboratories*
Laurel French - Summer, Autumn

*American Electric Power (AEP)*
Josh Gaudio - Spring, Summer

*Anheuser Busch*
Emily Jordan - Winter, Spring, Summer
Theresa Vonder Haar - Summer

*Armstrong World Industries*
Jamie Gomoll - Summer

*Ashland Inc*
Kiran Ahmad - Summer

*Battelle Memorial Institute*
Nicole Florea - Spring, Summer, Autumn
Hali Jackson - Winter, Spring
Lee Siers - Summer, Autumn

*Cargill*
Jessica Huber - Winter, Spring, Summer
Dwight Wiltheiss - Winter, Spring, Summer
<table>
<thead>
<tr>
<th>Company</th>
<th>Interns</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chemical Abstracts Service</td>
<td></td>
</tr>
<tr>
<td>Daniel Hartman - Summer, Autumn, Winter, Spring</td>
<td></td>
</tr>
<tr>
<td>Decueninck North America</td>
<td>Stefanie DePalma - Summer</td>
</tr>
<tr>
<td>Dow Chemical</td>
<td></td>
</tr>
<tr>
<td>Phil Deis - Summer, Spring</td>
<td>Nick Lorenz - Summer</td>
</tr>
<tr>
<td>Nick Lorenz - Summer</td>
<td>Kim Miller - Summer</td>
</tr>
<tr>
<td>Kim Miller - Summer</td>
<td>Robert Walters - Summer</td>
</tr>
<tr>
<td>Dow Chemical, FilmTec</td>
<td>Imogen Pryce - Spring</td>
</tr>
<tr>
<td>DTE Energy, Enrico Fermi II Nuclear Power Plant</td>
<td></td>
</tr>
<tr>
<td>Mike Klohn - Summer</td>
<td></td>
</tr>
<tr>
<td>DuPont</td>
<td>Charlie Benore - Summer</td>
</tr>
<tr>
<td>Engineering Experiment Station Internship</td>
<td></td>
</tr>
<tr>
<td>Imogen Pryce - Autumn, Winter, Spring</td>
<td></td>
</tr>
<tr>
<td>Entrotech</td>
<td></td>
</tr>
<tr>
<td>Duane Gotro - Winter, Summer</td>
<td></td>
</tr>
<tr>
<td>Daniel Hartman - Summer, Autumn</td>
<td></td>
</tr>
<tr>
<td>Yuen Hann Kwok - Winter</td>
<td></td>
</tr>
<tr>
<td>Dan Lamone - Autumn</td>
<td></td>
</tr>
<tr>
<td>ExxonMobil</td>
<td></td>
</tr>
<tr>
<td>Jesse Gurm - Winter</td>
<td></td>
</tr>
<tr>
<td>Flexo Tech Inc</td>
<td></td>
</tr>
<tr>
<td>Michael Brown - Spring, Summer</td>
<td></td>
</tr>
<tr>
<td>General Electric Consumer &amp; Industrial</td>
<td></td>
</tr>
<tr>
<td>Erika Houtz - Summer</td>
<td></td>
</tr>
<tr>
<td>Arup Mallik - Summer, Autumn</td>
<td></td>
</tr>
<tr>
<td>General Electric, Advanced Materials</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>Honda of America Mfg</td>
<td></td>
</tr>
<tr>
<td>Sandy Abraham - Winter</td>
<td></td>
</tr>
<tr>
<td>Todd Myers - Summer</td>
<td></td>
</tr>
<tr>
<td>Andrew Shives - Winter</td>
<td></td>
</tr>
<tr>
<td>Honda R&amp;D Americas Inc</td>
<td></td>
</tr>
<tr>
<td>Chad Bernard - Summer</td>
<td></td>
</tr>
<tr>
<td>Chris Kardassilaris - Autumn</td>
<td></td>
</tr>
<tr>
<td>Andrew Shives - Autumn</td>
<td></td>
</tr>
<tr>
<td>International Paper</td>
<td></td>
</tr>
<tr>
<td>Jonathan Lui - Summer, Autumn, Winter</td>
<td></td>
</tr>
<tr>
<td>Thomas Malott - Summer, Autumn</td>
<td></td>
</tr>
<tr>
<td>International Specialty Products (ISP)</td>
<td></td>
</tr>
<tr>
<td>Yuen Hahn Kwok - Autumn</td>
<td></td>
</tr>
<tr>
<td>ISP Fine Chemicals</td>
<td></td>
</tr>
<tr>
<td>Erika Houtz - Winter, Spring</td>
<td></td>
</tr>
<tr>
<td>Maverick Corporation</td>
<td></td>
</tr>
<tr>
<td>Steven Groanuer - Summer</td>
<td></td>
</tr>
<tr>
<td>MetaMateria</td>
<td></td>
</tr>
<tr>
<td>Cole Miller - Summer</td>
<td></td>
</tr>
<tr>
<td>Sherry Wunderle - Summer</td>
<td></td>
</tr>
<tr>
<td>NASA; Kennedy Space Center</td>
<td></td>
</tr>
<tr>
<td>Amanda Bryson - Autumn</td>
<td></td>
</tr>
<tr>
<td>NexTech Materials</td>
<td></td>
</tr>
<tr>
<td>Jonathan Halter - Summer</td>
<td></td>
</tr>
<tr>
<td>Ohio Coal Development Office</td>
<td></td>
</tr>
<tr>
<td>Katie Martin - Spring</td>
<td></td>
</tr>
<tr>
<td>Owens Corning</td>
<td></td>
</tr>
<tr>
<td>Elizabeth Curry - Summer</td>
<td></td>
</tr>
<tr>
<td>Procter &amp; Gamble</td>
<td></td>
</tr>
<tr>
<td>Chris Anderson - Summer</td>
<td></td>
</tr>
<tr>
<td>Andrea Breitenbach - Spring</td>
<td></td>
</tr>
<tr>
<td>Laura Kunes - Summer</td>
<td></td>
</tr>
</tbody>
</table>
Robert Messinger - Spring
Imogen Pryce - Summer
Matt Simone - Autumn
Elliott Steverson - Summer
Carol Udoh - Summer
Blake Washington - Summer
Kristen Hendrix - Winter, Summer

Wright Patterson Air Force Base
Paul Gardner - Summer
Geoff Schwienfurth - Summer
Jeanne Skebo - Summer
Jeff Skinn - Summer

Financial Aid

The cost per year of an in-state student attending Ohio State approaches $17,000 with about half of that in tuition. Fortunately more than 75% of Ohio State students receive some form of financial aid that helps them pay for their college education. Financial aid may be available to students from a number of sources: scholarships, grants, loans, and/or work programs. The Office of Student Financial Aid uses the FAFSA (Free Application for Federal Student Aid) to determine financial need and to distribute limited funds to those who have the fewest financial resources. Students may apply for need-based scholarships and grants, cooperative scholarship housing, loans, and the Federal Work-Study program by filing the FAFSA. A student’s financial need is based on the cost of education minus the expected family contribution.

In the Chemical & Biomolecular Engineering Department, department scholarships from alumni and corporate donors help defray part of the loan burden for many of our students. The highest amount a student can receive from the department is about $3000 and the average department scholarship in 2005 was $1400 with about 110 scholarships awarded. Department scholarships are determined mainly by merit, however, when a scholarship specifies that a student’s need be considered, both merit and need are taken into account. To put things in perspective the total amount of financial aid for College of Engineering students last year was $28M dollars (OSU scholarships at $6.3M, loans at $14M and Federal and other grants $6.4M, plus about $1.3M in the form of college and departmental scholarships). Our department awarded something like $154,000 to our students. While Chemical and Biomolecular Engineers make up close to 8% of the engineering undergraduate student population we are pleased to award more than 12% of the $1.3M of scholarships that arise in the category of college and departmental scholarships. We thank those of our alumni who have established scholarship endowments for this purpose as well as our corporate donors who provide scholarships on an annual basis.
Scholarship Recipients

Allan I. Gordon Undergraduate Scholarships for Study in Biochemical Engineering
Jonathan Lui Robert Harman

Dorothy J. & Herbert L. Fenburr Scholarship
Ashley Fotheringham Mark Liska
Brian Chapman Matthew Kuhn
Caroline Yang Nicholas Lorenz
Christopher Sammetinger Sandra Abraham
Cole Miller Shannon Quinn
Diana Snelling Theresa Vonder Haar
Dwight Wiltheiss Todd Longendelpher
Eugenia Wang Troy Vogel
Kimberly Miller Yuen Hahn Kwok
Laura Ensign Zachary Patterson
Lee Martin

David H. George Chemical Engineering Scholarship
Alexander Hodge Katherine Cooper
Brian Seltzer Katie Martin
David Bell Kimberly Ankrom
Elizabeth Johnson Megan Ward
Eric Sacia Robert Messinger
Jessica Huber Sherry Wunderle

George S. Bonn
Anand Patel Priyanka Patel
Jiapeng Xu Thomas Yang

The H. Richard Unkel Chemical Engineering Class of 1941 Scholarship
Adam Johnson Kristen Hendrix
Andrew Mittermiller Laurel French
Duane Gotro Phillip Deis

The Harold W. Almen Scholarship in Chemical Engineering
Kerri Hall

The Harry Warner Scholarship in Chemical Engineering
Emily Jordan Lauren Newby
Jeremy Coyne Thomas Malott
The Howard Steele Memorial Scholarship in Chemical Engineering
Alana Pevets
Andrea Thomas
Jean Wheasler
Jennifer Kovach
Katie Vermeersch
Kelly Kalb
Malcolm McCauley
Ryan Lance

The John Hoge Scholarship
Anthony Frost
David Webster
Elizabeth Curry

The Lubrizol Foundation Scholarship in Chemical Engineering
Leanna Assid
Ryan Cobb

The Milton & Karen Hendricks Scholarship
Robert Walters
Todd Myers

The Paul E. Bates Chemical Engineering Scholarship Fund
Adugna Demisse
Carol Udoh
Cedric Watlington
Christopher Anderson

The Raymond D. Hammond Chemical Engineering Scholarship
Adam Peter
Amanda Jensen
Charles Valentine
Christopher Lewe
Daniel Lundy
Diana Snelling
Erika Houtz
Gregory Cobb
James Knight
Justin Goode
Kimberly Miller
Leslie Shumaker
Nicholas Lorenz
Phil Deis
Robert Messinger
Robert Walters
Ryan Lance
Stephanie DePalma
Thomas Malott
Timothy Muntzinger
Todd Myers

The Samuel S. & Grace Hook Johnston Memorial Chemical Engineering Scholarship
Charles Valentine

The Shell Corporation
Jonathan Halter
Michael Noon

The Smith E. Howland & Aristech Chemical Corporation Scholarship
Daniel Hartman
Dieter von Deak
Erin Stall
Joseph Groszek
Molly Campbell
Precious Okoh
The Todd David Harris Memorial Scholarship
Brittany Valentine  Michael Klohn

The William R. & Doris M. Harris Scholarship in Chemical Engineering
Anal Parikh  Daniel Lundy
Andrea Breitenbach  Erik Zibritosky
Andrew Shives  Imogen Pryce
Charles Benore  Nicole Florea

Webster B. Kay Scholarship Fund in Chemical Engineering
Amanda Bryson  Ryan Mouton
Chad Benard  Stephanie Lau
Jeanne Skebo

The Michael D. Winfield Chemical Engineering Endowment
Shawn Clegg  Thomas Czechowski

Fred J. Winterkamp Memorial Scholarship
Alan Degenhart  Christine Harrison

Trends in Enrollment
GRADUATE PROGRAM

Master’s of Science Degree Program

Program of Study

Candidates for the Master’s of Science (MS) Degree in Chemical and Biomolecular Engineering will develop, with the advice and approval of their advisor, a program of study which satisfies the student’s goals, subject to the requirements of the Graduate Studies Committee and the Graduate School. The minimum requirement for the MS degree is 45 credit hours beyond the Bachelor’s of Science (BS) degree. The total academic course requirement, not including research or special project problems, is 36 credit hours. A minimum of nine (9) credits of Research ChBE 999 are required.

Doctor of Philosophy Degree Program

PhD Degree Requirements

A minimum of 130 graduate credit hours are required beyond the Bachelor’s degree of which 58 hours are for courses, not including ChBE 999. Course credit hours should normally be divided about equally among (1) Chemical and Biomolecular Engineering, (2) basic sciences, and (3) area of specialization. Students shall develop their course of study in consultation with their respective advisors and the other members of each student’s Graduate Advisory Committee. The course work shall provide a concentration in a specific area, yet allow reasonable breadth of subject matter, being designed to foster both productive scholarship and knowledge of chemical and biomolecular engineering in relation to allied fields.

Graduate Student Awards

Pankaj Apte: Outstanding Graduate Award for Academic Achievement at Lowrie Banquet.

He Bai: Won the Ray Travel Award given by the Council of Graduate Students, Outstanding Graduate Award for Academic Achievement at Lowrie Banquet.

Yunling Bai: Won the Alumni Grant for Graduate Research and Scholarship (AGGRS), Outstanding Graduate Award for Academic Achievement at Lowrie Banquet.

Jorge Hau: Won second place in the Graduate Student Paper Award Competition held by AIChE’s Environmental Division, Outstanding Graduate Award for Academic Achievement at Lowrie Banquet.
Erik Holmgreen: Won the Ray Travel Award given by the Council of Graduate Students.

Mahesh Iyer: Was awarded one of ten Graduate Associate Teaching Awards for 2005 given by the Graduate School. It is one of the University’s highest forms of recognition.

John Kuhn: Outstanding Graduate Award for Academic Achievement at Lowrie Banquet.

Xiaoguang Liu: Won the Alumni Grant for Graduate Research and Scholarship (AGGRS), Outstanding Graduate Award for Academic Achievement at Lowrie Banquet.

Robin Ng: Won the Ray Travel Award given by the Council of Graduate Students. Won the Outstanding Graduate Student Award and the 44th Annual Leadership Awards. Won the Best ChBE Teaching Associate Award – Summer 2005.

Anli Ouyang: Outstanding Graduate Award for Academic Achievement at Lowrie Banquet.

Nandan Ukidwe: American Institute of Chemists Foundation Outstanding Graduate Student Award.

Shengnian Wang: Outstanding Graduate Award for Academic Achievement at Lowrie Banquet.

Matthew Yung: Won First Place Award for his presentation at the 2005 Edward F. Hayes Graduate Research Forum.

Ying Zhang: Outstanding Graduate Award for Academic Achievement at Lowrie Banquet.

Jian Zou: Won Best ChBE Teaching Associate Award - Winter 2005.

Graduate Student Fellowships

Priya Balasubramanian: University Fellowship
Elizabeth Biddinger: University Fellowship
Shikha Gandhi: University Fellowship
Hongyan He: Presidential Fellowship
Nandita Lakshminarayan: University Fellowship
Hamsa Priya Mohana Sundaram: University Fellowship
Venkata Movva: University Fellowship
Anli Ouyang: Presidential Fellowship
Shwetha Ramkumar: University Fellowship
Jiong Shen: Presidential Fellowship
Matthew Yung: National Science Foundation GK-12 Fellowship

Graduate Students by Advisor

**Bhavik Bakshi**
Hongshu Chen Ph.D.
Geoffrey Grubb Ph.D.
Vikas Khanna Ph.D.
Yi Zhang Ph.D.

**Jin Huang**
Michael Vilt Ph.D.
Chi Yen Ph.D.
Jian Zou Ph.D.

**Kurt Koelling**
Michael Boehm Ph.D.
Elizabeth De Lucia M.S.
Christopher Kagarise Ph.D.
Sharath Nirmal Kumar Ph.D.
Jay Shah M.S.
Shunahshep Shukla Ph.D.

**Robert Brodkey**
Abdullahi Yusuf M.S.

**Jeffrey Chalmers**
Priya Balasubramanian Ph.D.
Claudia Berdugo Ph.D.
Ruben Godoy Ph.D.
Weiwei Hu Ph.D.
Xiaoxia Jin Ph.D.
Ying Jing Ph.D.
Bhavya Mehta Ph.D.
Matthew Nilsen Ph.D.
Mei Shao Ph.D.
Rustin Shenkman Ph.D.
Ying Xiong Ph.D.
Liying Zhang Ph.D.

**Isamu Kusaka**
Pankaj Apte Ph.D.
Manish Talreja Ph.D.

**Stuart Cooper**
Daniel Heath Ph.D.

**L. James Lee**
Nan-Rong Chiou Ph.D.
Zhengzheng Fei Ph.D.
Hongyan He Ph.D.
Orin Hemminger Ph.D.
Brian Henslee Ph.D.
Chee Guan Koh Ph.D.
Chunmeng Lu Ph.D.
Venkata Movva Ph.D.
Jiong Shen Ph.D.
Shengnian Wang Ph.D.

**Liang-Shih Fan**
Puneet Gupta Ph.D.
Mahesh Iyer Ph.D.
Fanxing Li Ph.D.
Justin Nellett M.S.
Shwetha Ramkumar Ph.D.
Luis Velazquez-Vargas Ph.D.

**Umit Ozkan**
Elizabeth Biddinger Ph.D.
Erik Holmgreen Ph.D.
John Kuhn Ph.D.
Nandita Lakshminarayanan Ph.D.
Paul Matter Ph.D.
Hua Song Ph.D.

**Winston Ho**
He Bai Ph.D.
Graduate Degrees Granted

Summer Quarter 2004
– August 2004

Master of Science

Bartev Boghos Sakadjian

Doctor of Philosophy

Shubhayu Basu
Hongbo Li

Autumn Quarter 2004
– December 2004

Master of Science

Matthew David Nilsen

Doctor of Philosophy

Chang Liu

Winter Quarter 2005
– March 2005

Master of Science

Michael Alvin Mollet
Michael David Triplett II
Liqun Xu
Huading Zhang

Spring Quarter 2005
– June 2005

Doctor of Philosophy

Zhe Cui
Bing Du
Sittichai Natesakhawat
Pei Sun
Nuttha Thongchul
Master of Science

None

Doctor of Philosophy

Jared Rausch Archer
Jeffrey Dean Clogston
Weihong Gao
Jorge Luis Hau
Supaporn Suwannakham
Nandan Uday Ukidwe
Yong Yang

Summer Quarter 2005
– August 2005

Master of Science

None

Doctor of Philosophy

Yang Ge
Xiaoguang Liu
Ah-Hyung Park
Clayt Austin Robinson
Ying Zhang

Autumn Quarter 2005
– December 2005

Master of Science

Clayton William Drees

Doctor of Philosophy

Thomas Kannankara Abraham
Yangzhong Tang
Jianhua Xu

Seminar Program

Winter 2005

01/06 Terri Camesano, Worcester Polytechnic Institute, “Investigation of Microbial Adhesion using Atomic Force Microscopy”

01/20 Kun-Lin Yang, University of Wisconsin at Madison, “Liquid Crystals as Molecular Amplifier for Metal-Ligand Coordination and Surface Binding Events”

02/03 Rakesh Agrawal, Winthrop E. Stone Distinguished Professor, Purdue University, “Hydrogen as an Energy Carrier – Its Promises and Challenges”

02/10 Aaron J. Link, CalTech, “Azide-Bearing Amino Acids in Protein Engineering and Proteomic Profiling”

02/17 Tejal Desai, Department of Biomedical Engineering, Boston University, “Biomedical Micro/Nanodevices for Therapeutic Targeting and Delivery”

02/24 Kevin Dorfman, Laboratoire Physicochimie-Curie, Institut Curie, “Ephesia: Separation of Long DNA in Microfluidic Magnetic Arrays”
03/03 Carlos Co, University of Cincinnati, “Novel Concepts in Interfacial Reaction and Engineering for the Template Synthesis of Nanomaterials, Encapsulation, and Dynamic Control of Cell-Biomaterial Interfaces”

03/10 Aaron Sin, “Microfluidic Cell Affinity Chromatography: Using Chemical Engineering Tools to Sort out the Complexity of Blood”

03/17 Michael Raab, Massachusetts Institute of Technology, Department of Chemical Engineering, “Genomic Investigations of Hepatic Insulin Resistance: Linking Transcription to Intracellular Measurements”

Spring 2005

03/31 Michael Timko, Department of Chemistry and Chemical Biology, Harvard University, “Using Molecular-Level Understanding to Identify Commercial Opportunities for Greener Chemical Processes”

04/01 Chiang Mei, Department of Civil & Environmental Engineering, Massachusetts Institute of Technology, Civil Engineering Lichtenstein Distinguished Lecture, “Linear and Nonlinear Dynamics of Venice Storm Barriers”

04/07 Sumit Agarwal, University of Massachusetts – Amherst, “Synthesis and Characterization of Nanostructured Materials”

04/14 Srinivasa Raghavan, Department of Chemical Engineering, University of Maryland, “Viscoelastic Fluids and Gels Engineered via Molecular Self-Assembly”

04/21 Lowrie Lecture I: Charles A. Eckert, J. Erskine Love, Jr. Institute Professor of Chemical Engineering and Physical Chemistry; Director, Specialty Separations Center, Georgia Institute of Technology, “Tunable Solvents for Sustainable Technology”


04/28 Amy Shen, Assistant Professor, Mechanical & Aerospace Engineering, Washington University in St. Louis, “Smart Plant Protein Inside Microdevices”

05/05 Terri Camesano, Department of Chemical Engineering, Worcester Polytechnic Institute, “A Fundamental Investigation of Bacterial Adhesion”
05/19 Kamalesh K. Sirkar, Distinguished Professor, Otto H. York Department of Chemical Engineering, New Jersey Institute of Technology, “Novel Membranes: Influences and Cross-fertilizations in Separation Technologies”

05/26 B. Erik Ydstie, Chemical Engineering Department, Carnegie Mellon University, “Inventory and Flow Control in Complex Networks”

06/02 Melissa Luden, Atmospheric Sciences Department, Environmental Energy Technologies Division, Lawrence Berkeley National Laboratory, “Indoor air quality: Possible excuses to be outdoors on a nice day”

06/09 Bob Wellek, Directorate for Engineering, National Science Foundation, untitled.

Autumn 2005

09/22 Shekhar Garde, Department of Chemical and Biological Engineering, Rensselaer Polytechnic Institute, “Water-Mediated Interactions Relevant to Protein Structure and Function”

09/29 D. Bhattacharyya, Department of Chemical and Materials Engineering, University of Kentucky, “Functionalized Membranes for Environmental and Bio Applications”

10/06 Anthony McHugh, Ruth H. and Sam Madrid Professor and Chair, Department of Chemical Engineering, Lehigh University, “Flow-Induced Structure Formation in Polymer Solutions: From Fiber Crystallization to Drag Reduction”

10/13 Caroline Whitbeck, Director, Online Ethics Center, Case Western Reserve University, “Responsibility and Emerging Nanoscience and Technology”


11/17 Stas Shvartsman, Assistant Professor, Department of Chemical Engineering, Princeton University, “Quantitative Analysis of Signal Integration in Developing Tissues”

12/01 Jingguang Chen, Center for Catalytic Science and Technology, Department of Chemical Engineering, University of Delaware, “Rational Design of Alternative Electrocatalysts for PEM Fuel Cells”
Center for Multifunctional Polymer Nanomaterials and Devices (CMPND)
A Wright Center of Innovation

L. James Lee, Helen C. Kurtz Professor of Chemical and Biomolecular Engineering, is P.I. of the newly-awarded Wright Center for Multifunctional Polymer Nanomaterials and Devices (CMPND), an initiative of Ohio's Third Frontier Program to revitalize Ohio industry. CMPND is establishing a comprehensive polymer nanotechnology center, with state-of-the-art equipment and facilities specific to novel nanomaterials. The technical plan of the center encompasses three industry oriented application areas: nanocomposites, photonics, and biomedical devices. These application areas are linked by three major research thrusts: Synthesis of Functional Materials, Novel Multiscale Fabrication Methods, and Advanced Characterization and Modeling.

The state of Ohio funding for this award is $22.5M, with $19.5M of this designated for high-tech equipment and renovation and $3M for operational support. The funding is shared by five other partner universities with about $7M targeted for OSU facilities. The new centralized labs at OSU include micro/nanomachining, micro/nanoscale polymer processing, micro/nanocharacterization, micro/nanofluidics, cell culture and biomolecular characterization, polymer photonics, advanced thermoplastic processing, thermoset composite processing, pilot-scale nanocomposite synthesis, rheology, supercritical fluids technology, and molecular simulation.

Chemical Engineering Graduate Council

The Chemical Engineering Graduate Council (CEGC) put together some exciting events this year. The first event of the year was an orientation for incoming graduate students. This included two meals, information sessions, and an interactive campus-wide scavenger hunt. The week after orientation there was a night of food, fun, and games at the Buckeye Hall of Fame Café. In mid-December we had a holiday potluck lunch. The food was delicious and as diverse as the cultures that make up our department. Teams of graduate students, faculty and staff also participated in intramural sports. The department boasts the reigning champion dodge ball team of fall quarter, and we are excited to start playing ice hockey in the coming weeks. In the spring there will also be an intramural softball team, as there is every year. These events promote camaraderie among students, faculty, and staff and it is a pleasure to organize them.

Chemical Hygiene and Safety Committee

The Department’s Chemical Hygiene Committee, or ChyComm, was formed in 2003 as a group of graduate students who were given the responsibility of ensuring and promoting safety within the Department’s labs. In order to build on the gains made in 2004 ChyComm focused on three specific areas as well as more general areas. The handling
and disposal of hazardous waste within the department was sporadic and far from unified. To combat the problem ChyComm developed a number of guidelines for handling and disposal. Next, ChyComm set about to standardize the safety signs within the department. Originally, each lab had its own version of each applicable sign. However, ChyComm reasoned that visitors and even lab workers should be presented with only one version of a sign regardless of which lab they enter. Therefore, the ChyComm designed, printed and laminated standardized signs for all the labs. Finally, in an effort to include all faculty members in the department, regardless of their level of experimental work, ChyComm added two new faculty members. Dr. Brodkey and Dr. Feinberg now have representation within ChyComm. This effort will ensure that all students receive a voice in ChyComm and enter the work force with an understanding and appreciation of lab safety.

Mission and Vision

To educate undergraduate and graduate students in Chemical and Biomolecular Engineering and foster cross-fertilization of allied fields.

To advance the state-of-the-art knowledge of Chemical and Biomolecular Engineering and allied fields through novel and sustained research.

To serve the public, academic, industrial and governmental communities through consultation, collaborative efforts and dissemination of research results.

To value diversity as defined broadly in scholarship, approach to teaching and in student, faculty and staff make-up.

Goals

To develop a high-quality education program at both the undergraduate and graduate levels ranked among the top twenty programs in the nation.

To develop a high-quality research program ranked among the top twenty programs in the nation.

To serve as a valued technical resource for the public, industry and all levels of government.

To have our innovations in education, research and successes in diversity serve as models for other departments, colleges and universities.
Faculty Activities

Research Areas


Cooper, Stuart L., University Scholar Professor and Department Chair, Ph.D., Princeton University, 1967. Polymer Science and Engineering, Properties of Polyurethanes and Ionomers, Blood-Materials Interactions, Tissue Engineering.

Corn, John, Instructor, M.S., Union University (Schenectady, NY), 1976. Undergraduate Engineering Education with an Emphasis on the Unit Operations Laboratory Experience.


Koelling, Kurt W., Professor, Ph.D., Princeton University, 1992. Advanced Polymer Processing, Microfluidics, Bubble and Drop Dynamics, Rheology of Complex Fluids, Biocompatible Polymers, Nanocomposite Foams, Gas-assisted and Thin-wall Injection Molding, Two-phase and Interfacial Flows of Viscoelastic Fluids, Shear and Extensional Rheology of Polymer Solutions and Nanoparticle Suspensions, Microfluidics of Macromolecular Solutions, Simulation of Fiber Spinning and Injection Molding Processes.

Kusaka, Isamu, Assistant Professor, Ph.D., Caltech, 1998. Nucleation, Solid Phase Equilibria, Polymers.

Lee, L. James, Professor, Ph.D., University of Minnesota, 1979. Polymer and Composite Processing, Micro/Nanoengineering, Micro/Nanofluidics, BioMEMS/NEMS.


Paulaitis, Michael E., Professor, Ph.D., Illinois. 1976. Molecular Simulations and Modeling of Weak Protein-Protein Interactions; Role Of Hydration in Biological Organization and Self-Assembly Phenomena; Multi-Scale Modeling of Biological Interactions.
Rathman, James F., Professor, Ph.D., University of Oklahoma, 1987. Molecular Self-assembly in Solution and at Interfaces, Chemical and Biological Informatics.

Tomasko, David L., Associate Professor, Ph.D., UIUC, 1992. Molecular Thermodynamics, Separations, Supercritical Fluid Processing.

Wyslouzil, Barbara, Associate Professor, Ph.D., Caltech, 1992. Aerosol Science, Nucleation, Biomedical Applications of Aerosols.

Yang, Shang-Tian, Professor, Ph.D., Purdue, 1984. Bioprocess Engineering, Biochemical Engineering, Tissue Engineering, Metabolic Engineering.

Awards and Honors

Chalmers, Jeffrey J.

2005 AIChE 15C Plenary Lecture, Magnetic Cell Separation: Biomedical, Bioprocess, or Biochemical? It’s All Chemical Engineering to Me!

Elected Fellow, American Association for the Advancement of Science, 2005.

Corn, John

Elected Fellow of the American Institute of Chemical Engineers (2005).

Fan, Liang-Shih

Honorary Visiting Professorship - Tsinghua University, P. R. China, October, 2005 - present.


Elected to Mexican Academy of Sciences – Corresponding Member, October 21, 2005.

Distinguished Chemical Engineering Alumnus Award, National Taiwan University, November 12, 2005.

Joseph Sullivant Medal of The Ohio State University, December 11, 2005.

2006 E.V. Murphree Award in Industrial and Engineering Chemistry, American Chemical Society.


Feinberg, Martin

Ohio State University Distinguished Scholar Award (2005).

Inaugural Amundson Lectures, University of Houston, December 2005.
Ho, W.S. Winston

Chairman of the Board, Chinese-American Chemical Society, 2005.


Keynote Speaker on “Facilitated Transport Membranes: New Directions for Environmental, Bio and Energy Applications,” China/USA/Japan Joint Chemical Engineering Conference, Beijing, China, October 11-13, 2005.


Lee, L. James

OSU College of Engineering Research Award (2005).

Best paper award of the Plastics and Composite Joining SIG at the Society of Plastics Engineers Annual Meeting in Boston, MA, May (2005).

Ozkan, Umit S.

Appointed to the U.S. Department of Energy National Coal Council (Advisory Board to the Secretary of Energy).

Rathman, James F.

Charles E. MacQuigg Outstanding Teaching Award, OSU College of Engineering (2005).

Tomasko, David L.

Exemplary Service Award, Minority Engineering Program, The Ohio State University (2005).
Yang, Shang-Tian

Visiting Professorship from Chinese National Science Council, Taipei, Taiwan (9/05-2/06).

Adjunct Professor, South China University of Technology, Guang Zhou, China (10/2005 – present).

Special Activities

Lowrie Lectures

The 2005 Lowrie Lecturer was Dr. Charles A. Eckert. Dr. Eckert has been a teacher and a scholar for more than thirty years. For the last sixteen he has been the J. Erskine Love, Jr., Institute Professor in the School of Chemical and Biomolecular Engineering and Director of the Center for Specialty Separations at Georgia Tech. He also holds an appointment in Chemistry. His lectures were as follows:

LECTURE I: Tunable Solvents for Sustainable Technology

For any chemical process there must be both a reaction and a separation. Conventionally these are often designed separately, but we have combined them with a series of novel, benign, tunable solvents to create a paradigm for sustainable development – benign solvents and improved performance. We have taken a systems approach to the synthesis problem, using novel solvent systems to achieve homogeneous reactions and heterogeneous separations, with the goal of developing more benign processes with economic advantages. Our group is a synergistic combination of chemistry and engineering, and we have used primarily water and carbon dioxide to alter reaction conditions to increase selectivity, eliminate waste, recycle catalysts, and achieve facile separations.

LECTURE II: The Chalk Dot: Creativity and Science

Although creativity is an essential component of research, many researchers are far less creative than they were when they were children. We shall discuss the creative process and its relation to science and engineering, what creativity is and some of the common barriers to overcome to be creative: emotional, perceptual, and cultural. And we shall offer some ways that people can turn on the creative faucet for their life as well as for their work. A variety of technical and nontechnical examples will illustrate the points being discussed.

2005 Advisory Board Meeting

The Advisory Board Meeting was held on March 14, 2005. Participants included Rich Brandon, Ron Harris, Kerry Hertenstein, Scott Joublanc, Bruce Martin, Karen Murphy,
Doug Smith, Mike Winfield, Leonore Witchey-Lakshmanan, Stuart Cooper, Michael Paulaitis, Jessica Winter, David Tomasko, Winston Ho, Umit Ozkan, Jim Lee, Bob Brodkey, John Corn, and Marty Feinberg.

The meeting began with a Continental Breakfast at 8:30 and a welcome by Stuart Cooper at 9:00. After member introductions Dr. Cooper gave an overview of the Department. Michael Paulaitis was then introduced as the newest faculty member to join the Department. He presented an overview of projects in his lab and the basis of his research. Future faculty member Jessica Winter was then introduced. She reported on her research which examines the interface between nanomaterials and biology.

David Tomasko then spoke to the group about the Strategic Plan for the Undergraduate Program. Winston Ho addressed the group regarding the Strategic Plan for the Graduate Program. Umit Ozkan then presented the Strategic Plan for Scientific and Technological Innovation, outlining the strengths, opportunities, challenges, and areas for improvement. Jim Lee then briefly introduced the new NSF Nanoscale Science and Engineering Center at OSU.

In the wrap-up discussion it was noted that the Department continues to move the Koffolt building project forward. Dr. Cooper said that the National Committee was planning to mobilize alumni toward helping with this goal and that he would have more information after the May meeting of this committee.

National Committee for the Renovation and Expansion of Koffolt Laboratory

The Committee for the Renovation and Expansion of Koffolt Laboratories had a dinner meeting on May 19th 2005 at the OSU Faculty Club. The department’s strategic plan was introduced and a plan for a staged remodeling of the building was presented. Next steps regarding fund raising were discussed. After the meeting it was decided to hold on the remodeling plan until a feasibility study is completed some time in 2006. At that point a decision will be made to either remodel or rebuild on the current site or on some other location on campus.

The National Committee held a meeting November 10, 2005 in Room 230 Pfahl Hall (adjacent to the Blackwell). Paul Bates and Ron Harris attended and of the expanded list of committee members, two of them were present, Bob Bates (Paul's brother) and Kerry Hertenstein. Dr. Cooper also saw a newly recruited committee member, Paul Keinholz ('57), at the Dean's Northwestern tailgate. At the meeting Dr. Cooper provided an introduction for the new members and two individuals from Facilities and Planning went over the details of the feasibility study about to begin. The architectural firms have been narrowed to 5 and they all will be interviewed on November 29th. Options and site possibilities are to be delivered by mid July. A challenge we will have is to maintain momentum in 2006 and 2007 to assure a 2012 completion date. John Meyer, Associate
VP and Director of Development, was there to observe the development challenge which was articulated by Dave McCarthy. Dave had a list of the expanded committee and a gift table indicating the challenges ahead. We are planning for a May meeting where we will aim to get a large turnout from our committee which may well total 20 by then.

**National Committee for the Renovation and Expansion of Koffolt Laboratory**

- Richard A. Arnold
- Paul E. Bates
- Robert A. Bates
- Edward R. Corino
- David R. Grove
- Jack A. Hammond
- Ronald D. Harris
- Kerry G. Hertenstein

- Dennis W. Hurley
- Alex W. Kawczak
- Paul J. Kienholz
- Bruce Martin
- Sumner M. Saeks
- Edward A. Slowter
- Michael D. Winfield
- Stuart L. Cooper

William G. Lowrie, Committee Chair

Participants arrive for the dedication of the new Chemical Engineering building, on May 5, 1960.
Alumni Donors in 2005

(If you made a donation and your name does not appear here, please contact Sherry Stoneman at stoneman@chbmeng.ohio-state.edu)

1934
Edward E. Slowter
1944
Wallace L. Bostwick
Clarence A. Haverly, Jr.
Glen D. Schaaf
Roland I. Spencer

1936
Joseph G. Mravec
1946
Kenneth A. Brandstetter
Haskell H. McGriff, Jr.
1950
Walter E. Donham
David R. Hamilton III
Verne R. Rinehart
R. Brown Ritter
Richard L. Scott
Ralph E. Sieber
Harold L. Stelzer, Jr.
Robert E. Thompson

1937
Nicholas Fatica
Frederick R. Pullen
1947
William K. Fell
Thurman L. Graves
Lewis C. Hullinger
Robert M. Kell
John M. Kolbas
J. Bruce Martin
Bryce H. McMullen
Aloysius M. Sebian
Donald F. Stauffer
Leroy Streett
1951
Charles E. Breithaupt
Richard N. Eilerman
John R. Parkinson
David A. Strang
Bruce W. Wilkinson
Farjallah (Frederic) Zind

1938
Daniel W. Duncan
Robert L. Savage
1948
Donald E. Garrett
Earl Goodman
William L. Gray
Robert E. Kraus
Douglas O. Robinette
George R. Secrist
Jack C. Stewart
John M. Wallin
1952
Donald E. Haupt
Richard F. Hazeltone
M. Frank Rummel
Charles J. Schmitz
David G. Stephan

1939
Dillard W. Kuhlman
Clayton W. Weber
1949
Paul E. Bates
Gordon G. Cross
Theodore M. Jenney
J. Howard Kerstetter, Jr.
Frederick A. Mac
Dougall
Richard R. Miller
Donald R. Roberts
1953
Robert A. Bates
G. Clyde Bazell
Roger L. Briggs
Robert T. Hewitt
Wilfred C. Ling
Kenneth E. Whitehead
James L. Wilson

1940
Loren F. Grandey
Everett H. Strobel
1954
Gilbert E. Raines

1941
David Thomas

1942
Donald S. Arnold
Dale B. Baker
R. Richard Midlam

1943
Halvor S. Christianson
Richard M. Garrett
Glen L. Gifford
Leonard A. Harris
Roy E. Schneider
Carlyle E. Shoemaker
James C. Wynd
Hong Ton Yee
<table>
<thead>
<tr>
<th>Year</th>
<th>Names</th>
</tr>
</thead>
</table>
| 1955 | Wendell B. Hammond, Jr.  
Phillip J. McAteer |
| 1956 | Robert A. Cody |
A. Leo Carter  
Walter A. Flack  
Jon D. Helms  
David P. Marcarus |
| 1958 | Edward H. Bollinger  
James R. Facer  
Barry C. Hartley  
Dan M. Hayes, Jr.  
Werner S. Lichtenstein  
Frank J. Nagy  
Valdis E. Petritis  
Richard M. Smith  
Harold A. Sorgenti  
James W. Stark  
Lawrence R. Steele |
| 1959 | James O. Albery  
James R. Godwin  
Ronald M. Kovach  
James H. Laughlin  
Darryl J. Von Lehmden  
Gerald A. Wilcox |
| 1960 | Carl Brooks, Jr.  
Guy A. Crossley  
Joseph O. Estill  
Orville Gruebmeier, Jr.  
George M. Hauswirth  
Gordon R. Howard  
Marion H. Marshall  
Warren E. McAdams  
Irwin Weinstock |
| 1961 | Paul R. Bigley  
Thomas E. Cattarin  
Richard B. Cooper  
Edward R. Corino  
Jack A. Hammond  
Ronald D. Harris  
Kenneth Negley  
Jerry B. Pausch  
Larry E. Woodworth |
| 1962 | David E. Bidstrup  
Kenneth J. Fulk  
James C. Opatrny  
C. David Osbun |
| 1963 | Nelson W. Barnhill  
Myers G. Hammond  
Fred A. Shaffistall  
Kay Logan Snider |
| 1964 | Wayne O. Betz  
Michael B. Cutlip  
William R. Ferris  
James B. Sapp |
| 1965 | Frederick H. Flor, Jr.  
John P. Gegner  
Kiu H. Lee  
Frederick J. Rerko  
Michael C. Royer  
Gary L. Street  
John A. Weaver |
| 1966 | Thomas E. Fitz, Sr.  
William G. Lowrie  
Glenn L. McKee |
| 1967 | F. William Hauschildt  
Dennis W. Hurley  
Martin R. Okos  
Graham Painter  
Bruce E. Poling  
John M. Yacher |
| 1968 | Doug E. Smith |
| 1969 | Smith E. Howland  
M. Anandha Rao  
John W. Toussant |
| 1970 | David R. Grove  
Richard B. Strait  
Rosa Uy |
| 1971 | Juliet Davison Balmer  
Wayne R. Fontaine  
Kerry G. Hertenstein  
William E. Pritchard  
Harrison L. Stebbins  
Stephen Zakanycz |
| 1972 | Hubert M. Litt |
| 1973 | John C. Bost  
John C. Groves  
Norman F. Lucas, Jr.  
Johnny O. Wright |
| 1974 | Steve Irwin  
John E. Myers  
Michael A. Patterson |
| 1975 | John T. Erikson |
Stephen L. Grant

1977
Robert L. Collins

1978
Douglas T. Brown
Janet Lyons Inkrott
Elizabeth Ann Stuber
Neil P. Stuber
Thomas E. Winkler

1979
Darice Ann Davis
Tad K. Williams

1980
Matthew J. Galosi
Gary R. Prok
Pankaj P. Shah
David G. Vutetakis

1981
Nancy Coultrip Dawes
Sunil Satija

1983
Cheryl Kennedy Alfieri
Michael B. Begland
Tracy Flora Begland
Mark D. Dieringer
Samuel D. Fink
Jeffrey W. Patterson

1984
Robert G. Larsen
Gregory M. Masica
George W. Miller

1985
Douglas J. Ball
Roger G. Facer
Timothy A. Johnson
David J. Moonay

1987
Karen S. Johnson
D. Brian Noe
Timothy A. Rash
Maureen McClain
Visneski

1988
Amy Schmitt Doty
Joseph F. Ennis
M. Alison Jabbour
Paula Fulk Oren
Wes Oren

1989
Stuart F. Doty
Amy Reynolds Marinelli

1990
James V. Lombardi

1992
Pamela J. Archer
Julie Vander Meer
Joehlin
Scott A. Joehlin

1993
Samir Kumar

1996
Beth Gibson
Jack R. Reese II
Liping Zhang

1997
Jeffrey D. Adams
Paul D. Cowan
Xukun Luo

1998
David M. Bressler
Carrie Elizabeth
Chambers
Michael T. Timko

2000
Amanda Cook
Brueggemeier
Shawn B. Brueggemeier
Regis P. Geisler III
Jennifer Kay McKown

2001
Marcin Jan Telko
Jason R. Vititoe

2002
Ningning Ma
Lindsay Marie
Michalski

FOCBE
Betty Bartels Bates
Audrey Bowser Bazler
Robert S. Brodkey
Karen Barber Brown
Stuart L. Cooper
Mark E. Dawes
L.S. Fan
Richard W. Garver
Marilyn Elizabeth
George
Kathryn W. Grant
Timothy G. Grasel
Doris Whitman Harris
Beatrice Getz Hayes
W.S. Winston Ho
Jo Ann Heywood Hoge
Karen Fossie Timko
Thomas A. Timko
Cheryl Schoonmaker
Shafer
Scott T. Shafer
Donna Schrock Steele
Louise Mericle Stelzer
Scott L. Swartz
Betty French Unkel
Edmund V. Visneski

Samir Verma
Close to 500 alumni and friends of the Department attended the dedication of the new building in 1960.
Sponsors of Research

American Leistritz Extruder Corp
Anton Paar USA, Inc
Battelle Memorial Institute
Bell Helicopter Textron Inc
Bioprocessing Innovative Company, Inc
Cleveland Clinic Foundation
Columbus NanoWorks, Inc
Consortium Plant Biotechnology Research Inc
Cook Composites & Polymers
Department of Energy
Dreyfus Foundation
Entrotech Inc
Environmental Protection Agency
Fresnel Technologies, Inc
Gas Technology Institute
Honda of America Manufacturing Inc
Johnson & Johnson
Martek Biosciences Corp
Masco Corp
MOCON, Inc
Moore Nanotechnology Systems, LLC
National Cancer Institute
National Energy Technical Laboratory
National Institute of Allergy & Infectious Diseases
National Institute Diabetes & Digestive & Kidney Diseases
National Institute of Standards and Technology
National Science Foundation
New Energy Development Organization
Office of Naval Research
Ohio Board of Regents
Ohio Coal Development Office
Ohio Department of Development
Ohio University
OMNOVA Solutions Foundation
Owens Corning Corporation
Petroleum Research Foundation
Rockwell Automation
Sud-Chemie Inc
TA Instruments
University of Kentucky
USDA Foreign Agriculture Service
Financial Summary
Appendix A – Publications and Patents

Bakshi, Bhavik R.

Refereed Papers


Brodkey, Robert S.

Books and Book Chapters


Refereed Papers


Chalmers, Jeffrey J.

Books and Book Chapters


Refereed Papers


**Cooper, Stuart L.**

*Books and Book Chapters*


*Refereed Papers*


**Fan, Liang-Shih**

*Refereed Papers*


**Patents**

Gupta, H., Iyer, M., and Fan, L.-S., “Regeneration of Calcium Sulfide to Mesoporous Calcium Carbonate Using Ionic Dispersants and Selective Reclamation of Unreacted Calcium from Calcium-Containing Solid


Feinberg, Martin

Refereed Papers


Ho, W.S. Winston

Refereed Papers


Patents

Koelling, Kurt W.

Books and Book Chapters


Refereed Papers


Lee, L. James

Refereed Papers


**Ozkan, Umit S.**

Books and Book Chapters


Paulaitis, Michael

Refereed Papers


Rathman, James F.

Refereed Papers


Tomasko, David L.

Refereed Papers


Wyslouzil, Barbara E.

Refereed Papers


Yang, Shang-Tian

Books and Book Chapters


Refereed Papers


Zakin, Jacques L.

Book Chapters


Refereed Publications


Appendix B – Current Projects and Grants

Bakshi, Bhavik R.


$45,000 Bakshi, Bhavik R. 2004-2006 Life Cycle Assessment of Ionic Liquids versus Other Solvents, Environmental Protection Agency.
<table>
<thead>
<tr>
<th>Amount</th>
<th>Investigator</th>
<th>Year(s)</th>
<th>Project Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>$375,000</td>
<td>Bakshi, Bhavik R.</td>
<td>2005-2008</td>
<td>Evaluating the Impacts of Nanomanufacturing via Thermodynamic and Life Cycle Analysis (co-PI Prof. L. James Lee, ChBE), U.S. Environmental Protection Agency.</td>
</tr>
<tr>
<td>$37,000</td>
<td>Chalmers, J.J.</td>
<td>2005</td>
<td>Magnetic Nanobeads for Cancer Cell Separation, Columbus Nanoworks, NCISBIR, 1R43CA116048-01.</td>
</tr>
<tr>
<td>$40,000</td>
<td>Chalmers, J.J.</td>
<td>2005-2007</td>
<td>Magnetic Sorter Channels for Stem Cells, NHLBI-SBIR Phase II (1 R43DK072647-01), (SHOT/Paul Todd, P.I.; Chalmers P.I. of sub-contract).</td>
</tr>
<tr>
<td>$50,000</td>
<td>Chalmers, J.J.</td>
<td>2005-2007</td>
<td>Algal Shear Sensitivity, Martek Biosciences Corp.</td>
</tr>
</tbody>
</table>
### Fan, L.-S.

<table>
<thead>
<tr>
<th>Amount</th>
<th>Name</th>
<th>Project Title</th>
<th>Funding Agency</th>
<th>Years</th>
</tr>
</thead>
<tbody>
<tr>
<td>$80,000</td>
<td>Fan, L.-S.</td>
<td>Chemical Combustion Looping, Ohio Coal Development Office.</td>
<td>Ohio Coal Development Office.</td>
<td>2005-2006</td>
</tr>
<tr>
<td>$45,000</td>
<td>Fan, L.-S.</td>
<td>Robust Manufacturing Protocol For Particulate-Like Nanoporous Micro-Devices (Nmds) For Biomedical And Biochemical Applications, National Science Foundation (Co-PI).</td>
<td>National Science Foundation.</td>
<td>2003-2006</td>
</tr>
</tbody>
</table>

### Feinberg, Martin

<table>
<thead>
<tr>
<th>Amount</th>
<th>Name</th>
<th>Project Title</th>
<th>Funding Agency</th>
<th>Years</th>
</tr>
</thead>
<tbody>
<tr>
<td>$309,166</td>
<td>Feinberg, M.</td>
<td>Understanding Bistability in Complex Enzyme-Driven Reaction Networks, National Science Foundation.</td>
<td>National Science Foundation.</td>
<td>2004-2006</td>
</tr>
<tr>
<td>$100,000</td>
<td>Feinberg, M.</td>
<td>Biological Applications of Chemical Reaction Network Theory, National Science Foundation.</td>
<td>National Science Foundation.</td>
<td>2002-2005</td>
</tr>
</tbody>
</table>

### Koelling, Kurt

<table>
<thead>
<tr>
<th>Amount</th>
<th>Name</th>
<th>Project Title</th>
<th>Funding Agency</th>
<th>Years</th>
</tr>
</thead>
<tbody>
<tr>
<td>$360,000</td>
<td>Koelling, K.</td>
<td>Shear and Extensional Rheology of Nanoclays and Nanotubes in Polymer Melts and Solutions (Co-PIs: Stephen Bechtel and Greg Forest), National Science Foundation.</td>
<td>National Science Foundation.</td>
<td>2001-2005</td>
</tr>
<tr>
<td>$365,000</td>
<td>Koelling, K.</td>
<td>Industry/University Cooperative Research Center (I/UCRC)</td>
<td>Battelle Memorial Inst.</td>
<td>2002-2007</td>
</tr>
</tbody>
</table>
Advanced Polymer and Composite Engineering (CAPCE),
Phase II Operating Grant (Co-PIs: L. J. Lee, T. Luscher, J. Castro,
D. Tomasko), National Science Foundation Research Center Program.

$25,000  Koelling, K.
Design and Control of Paint Coating Circulation System, Honda
of America.  2005

$240,000  Koelling, K.
Polymer Nanocomposite Foams Prepared by Environmentally Benign
Supercritical Fluids (PI: D.T. Tomasko; Co-PIs: K.W. Koelling and
L.J. Lee), National Science Foundation.  2002-2005

$600,000  Koelling, K.
Environmentally Benign Micro-Cellular Nano-Composite Foam for
Structural and Insulation Market (PI: L.J. Lee; Co-PIs: K. Koelling
and D. Tomasko, National Institute of Standards and Technology-
Advanced Technology Program.  2002-2005

$2,000,000  Koelling, K.
Environmentally Benign Micro-Cellular Nano-Composite Foam
for Structural and Insulation Market (PI: L.J. Lee; Co-PIs: K. Koelling

$2,100,000  Koelling, K.
Consortium for Affordable Manufacturing of Polymers and
Composites at the Nanoscale (PI: L.J. Lee; Co-PIs: K. Koelling and

$25,000  Koelling, K.
Suspension Polymerization of Polystyrene Nanocomposite Foams
(PI: L.J. Lee; Co-PI: K. Koelling), Owens Corning.  2004-2005

$100,000  Koelling, K.
($40,000  Polymer Nanocomposite Foams (PIs: L.J. Lee, D. K. Koelling,
to OSU)  D.Tomasko), NSF SBIR.  2005

**Kusaka, Isamu**

$33,966  Kusaka, Isamu
CANPBD: Statistical Mechanics of Bubble Nucleation in

$80,000  Kusaka, Isamu
Simulation-based Study of Crystal Nucleation in Binary Mixtures,
Petroleum Research Fund.  2003-2006

**Lee, L. James**

$600,000  Lee, L.J.
Environmentally Benign Micro-Cellular Nano-Composite Foam for
Structural and Insulation Market (PI, with 2 Co-PIs), National Institute
of Standards and Technology.  2002-2005
<table>
<thead>
<tr>
<th>Amount</th>
<th>Principal Investigator(s)</th>
<th>Description</th>
<th>Years</th>
</tr>
</thead>
<tbody>
<tr>
<td>$2,000,000</td>
<td>Lee, L.J.</td>
<td>Low Cost Nanocomposite Foams (PI, with 7 Co-PIs), Ohio Department of Development.</td>
<td>2003-2005</td>
</tr>
<tr>
<td>$830,000</td>
<td>Lee, L.J.</td>
<td>Robust Manufacturing Protocol for Particulate-like Nanoporous Micro-devices (NMDs) for Biomedical and Biochemical Applications (PI with 4 Co-PIs), National Science Foundation.</td>
<td>2003-2006</td>
</tr>
<tr>
<td>$2,000,000</td>
<td>Lee, L.J.</td>
<td>Affordable Polymer Manufacturing at the Nanoscale (PI with 18 Co-PIs), Ohio Board of Regents.</td>
<td>2003-2005</td>
</tr>
<tr>
<td>$169,681</td>
<td>Lee, L.J.</td>
<td>Low Cost Biochips and Sensors for Medical Diagnostics and Chem/Bioweapon Detection (PI with 1 Co-PI), Ohio Department of Development.</td>
<td>2003-2005</td>
</tr>
<tr>
<td>$42,000</td>
<td>Lee, L.J.</td>
<td>CD-ELISA Biochips (PI with 1 Co-PI), National Science Foundation.</td>
<td>2004-2005</td>
</tr>
<tr>
<td>$12,900,000</td>
<td>Lee, L.J.</td>
<td>Nanoscale Science and Engineering Center for Affordable Nanoengineering of Polymer Biomedical Devices (PI with 37 Co-PIs), National Science Foundation.</td>
<td>2004-2009</td>
</tr>
<tr>
<td>$22,489,845</td>
<td>Lee, L.J.</td>
<td>Center for Multifunctional Polymer Nanomaterials and Devices (PI, with 42 Co-PIs from 6 Ohio universities), Ohio Department of Development.</td>
<td>2005-2008</td>
</tr>
<tr>
<td>$150,000</td>
<td>Lee, L.J.</td>
<td>Polymer and Composite Processing, Industrial Membership Fees, NSF Center for Advanced Polymer and Composite Engineering.</td>
<td>2005</td>
</tr>
</tbody>
</table>

**Ozkan, Umit S.**

<table>
<thead>
<tr>
<th>Amount</th>
<th>Principal Investigator(s)</th>
<th>Description</th>
<th>Years</th>
</tr>
</thead>
<tbody>
<tr>
<td>$600,000</td>
<td>Ozkan, Umit S.</td>
<td>Two-Stage Catalytic Reduction of NO with Methane from Lean-Burn Natural Gas Reciprocating Engines, US Department of Energy.</td>
<td>2002-2005</td>
</tr>
<tr>
<td>$4,950,000</td>
<td>Ozkan, Umit S.</td>
<td>Wright Center of Innovation for Fuel Cells (Co-PI with Drs. Rizzoni, Verweij, Lannuti, Fan and Ho; Oakum portion: $775,830), Ohio Department of Development.</td>
<td>2003-2006</td>
</tr>
<tr>
<td>$2,500,000</td>
<td>Ozkan, Umit S.</td>
<td>IGERT Fellowship for Engineering of Nano-Scale Systems (PI: J.L. Lee; Ozkan’s portion is support for one IGERT Fellow), National Science Foundation.</td>
<td>2003-2006</td>
</tr>
</tbody>
</table>
Fuel Cell, National Science Foundation.

$79,929  Ozkan, Umit S.  
Hydrogen Production via Water Gas Shift Reaction, Ohio Coal Development Office.  
2004-2005

$1,145,624  Ozkan, Umit S.  
Investigation of Reaction Networks and Active Sites in Bio-ethanol Steam Reforming over Co-based Catalysts, Department of Energy.  
2005-2009

$150,000  Ozkan, Umit S.  
Engineering New Catalysts for In-process Elimination of Tars, Department of Energy/Gas Technology Institute.  
2005-2007

$80,000  Ozkan, Umit S.  
Hydrogen Production via Water Gas Shift Reaction, Ohio Coal Development Office.  
2005-2006

$80,000  Ozkan, Umit S.  
2005-2006

Paulaitis, Michael

$287,763  Paulaitis, Michael  
Collaborative Research: The Thermodynamics of Protein Separations, National Science Foundation.  
2005-2009

$2,500,000  Paulaitis, Michael  
Interactions Between Physical, Chemical, Computational Sciences And Biological Sciences, Burroughs Wellcome Fund.  
1999-2007

$1,000,000  Paulaitis, Michael  
NIRT: Nanoscale Sensing of Single Cell Surface Receptor Affinity for Individual Ligands, National Science Foundation.  
2002-2006

$1,100,069  Paulaitis, Michael  
NIRT: Nanoscale Engineering of Bilaterally Accessible Biomembrane Mimics, National Science Foundation.  
2002-2007

$2,652,017  Paulaitis, Michael  
Institute for Multiscale Modeling and Analysis of Complex Interactions in Biology, Department of Energy.  
2004-2007

Rathman, James F.

$830,000  NIRT: Robust Manufacturing Protocol for Particulate-like Nanoporous Micro-devices (NMDs) for Biomedical and Biochemical Applications (Manufacturing Processes at the Nanoscale), National Science Foundation.
Tomasko, David

$240,000  Tomasko, David (PI)  
Polymer Nanocomposite Foams Prepared By Environmentally Benign Supercritical Fluids, National Science Foundation.  
2002-2006

$100,000  Tomasko, David (PI)  
NUE: Lab-on-a-chip Nanomanufacturing For Freshman Engineering, National Science Foundation.  
2003-2005

$308,000  Tomasko, David (PI)  
Application of Supercritical or Subcritical CO2 in Pharmaceutical Polymer Processing, Johnson & Johnson Pharmaceutical Research and Development.  
2000-2006

$1,982,000  Tomasko, David (Co-PI)  
Track 2, GK-12, Optimization and Institutionalization of the Science Fellows Supporting Teachers (SFST) Program, National Science Foundation.  
2004-2009

$2,000,000  Tomasko, David (Co-PI)  
Low Cost Nanocomposite Foams, Ohio Dept. of Development Wright Capital Projects Fund.  
2003-2005

$600,000  Tomasko, David (Co-PI)  
Environmentally Benign Microcellular Nanocomposite Foams for Structural and Insulation Market, NIST-ATP (Subcontract from Owens-Corning).  
2003-2005

$365,000  Tomasko, David (Co-PI)  
Renewing and Industry/University Cooperative Research Center for Advanced Polymer & Composite Engineering, National Science Foundation.  
2003-2005

$25,000  Tomasko, David (Co-PI)  
e-Tools for Peer Review of Teaching,Ohio Learning Network Learning Communities Initiative.  
2003-2005

Wyslouzil, Barbara E.

$2,670,000  Wyslouzil, Barbara E.  
Fundamental Studies of Nanoparticle Formation In Air Pollution, National Science Foundation.  
2000-2006

$16,000  Wyslouzil, Barbara E.  
Collaborative Experimental Investigation of Vapor Phase Nucleation, National Science Foundation – International Division.  
2001-2006

$80,000  Wyslouzil, Barbara E.  
Nucleation Rate Measurements in a Supersonic Nozzle: A SAXS Challenge, American Chemical Society – Petroleum Research Fund.  
2003-2006
<table>
<thead>
<tr>
<th>Project Title</th>
<th>Principal Investigator</th>
<th>Year(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>The Formation Rates and Structure of Nanodroplets</td>
<td>Wyslouzil, Barbara E.</td>
<td>2005-2009</td>
</tr>
<tr>
<td>Production of Galacto-oligosaccharides from Lactose by Immobilized Enzyme</td>
<td>Yang, S.T.</td>
<td>2002-2005</td>
</tr>
<tr>
<td>on Cotton Cloth” U.S. Department of Agriculture, SBIR Phase II ($140,000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>subcontract, with Bioprocessing Innovative Company, Inc., PI: I-Ching Tang)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Microfluidic CD-ELISA for Fast Detection of Food-borne Pathogens and</td>
<td>Yang, S.T.</td>
<td>2003-2005</td>
</tr>
<tr>
<td>Toxins, Midwest Advanced Food Manufacturing Alliance (MAFMA).</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Production of L(+)–Lactic Acid from Plant Biomass by Filamentous Fungi</td>
<td>Yang, S.T.</td>
<td>2003-2005</td>
</tr>
<tr>
<td>Extractive Fermentation for Production of Lactic Acid from Corn Starch by</td>
<td>Yang, S.T.</td>
<td>2003-2005</td>
</tr>
<tr>
<td>Filamentous Fungi Immobilized in Fibrous Bed Bioreactor, U.S. Department</td>
<td></td>
<td></td>
</tr>
<tr>
<td>of Agriculture, SBIR Phase II, ($145,000 subcontract, with Environmental</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Detection, Ohio Department of Development, Ohio Third Frontier Action Fund</td>
<td></td>
<td></td>
</tr>
<tr>
<td>A Novel Fermentation Process for Butyric Acid and Butanol Production</td>
<td>Yang, S.T.</td>
<td>2004-2006</td>
</tr>
<tr>
<td>Microfluidic CD Biochips for Enzyme-Linked Immunosorbent Assays, National</td>
<td>Yang, S.T.</td>
<td>2004-2005</td>
</tr>
<tr>
<td>Science Foundation, STTR Phase I ($42,000 subcontract, with Bioprocessing</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Chemical and Biomolecular Engineering Department
Annual Report 2005

$100,000  Yang, S.T.  2005
Production and Separation of Galacto-Oligosaccharides from Lactose for Prebiotic Food Applications” NSF SBIR Phase I (PI time commitment: 2 months) ($33,000 OSU subcontract PI: S.T. Yang).

Zakin, J.L.

$ 157,234.53  Zakin, J.L.  2002-2005

$ 133,293.94  Zakin, J.L.  2002-2005

$ 20,000  Zakin, J.L.  2001-2006
Dreyfus Foundation Proposal for Undergraduate Research Studies, RF 742348.

$ 48,361  Zakin, J.L.  2003-2006
NSF Travel Grant for 3rd Chemical Engineering Conference for Collaborative Research in Eastern Mediterranean (Thessaloniki, Greece), RF 744357.
Unit Ops Lab 2005