

**LEHIGH UNIVERSITY
DEPARTMENT OF CHEMICAL ENGINEERING
Chairman's Report
2000 - 2001 Academic Year**

Selected Departmental Statistics 2000 - 2001

Full-time Faculty ¹	20
Percent Faculty with PhDs	100%
2000-01 Research Expenditures ²	\$2,838,215
Research Papers Published ² January 1, 2000 to December 31, 2000	78
Undergraduate Enrollment	135
B.S. Degrees Granted	33
Co-op Positions	15
Student Participants in the Opportunities for Student Innovation (OSI) Program	6
Full-time Graduate Enrollment	Fall 00: 63 Spring 01: 58
Part-time Graduate Enrollment	Fall 00: 38 Spring 01: 28
M.S. Degrees Awarded ³	12
M.Eng. Degrees Awarded ³	6
PhD Degrees Awarded ⁴	12

¹ includes 2 faculty with joint appointments

² does not include faculty with joint appointments

³ includes 1 Materials Science student who was a Polymer Science major and was advised by ChE faculty

⁴ includes 1 Materials Science student and 2 Chemical Engineering students who were Polymer Science majors and were advised by ChE faculty

**DEPARTMENT ACCOMPLISHMENTS
FOR
2000-2001**

FACULTY

Based on Average Citations per paper, the Institute for Scientific Information (ISI) ranked Lehigh University's Chemical Engineering Department fifth among the top 100 federally funded U.S. universities. ISI surveyed only those universities that published at least 100 papers in ISI-indexed journals of chemical engineering from 1996-2000. The Table prepared by ISI can be found on the back cover of this Report.

The departments of Chemical Engineering, Civil and Environmental Engineering and Mechanical Engineering and Mechanics have received a small grant from ExxonMobil that can be used for scholarships, field trips, visiting speakers and other educational purposes. The grant is part of \$1.9 million in funds that ExxonMobil has given to 105 universities.

Our Chemical Engineering Department has begun its search for three new faculty members in the field of : The list of our Faculty Search Committee members can be found on page 14 of this report.

HUGO CARAM took sabbatical leave during the 00-01 Academic Year. During the first half of his sabbatical leave, Prof. Caram worked with Mineral Technologies Inc. During the second half of his leave, he devoted his time to deepening his involvement with the ATLSS-U.S. Navy Double Hull Project.

MANOJ CHAUDHURY published his fifth article in Science (January 26, 2001 issue), the nation's leading science journal.

MANOJ CHAUDHURY was Vice-Chair of the Gordon Conference, Science of Adhesion, August 2000.

JOHN CHEN was elected Secretary of the American Institute of Chemical Engineers. John has been a member of the AIChE for over 41 years and has been a Fellow for over 16 years.

JOHN CHEN was Vice Chair of the technical session on "Heat and Mass Transfer in Fluidization and Fluid/Particle Systems" at the 2000 Annual Meeting of the American Institute of Chemical Engineers held in Los Angeles.

MOHAMED S. EL-AASSER was appointed the Dean of the P.C. Rossin College of Engineering and Applied Science at Lehigh University. His term as Dean began on July 1, 2001.

MOHAMED S. EL-AASSER was organizer of a mini-symposium held to celebrate the installation of Wendell Smith and Roswell Ewart into the International Rubber Science Hall of Fame. Smith and Ewart developed the first theory of emulsion polymerization based on

Harkins' qualitative picture. The symposium was held at the University of Akron on November 3, 2000.

MOHAMED S. EL-AASSER and Carrington Smith, Air Products, edited a book, "Emulsion Polymers", ACS Symposium, Wiley-VCH, pp. 237, April 2000. The chapters in this book are based upon papers presented at the National ACS Meeting held in Anaheim California in March 1999.

CHRISTOS GEORGAKIS was Chair of the technical session on "Advances in Process Control II" at the 2000 Annual Meeting of the American Institute of Chemical Engineers held in Los Angeles, November 12-17, 2000.

CHRISTOS GEORGAKIS was appointed Chairman of the Faculty Search Committee for our Chemical Engineering Department.

CHRISTOS GEORGAKIS was appointed an Iacocca Professor at Lehigh University. Iacocca Professorships are given to those individuals who are deemed excellent educators who continue to enrich the lives of students while making the university a more engaging place to learn and work.

WILLIAM HENCKE was awarded the F.J. & Dorothy Van Antwerpen Award for Service to the American Institute of Chemical Engineers. This award was given in recognition of his continuing contributions to making AIChE the Lifetime Center for members' career and professional development. The award was sponsored by The Dow Chemical Company.

MAYURESH KOTHARE was appointed Associate Editor on the Conference Editorial Board of the Institute of Electronics and Electrical Engineers' (IEEE) Control System Society for 2001.

MAYURESH KOTHARE received a Type G Starter Grant from The American Chemical Society's PRF Advisory Board. This grant is given to young investigators in their first three years of their academic appointment. Mayuresh's proposal is entitled "Linear Matrix Inequalities in Chemical Process Control".

MAYURESH KOTHARE was awarded the Ted Petersen Student Paper Award for 2000. This award is given by CAST (Computers and Systems Technology) which is a division of the AIChE and was for a paper he co-wrote in 1996 when he was a Ph.D. student at the California Institute of Technology.

MAYURESH KOTHARE was co-Chair of a technical session on "Advances in Process Control" at the 2000 Annual Meeting of the American Institute of Chemical Engineers held in Los Angeles.

MARIA SANTORE received an invitation from the Journal of Colloid & Interface Science to write a Feature Article on her research. A Feature Article is the highest honor offered by the Journal and each article is one-of-a-kind.

MARIA SANTORE was Vice-Chair of a technical session on "Colloidal Dispersions" at the 2000 Annual Meeting of the American Institute of Chemical Engineers held in Los Angeles.

MARIA SANTORE chaired and organized a 3-day, 5-session Symposium on Polymer Interfaces for the Colloids Division at the National ACS Meeting, Washington D.C., August 2000.

MARIA SANTORE chaired a session on Polymer Adsorption at the Gordon Conference on Colloidal Macromolecular and Polyelectrolyte Solutions, Ventura, CA, February 2000.

MARIA SANTORE chaired a session on Brushes at the APS National Meeting, Minneapolis, MN, March 2000.

WILLIAM SCHIESSER co-edited a new book, "Adaptive Method of Lines" that was published this spring by Chapman & Hall/CRC. This book was also edited by A Vande Wouwer and P. Saucez of the Faculte Polytechnique de Mons, Belgium.

WILLIAM SCHIESSER was one of four guest editors of a special issue of the journal Mathematics and Computer in Simulation that focuses on the solution of nonlinear wave equations using the method of line (MOL).

WILLIAM SCHIESSER chaired Numerical Methods and Applications I, at the SIAM 2000 Annual Meeting held in Puerto Rico, July 2000.

ARUP SENGUPTA was awarded the 2001 Professional Research Award from the Pennsylvania Water Environment Associate. This award is given to a scientist, engineer or economist who has made significant independent contributions in water-pollution control.

LESLIE H. SPERLING recently had the third edition of his book "Introduction to Physical Polymer Science" published by John Wiley & Sons Inc. of New York.

HARVEY STENGER was awarded the Teaching Excellence Award at Lehigh University, given for teaching mainly within the Department of Chemical Engineering. He was chosen to receive this award by representatives of the student chapters of professional societies in the P.C. Rossin College of Engineering and Applied Science at Lehigh University.

ISRAEL WACHS was touted by the Silver Institute for a new catalytic-conversion process that he patented last fall. This process promises greater efficiency and other improvements in the making of formaldehyde, an essential component in the production of hard plastics. This patent is shared with Chuan-Bao Wang, a former Lehigh post-doctoral scholar.

ISRAEL WACHS has been listed in the 55th edition of Who's Who in America.

ISRAEL WACHS was co-author of a paper that received the "Young Scientist Prize" at the 12th International Congress of Catalysis held in Granada, Spain, July 9-14,2000. The presenter of this paper was M.A. Banares.

ISRAEL WACHS organized the Session on "Oxide Catalysis" for the AIChE Annual Meeting held in Los Angeles, CA in November 2000.

Our faculty were granted the following patents during 2000:

- “Selective Removal of Phosphates and Chromates from Contaminated Water by Ion Exchange”, **Arup SenGupta** and Dongye Zhao. U.S. Patent No. 6,136,199, October 24, 2000.
- “Heat Transfer Fluid Compositions for Low Temperature Applications”, **James T. Hsu**, Kenneth F. Wieland, Satish Mohapatra, and Daniel J. Loikits, U.S. Patent No. 6,086,782, July 11, 2000.
- “Adhesives and Method for Making Same”, Singa Tobing, **Andrew Klein**, and Thomas White, International Publication No. WO 00/68316, November 16, 2000.
- “Production of Formaldehyde from CH₃OH and H₂S”, **Israel E. Wachs**, U.S. Patent No. 6,028,228, February 22, 2000.
- “In Situ Regeneration of Metal-Molybdate Catalysts for Methanol Oxidation to Formaldehyde”, **Israel E. Wachs**, U.S. Patent No. 6,037,290, March 14, 2000.
- “Production of Formaldehyde using Carbon Oxides, Hydrogen and H₂S”, **Israel E. Wachs**, U.S. Patent No. 6,084,135, July 4, 2000.
- “Formaldehyde Production”, **Israel E. Wachs**, U.S. Patent No. 6,147,263, November 14, 2000.
- “Production of Formaldehyde from Carbon Oxides and H₂S”, **Israel E. Wachs**, International Publication No. WO 38/54113, July 6, 2000.

Our faculty presented over 98 talks at various national/international meetings and industrial and academic seminars, with an average of 6 presentations per faculty. In addition, 23 of our students (both graduate and undergraduate) presented talks/posters at various national/international meetings throughout the 2000-2001 academic year.

Our faculty published a total of 78 articles in 2000 in various technical journals, with an average of 4 articles per faculty. In addition, our faculty contributed 11 chapters to books during the year 2000. A complete list is given in this Report under Faculty and Department Activities.

UNDERGRADUATE

- Fifty-four Lehigh University freshmen have chosen to declare chemical engineering as their major and will be entering our program as sophomores in the Fall 2001 Semester.
- Six Chemical Engineering Seniors participated in the Opportunities for Student Innovation (OSI) Program. This program provides an opportunity for industrial-

related research experience. Participating companies included: Air Products and Chemicals, Avon, and General Chemical.

- Fifteen Chemical Engineering Juniors participated in the Co-op Program. The participating companies were: Air Products and Chemicals, B. Braun, Becton Dickinson, IBM, Infineum, Instrument Specialties, Lucent, Merck, Morton, Praxair, and Rohm and Haas.

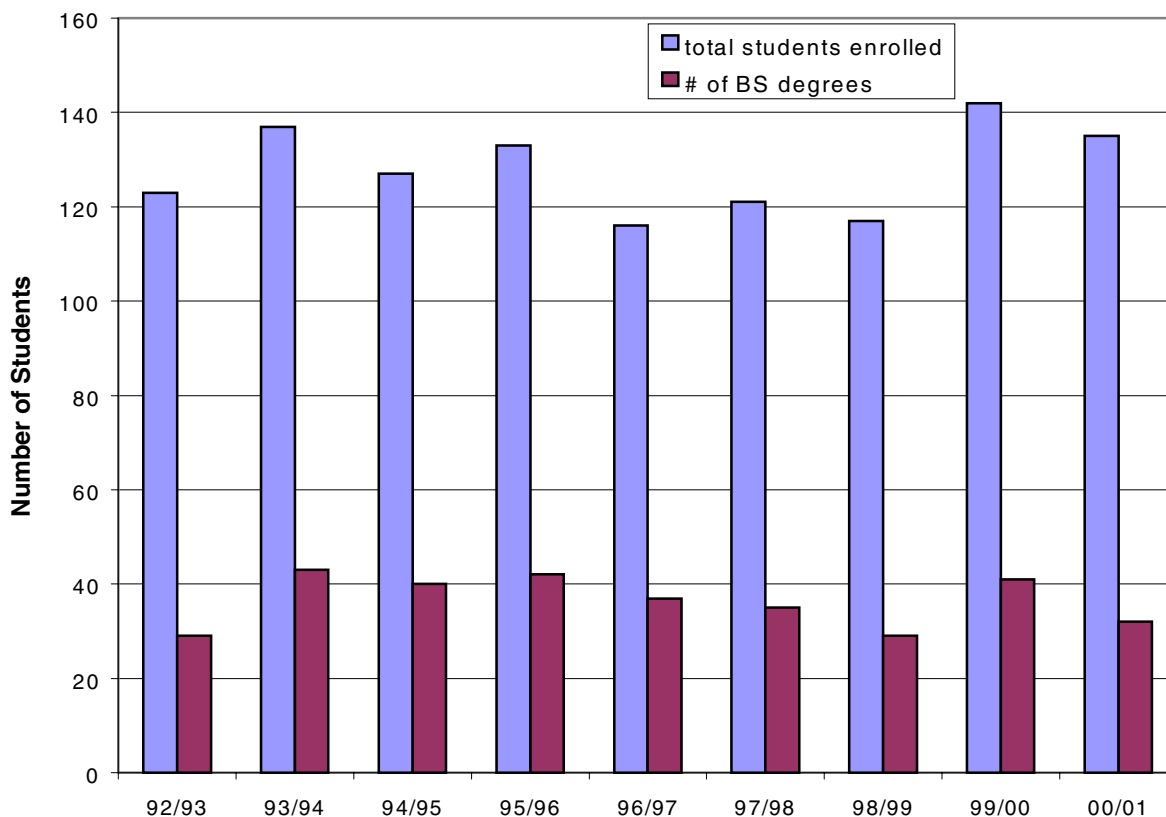


Figure 1: *Profile of Chemical Engineering Undergraduate Enrollment and BS Degrees Awarded.*

- The Department hosted 6 exchange ChE students from the University of Dortmund, Germany, for the Fall 2000 Semester.
- The total ChE undergraduate enrollment (3 classes) in the Fall of 2000 was 135 students. The 9-year enrollment profile is shown in Figure 1; the 9-year average is 128 students.
- The number of B.S. degrees in ChE awarded in 2001 was 33; a list of the graduates is included in this Annual Report in the Undergraduate Programs section. A 9-year profile is given in Figure 1; the 9-year average is 36 B.S. degrees.

- A Biotechnology Minor for Chemical Engineering Majors was approved in February of 2001. At present, technical minors have been established in environmental engineering, polymer science and engineering, materials science and engineering and economics. These technical minors in chemical engineering have established in order to provide our chemical engineering undergraduates with an in-depth exposure to some of these rapidly growing technologies.
- Our Department has enjoyed the contributions and unrestricted grants from individuals and industrial companies for supporting the various educational activities of the Department, including student awards and prizes, the Co-op Program, our undergraduate computation laboratory, our new undergraduate lounge, and the continued upgrading of our Unit Operations Laboratory. (These companies and individuals are listed on the inside of the front cover).

GRADUATE AND RESEARCH

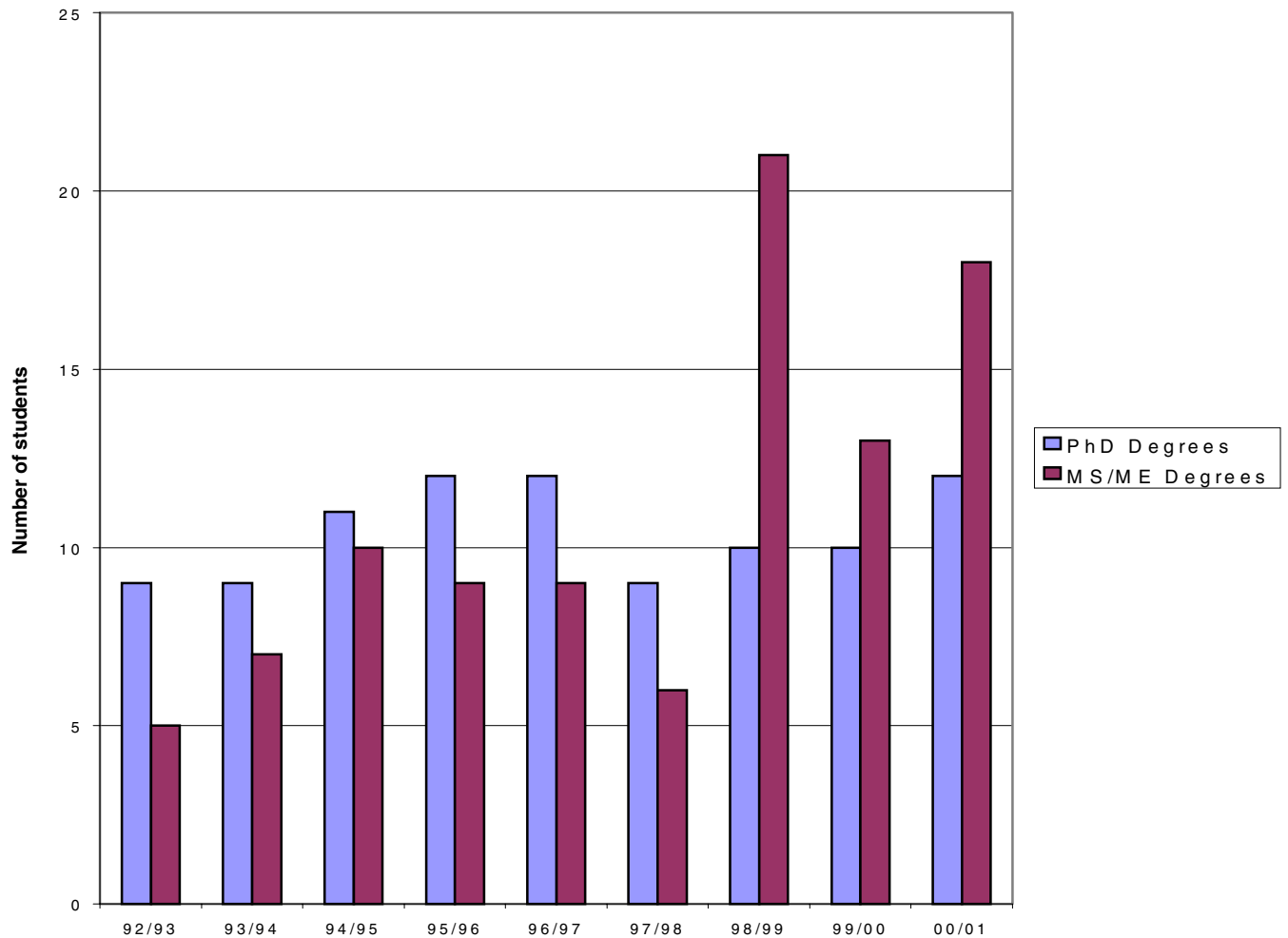


Figure 2: Profile of Ph.D., M.S., and M.Eng. Degrees in Chemical Engineering.

- The ChE graduate enrollment in the Fall of 2000 was 101, with 63 full-time residents and 38 part-time non-resident students. The average over the past 9 years is 107.
- A total of 12 Ph.D. degrees and 18 M.S./M.Eng. degrees were awarded in 2000/2001. (Included in these numbers are 3 doctoral students majoring in polymer science and engineering who were advised by ChE faculty, and 2 master's students majoring in polymer science and engineering who were also advised by ChE faculty). A list of these degree recipients is included in this report. The 9-year profile of Ph.D. and M.S. degrees is shown in Figure 2. The 9-year average is 10 Ph.D. degrees/year and 11 M.S./M.Eng. degrees/year.
- The total research expenditures from external funds amount to \$2,838,215 in 00/01 which averages to \$173,614 per faculty (based on 15 faculty). A 9-year profile of total external research dollars generated by the ChE faculty is given in Figure 3.

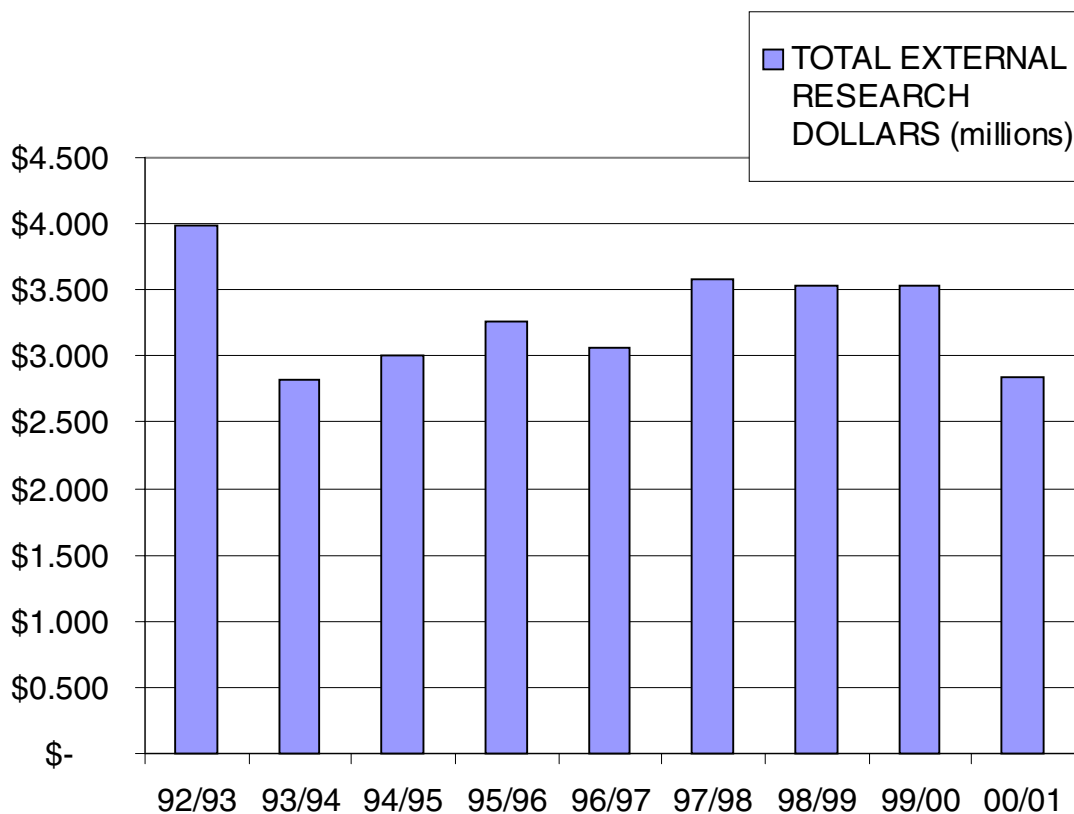


Figure 3: *Total External Research Dollars.*

- The Master of Engineering Degree in Chemical Engineering at Lehigh has been revised. This revision was made to make the M.Eng. program more attractive to professional employees, who are interested in gaining knowledge in areas of our strengths such as polymers, biotechnology, process modeling and control, and catalysis and molecular-level characterization. Students have flexibility in selecting many of the specialized courses. At this time, approximately 44 Distance Education students are enrolled in our M.Eng. program.

- A Master of Business Administration & Engineering Program has been approved and initiated at Lehigh University. It is now possible for our graduate students in Chemical Engineering to pursue the MBA&E Degree with a Chemical Engineering concentration. The MBAE program at Lehigh University aims to address the growing need by corporate employers for employees with technical skills who can work on cross-functional teams.
- Six (6) Interdisciplinary Research Centers and Institutes are affiliated with our Department. Chemical Engineering faculty direct all 6 Centers/Institutes; a list of these Centers/ Institutes and their research agendas is included in this report.
- Our ChE Department interacts with industry via three strong global Industrial Liaison Programs that support several research projects and graduate students in emulsion polymers, polymer interfaces, and process modeling and control; a list of the industrial companies is listed on the back cover of this report.

FACULTY AND RESEARCH AREAS

Philip A. Blythe, (*Associate Dean of Graduate Studies, P.C. Rossin College of Engineering and Applied Science; joint appointment with the Department of Mechanical Engineering and Mechanics*), B.Sc. (1958) and Ph.D. (1961) University of Manchester, England ♦ fluid mechanics • heat transfer • applied mathematics

Hugo S. Caram, B.S. (1967) Buenos Aires, Argentina; and Ph.D. (1977) University of Minnesota ♦ gas-solid and gas-liquid systems • optical techniques • reaction engineering

Marvin Charles, B.S. (1964), M.S. (1967), and Ph.D. (1970) Brooklyn Polytechnic ♦ bioprocess design • cGMP (Current Good Manufacturing Practices) R&D

Manoj K. Chaudhury, B.S. (1976) University of Calcutta; M.S. (1980) and Ph.D. (1984) SUNY at Buffalo ♦ adhesion • thin films • surface chemistry

John C. Chen, (*Dean, P.C. Rossin College of Engineering and Applied Science*) B.S. (1956) Cooper Union; M.S. (1959) Carnegie-Mellon; and Ph.D. (1961) University of Michigan ♦ two-phase vapor-liquid flow • fluidization • radiative heat transfer • environmental technology

Mohamed S. El-Aasser (*Department Chairperson*), B.S. (1962) and M.S. (1966) University of Alexandria, Egypt; Ph.D. (1972) McGill University, Montreal, Canada ♦ nano-polymer particles • kinetics of emulsion polymerization • surface and colloidal phenomena • latex film formation

Gregory C. Farrington (*President, Lehigh University; joint appointment with Materials Science and Engineering*), B.S. (1968) Clarkson; M.A. (1970) Harvard; and Ph.D. (1972) Harvard ♦ solid state chemistry • electrochemical phenomena • polyelectrolytes

Christos Georgakis, B.S. (1970) National Technical, Athens, Greece; M.S. (1972) University of Illinois; and Ph.D. (1975) University of Minnesota ♦ batch control • model predictive control • identification • statistical process control

James Tsai-An Hsu, B.S. (1969) National Cheng-Kung University; M.S. (1972) University of Rhode Island; and Ph.D. (1979) Northwestern University ♦ bio-separations ♦ separation processes • applied recombinant DNA technology

Andrew J. Klein, B.S. (1961) City University of New York; M.S. (1965) Stevens Institute of Technology; and Ph.D. (1972) North Carolina State ♦ emulsion polymerization • colloidal and surface effects in polymerization

FACULTY AND RESEARCH AREAS - continued

Mayuresh V. Kothare, B.Tech. (1991) Indian Institute of Technology, Bombay; M.S. (1995), California Institute of Technology; and Ph.D. (1997) California Institute of Technology ♦ constrained and robust model predictive control • convex constrained optimization • microreaction engineering and control • micro-fuel cells

William L. Luyben, B.S. (1955) Penn State; and Ph.D. (1963) University of Delaware ♦ process design and control • distillation

Maria M. Santore, B.S. (1985) Carnegie-Mellon; and Ph.D. (1989) Princeton University ♦ dynamics of polymer interfaces • colloids • biointerfaces

William E. Schiesser, B.S. (1955) Lehigh University; M.A. (1958) and Ph.D. (1960) Princeton University ♦ numerical algorithms and software in chemical engineering

Arup K. Sengupta, (*Chairperson, Department of Civil Engineering; joint appointment with the Department of Civil Engineering*), B.S. (1973) Jadavpur University; M.S. (1982) and Ph.D. (1984) University of Houston ♦ use of adsorbents, ion exchange, reactive polymers, membranes in environmental pollution

Cesar A. Silebi, B.S. (1970) Universidad del Atlantico, Colombia; M.S. (1974) and Ph.D. (1978) Lehigh University ♦ separation of colloidal particles • electrophoresis • mass transfer

Leslie H. Sperling, B.S. (1954) University of Florida; M.S. (1957) and Ph.D. (1959) Duke University ♦ mechanical and morphological properties of polymers • interpenetrating polymer networks

Fred P. Stein (*Department Associate Chairperson*), B.S. (1956) Lehigh University; M.S.E. (1957) and Ph.D. (1961) University of Michigan ♦ thermodynamic properties of mixtures

Harvey G. Stenger, Jr., B.S. (1979) Cornell University; and Ph.D. (1984) Massachusetts Institute of Technology ♦ reactor engineering ♦ flue gas denitrification

Israel E. Wachs, B.E. (1973) City College of the City University of New York; M.S. (1974) and Ph.D. (1977) Stanford University ♦ environmental catalysis • heterogeneous catalysis • surface chemistry • materials characterization

PROFESSORS EMERITUS

Curtis W. Clump, Emeritus, B.S. (1947) Bucknell; M.S. (1949) Bucknell; and Ph.D. (1953) Carnegie Institute of Technology ♦ mass transfer • environmental systems engineering

Arthur E. Humphrey, Emeritus, B.S. (1948), Idaho; M.S. (1950) and Ph.D. (1953) Columbia; M.S. (1960) M.I.T.; and Ph.D. (1984) Idaho ♦ biochemical engineering • instrumentation/control of bioreactors • microbial and mammalian cell culture

Leonard A. Wenzel, Emeritus, B.S. (1943) Penn State; M.S. (1948) and Ph.D. (1950) University of Michigan ♦ thermodynamics • cryogenics and mixed-gas adsorption

ADJUNCT FACULTY

Kemal Tuzla, M.S. (1966) and Ph.D. (1972) Tech. Univ. of Istanbul ♦ fluidization • heat transfer in two-phase vapor-liquid systems • environmental technology

William Hencke, B.S. (1944) Virginia Polytechnic Institute; and M.S.E. (1947) University of Michigan ♦ unit operations • process economics • novel (and commercial) methods for grease manufacture

Peter G. Simpkins, Dipl. Tech. (1957) Northampton Engineering College, London; M.Sc. (1960) California Institute of Technology; and Ph.D. (1965) Imperial College of Science and Technology, London ♦ thermofluids • optical fiber coatings • natural convection

DEPARTMENTAL STAFF

Paul N. Bader, Senior Electronics Technician

John Caffrey, Senior Engineering Technician

Ralph J. Gabriel, Administrative Associate, Graduate Studies

Barbara A. Kessler, Secretary

Ruth Kneller, Academic Coordinator

Debra H. Nyby, Administrative Associate, Finances and Administration

Kathryn Plotts, Secretary to the Chairman and Associate Chairman

AFFILIATED CENTER AND INSTITUTE STAFF

Leanne M. Adamcik, Secretary, The Emulsion Polymers Institute

Elaine Correll, Secretary/Assistant, Institute of Thermo-Fluid Engineering and Science

Joan Decker, Secretary/Assistant, The Biopharmaceutical Technology Institute

Tammy Hofmann, Administrative Secretary, The Chemical Process Modeling and Control Research Center

Debra H. Nyby, Administrative Associate, The Emulsion Polymers Institute

Rae Snell, Office Coordinator, The Polymer Interfaces Center

**FACULTY SEARCH COMMITTEE
CHEMICAL ENGINEERING DEPARTMENT**

Christos Georgakis, Chairman
Chemical Engineering Department
Process Modeling and Control

Maria Santore
Chemical Engineering Department

Manoj Chaudhury
Chemical Engineering Department
Polymer Interfaces Center

James Hsu
Chemical Engineering Department
Biopharmaceutical Technology Institute

Mayuresh Kothare
Chemical Engineering Department

James Gunton
Physics Department

Lynne Cassimeris
Biological Sciences

Terry Boulton
Electrical Engineering and Computer Science

Raymond Pearson
Materials Science and Engineering Department

**DEPARTMENTAL COMMITTEES
AND SUBCOMMITTEES**

CHE 2000 COMMITTEE

Mohamed S. El-Aasser (Chair)
John Chen
Christos Georgakis
Maria Santore
Israel Wachs
Debra Nyby, Scribe

**ABET AND CURRICULUM EVALUATION
TASK FORCE**

Marvin Charles (Chair)
Mayuresh Kothare
Fred Stein
Andrew Klein

COMMITTEE FOR COMPUTING

Bill Schiesser (Chair)
Bill Luyben
Andy Klein
Mayuresh Kothare

COMPUTER CLASSROOM COMMITTEE

Andrew Klein
Bill Schiesser
Mayuresh Kothare

GRADUATE COMMITTEE

Jim Hsu (Chair)
Cesar Silebi
Maria Santore
Manoj Chaudhury
Mayuresh Kothare

**SUBCOMMITTEE FOR
RECRUITING AND ADMISSION**

Jim Hsu (Acting Chair)
Maria Santore
Cesar Silebi

**SUBCOMMITTEE FOR DISTANCE
EDUCATION**

Cesar Silebi

POLYMER EDUCATION COMMITTEE

Les Sperling (Chair)
John Coulter (Mechanical Eng.)
Andy Klein (Chemical Eng.)
Dan Ou-Yang (Physics)
Ray Pearson (Materials Science)
Jim Roberts (Chemistry)
Debra Nyby, Scribe

**OPPORTUNITIES FOR STUDENT
INNOVATION (OSI)**

Israel Wachs

SAFETY COMMITTEE

Kemal Tuzla (Chair)
Fred Stein
Mohamed S. El-Aasser
Jim Hsu
Victoria Dimonie
Eric Daniels
John Caffrey
Alex Verdooren
Christian Wertz
Arun Sharma

RESEARCH CENTERS AND INSTITUTES LED BY CH.E. FACULTY

The Biopharmaceutical Technology Institute

[Established in 1995]

Director: James T. Hsu

e-mail: jth@lehigh.edu

telephone: (610) 758-4257

The Center for Polymer Science and Engineering

[Established in 1988]

Director: Mohamed S. El-Aasser

e-mail: mse@lehigh.edu

telephone: (610) 758-3598

Chemical Process Modeling and Control Research Center

[An NSF-Industry/University Cooperative Research Center, established in 1985]

Director: Christos Georgakis

e-mail: c.georgakis@lehigh.edu

telephone: (610) 758-5432

The Emulsion Polymers Institute

[Established in 1975]

Director: Mohamed S. El-Aasser

e-mail: mse@lehigh.edu

telephone: (610) 758-3598

Associate Directors: Eric S. Daniels

e-mail: esd@lehigh.edu

telephone: (610) 758-3602

E. David Sudol

e-mail: eds2@lehigh.edu

telephone: (610) 758-5580

The Polymer Interfaces Center

[An NSF-Industry/University Cooperative Research Center, established in 1991]

Director: Manoj K. Chaudhury

e-mail: mkc4@lehigh.edu

telephone: (610) 758-4471

Institute for Thermo-Fluid Engineering and Science

[Established in 1978]

Director: John C. Chen

e-mail: jcc@lehigh.edu

telephone: (610) 758-4098

RESEARCH AGENDA

The Biopharmaceutical Technology Institute

- Development of strategies for bioreactor and optimization
- Affinity aqueous two-phase systems for protein recovery and purification
- Utilization of high pressure supercritical carbon dioxide for natural products extraction
- Engineering studies of Opticep[®] membrane unit for biopharmaceutical purification
- DNA amplification by polymerase chain reaction engineering
- Enhancement of recombinant protein production in E. coli by metabolic engineering techniques
- Investigation of complimentary DNA for enzymatic reaction

The Center for Polymer Science and Engineering

- Surface/interfacial aspects of polymer colloids
- Adhesion
- Polymer blends and composites
- Polymerization mechanisms and kinetics
- Polymerization reactors — modeling and control
- Structure/properties relationship of interpenetrating polymer networks
- Macromolecular chemistry of biopolymers and coal
- Polymer coatings for corrosion protection and microelectronic packaging

Chemical Process Modeling and Control Research Center

- Modeling, optimization, and control of continuous and batch processes
- Linear and nonlinear model predictive control
- Identification of dynamic models from process data
- Integration of process design and control
- Statistical process and controller monitoring
- Plant-wide control
- Order reduction of dynamic models
- Dynamics and control of emulsion polymerization processes

The Emulsion Polymers Institute

- Kinetics and mechanisms in emulsion polymerization
- Miniemulsion: preparation, stabilization, polymerization and application
- Role of surfactants/stabilizers in emulsion polymerization systems
- Film formation and crosslinking from latexes
- Morphology development and control in composite latex particles
- Microscopic characterization of latexes and latex films via TEM, SEM and AFM
- Reaction calorimetry applied to heterogeneous polymerization processes
- Preparation of large-particle-size monodisperse latexes

RESEARCH AGENDA - continued

The Polymer Interfaces Center

- Development of versatile-methodologies to characterize the interphase region between polymers and substrates.
- Adsorption of non-ionic associative water-soluble polymers and polyionic water soluble polymers to diverse surfaces to elucidate colloid stability, rheology, gloss, flocculation, lubricity and other relevant behaviors.
- Fundamentals of wetting and adhesion and means of varying these processes by altering the molecular structure of the interface, as related to the design of adhesives, coatings, inks, plastic additives and related end-use systems.
- Examination of the mechanical behavior of polymer systems that innately contain interphase regions, or are purposely modified to incorporate interphases so as to develop predictive capabilities on ultimate fracture toughness of such composites.

Institute for Thermo-Fluid Engineering and Science

- Multiphase fluid mechanics in fast fluidized riser reactors
- Particle clusters in fast fluidization
- Two-phase heat transfer in fast fluidization
- Downflow fluidization
- Interactive heat and mass transfer in falling films
- Dropwise condensation on gradient-energy surfaces
- Boiling and condensing of alternate refrigerants
- Mechanisms of convective boiling heat transfer

B.S. Degree Recipients

There were a total of 33 Bachelor of Science degrees awarded during the time period of July 1, 2000 through June 30, 2001.

January 2001 Graduates

Mark Schleppy

May 2001 Graduates

Ronald Elliott Allen
Tessa Marie Allen **
Keisha Antoine **
Kevin Robert Bautz
Scott Michael Beaver **
Alyssa Jane Berg
Lynn Christine Buscarini *
Ling Chiang
Christian Charles Clark*
Daniel B. Craft
Gennaro Giovanni D'Aurizio *
Jennifer Ann Dickensheets
Allen Paul Dowdy II ***
J. Matthew Dubach
Joseph Michael Fedeyko **
Melissa Jo Garofalo
Juan Rafael Hernandez
Brenton Devin Hoffman ***
Sarah Anne Hotaling **
Brett Hudock
Deval Pratap Joisher
Mobolaji Kamson
Shaireen Khawaja
Joseph Anthony O'Leary, Jr. **
Annelise Helen Tatiana Preslan **
Jayson Lee Snyder
Joshua William Tilghman *
Kirsten Marie Tollefsen
Stephen Frank Turoscy
John Christopher Wagner
Jonathan Michael Watkins
Ramey M. Yousseff

*** Highest Honors ** High Honors * Honors

Undergraduate Scholarships and Awards July 1, 2000 - June 30, 2001

Barry M. Goldwater Scholarship 2000-2001

Brian Timko

Akzo Nobel Business Course

Andrey Zinchuk

Merck Engineering and Technology Fellowship Award

Christopher Jewell

Robert Ridgeway Senior Cup

Sanjoy Sircar

Harry M. Ullmann Chemistry Prize

Brenton Hoffman

American Institute of Chemical Engineering Award

Joseph Fedeyko
Annelise Preslan

American Chemical Society Award

Joseph Fedeyko

American Institute of Chemists Award

Annelise Preslan

Robert C. Hicks Prize (Chemical Engineering)

Sanjoy Sircar

***William H. Chandler Prize in Chemistry
and Chemical Engineering***

Allen Dowdy (Senior)
Julie Lindquist (Junior)
Jonathan Berg (Sophomore)

Merck Book Award

Jonathan Berg
Edward McConnell

Semiconductor Research Corporation Scholarship

Jake Towne

Undergraduates inducted into the following Honorary Societies:

Phi Beta Kappa

In recognition of high academic achievement in the liberal arts and sciences

Joseph M. Fedeyko

Annelise H. Preslan

Tau Beta Pi

In recognition of distinguished scholarship and exemplary character among students of engineering

Tessa M. Allen

Keisha Antoine

Scott M. Beaver

Allen Paul Dowdy

Joseph M. Fedeyko

Brenton Hoffman

Grant O. Hutchings

Joseph A. O'Leary

Annelise H. Preslan

Sanjoy Sircar

Opportunities for Student Innovation (OSI) Program

The OSI Program at Lehigh University affords selected seniors in chemical engineering, chemistry, and materials science and engineering an opportunity to experience team research leading toward technological benefits. This program seeks to develop a student's propensity for critical assessment and innovative solution of meaningful problems. Groups of two to four students pursue projects that are of industrial interest. Each project is hosted by a company and carried out under the supervision of a Lehigh faculty member with the guidance of a technical expert from the host company. The

scope of each project is tailored so that the student teams can make significant progress within nine months (fall and spring semesters).

Six chemical engineer students participated in the OSI Program during the 2000-01 year. The student names, the titles of their projects, and the names of the host companies are listed below. Two technical meetings are held during the year the purpose of which is to provide the students an opportunity to present their research to both the industrial partners and to the faculty.

Project: Optimization of Melt Dropping Process for Caustic Pellets Production
Students: Cesar Meza
Company: General Chemical
Faculty Advisor: Leonard Wenzel
Industrial Advisor: W. Bortle, R. Morgan

Project/: Steady-State Process Operability
Students: Brett Hudock, Scott Beaver
Company: Air Products
Faculty Advisor: Christos Georgakis
Industrial Advisor: Dave Vinson

Project: Predicting Phase Stability of Conditioners after Exposure to Freeze Thaw Cycles
Students: Alyssa Berg
Company: Avon Products
Faculty Advisor: Cesar Silebi
Industrial Advisors: Alan Letton

Project: Waterproofing/Film Forming Attributes
Students: Matt Dubach
Company: Avon Products
Faculty Advisor: Andy Klein
Industrial Advisors: Alan Letton

Project: Lifetime Storage Studies to Predict Shelf Life and Corrosion Failure Envelopes of Aerosol Packages
Students: Kevin Bautz
Company: Avon Products
Faculty Advisor: John Matson
Industrial Advisors: Alan Letton

Cooperative Education Program

Lehigh University's Co-op program is unique because it allows a student to graduate in four years. Because students are expected to graduate on time, a rigorous schedule is required. Only the top third of the sophomore engineering students, determined by their freshmen GPA are invited to participate.

Our Chemical Engineering Department is the biggest participant in the Engineering College's Co-op program. The qualified students attend summer school prior to their junior year. They work at a company during the fall semester of their junior year and the summer following

their junior year. They return to Lehigh for their senior year and graduate "on time" with the rest of their classmates.

During the past year, 15 chemical engineering majors participated in the Co-op program. During 2000-01, the average monthly salary for Co-op students working as chemical engineers was \$3,007.

Approximately 45 employers in the State of Pennsylvania and throughout the U.S. participated in the Co-op program. Those who provided employment to our department's students this past year are listed below followed by the names of the students involved.

Air Products & Chemicals, Inc.

Elizabeth Markulin
Joseph Otto
Alissa Thomas
Tiago Vasconcellos

Becton Dickinson

Lauren Williams

B. Braun

Jason Bombard

IBM

Peter Matturi

Infineum

Jason Horowitz
Krista Robinson

Instrument Specialties

Kaushik Som

Lucent

Mark Benfield

Merck

Grant Hutchings

Morton

James Knaub

Praxair

Jason Metzger

Rohm & Haas

Judith Luckie

Student Organizations - Undergraduate

AIChE Student Chapter:

Officers: 2000 - 2001

President	Annelise Preslan
Vice-President	Deval Joisher
Secretary	Katie Shannon
Treasurer	Alissa Thomas
Social Chair	Allen Dowdy

AIChE Advisor: Professor Maria M. Santore

2001 - 2002 Student Chapter Officers

President	Grant Hutchings
Vice-President	Katie Shannon
Secretary	Rose Deeter
Treasurer	Brian Fyfe
Social Chair	Alissa Thomas

AIChE Advisor: Professor Harvey Stenger

Activities of the AIChE Student Chapter

- Hosted and organized a Career Night (September 19, 2000) where our Chemical Engineering undergraduates were given the opportunity to meet and interact with company representatives.
- AIChE Student Chapter Winter Banquet, December 1, 2000.
- Ten Student Chapter Members attended the Fall AIChE National Meeting in Los Angeles, CA.
- Held Plants Tours at the following companies: Yuengling Brewery
- Halloween trip to a Haunted House
- Annual year-end department-wide picnic
- The Student Chapter Officers were actively involved in freshmen recruiting. They met with current Lehigh freshmen throughout the year to answer questions and talk about the Chemical Engineering curriculum.
- Chemical Engineering T-shirt sale

Graduate Students, 2000 - 2001

Full-Time Status

Student	Advisor	Undergraduate School	Matriculated	Degree
Alfadhel, Khaled	Kothare	Kuwait University	Fall 1999	MS/PhD
Al-Arfaj, Muhammad	Luyben	King Fahd University	Fall 1996	MS/PhD
Al-Busairi, Bader	Hsu	Kuwait University	Fall 1997	PhD
Al-Ghamdi, G.	El-Aasser	King Saud University	Fall 1998	PhD
Amnuaypanich, S.	Silebi	Prince Songkhla Univ.	Fall 1997	PhD
Anderson, Christopher	El-Aasser	Penn State Univ.	Fall 1996	PhD
Bezergianni, Styliani	Georgakis	Aristotle U Tessaloniki	Fall 1995	PhD
Bloss, Karl	Schiesser	W. Virginia University	Fall 1997	PhD
Boyars, Brian	Klein	Carnegie Mellon Univ.	Fall 1999	MS/PhD
Chen, Yongsheng	Wachs	Tsinghua University	Spring 1999	PhD
Choi, Yong-Taek	Stenger	Yonsei University	Fall 2000	PhD
Chung, Jun Young	Georgakis	Ajou University	Fall 2000	PhD
Daniel, Susan	Chaudhury	Lehigh University	Fall 1999	MS
Ding, Tianhua	Klein	Tsinghua University	Fall 1998	PhD
Fein, David	Wachs	Lehigh University	Fall 2000	MS
Ghatak, Animangsu	Chaudhury	I.I.T. - Kanpur	Fall 1998	PhD
Gonzalez, Jesus	Hsu	Universidad del Atlantico	Fall 1999	MS/PhD
Guo, Guang-Je	Schiesser	National Tsing-Hua	Fall 2000	MEng
Guvelioglu, Galip	Stenger	Bogazici University	Fall 2000	MS
Hansupalak, Nanthiya	Santore	King Mongkut's Inst. Tech	Fall 1996	PhD
Hsiao, Jevon C.	Hsu	New Jersey Inst. Of Tech.	Fall 2000	MEng
Huang, Lilong	Georgakis	Beijing University	Fall 1999	PhD
Huang, Xinyu	El-Aasser	Beijing Univ Chem Tech	Fall 1998	PhD
Huang, Yaodong	Santore	Tsinghua University	Fall 1998	PhD
Jaisathaporn, Phisit	Luyben	King Mongkut's Inst. Tech	Fall 1996	MS/PhD
Jeong, Pilmoon	El-Aasser	Seoul National Univ.	Fall 1996	PhD
Jiang, Sheng	El-Aasser	Tsinghua University	Fall 2000	MS/PhD
Kapilakarn, Kulchanat	Luyben	Prince of Songkla Univ.	Spring 1997	MS/PhD
Kaymak, Devrim	Georgakis	Istanbul Tech. Univ.	Fall 2000	PhD
Kim, Jongsoo	Chaudhury	Yonsei University	Fall 1997	PhD
Kim, Noma	El-Aasser	Seoul National Univ.	Fall 1999	PhD
Krishnan, Sitaraman	El-Aasser/ Klein	UDCT - Bombay	Fall 1997	PhD
Kropf, Jared	Stenger	Brigham Young Univ.	Spring 2001	MS
Kulkarni, Deepak	Wachs	I.I.T. - Madras	Fall 1999	MS
Lai, Zhen	El-Aasser	Tsinghua University	Fall 1999	PhD
Lee, Hyunjin	Schiesser	University of Seoul	Fall 1999	MS
Li, Tong	Georgakis	Tsinghua University	Fall 1999	MS/PhD
Lilly, Dawn Heater	Luyben	Univ. of Tennessee	Fall 2000	MS
Malotky, David	Chaudhury	University of Delaware	Fall 1996	PhD
Marcu, Ioan	El-Aasser	Technical Univ. of Iasi	Fall 1999	MS/PhD

Graduate Students, 2000 - 2001

Full-Time Status - continued

Student	Advisor	Undergraduate School	Matriculated	Degree
Mubarekyan, Ervin	Santore	Bogazici University	Fall 1992	MS/PhD
Mukherjee, Samrat	Georgakis	I.I.T., Kharagpur	Fall 2000	MS/PhD
Mulder, Eric	Kothare	Purdue University	Fall 1998	PhD
Namkanisorn, Apinan	Chaudhury	University of Minnesota	Fall 1994	PhD
Nguyen, Phu	Stenger	Lehigh University	Fall 2000	MEng
Oliveria-Lopes, Luis	Georgakis	Univ. Federal de Bahia	Fall 1996	PhD
Ozkan, Leyla	Georgakis/ Kothare	Bogazici University	Fall 1997	PhD
Palmer, Thomas	Chen	Carnegie-Mellon Univ.	Fall 1996	PhD
Pan, Gaofeng	El-Aasser	Tsinghua University	Fall 1997	PhD
Pattekar, Ashish	Kothare	I.I.T., Bombay	Fall 1999	PhD
Reyes-de-Leon, F.	Luyben	Tech. de Monterrey	Fall 1994	PhD
Saunders, Philip	Wachs	U of Missouri - Rolla	Fall 1999	PhD
Shapella, Brian	Santore	Lafayette College	Fall 1999	MS
Sharma, Arun K.	Chen	I.I.T. - Delhi	Fall 1995	PhD
Shin, Yongwoo	Santore	Korea University	Fall 1996	PhD
Sookkumnerd, T.	Hsu	Kasetsart University	Fall 1994	PhD
Subramanian, S.	Georgakis	Annamalai University	Fall 1997	PhD
Uzturk, Derya	Georgakis	Bogazici University	Fall 1996	PhD
Valappil, Jaleel	Georgakis	I.I.T. - Kharagpur	Fall 1995	PhD
Verdooren, Alexander	Caram	Universidad del Atlantico	Spring 1999	MS/PhD
Vorvolakos, Katherine	Chaudhury	Polytechnic University	Spring 1996	PhD
Wan, Zhaoyang	Kothare	Tsinghua University	Fall 1998	MS/PhD
Wang, Xiaoru	El-Aasser	Tsinghua University	Fall 1996	PhD
Wertz, Christian	Santore	University of Minnesota	Fall 1997	MS/PhD
Yan, Xun	Hsu/Regen	Tsinghua University	Fall 1998	PhD

Part-Time and Satellite Status

Student	Advisor*	Undergraduate School	Matriculated	Degree
Anderson, Jennifer	Silebi	Indiana University	Spring 1998	MEng
Avent, Yuen	Silebi	North Carolina A&T	Spring 2000	MEng
Barton, Joseph	Silebi	US Naval Academy	Spring 2001	MEng
Bricker, Michael	Silebi	Villanova University	Fall 1998	MEng
Brooks, Ralph	Silebi	Yale University	Spring 1998	MEng
DeSantos, Chris	Silebi	Rensselaer Polytechnic	Fall 1995	MEng
Dolan, Thomas	Silebi	Georgia Tech	Fall 1997	MEng
El-Agha, Ali	Hsu	University of Rochester	Fall 1996	MEng

* Professor Silebi is advisor in his capacity as Chairman of the Distance Education Committee

Graduate Students, 2000 - 2001

Part-Time and Satellite Status - continued

Student	Advisor*	Undergraduate School	Matriculated	Degree
Elliot, James	Silebi	Wayne State	Fall 1999	MEng
Finch, John	Silebi	University of Illinois	Fall 1996	MEng
Gangloff, Scott	Silebi	Villanova University	Fall 1998	MEng
Gawlik, Jennifer	Silebi	University of Michigan	Fall 1998	MEng
Gersbach, John	Silebi	University of Richmond	Spring 1999	MEng
Grove, Gordon	Silebi	Western Michigan	Spring 1998	MEng
Gutberlet, Charles	Silebi	Virginia Tech	Fall 1998	MEng
Hall, Jerald	Silebi	University of Minnesota	Spring 1998	MEng
Henrickson, Randy	Silebi	Purdue University	Fall 1998	MEng
Lachawiec, Anthony	Chen	Lehigh University	Fall 1998	PhD
Lam, Anh	Silebi	University of PA	Fall 1999	MEng
Lassig, Jennifer	Silebi	University of Michigan	Spring 2000	MEng
Lee, Ronald	Silebi	University of PA	Fall 1997	MEng
Liang, Jing	Silebi	Zhejiang University	Spring 2001	MEng
Markusen, Julia	Silebi	Cornell University	Fall 1996	MEng
Menzo, Darren	Silebi	University of Delaware	Fall 1999	MEng
Miller, Mark	Silebi	University of Wisconsin	Fall 1998	MEng
Peck, Kenneth	Silebi	Dartmouth College	Fall 1998	MEng
Pelley, Denise	Sperling	Penn State University	Spring 1998	MEng
Popule, Michael	Silebi	Rensselaer Polytechnic	Spring 1998	MEng
Ribnicky, Brian	Silebi	Stevens Institute	Spring 2000	MEng
Rogers, Bethany	Silebi	MIT	Spring 1998	MEng
Rozinsky, Maria	Silebi	Lehigh University	Spring 2001	MEng
Silvernale, Jeffrey	Silebi	University of Minnesota	Fall 1994	MS
Stamp, Todd	Silebi	Clarion University	Fall 1998	MEng
Swiney, David	Silebi	University of PA	Spring 1998	MEng
Taylor, Jedd	Silebi	Brigham Young Univ.	Spring 1998	MEng
Tran, Luong	Hsu	Rensselaer Polytechnic	Fall 1998	MEng
Wallace, Ian	Silebi	Messiah College	Fall 1998	MEng
Walters, Michael	Silebi	Bucknell University	Spring 2001	MEng
Wang, Hai	Silebi	Beijing University	Fall 1999	MEng
Williams, Patricia	Silebi	Bloomsburg University	Fall 1995	MEng
Wright, Mark	Silebi	University of Wisconsin	Fall 2000	MEng
Wu, Michael	Silebi	Stevens Inst. Of Tech.	Spring 2000	MEng
Young, Heather	Silebi	Penn State University	Summer 2000	MEng
Yuraszcek, Carlos	Silebi	RIT	Fall 1999	MEng

- Professor Silebi is advisor in his capacity as Chairman of the Distance Education Committee

Graduate Degree Recipients July 1, 2000 - June 30, 2001

January 2001 Degrees

Master of Science (M.S.) Degrees

Ralph P. Brooks (Advisor: C. A. Silebi)
B.S., Yale University
Merck & Company

Julia Firks Markusen (Advisor: C. A. Silebi)
B.S., Cornell University
Merck & Company

Jeffrey Paul Silvernale (Advisor: J. T. Hsu)
B.S., University of Minnesota
Air Products and Chemicals

Jedd D. Taylor (Advisor: C. A. Silebi)
B.S., Brigham Young University
Merck & Company

Master of Engineering (M.Eng.) Degrees

Ali Fouad El-Agha (Advisor: J. T. Hsu)
B. S., University of Rochester
Air Products and Chemicals

Michael Paul Popule (Advisor: C. A. Silebi)
B.S., Rensselaer Polytechnic Institute
Air Products and Chemicals

Master of Science (M.S.) Degree in Polymer Science and Engineering

Karl Seven (Advisors: A. Klein/M.S. El-Aasser) *[Materials student co-advised by ChE Faculty]*
B.S., Allegheny College
KNC Corporation

Master of Engineering (M.Eng.) Degree in Polymer Science and Engineering

Jerald William Hall, Jr. (Advisor: L. Sperling) *[Materials student advised by ChE Faculty]*
B.S., University of Minnesota
3M

January 2001 Degrees - continued

Doctor of Philosophy (Ph.D.) Degree - Chemical Engineering

Karl Friedrich Bloss (Advisor: W. E. Schiesser)
B.S., West Virginia University
Dissertation: *Dynamic Process Optimization Through Adjoint Formulations and Constraint Aggregation*
Air Products and Chemicals

Ervin Mubarekyan (Advisor: M. M. Santore)
B.S., Bogazici University, Turkey
Dissertation: *Relaxation and Exchange of Polymers at Solid/liquid Interfaces*
Dow Chemical Company

Luis Cláudio Oliveria Lopes (Advisor: C. Georgakis)
B.S., Federal University of Bahia, Brazil
Dissertation: *Reference System Nonlinear Model Predictive Control*
University of Uberlândia, Brazil

Francisco de Jesús Reyes de León (Advisor: W. L. Luyben)
B.S., Tecnológico de Monterrey, Mexico
Dissertation: *Design and Control of Recycle Systems with Tubular Reactors*
Instituto Mexicano del Petroleo, Mexico

Arun Kumar Sharma (Advisor: J. C. Chen)
B.S., Indian Institute of Technology, Delhi, India
Dissertation: *Transient Studies in Fast-Fluidized Beds*
ExxonMobil

Terasut Sookkumnerd (Advisor: J. T. Hsu)
B.Eng., Kasetsart University, Thailand
Dissertation: *Protein Fractionation by Aqueous Two-Phase Systems and Differential Ammonium Sulfate Precipitation*
Suranaree University of Technology, Thailand

Jaleel V. Valappil (Advisor: C. Georgakis)
B.S., Indian Institute of Technology, Kharagpur, India
Dissertation: *Nonlinear Model Predictive Control of End-Use Properties in Batch Reactors Under Uncertainty*
Aspen Tech

January 2001 Degrees - continued

Doctor of Philosophy (Ph.D.) Degrees - Polymer Science and Engineering

Pilmoon Jeong (Advisor: M.S. El-Aasser)
B.S., Seoul National University, Korea
Dissertation: *Hybrid Composite Latexes*
Cheil Industries, Inc.

Jiansheng Tang (Advisor: M.S. El-Aasser) [*Materials student advised by ChE Faculty*]
B.S., Tsinghua University, China
Dissertation: *Film Formation from Latex Blends*
Apache Products

Xiaoru Wang (Advisor: M.S. El-Aasser)
B.S., Tsinghua University, China
Dissertation: *Emulsion Polymerization of Styrene Using a Reactive Surfactant*
Eastman Kodak

May 2001 Degrees

Master of Science (M.S.) Degrees

Khaled Ali Alfadhel (Advisor: M. V. Kothare)
B.S., Kuwait University
Continuing for Ph.D. at Lehigh University

Susan Daniel (Advisors: J. C. Chen/M. K. Chaudhury)
B.S., Lehigh University
Weighing employment alternatives

David Eric Fein (Advisor: I. E. Wachs)
B.S., Lehigh University
Merck & Company

Yaodong Huang (Advisor: M. M. Santore)
B.S., Tsinghua University, China
Continuing for Ph.D. at Lehigh University

Deepak A. Kulkarni (Advisor: I. E. Wachs)
B.Tech., I.I.T.-Madras, India
Weighing employment alternatives

May 2001 Degrees - continued

Master of Science (M.S.) Degrees - continued

Hyunjin Lee (Advisor: W. E. Schiesser)
B.S., University of Seoul, Korea
Continuing for the Ph.D. at University of Arizona

Alexander Verdooren (Advisor: H. S. Caram)
B.S., Universidad del Atlántico, Colombia
Continuing for Ph.D. at Lehigh University

Master of Engineering (M. Eng.) Degrees

Christopher Alan DeSantos (Advisor: C. A. Silebi)
Rensselaer Polytechnic Institute
Johnson & Johnson

Jennifer Michelle Gawlik (Advisor: C. A. Silebi)
University of Michigan
Merck & Company

Phu Hoang Nguyen (Advisor: H. G. Stenger)
B.S. Lehigh University
EMCORE

Doctor of Philosophy (Ph.D.) Degree - Chemical Engineering

Styliani Bezergianni (Advisor: C. Georgakis)
B.S., Aristotle University of Thessaloniki, Greece
Dissertation: *Assessment of Multivariable Controller Performance*
ExxonMobil

Thomas Rainier Palmer (Advisor: J. C. Chen)
B.S., Carnegie Mellon University
Dissertation: *Rapid Transient Two-Phase Flow of Vaporizing Liquids Containing Dissolved Gas*
ExxonMobil

**Graduate Fellowships, Awards, Prizes and Honors
July 1, 2000 - June 30, 2001**

Byllesby Fellowship

Jesús María González
Samrat Mukherjee

Gotshall Fellowship

Sheng Jiang
Jared Kropf

Lehigh University President Scholar

David Fein
Phu Nguyen

P. C. Rossin Fellowship

Philip Saunders

Best Poster Award

2001 Emulsion Polymer Institute Annual Review Meeting

Mei Li (first prize)
Christopher Anderson (second prize)
Xinyu Huang and Noma Kim (third prize)

Textile Veterans Associated Award

Sitaraman Krishnan

TICONA Award

Society of Plastics Engineers

Chris Anderson
Mei Li

Leonard A. Wenzel Prize

Best Performance on Qualifying/General Examination

Khaled Alfadhel
Ashish Pattekar

Dupont Chemical Significant Contribution Award

Zhaoyang Wan

**Graduate Student Presentations
July 1, 2000 - June 30, 2001**

"Interaction Between Design and Control for a Methyl Acetate Reactive
Distillation Column"
AIChE Annual Meeting, Los Angeles, CA, November, 2000
Muhammad Al-Arfaj

"Modeling and Simulation of Palladium Membrane Microseparator for
Miniature Fuel Cell Applications"
Pittsburgh Digital Greenhouse, March, 2001
Khaled Alfadhel

" Modeling, Design and Microfabrication of a Miniature Methanol Reformer
for Compact Fuel Cell Applications, "
Air Products and Chemicals, September, 2000
Pittsburgh Digital Greenhouse, December, 2000 and March, 2001
Ashish Pattekar

"A Microreactor for in-situ Hydrogen Production by Catalytic Methanol Reforming"
5th International Conference on Microreaction Technology, Strasbourg, France, May
2001
Ashish Pattekar

"Robust Constrained Output Feedback Model Predictive Control
Using Linear Matrix Inequalities"
AIChE Annual Meeting, Los Angeles, CA, November, 2000
6th Conference on Chemical Process Control, Tucson, Arizona, January, 2001
Zhaoyang Wan

"Robust Output Feedback Model Predictive Control
Using Off-line Linear Matrix Inequalities"
2001 American Control Conference, Arlington, Virginia, June, 2001.
Zhaoyang Wan

Graduate Student Publications
July 1, 2000 - June 30, 2001

"Effect of Number of Fractionating Trays on Reactive Distillation Performance"
AIChE Journal; v46; 2417-2425; 2000.
Muhammad Al-Arfaj

"Comparison of Alternative Control Structures for an Ideal Two-Product
Reactive Distillation Column"
I&ECR; v39; 3298-3307; 2000.
Muhammad Al-Arfaj

Graduate Student Internships
July 1, 2000 - June 30, 2001

Galip H. Guvelioglu
Foster Wheeler Development Corporation
May, 2001 - August, 2001

Dawn Heater Lilly
Air Products and Chemicals
May, 2001 - August, 2001

Katherine Vorvolakos
General Electric
November, 2000 - April, 2001

Zhaoyang Wan
DuPont Process Dynamic and Control
September, 2000 - December, 2000

Student Organizations - Graduate

ChEGA

2000 - 2001 Officers

President	Susan Daniel
Vice President	Ashish Pattekar
Secretary	Deepak Kulkarni
Treasurer	Brian Shapella

2001 - 2002 Officers

Ashish Pattekar
Khaled Alfadhel
Panarat Tomanee
Dawn Heater Lilly

ChEGA Activities

- Hosted and organized a picnic following the Graduate Student Research Poster Show on July 12, 2000.
- Hosted and organized a picnic for welcoming new graduate students to Lehigh University on September 1, 2000.
- Prepared for ChE Colloquia held in Fall 2000 and Spring 2001 Semesters.

Graduate Student Activities

- Participation in the Graduate Student Research Poster Show at Iacocca Hall, Lehigh University on July 12, 2000. The poster show offered the graduate students the opportunity to learn about each other's research, as well as the opportunity to share their research and findings with participating faculty and industrial representatives.
- Participation in the 2000 Annual Meeting of the American Institute of Chemical Engineers, San Diego, CA
- Participation in and attendance at the Fall 2000 and Spring 2001 Chemical Engineering Colloquia held at Lehigh University.
- Participation by graduate students performing research in the field of process modeling and control in the 32nd and 33rd meetings of the Center for Process Modeling and Control Industrial Advisory Committee held in October 2000 and April 2001, respectively, at Lehigh University. This Center is an NSF/Industry/University Cooperative Research Center.

Graduate Student Activities (continued)

- Participation by graduate students performing research in the area of polymer interfaces in the Fall and Spring (November 2000 and May 2001) Semi-Annual Review Meetings held by the Polymer Interfaces Center, an NSF/Industry/University Cooperative Research Center, at Lehigh University.
- Participation by graduate students performing research in the area of emulsion polymers in the Emulsion Polymers Institute (EPI) Annual Review Meeting held at Lehigh University, March 2001 and in the June, 2001 EPI Short Course, "Advances in Emulsion Polymerization and Latex Technology."

Career Placement

Companies Recruiting our B.S., M.S., and Ph.D. Graduates

Agere Systems	Osram Sylvania Products Inc.
Air Products & Chemicals	P.H. Gladfelter Company
ALCOA	PECO Energy Company
Andersen Consulting	Pfizer, Inc.
Avecia Inc.	Philips Semi-Conductor
Aventis Pasteur	Picatinny Arsenal (US Army)
Avery Dennison	PPG Industries, Inc.
Basell Polyolefins	Praxair Inc.
Becton Dickinson Vacutainer Sys.	Rohm & Haas Company
Binney & Smith	Schering-Plough
BOC Group	South Down
Capital One Services, Inc.	Sun Oil Company
Elsicon Inc.	Ticona
EMCORE Corporation	Trane Company
Environ Corporation	UGI Corporation
Environmental Elements Corp.	US Nuclear Regulatory Commission
ExxonMobil Corporation	US Patent & Trademark Office
Firmenich	W.L. Gore & Associates, Inc.
FM Global	Westinghouse Electric Corporation
Foster Wheeler Corporation	Xyntek, Inc.
General Chemical Corporation	
Global Technology Services	
Hercules Incorporated	
Honeywell International	
Howmedica Osteonics	
Hydro Aluminum Metal Products	
IBM Corporation	
Infineum USA LP	
Instrument Specialties Co., Inc.	
Johnson Matthey	
Kulicke & Sotta Industries Inc.	
Kvaerner Group	
Lehigh Portland Cement Company	
Loreal USA	
Mallinckrodt Baker, Inc.	
Merck & Company	
Morton Powder Coatings	
National Starch & Chemical Co.	
Naval Surface Warfare Center	

Career Placement

Companies and Universities that Hired our Graduates

	<u>B.S.</u>	<u>M.S.</u>	<u>M.Eng.</u>	<u>Ph.D.</u>
Apache Products				X
Air Products	X	X	X	X
Accenture	X			
Aspen Technology				X
Andersen Consulting	X			
Aventis Pasteur	X			
Cheil Industries				X
Deloitte Consulting	X			
Dow Chemical Company				X
Eastman Kodak				X
Emcore Corporation			X	
ExxonMobil	X			X
Global Technology	X			
Instituto Mexicano del Petroleo, Mexico				X
IBM	X			
Johnson & Johnson			X	
ImClone Systems	X			
KNC Corporation		X		
Merck & Company	X	X	X	X
3M			X	
Philips Semiconductor	X			
Pfizer	X			
Suranarec University of Technology, Thailand				X
U.S. Navy	X			
University of Uberlandia, Brazil				X

Faculty Activities - January 1, 2000 thru December 31, 2000

Caram, Hugo S. (610) 758-4259
Professor hsc0@lehigh.edu

Interests gas-solid and gas-liquid systems, optical techniques, reaction engineering

2000 Publications

Refereed Journal Articles:

"Alumina-aluminide Alloys (3A) Technology: II, Modeling of $Ti_xAl_y-Al_2O_3$ Composites Formation", S.P. Gaus, M.P. Harmer, H.M. Chan, H.S. Caram, J. Bruhn, N. Claussen, J. Am. Ceram. Soc., 83(7), 1606-1612 (2000).

"Alumina-aluminide Alloys (3A) Technology: I, Model Development", S.P. Gaus, M.P. Harmer, H.M. Chan, H.S. Caram, N. Claussen, J. Am. Ceram. Soc., 83(7), 1599-1605 (2000).

Presentations at National / International Meetings

"Speed of Sound and Acoustic Attenuation in Fluidized Beds", with E.K. Levy, C. Herrera, and J. Ochs. Session on Fundamentals of Fluidization and Fluid Particle Systems-1, AIChE Annual Meeting, Los Angeles, CA, Nov. 12-17, 2000.

"Tensile Stress and Deformation in Wet Granular Materials", with D. Agrawal and J.J. McCarthy. Session on Solids Handling and Processing, AIChE Annual Meeting, Los Angeles, CA, Nov. 12-17, 2000.

"The Spherical Reverse Flow Reactor", with G. Viecco. Session on Unsteady-State Operation of Chemical Reactors, AIChE Annual Meeting, Los Angeles, CA, Nov. 12-17, 2000.

"Rate of the Aluminum/Oxygen Reaction in the Reaction-Bonding of Aluminum Oxide", with J. Aaron, M.P. Harmer, and H.M. Chan. Session on High Temperature Non-Catalytic Reacting Systems, AIChE Annual Meeting, Los Angeles, CA, Nov. 12-17, 2000.

Active Grants and Contracts

"Discharge of Gas and Vapor", PADC

"PITA Navy SS Double", PADC

"Nonmag SS Adv Ships", ONR

"Processing of Advanced Refractories Lining Materials by Reaction Bonding", ONR

"Wet Solids Flow Enhancement", DOE

Project – Air Products

Charles, Marvin (610) 758-4268
Professor mc02@lehigh.edu

Interests bioprocess design, cGMP (Current Good Manufacturing turing Practices) R&D

2000 Publications Patent

Invited Industrial Seminars / Presentations

"Highly Viscous Fermentations", Fermatek, Louisville, KY, February 21, 2000.

"Applications of Bioinformatics to Practical Issues in Process Development"" Ijong Biotech, Sydney, Australia, March 20, 2000.

"Design of Multiproduct Biologics Plants", LDH Enterprises, Sydney, Australia, March 22, 2000.

"Design of Large Scale Ethanol Fermentation Processes", BioFuel, Torrence, CA, May 23, 2000.

"Genetic Engineering Applied to BioProcess Development", BioProteus, Mauntz, France, June 18, 2000.

"Problems in Viral Clearance Validation", PharmaScope, Bottmingen, Switzerland, June 22, 2000.

Marvin Charles (continued)

“Regulatory Issues in Cleaning Validation of Membrane Filters” GMP Associates, Morrisville, NC, July 26, 2000.

“Scaleup of Mammalian Cell Bioreactors”, Chugai Pharmaceutical, Tokyo, Japan, August 7, 2000.

“Protecting Large Scale BioReactors from Viral Contamination”, Daiek Engineering, Bombay, India, August 11, 2000.

“BioReactor Design and Control”, GIA Biotech, Raleigh, NC, December 12, 2000.

Chaudhury, Manoj K. (610) 758-4471
Associate Professor mkc4@lehigh.edu

Interests adhesion, thin films, surface chemistry

2000 Publications

Refereed Book Chapter:

“Surface Properties of Thin Film Poly(dimethylsiloxane)”, H. She, M.K. Chaudhury, and M.J. Owen in Silicones and Silicone-Modified Materials, Chapter 11, ACS Symp. Series No. 729, Ed., S. Clarson, J.J. Fitzgerald, M.J. Owen and S.D. Smith (2000).

Invited Feature Article:

“Interfacial Rate Processes in Adhesion and Friction”, A. Ghatak, K. Vorvolakos, H. She, D. Malotky, and M.K. Chaudhury, *J. Phys. Chem. B*, 104, 4018 (2000).

Refereed Journal Articles:

“Surface Modification of Silicone Elastomer Using Perfluorinated Ether”, S.K. Thanawala and M.K. Chaudhury, *Langmuir*, 16, 1256 (2000).

“Estimation of Adhesion Hysteresis Using Rolling Contact Mechanics”, H. She and M.K. Chaudhury, *Langmuir* 16, 622 (2000).

“Synthesis of Surface/Active Quaternary Amino Fluorosiloxanes”, A. Vaidya and M.K. Chaudhury, *J. Appl. Polym. Sci*, 77, 1700 (2000).

“Surface of Semi-Fluorinated Block Copolymers Studied Using NEXAFS”, J. Genzer, E. Sivaniah, E.J. Kramer, J. Wang, H. Korner, X. Maoliang, S. Yang, C.K. Ober, K. Chr, M.K. Chaudhury, B.M. Dekoven, R.A. Bubeck, D.A. Fischer, and S. Sambasivan, *Macromolecules*, 33, 1882 (2000).

“Hydrophobic Recovery of the Polydimethyl - siloxne Elastomer Exposed to Partial Electrical Discharge”, *J. Colloid Interface Sci.*, 226, 231 (2000).

“How Resin-Polymer Interactions Affect Silicone Release Coatings: Forcing the Issue”, G.V. Gordon, T.M. Leaym, M.J. Owen, M.S. Owens, S.V. Perz, J.. Stasser, J.S. Tonge, M.K. Chaudhury, K.A. Vorvolakos, and H. She, *Adhesives Age*, 43(3), 41 (2000).

“Meniscus Instability in Thin Elastic Films”, A. Ghatak, M.K. Chaudhury, A. Sharma, and V. Shenoy, *Phys. Rev. Lett.*, 85, 4329 (2000).

Invited Lectures at National / International Meetings

“Roles of Interfacial Chemistry and Mechanics in Release Phenomena”, Poly Millennium 2000 – First International Symposium on Polymers in the Marine Environment, Waikoloa, Hawaii, December 10-12, 2000.

Invited Academic Seminars / Presentations

“Guided Liquids on Gradient Surfaces”, Fluid Dynamics Seminar Series, Massachusetts Institute of Technology, September 2000.

“Preparation and Properties of Gradient Surfaces”, Department of Chemical Engineering, University of Pittsburgh, Pittsburgh, PA, July 2000.

Invited Seminars / Presentations

“Mechanism of Release”, Office of Naval Research, September 2000.

Manoj Chaudhury (continued)

“Combating Bioadhesion with Silicone Coatings”, Green Approaches to Combating Biodeterioration, Philadelphia, PA, September 2000.

Active Grants and Contracts

“Microscopic Mechanics of Biofouling Release in Marine Environments”, ONR

“Industry/University Cooperative Research Center for Polymer Interfaces”, NSF

“Hydrophobic Recovery of Corona Treated Silicon Rubbers”, Dow Corning

“Dow Corning Corporation – Graduate Research Projects”, Dow Corning

“Mechanism of Hard Fouling Release”, ONR

“NSF IUCRC – A Multi-Institutional Program Targeting the Fundamental Adsorption Behavior of Polyelectrolytes”, NSF

Chen, John C. (610) 758-4091
Professor jcc0@lehigh.edu

Interests two-phase vapor-liquid flow, fluidization, radiative heat transfer, environmental technology

2000 Publications

Refereed Journal Articles:

“Characteristics of Liquid-wall Contact in Post-CHF Flow Boiling”, with Asuman F. Cokmez-Tuzla and Kemal Tuzla, International Journal of Heat and Mass Transfer, 43, 1925-1934 (2000).

“Parametric Effects of Particle Size and Gas Velocity on Cluster Characteristics in Fast Fluidized Beds”, with A.K. Sharma, K. Tuzla, and J. Matsen, Powder Technology, 111, 114-123 (2000).

Conference Proceedings:

“Heat Transfer Across Evaporating Falling Films of Single Component Liquids”, with A.A. Alhusseini and K. Tuzla, in Convective Flow and Pool Boiling, eds, F. Mayinger and M. Lehner, Taylor & Francis Pub., 371-377 (2000).

“Experimental Study of Heat Transfer in Laminar Falling Films at High Prandtl Numbers”, with K. Tuzla and T. Palmer, in Boiling 2000 Phenomena and Emerging Applications, Begell House Pub., Volume 1, 41-65 (2000).

Invited Lectures at National / International Meetings

“New Paradigm for Fellow Election Honors in AIChE”, presentation to Governing Board, AIChE Annual Meeting, Los Angeles, CA, November 10, 2000.

Presentations at National / International Meetings

“Comparison of Cluster Characteristics in Riser and Downer Fast Fluidized Beds”, AIChE Annual Meeting, Los Angeles, CA, November 2000.

Invited Industrial Seminars / Presentations

“Advanced Technology for Heat Transfer in Polymer Processing”, Polyolefin Division, Dow Chemical Corporation, Freeport, TX, October 19, 2000.

“Novel Concepts for Enhanced Heat Transfer in Polymer Reactors and D-Volatizers”, presentation to Corporate Technical Managers, Dow Chemical Corporation, Houston, TX, November 13, 2000.

Active Grants and Contracts

“Polymer Processing Heat Transfer”, Dow Chemical Research

“DPC Cirrus”

El-Aasser, Mohamed S. (610) 758-4470
Professor mse0@lehigh.edu

Interests nano-polymer particles,
kinetics of emulsion
polymerization, surface and
colloidal phenomena, latex
film formation

2000 Publications

Book:

Emulsion Polymers, ACS Symposium Editors,
Mohamed S. El-Aasser and Carrington Smith,
Wiley-VCH, pp. 237, April 2000

Refereed Book Chapters:

"Encapsulation of Inorganic Particles via Mini-emulsion Polymerization", B. Erdem, E.D. Sudol, V.L. Dimonie, and M.S. El-Aasser, in Emulsion Polymers, M.S. El-Aasser and C. Smith, Editors, *Macromol. Symp.* 155, 181-198 (2000).

"Study of the Drying Behavior of Model Latex Blends during Film Formation: Influence of Carboxyl Groups", J. Tang, V.L. Dimonie, E.S. Daniels, A. Klein, and M.S. El-Aasser, in Emulsion Polymers, M.S. El-Aasser and C. Smith, Editors, *Macromol. Symp.* 155, 139-161 (2000).

"Characterization of Partially Hydrolyzed Poly(Vinyl alcohol). I. Sequence Distribution via ^1H and ^{13}C -NMR and a Reversed-phased Gradient Elution HPLC Technique", B. Budhlall, K. Landfester, D. Nagy, E.D. Sudol, V.L. Dimonie, D. Sagl, A. Klein, and M. S. El-Aasser, in Emulsion Polymers, M.S. El-Aasser and C. Smith, Editors, *Macromol. Symp.* 155, 63-84 (2000).

"Nitroxide-Mediated Living Free Radical Miniemulsion Polymerization of Styrene", T. Prodpran, V.L. Dimonie, E.D. Sudol, and M.S. El-Aasser, in Emulsion Polymers, M.S. El-Aasser and C. Smith, Editors, *Macromol. Symp.* 155, 1-14 (2000).

"Recent Advances in Miniemulsion Polymerization", P.J. Blythe, E.D. Sudol, and M.S. El-Aasser, in Polymers in Dispersed Media I, J. Claverie, M.-T. Charreyre, C. Pichot, Eds., Wiley-VCH, Germany. *Macromolecular Symposia Issue*, Fourth International Symposium on "Polymers in Dispersed Media", Lyon, France, Vol. 150, pp. 1-318 (2000).

Refereed Journal Articles:

"Low Free Energy Surfaces Using Blends of Fluorinated Acrylic Copolymer and Hydrocarbon Acrylic Copolymer Latexes", R.R. Thomas, N.G. Tassi, K.G. Lloyd, K.M. Stika, L.E. Stephans, G.S. Magallanes, V.L. Dimonie, E.D. Sudol, and M.S. El-Aasser, *Macromolecules*, 33(23), 8828-8841 (2000).

"Role of Mixed Anionic-Nonionic Systems of Surfactants in the Emulsion Polymerization of Styrene: Effect on Particle Nucleation", D. Colombie, E.D. Sudol, and M.S. El-Aasser, *Macromolecules*, 33, No. 20, 7283-7291 (2000).

"Competitive Adsorption of the Anionic Surfactant SLS and the Nonionic Surfactant Triton X-405 on Polystyrene Latex Particles", D. Colombie, K. Landfester, E.D. Sudol, and M.S. El-Aasser, *Langmuir*, 16, No. 21, 7905-7913 (2000).

"Synthesis and Characterization of a Macromonomer Crosslinker", H. Mohd. Ghazaly, E.S. Daniels, V.L. Dimonie, M.S. El-Aasser, and A. Klein, *J. App. Polymer Sci.*, 77, 1362-1368 (2000).

"Effect of a Mixed Anionic-Nonionic System of Surfactants on the Entry and Exit of Free Radicals into Polystyrene Particles", D. Colombie, E. D. Sudol, and M.S. El-Aasser, *Macromolecules*, 33, No. 12, pp. 4347-4353 (2000).

"Synthesis and Characterization of Model Carboxylated Latexes for Studies of Film Formation from Latex Blends", J. Tang, V.L. Dimonie, E.S. Daniels, A. Klein, and M.S. El-Aasser, *J. Appl. Polym. Sci.*, 77, 644-659 (2000).

Mohamed El-Aasser (continued)

"Determination of Miniemulsion Droplet Size via Soap Titration", B. Erdem, Y. Sully, E. D. Sudol, V.L. Dimonie, and M.S. El-Aasser, *Langmuir*, 16, No. 11, 4890-4895 (2000).

"Polymerization of Miniemulsions Containing Predissolved Polystyrene and using Hexadecane as Costabilizer", P.J. Blythe, B.R. Morrison, K. Mathauer, E.D. Sudol, and M.S. El-Aasser, *Langmuir*, 16, No. 3, 898-904 (2000).

Conference Proceedings:

"Hybrid Composite Latexes", P. Jeong, V.L. Dimonie, E.S. Daniels, and M.S. El-Aasser, *Proceedings of Spring 2000 ACS Meeting, Div. Polymeric Materials: Science and Engineering*, 82, 305 (2000).

Abstracts:

"Emulsion Polymerization of Styrene Using a Reactive Surfactant", X. Wang, E.D. Sudol, and M.S. El-Aasser, Polymer Colloids Symposium of the 74th Colloid and Surface Science Symposium, Lehigh University, Bethlehem, PA, June 19 - 21, 2000.

"Role of Grafting in the Emulsion Polymerization of Vinyl Acetate. Effect of the Degree Poly(vinyl alcohol) Blockiness on the Kinetics and Mechanism of Grafting", B.M. Budhlall, E.D. Sudol, V.L. Dimonie, A. Klein, and M.S. El-Aasser, Polymer Colloids Symposium of the 74th Colloid and Surface Science Symposium, Lehigh University, Bethlehem, PA, June 19 - 21, 2000.

"Living Free Radical Miniemulsion Polymerization of Styrene", G. Pan, E.D. Sudol, V.L. Dimonie, and M.S. El-Aasser, Polymer Colloids Symposium of the 74th Colloid and Surface Science Symposium, Lehigh University, Bethlehem, PA, June 19 - 21, 2000.

"Encapsulation of Inorganic Particles via Miniemulsion Polymerization. Encapsulation and Characterization", B. Erdem, E.D. Sudol, V.L. Dimonie, and M.S. El-Aasser, Polymer Colloids Symposium of the 74th Colloid and

Surface Science Symposium, Lehigh University, Bethlehem, PA, June 19 - 21, 2000.

"Influence of the Surface Characteristics of Latex Particles on the Mechanical Properties of Latex Blend Films", J. Tang, E.S. Daniels, V.L. Dimonie, M.S. Vratsanos, A. Klein, and M.S. El-Aasser, Polymer Colloids Symposium of the 74th Colloid and Surface Science Symposium, Lehigh University, Bethlehem, PA, June 19 - 21, 2000.

"Hybrid Composite Latexes", P. Jeong, E.S. Daniels, V.L. Dimonie, and M.S. El-Aasser, Polymer Colloids Symposium of the 74th Colloid and Surface Science Symposium, Lehigh University, Bethlehem, PA, June 19 - 21, 2000.

"Miniemulsion Copolymerization of Styrene and n-Butyl Acrylate", C.D. Anderson, E.D. Sudol, and M.S. El-Aasser, 74th Colloid and Surface Science Symposium, Lehigh University, Bethlehem, PA, June 19 - 21, 2000.

"Encapsulation of TiO₂ in Latex Particles via Miniemulsion Polymerization", B. Erdem, G. Al-Ghamdi, E.D. Sudol, V.L. Dimonie, and M.S. El-Aasser, Session on Applications of Microstructured Fluids II, AIChE 2000 Annual Meeting, Los Angeles, CA, November 12-17, 2000.

Invited Lectures at National / International Meetings

"Encapsulation of TiO₂ in Latex Particles via Miniemulsion Polymerization", AIChE 2000 Annual Meeting, Los Angeles, CA, November 17, 2000.

"Smith and Ewart Theory and Miniemulsion Polymerization". Symposium Chair and Lecturer, Symposium to celebrate the installation of Smith and Ewart into the International Rubber Science Hall of Fame at the University of Akron, November 3, 2000.

"Advances in Emulsion Polymerization and Latex Technology", American Association of Pharmaceutical Scientists Meeting, November 1, 2000, Indianapolis, IN.

Mohamed El-Aasser (continued)

"Advances in Emulsion Polymerization for Coatings Applications: Latex Blends and Reactive Surfactants". Invited Keynote Lecturer and Session Moderator, Advances in Waterborne Resins, Federation of Societies for Coatings Technology 78th Annual Meeting, October 19, 2000, Chicago, IL.

"Latexes and Artificial Latexes via Emulsion Polymerization and Miniemulsion Systems", Dow Chemical, Freeport, TX, September 12, 2000.

"Miniemulsion Polymerization - Theory and Practice", Department of Chemical Engineering, Tulane University, New Orleans, LA, September 8, 2000.

"Advances in Miniemulsion Polymerization", ACS North Carolina Polymer Discussion Group Meeting, North Carolina State University Club, Cary, NC, February 10, 2000.

Invited Seminars / Presentations

"Preparation and Characterization of Latexes for Immunoassay Use", The Latex Course, Emerald Diagnostics, Amsterdam, The Netherlands, May 17-19, 2000.

Short Course Presentations

"Stabilization Mechanisms in Aqueous and Non-Aqueous Latexes", Advances in Emulsion Polymerization and Latex Technology Short Course, Davos, Switzerland, August 14-18, 2000.

"Structured Latex Particles: Morphology Designs, Characterization and Applications", Advances in Emulsion Polymerization and Latex Technology Short Course, Davos, Switzerland, August 14-18, 2000.

"Latex Preparation by Direct Emulsification and Polymerization in Miniemulsions", Advances in Emulsion Polymerization and Latex Technology Short Course, Davos, Switzerland, August 14-18, 2000.

"The Role of Surfactants in Emulsion Polymerization", Advances in Emulsion

Polymerization and Latex Technology Short Course, Davos, Switzerland, August 14-18, 2000.

"Surface Characterization of Latex Systems", Annual EPI Short Course, Advances in Emulsion Polymerization and Latex Technology, Lehigh University, Bethlehem, PA., June 5-9 2000.

"Latex Preparation by Direct Emulsification and Polymerization in Miniemulsions", Annual EPI Short Course, Advances in Emulsion Polymerization and Latex Technology, Lehigh University, Bethlehem, PA., June 5-9, 2000.

"Stabilization Mechanisms in Aqueous and Non-Aqueous Latexes", Annual EPI Short Course, Advances in Emulsion Polymerization and Latex Technology, Lehigh University, Bethlehem, PA., June 5-9, 2000.

"The Role of Surfactants in Emulsion Polymerization Processes", Annual EPI Short Course, Advances in Emulsion Polymerization and Latex Technology, Lehigh University, Bethlehem, PA., June 5-9, 2000.

Presentations made by Advisees

"Emulsion Polymerization of Styrene Using a Reactive Surfactant", X. Wang, E.D. Sudol, and M.S. El-Aasser, paper presented at the Polymer Colloids Symposium of the 74th Colloid and Surface Science Symposium, Lehigh University, Bethlehem, PA, June 19 - 21, 2000.

"Role of Grafting in the Emulsion Polymerization of Vinyl Acetate. Effect of the Degree Poly(vinyl alcohol) Blockiness on the Kinetics and Mechanism of Grafting", B.M. Budhlall, E.D. Sudol, V.L. Dimonie, A. Klein, and M.S. El-Aasser, paper presented at the Polymer Colloids Symposium of the 74th Colloid and Surface Science Symposium, Lehigh University, Bethlehem, PA, June 19 - 21, 2000.

"Living Free Radical Miniemulsion Polymerization of Styrene", G. Pan, E.D. Sudol, V.L. Dimonie, and M.S. El-Aasser, paper presented at the Polymer Colloids Symposium of the 74th Colloid and Surface Science Symposium, Lehigh University, Bethlehem, PA, June 19 - 21, 2000.

Mohamed El-Aasser (continued)

"Encapsulation of Inorganic Particles via Miniemulsion Polymerization. Encapsulation and Characterization", B. Erdem, E.D. Sudol, V.L. Dimonie, and M.S. El-Aasser, paper presented at the Polymer Colloids Symposium of the 74th Colloid and Surface Science Symposium, Lehigh University, Bethlehem, PA, June 19 - 21, 2000.

"Influence of the Surface Characteristics of Latex Particles on the Mechanical Properties of Latex Blend Films", J. Tang, E.S. Daniels, V.L. Dimonie, M.S. Vratsanos, A. Klein, and M.S. El-Aasser, paper presented at the Polymer Colloids Symposium of the 74th Colloid and Surface Science Symposium, Lehigh University, Bethlehem, PA, June 19 - 21, 2000.

Hybrid Composite Latexes", P. Jeong, E.S. Daniels, V.L. Dimonie, and M.S. El-Aasser, paper presented at the Polymer Colloids Symposium of the 74th Colloid and Surface Science Symposium, Lehigh University, Bethlehem, PA, June 19 - 21, 2000.

"Miniemulsion Copolymerization of Styrene and n-Butyl Acrylate", C.D. Anderson, E.D. Sudol, and M.S. El-Aasser, poster presented at the 74th Colloid and Surface Science Symposium, Lehigh University, Bethlehem, PA, June 19 - 21, 2000.

Active Grants and Contracts

"Emulsion Polymers Institute Industrial Liaison Program"

"Two Postdoctoral Research Programs on General Emulsion Polymerization", Elf Atochem

"A New Process to Obtain PVC Powders for Paste by Controlled Agglomeration of PVC Dispersions", Vestolit

"Kinetics and Mechanisms of Stable Free Radical Miniemulsion Polymerization (SFRMP) and Application to the Preparation of Nanostructured Latex Particles", NSF

"Enhanced Nucleation of Monomer Droplets in Miniemulsion NSF Polymerization", NSF

"Preparation of High Molecular Weight (Co)-Polymers by Emulsion Polymerization for use as Drag Reducing Agents in Oil Pipeline Transportation", Norsk Hydro

Georgakis, Christos (610) 758-5432
Professor c.georgakis@lehigh.edu

Interests batch control, model predictive control, identification, statistical process control

2000 Publications

Book:

Guest Editor, Journal of Process Control, 10, front matter, 2000.

Refereed Journal Articles:

"Effect of Feedback Controllers in State Estimation Schemes", with G.E. Elicabe, I&E Chem. Research, 39, 387-395 (2000).

"Systematic Estimation of State Noise Statistics for use in Extended Kalman Filters", with J. Valappil, AIChE Journal, 46, No. 2, 292-308 (2000).

"A New Measure of Process Output Controllability", with D.R. Vinson, J. Process Control, 10, 185-194 (2000).

"Controller Performance Assessment Based on Minimum and Open-loop Output Variance", Control Engineering Practice, 8, 791-979 (2000).

"Steady-State Operability Characteristics of Reactors", with S. Subramanian, Computers and Chemical Eng., 24, 1563-1568 (2000).

"Model Predictive Control of Nonlinear Systems Using Piecewise Linear Models", with L. Ozkan and M. Kothare, Computers and Chemical Eng., 24, 793-799 (2000).

Christos Georgakis (continued)

Conference Proceedings:

"Steady-State Operability Characteristics of Reactors", with S. Subramanian, Proceedings of the Process Systems Engineering 2000 Conference, Keystone, CO, July 16-21, 2000.

"Model Predictive Control of Nonlinear Systems Using Piecewise Linear Models", with L. Ozkan and M. Kothare, Proceedings of the Process Systems Engineering 2000 Conference, Keystone, CO, July 16-21, 2000.

"On L_1 -Reference System Linear Model Predictive Control", with L.C. Oliveira-Lopes, Proceedings of the ADCHEM 2000 IFAC Symposium, pp. 293-298, Pisa, Italy, June 14-16, 2000.

"Steady State Optimal Test Signal Design for Constrained Multivariable System", with Q. Zhan, Proceedings of the IFAC Symposium on System Identification, Santa Barbara, CA, June 21-23, 2000.

"Transition Control using a Locally Linearized Reference System Model Predictive Controller", with L.C. Oliveira-Lopes, Proceedings of the 8th IEEE Mediterranean Conference on Control & Automation (MED 2000), Rio, Greece, July 17-19, 2000.

Abstracts:

"Incorporation of Uncertainty in Nonlinear Model Predictive Control of Batch Reactors", with J. Valappil, AIChE 2000 Annual Meeting, Los Angeles, CA, November 12-17, 2000.

"Assessment and Enhancement of Inherent Dynamic Operability of Processes", with D. Uzturk, AIChE 2000 Annual Meeting, Los Angeles, CA, November 12-17, 2000.

"Nonlinear Transition Control Using RS-MPC", with L.C. Oliveira-Lopes, AIChE 2000 Annual Meeting, Los Angeles, CA, November 12-17, 2000.

Presentations at National / International Meetings

"Incorporation of Uncertainty in Nonlinear Model Predictive Control of Batch Reactors", AIChE 2000 Annual Meeting, Los Angeles, CA, November 12-17, 2000.

"Assessment and Enhancement of Inherent Dynamic Operability of Processes", AIChE 2000 Annual Meeting, Los Angeles, CA, November 12-17, 2000.

"Nonlinear Transition Control Using RS-MPC", AIChE 2000 Annual Meeting, Los Angeles, CA, November 12-17, 2000.

Invited Academic Seminars / Presentations

"A New Look at Process Operability", Case Western Reserve University, Cleveland, OH, April 11, 2000.

"On the Operability of Continuous Processes", Boston University, Boston, MA, September 8, 2000.

"How Do We Know? The Case of the Kinetic Theory of Heat", with H. Caram and C. Silebi, November 29, 2000.

Active Grants and Contracts

Industry/University Cooperative Research Center for Chemical Process Modeling and Control.

"An Integrated Chemical Reforming Microplant for Fuel Cell Applications", NSF.

Hsu, James T. (610) 758-4257
Professor jth0@lehigh.edu

Interests bioseparation, separation processes, applied recombinant DNA technology

2000 Publications

Patent

“Heat Transfer Fluid Compositions for Low Temperature Applications”, J.T. Hsu, K.F. Wieland, S. Mohapatra, and D.J. Loikits, U.S. Patent 6,086,782, July 11, 2000.

Refereed Journal Articles:

“Gradient Formation in Membrane Unit for Differential Precipitation of Proteins”, T. Sookkumnerd, J.T. Hsu, and Y. Ito, *AICHE Journal*, 46(6), 1191 (2000).

“Gel Entrapment of Chemically Modified Enzymes for Continuous Reaction”, S.C. Mohapatra and J.T. Hsu, *J. Chem. Tech. and Biotech.*, 75, 1 (2000).

“Selective Dampening of Gas Permeability of a Lagmuir-Blodgett Film Using Moist Permeants”, X. Yan, J.T. Hsu, and S.L. Regen, *J. Am. Chem. Soc.*, 122, 11944 (2000).

“Purification of PEG-Protein Conjugates by Countercurrent Distribution in Aqueous Two-Phase Systems”, *J. Liquid Chrom. and Related Tech.*, 23(4), 297 (2000).

“Studies on Gradient Chromatography for Separation of DNA and Oligonucleotides”, *J. Liquid Chrom. and Related Tech.*, 23(12), 1809 (2000).

“Purification of PEG Protein Conjugates by Centrifugal Precipitation Chromatography”, *J. Liquid Chrom. and Related Tech.*, 23(13), 1973 (2000).

Invited Lectures at National / International Meetings

“Centrifugal Precipitation Chromatography: Gradient Formation in Membrane Unit for Differential Precipitation of Proteins”, HPLC-2000, Seattle, WA, June 24-30, 2000.

“Gradient Approach to Chromatography Technology”, HPLC-2000, Seattle, WA, June 24-30, 2000.

“Studies on Gradient Elution Chromatography for Separation of DNA and Oligonucleotides”, HPLC-2000, Seattle, WA, June 24-30, 2000.

“Centrifugal Membrane Chromatography: Gradient Formation in Membrane Unit for Differential Precipitation of Proteins”, 74th Colloid and Surface Science Symposium, Lehigh University, Bethlehem, PA, June 19-21, 2000.

“Gradient Approach to Chromatography Separation for Proteins and DNA”, presented in Session on Liquid Phase Applications of Adsorption, AIChE Annual Meeting, Los Angeles, CA, November 12-17, 2000.

Invited Industrial Seminars / Presentations

“Centrifugal Precipitation Chromatography Protein Fractionation by Differential Precipitation”, Janssen Research Foundation, Johnson and Johnson, Spring House, PA, August 4, 2000.

Active Grants and Contracts

“Saw Palmetto Berry Extract as a Nutraceutical”, B.F.

“Highly Efficient Extraction Process for Nutraceuticals”, B.F.

“Bio-Project”, Hagelin

Aventis Pasteur Fellowship

Klein, Andrew
Professor

(610) 758-4219
ak04@lehigh.edu

Interests emulsion polymerization,
colloidal and surface effects in
polymerization

2000 Publications

Patent

"Adhesives and Method for Making Same", S. Tobing, A. Klein, and T. White, International Publication No. WO 00/68316, November 16, 2000.

Refereed Book Chapter:

"Study of the Drying Behavior of Model Latex Blends during Film Formation: Influence of Carboxyl Groups", J. Tang, V.L. Dimonie, E.S. Daniels, A. Klein, and M.S. El-Aasser, in Emulsion Polymers, M.S. El-Aasser and C. Smith, Editors, *Macromol. Symp.* 155, 139-161 (2000).

"Characterization of Partially Hydrolyzed Poly(Vinyl alcohol). I. Sequence Distribution via ^1H and ^{13}C -NMR and a Reversed-phased Gradient Elution HPLC Technique", B. Budhlall, K. Landfester, D. Nagy, E.D. Sudol, V.L. Dimonie, D. Sagl, A. Klein, and M. S. El-Aasser, in Emulsion Polymers, M.S. El-Aasser and C. Smith, Editors, *Macromol. Symp.* 155, 63-84 (2000).

Refereed Journal Articles:

"Mechanistic Studies in Tackified Acrylic Emulsion Pressure Sensitive Adhesives", S.D. Tobing and A. Klein, *J. Appl. Polym. Sci.*, 76, 1965-1976 (2000).

"Synthesis and Characterization of Model Carboxylated Latexes for Studies of Film Formation from Latex Blends", J. Tang, V.L. Dimonie, E.S. Daniels, A. Klein, and M.S. El-Aasser, *J. Appl. Polym. Sci.*, 77, 644-659 (2000).

"Synthesis and Characterization of a Macromonomer Crosslinker", H. Mohd. Ghazaly, E.S. Daniels, V.L. Dimonie, M.S. El-Aasser, and A. Klein, *J. Appl. Polym. Sci.*, 77, 1362-1368 (2000).

"SANS Study of Sulfonate End Group Effect on Polystyrene Self-Diffusion", S.D. Kim, A. Klein, and L.H. Sperling, *Macromolecules*, 33, 8334-8343 (2000).

"A Direct Comparison of SANS and DET for Polymer Diffusion During Polystyrene Latex Film Formation", S.D. Kim, E.M. Boczar, B.J. Bauer, A. Klein, and L.H. Sperling, *Polymer Preprints*, 41(1), 28 (2000).

"Effect of Surface Segregation of Ionic End Groups on Polystyrene Latex Early-Time Interdiffusion", S.D. Kim, E.M. Boczar, A. Klein, and L.H. Sperling, *Langmuir*, 16, 1279-1284 (2000).

Invited Lectures at National / International Meetings

"Scale-up in Emulsion Polymerization with Focus on Coagulum Formation", Engineering Foundation Conference, Polymer Reaction Engineering IV, Harborside, Palm Coast Florida, March 19-24, 2000.

Short Course Presentations

"Semi-continuous Emulsion Polymerization and Structured Latexes", Annual EPI Short Course, Advances in Emulsion Polymerization and Latex Technology, Lehigh University, Bethlehem, PA., June 5-9, 2000.

"Film Formation and Cohesive Strength Development from Latex Systems", Annual EPI Short Course, Advances in Emulsion Polymerization and Latex Technology, Lehigh University, Bethlehem, PA., June 5-9, 2000.

"Mixing Scale-up in Emulsion Polymerization", Annual EPI Short Course, Advances in Emulsion Polymerization and Latex Technology, Lehigh University, Bethlehem, PA., June 5-9, 2000.

Andrew Klein (continued)

“Semi-continuous Emulsion Polymerization and Structured Latexes”, Advances in Emulsion Polymerization and Latex Technology Short Course, Davos, Switzerland, August 14-18, 2000.

“Film Formation and Cohesive Strength Development from Latex Systems”, Advances in Emulsion Polymerization and Latex Technology Short Course, Davos, Switzerland, August 14-18, 2000.

“Mixing and Scale-Up in Emulsion Polymerization Reactions”, Advances in Emulsion Polymerization and Latex Technology Short Course, Davos, Switzerland, August 14-18, 2000.

Active Grants and Contracts

“Development of Expandable Microspheres for Rigid Polyurethane Foam Insulation”, Apache Products

“GOALI: Diffusion of Polymer Chains Near Interfaces”, NSF

Kothare, Mayuresh V. (610) 758-6654
Assistant Professor mvk2@lehigh.edu

Interests constrained and robust model predictive control, convex constrained optimization, microreaction engineering and control, micro-fuel cells

2000 Publications

Refereed Journal Articles:

“Level Control in the Steam Generator of a Nuclear Power Plant”, M.V. Kothare, B. Mettler, M. Morari, P. Bendotti, and C.-M. Falinower, IEEE Transactions on Control Systems Technology, Vol. 8(1), 55-69, (January 2000).

“On Defining the Partial Control Problem: Concepts and Examples”, M.V. Kothare, R. Shinnar, I. Rinard, and M. Morari, AIChE

Journal, Vol. 46, No. 2, 2456-2474 (December 2000).

“Model Predictive Control of Nonlinear Systems using Piecewise Linear Models”, L. Ozkan, C. Georgakis, and M.V. Kothare, Computers & Chemical Engineering, Vo. 24(2-7), 93-799, (July 2000).

Conference Proceedings:

“Synthesis of Stabilizing Anti-Windup Controllers using Piecewise Quadratic Lyapunov Functions”, E.F. Mulder and M.V. Kothare, Proceedings of the 2000 American Control Conference, 3239-3243, Chicago, IL, June 28-30, 2000.

“Linear Matrix Inequalities in Process Control”, M.V. Kothare, Invited session at the 2000 American Control Conference, Chicago, IL, June 28-30, 2000.

“Model Predictive of Nonlinear Systems using Piecewise Linear Models”, L. Ozkan, C. Georgakis, and M.V. Kothare, Proceedings of the 7th International Symposium on Process Systems Engineering, 793-799, Keystone, CO, July 16-21, 2000.

Abstracts:

“Multivariable Anti Wind-up Controller Synthesis using Piecewise Quadratic Lyapunov Functions”, E.F. Mulder and M.V. Kothare, 2000 AIChE Annual Meeting, Los Angeles, CA, November 2000.

“Robust Output Feedback Model Predictive Control using Linear Matrix Inequalities”, Z. Wan and M.V. Kothare, 2000 AIChE Annual Meeting, Los Angeles, CA, November 2000.

“Issues involved in the Fabrication of a Palladium based Micro-membrane for Hydrogen Gas Separation”, S.V. Karnik, M.K. Hatalis, and M.V. Kothare, 2000 AIChE Annual Meeting, Los Angeles, CA, November 2000.

Presentations at National / International Meetings

“Multivariable Anti-windup Controller Synthesis using Piecewise Quadratic Lyapunov

Mayuresh Kothare (continued)

Functions”, 2000 AIChE Annual Meeting, Los Angeles, CA, November 15, 2000.

Invited Academic Seminars / Presentations

“Constrained Process Control: Theory and Practice”, Department of Mechanical Engineering Seminar Series, Lehigh University, Bethlehem, PA, March 31, 2000.

“Some Research Problems in Constrained Process Control and Integrated Microchemical Systems”, 15th Anniversary of the Center for Chemical Process Modeling and Control, Lehigh University, Bethlehem, PA, April 26, 2000.

“Research on Integrated Microchemical Systems at Lehigh”, joint meeting of the Energy Research Center and Foster Wheeler at Lehigh University, Bethlehem, PA, December 8, 2000.

Invited Seminars / Presentations

“An Integrated Chemical Reforming Microplant for Fuel Cell Applications” joint Lehigh University and Sandia National Laboratory interaction meeting, Bethlehem, PA, April 21, 2000.

“An Integrated Chemical Reforming Microplant for Fuel Cell Applications” National Science Foundation, ‘Engineering Microsystems – XYZ on a Chip’ Grantees Workshop, Washington, DC, May 2000.

“Integrated Microchemical Systems Research at Lehigh University”, joint Lehigh University and Pittsburgh Digital Greenhouse Interaction Meeting, Bethlehem, PA, September 22, 2000.

“Chemical Microplant on a Chip: Miniature Fuel Processing for Portable Power”, kick-off meeting of the grantees of the Pittsburgh Digital Greenhouse, Pittsburgh, PA, September 28, 2000.

Presentations made by Advisees

“Synthesis of Stabilizing Anti-windup Controllers using Piecewise Quadratic Lyapunov Functions”, E.F. Mulder and M.V. Kothare, 2000 American Control Conference, Chicago, IL, June 2000.

“Robust Output Feedback Model Predictive Control using Linear Matrix Inequalities”, Z. Wan and M.V. Kothare, 2000 AIChE Annual Meeting, Los Angeles, CA, November 16, 2000.

“Modeling, Design and Microfabrication of a Miniature Methanol Reformer for Compact Fuel Cell Applications”, A. Pattekar, Air Products and Chemicals, September 2000.

“Modeling, Design and Microfabrication of a Miniature Methanol Reformer for Compact Fuel Cell Applications”, A. Pattekar, Pittsburgh Digital Greenhouse, December 2000.

Active Grants and Contracts

Startup grant, Office of the Dean, P.C. Rossin College of Engineering and Applied Science, Lehigh University.

“An Integrated Chemical Reforming Microplant for Fuel Cell Applications”, NSF.

Cost-sharing for Microplant NSF Project, Lehigh University.

DuPont Internship Program, E.I. DuPont de Nemours and Company.

“Chemical Microplant-on-Chip: Miniature Fuel Processing for Portable Power”, Pittsburgh Digital Greenhouse.

“Micro-Methanol Steam Reformer (MMSR)”, Sandia National Lab.

Luyben, William (610) 758-4256
Professor wll0@lehigh.edu

Interests process design and control,
distillation

2000 Publications

Refereed Journal Articles:

“Tuning Proportional – Integral Controllers for Processes with Both Inverse Response and Deadtime”, W.L. Luyben, Ind. Eng. Chem. Res., 39, 973-976 (2000).

“Control of Outlet Temperature in Adiabatic Tubular Reactors”, W.L. Luyben, Ind. Eng. Chem. Res. 39, 1271-1278 (2000).

“Design and Control of Gas-Phase Reactor/Recycle Processes with Reversible Exothermic Reactions”, W.L. Luyben, Ind. Eng. Chem. Res. 39, 1529-1538 (2000).

“Effect of Kinetic, Design, Operating Parameters on Reactor Gain”, W.L. Luyben, Ind. Eng. Chem. Res. 39, 2384-2391 (2000).

“Impact of Reaction Activation Energy on Plantwide Control Structures in Adiabatic Tubular Reactor Systems”, W.L. Luyben, Ind. Eng. Chem. Res. 39, 2345-2354 (2000).

“Economics and Dynamic Impact of the Use of Excess Reactant in Reactive Distillation Systems”, W.L. Luyben, Ind. Eng. Chem. Res. 39, 2935-2946 (2000).

“Comparison of Alternative Control Structures for an Ideal Two-Product Reactive Distillation Column”, M. Al-Arfaj and W.L. Luyben, Ind. Eng. Chem. Res. 39, 3298-3307 (2000).

Abstracts:

“Interaction Between Design and Control for a Methyl Acetate Reactive Distillation Column”, M. Al-Arfaj, AIChE Annual Meeting, Los Angeles, CA, November 2000.

Short Course Presentations

“Practical Process Control”, Air Products and Chemicals, Inc., November 8-9, 2000.

Presentations made by Advisees

“Interaction Between Design and Control for a Methyl Acetate Reactive Distillation Column”, M. Al-Arfaj, AIChE Annual Meeting, Los Angeles, CA, November 2000.

Active Grants and Contracts

“Development of a Dynamic Model and Effective Control Structure of a Hot Gas Desulfurization System”, Korean Institute of Energy Research.

Santore, Maria M. (610) 758-4469
Associate Professor mms2@lehigh.edu

Interests dynamics of polymer interfaces,
colloids, biointerfaces

2000 Publications

Book Chapter:

“Dynamics in Adsorbed Polymer Layers”, M. Santore, Z. Fu, and E. Mubarekyan in Associative Polymers in Aqueous Solutions, ed. J.E. Glass, ACS Symp. Series 786, 206-220, 2000.

“Diffusion Limited Adsorption Kinetics of Polymer Layers Adsorbed at the Solid-Liquid Interface”, in Encyclopedia of Surface and Colloid Science, ed. A. Hubbard, Marcel Dekker, NY, 2000.

Refereed Journal Articles:

“Adsorption and Exchange Dynamics in Hydroxyethylcellulose Layers on Silica”, E. Mubarekyan and M. Santore, J. Colloid and Inter. Sci., 227, 334-344 (2000).

Maria Santore (continued)

Abstracts:

“A Polymer-Surfactant Biomimetic System for the Attack of Cells by Viral Fusion Peptides: Equilibrium, poster presentation, Gordon Conference on Colloidal Macromolecular and Polyelectrolyte Solutions, Venture, CA, February 2000.

“Surfactant Uptake in CoPolymer BiLamellar Vesicle Membranes: A Means to Control Lysis and Other Properties”, Polymer Physics Division of the APS, National Meeting, Minneapolis, MN, March 2000.

“Polyethylene Oxide in Complex Fluids: Fundamental Interfacial Physics in Applications from Commodities to Specialized Biomimetics”, Dept. of Chemical Engineering Seminar, City College, New York, May 2000.

“Polyelectrolyte Adsorption Investigated by the Brewster Angle Method”, Nanthiya Hansupalak, M. Santore, poster presentation at the ACS Colloids Division Meeting, Lehigh University, June 2000.

“Investigation of the Adsorption of Cationic Polyacrylamide to Silica using Brewster Angle Reflectometry”, L. Yezek and M. Santore, Symposium on Adsorption and Thin Films, ACS Colloids Meeting, Lehigh University, June 2000.

“Adsorption and Relaxation Dynamics of Polymers at Interfaces”, E. Muybarekyan and M. Santore, Symposium on Adsorption and Thin Films, ACS Colloids Division Meeting, Lehigh University, June 2000.

“Adsorption and Relaxation Kinetics of Albumin and Fibrinogen on Hydrophobic and Hydrophilic Self-Assembled Monolayers”, C. Wertz and M. Santore, Symposium on Biocolloids and BioInterfaces, ACS Colloids Division Meeting, Lehigh University, June 2000.

IgG Adsorption onto Plasma Treated PDMS Surfaces”, F. Li and M. Santore, Symposium on Biocolloids and BioInterfaces, ACS Colloids Division Meeting, Lehigh University, June 2000.

“Polyelectrolyte Adsorption Studies onto Colloidal Silica by Means of NMR, Electrophoresis, pH, and Conductimetric Titrations”, Y. Shin, M. Santore, and J.E. Roberts, Symposium on Adsorption and Thin Films, ACS Colloids Division Meeting, Lehigh University, June 2000.

“Adsorption Kinetics and Self Exchange Studies Probing the Dynamic State of Adsorbed Polyethylene Oxide Layers”, World Polymer Congress, 38th Macromolecular IUPCAC Symposium, Warsaw, Poland, 2000.

“Relaxations and the Issues of Entanglements and Distinct Population in a Thin PEO Film on a Solid Substrate”, Session on Polymer Thin Films and Interfaces, AIChE National Meeting, Los Angeles, CA, November 2000.

“Protein Spreading and Its Influence of Competitive Protein Adsorption”, Session on Characterization of Biomaterial-Host Interactions, AIChE National Meeting, Los Angeles, CA, November 2000.

“Polymeric Vesicles as Tunable Carriers for Drug and Gene Delivery”, Session on Characterization of Biomaterial-Host Interaction, AIChE National Meeting, Los Angeles, CA, November 2000.

Invited Lectures at National / International Meetings

“Adsorption Kinetics and Self Exchange Studies Probing the Dynamic State of Adsorbed Polyethylene Oxide Layers”, World Polymer Congress, 38th Macromolecular IUPAC Symposium, Polymer Interfaces and Polymer Properties, Warsaw, Poland, July 2000.

Discussion Leader on Behavior in Adsorbed Polymer Layers, Gordon Conference on Colloidal, Macromolecular, and Polyelectrolyte Solutions, Ventura, CA, February 2000.

Presentations at National / International Meetings

IgG Adsorption onto Plasma Treated PDMS Surfaces”, F. Li and M. Santore, Symposium on Biocolloids and BioInterfaces, ACS Colloids Division Meeting, Lehigh University, June 2000.

Maria Santore (continued)

“Polymeric Vesicles with Tunable Membrane Properties by the Addition of Surfactant”, Colloids Division Symposium on Polymer Interfaces, ACS National Meeting, Washington, DC, August 2000.

“Protein Interactions with PDMS during Interfacial PDMS Restructuring and Deformation” Symposium DD on Interfacial Aspects of Soft Biomaterials”, MRS National Meeting, San Francisco, CA, April 2000.

“Interaction of Diblock Copolymer Vesicles with Surfactants”, Symposium DD on Interfacial Aspects of Soft Biomaterials”, MRS National Meeting, San Francisco, CA, April 2000.

“A Polymer-Surfactant Biomimetic System for the Attack of Cells by Viral Fusion Peptides: Equilibrium, poster presentation, Gordon Conference on Colloidal Macromolecular and Polyelectrolyte Solutions, Venture, CA, February 2000.

“Surfactant Uptake in CoPolymer BiLamellar Vesicle Membranes: A Means to Control Lysis and Other Properties”, Polymer Physics Division of the APS, National Meeting, Minneapolis, MN, March 2000.

“Relaxations and the Issues of Entanglements and Distinct Population in a Thin PEO Film on a Solid Substrate”, Session on Polymer Thin Films and Interfaces, AIChE National Meeting, Los Angeles, CA, November 2000.

“Protein Spreading and Its Influence of Competitive Protein Adsorption”, Session on Characterization of Biomaterial-Host Interactions, AIChE National Meeting, Los Angeles, CA, November 2000.

“Polymeric Vesicles as Tunable Carriers for Drug and Gene Delivery”, Session on Characterization of Biomaterial-Host Interaction, AIChE National Meeting, Los Angeles, CA, November 2000.

Invited Academic Seminars / Presentations

“Adsorption Behavior of Anionic Copolymers”, EMU-Southern Mississippi Coatings Research Center Meeting, Ysilanti, MI, October 2000.

“What Determines Dynamics in Adsorbed Polymer Layers: Entanglements, Surface Influence, and Solvent Influence”, Department of Polymer Science Seminar Series, University of Massachusetts, Amherst, MA, September 2000.

“The Role of Entanglements in Relaxations and Self Exchange of Adsorbed Homopolymer Layers”, Complex Fluid Seminar Series, Institute Louis Pasteur, Strasbourg, France, May 2000.

“Polymeric Vesicles and their Susceptibility to Attack by Surfactants: A Mimetic for Viral Attack on Cells” Complex Fluid Seminar Series, Institute Louis Pasteur, Strasbourg, France, May 2000.

“Polyethylene Oxide in Complex Fluids: Fundamental Interfacial Physics in Applications from Commodities to Specialized Biomimetics”, Dept. of Chemical Engineering, City College, New York, May 2000.

Presentations made by Advisees

“Polyelectrolyte Adsorption Investigated by the Brewster Angle Method”, N. Hansupalak, M. Santore, poster presentation at the ACS Colloids Division Meeting, Lehigh University, 2000.

“Investigation of the Adsorption of Cationic Polyacrylamide to Silica using Brewster Angle Reflectometry”, L. Yezek and M. Santore, Symposium on Adsorption and Thin Films, ACS Colloids Meeting, Lehigh, 2000.

“Adsorption and Relaxation Dynamics of Polymers at Interfaces”, E. Muybarekyan and M. Santore, Symposium on Adsorption and Thin Films, ACS Colloids Division Meeting, Lehigh University, 2000.

Maria Santore (continued)

“Adsorption and Relaxation Kinetics of Albumin and Fibrinogen on Hydrophobic and Hydrophilic Self-Assembled Monolayers”, C. Wertz and M. Santore, Symposium on Biocolloids and BioInterfaces, ACS Colloids Division Meeting, Lehigh University, June 2000.

“Polyelectrolyte Adsorption Studies onto Colloidal Silica by Means of NMR, Electrophoresis, pH, and Conductimetric Titrations”, Y. Shin, M. Santore, and J.E. Roberts, Symposium on Adsorption and Thin Films, ACS Colloids Division Meeting, Lehigh University, June 2000.

DMAEMA Adsorption Studies on Colloidal Silica Surfaces by Means of NMR, Electrophoresis, pH, and Conductimetric Titrations”, Y. Shin and M. Santore, Colloids Division Symposium on Polymer Interfaces, ACS National Meeting, Washington, DC, August 2000.

“An Investigation of the Adsorption of Cationic Polyacrylamide onto Silica”, L. Yezek and M. Santore, World Polymer Congress, 38th Macromolecular IUPAC Symposium, Polymer Interfaces and Polymer Properties, Warsaw, Poland, July 2000.

Active Grants and Contracts

“Competitive Protein Absorption and Thrombosis Kinetics: A Mechanistic Integrated Optical-Fluorescent Study of The Role of Substrate Features”, The Whitaker Foundation.

“Polysomes: Biologically-Inspired Copolymer Vesicles for Controlled Release and Targeted Delivery”, NSF-POWRE.

“Dynamically Tailored Surface-Active Polymers for Processes with Extreme Dynamic Constraints”, NSF/GOALI.

“A Multi-Institutional Program Targeting the Fundamental Adsorption Behavior of Polyelectrolytes”, NSF-IUCRC.

Schiesser, William (610) 758-4264
Professor wes1@lehigh.edu

Interests numerical algorithms and software in chemical engineering

Invited Lectures at National / International Meetings

“Method of Lines Analysis of Multidimensional Chemical Reactors” First SIAM Conference on Computational Science and Engineering, Washington, DC, September 21-24, 2000.

“Variable Order Spatial Differentiation in the Method of Lines”, SIAM 2000 Annual Meeting, Puerto Rico, July 2000.

“Application of Spatial p- and r-refinement in the Method of Lines”, SIAM 2000 Annual Meeting, Puerto Rico, July 2000.

“Application of the Adaptive Method of Lines to Nonlinear Wave Propagation Problems”, PIERS 2000, Boston, MA, July 5-14, 2000.

Active Grants and Contracts

“Dynamic Analysis of Heat Transfer Systems”, Air Products and Chemicals, Inc.

Silebi, Cesar A. (610) 758-4267
Professor cas5@lehigh.edu

Interests separation of colloidal particles, electrophoresis, mass transfer

Sperling, Leslie H. (610) 758-3845
Professor lhs0@lehigh.edu

Interests mechanical and morphological properties of polymers, interpenetrating polymer networks

2000 Publications

Refereed Journal Articles:

“SANS Study of Sulfonate End Group Effect on Polystyrene Self-Diffusion”, S.D. Kim, A. Klein, L.H. Sperling, E.M. Boczar, and B.J. Bauer, *Macromolecules*, 33, 8334-8343 (2000).

“Morphologies of Blends of Isotactic Polypropylene and Ethylene Copolymer by Rapid Expansion of Supercritical Solution and Isobaric Crystallization from Supercritical Solution”, S.J. Han, D.J. Lohse, M. Radosz, and L.H. Sperling, *J. Appl. Polym. Sci.*, 77, 1478-1487 (2000).

“Effect of Surface Segregation of Ionic End Groups on Polystyrene Latex Early-Time Interdiffusion”, S.D. Kim, E.M. Boczar, A. Klein, and L.H. Sperling, *Langmuir*, 16, 1279-1284 (2000).

“Phase Separation in Semicrystalline Blends of Poly(phenylene sulfide) and Poly(ethylene terephthalate). II. Effect of Poly(phenylene sulfide) Homopolymer Solubilization of PPS-graft-PET Copolymer on Morphology and Crystallization Behavior, S.J. Hanley, A.M. Nesheiwat, R.T. Chen, M. Jamieson, R.A. Pearson, and L.H. Sperling, *J. Polym. Sci. Part B: Polym. Phys.*, 38, 599-610 (2000).

“A Direct Comparison of SANS and DET for Polymer Diffusion During Polystyrene Latex Film Formation”, S.D. Kim, E.M. Boczar, B.J. Bauer, A. Klein, and L.H. Sperling, *Polymer Preprints*, 41(1), 28 (2000).

Invited Lectures at National / International Meetings

“Recent Advances in Interpenetrating Polymer Networks”, Polymer Processing Society, June 2000.

Invited Academic Seminars / Presentations

“Sound and Vibration Damping with Polymers”, W.L. Gore, May 2000.

Active Grants and Contracts

“Diff. Of Polymer Chains near Interfaces”, NSF-GOALI.

Stein, Fred P. (610) 758-4328
Professor fps0@lehigh.edu

Interests thermodynamic properties of mixtures

Stenger, Harvey (610) 758-4791
Professor hgs0@lehigh.edu

Interests reactor engineering, flue gas denitrification

2000 Publications

Refereed Journal Articles:

“Analysis of Alloy Nanoparticles”, C.E. Lyman, R.E. Lakis, H.G. Stenger, B. Totdal, and R. Prestvik, *Mikrochim Acts*, 132(2-4), 301-308 (2000).

“Testing Zeolite SCR Catalysts under Protocol Conditions for Nox Abatement from Stationary Emission Sources”, B. Ramachandran, R.G. Herman, S. Choi, H.G. Stenger, C.E. Lyman, and J.W. Sale, *Catal. Today*, 55(3), 281-290 (2000).

Active Grants and Contracts

“Selective Catalytic Oxidation of Organosulfur Compounds to Valuable Chemical Intermediates”, NSF.

“Reduction of Nox Emissions”, PA Dept. of Community and Economic Development.

“Modeling and Optimization of Integrated Environmental Control Process for Air Pollution

Harvey Stenger (continued)

Removal", PA Dept. of Community and Economic Development.

"Selective Catalytic Oxidation of Organosulfur Compounds to Valuable Chemical Intermediates", NSF.

"Calcium Nitrate Recovery", BOC Gases.

Wachs, Israel E. (610) 758-4274
Professor iew0@lehigh.edu

Interests environmental catalysis,
heterogeneous catalysis,
surface chemistry,
materials characterization

2000 Publications

Patents

"Production of Formaldehyde from CH₃CHO and H₂S", Israel E. Wachs, U.S. Patent No. 6,028,228, February 22, 2000.

"In Situ Regeneration of Metal-Molybdate Catalysts for Methanol Oxidation to Formaldehyde", Israel E. Wachs, U.S. Patent No. 6,037,290, March 14, 2000.

"Production of Formaldehyde using Carbon Oxides, Hydrogen and H₂S", Israel E. Wachs, U.S. Patent No. 6,084,135, July 4, 2000.

"Formaldehyde Production", Israel E. Wachs, U.S. Patent No. 6,147,263, November 14, 2000.

"Production of Formaldehyde from Carbon Oxides and H₂S", Israel E. Wachs, International Publication No. WO 38/54113, July 6, 2000.

Book Chapter:

"Historical Perspective of Raman Spectroscopy in Catalysis", Israel E. Wachs, in Raman Scattering in Materials Science, eds. W.H.

Weber and R. Merlin, Springer-Verlag Berlin Heidelberg, Germany, 2000.

Refereed Journal Articles:

"Quantitative Determination of the Number of Active Surface Sites and the Turnover Frequencies for Methanol Oxidation over Metal Oxide Catalysts I. Fundamentals of the Methanol Chemisorption Technique and Application to Monolayer Supported Molybdenum Oxide Catalysts", L.E. Briand, W.E. Farneth, and I.E. Wachs, *Catalysis Today* 62, 219-229 (2000)

"Dynamic Behavior of Supported Vanadia Catalysts in the Selective Oxidation of Ethane In situ Raman, UV-Vis DRS and Reactivity Studies", M.A. Banares, M.V. Martinez-Huerta, X. Gao, J.L.G. Fierro, and I.E. Wachs, *Catalysis Today* 61, 295-301 (2000).

"In Situ Raman Spectroscopy of Supported Transition Metal Oxide Catalysts: ¹⁸O₂ – ¹⁶O₂ Isotopic Labeling Studies, B.M. Weckhuysen, J.-M. Jehng, and I.E. Wachs, *J. Phys. Chem. B*, 104, 7382-8387 (2000).

"Structural Characteristics and Reactivity Properties of Highly Dispersed Al₂O₃/SiO₂ and V₂O₅/Al₂O₃/SiO₂ Catalysts", X. Gao and I.E. Wachs, *J. of Catalysis* 192, 18-28 (2000).

"*In Situ* IR, Raman, and UV-Vis DRS Spectroscopy of Supported Vanadium Oxide Catalysts during Methanol Oxidation", L.J. Burcham, G. Deo, X. Gao, and I.E. Wachs, *Topics in Catalysis* 11/12, 85-100 (2000).

"The Structure of Vanadium Oxide Species on γ -alumina; an *In Situ* X-ray Absorption Study During Catalytic Oxidation", M. Ruitenbeek, A.J. van Dillen, F.M.F. de Groot, I.E. Wachs, J.W. Geus, and D.C. Koningsberger, *Topics in Catalysis* 10, 241-254 (2000).

"Molecular Structure and Reactivity of the Group V Metal Oxides", I.E. Wachs, L.E. Briand, J.-M. Jehng, L. Burcham, and X. Gao, *Catalysis Today* 57, 323-330 (2000).

Israel Wachs (continued)

"Investigation of Surface Structures of Supported Vanadium Oxide Catalysts by UV-vis-NIR Diffuse Reflectance Spectroscopy", J. Phys. Chem. B, 104, 1261-1268 (2000).

Conference Proceedings:

"Quantitative Determination of the Number of Active Surface Sites and the Turnover Frequencies for Methanol Oxidation over Metal Oxide Catalysts", L.E. Briand and I.E. Wachs, 12th International Congress of Catalysis, Granada, Spain, July 9-14, 2000, in Studies in Surface Science and Catalysis 130, eds, A. Corma, F.V. Melo, S. Mendioroz and J.L.G. Fierro, Elsevier Science B.V. 2000.

"Identification and Role of the Different Active Sites in Supported Vanadia Catalysts by *In Situ* Techniques", M. Martinez-Huerta, M.A. Banares, X. Gao, I.E. Wachs, J.L.G. Fierro, 12th International Congress of Catalysis, Granada, Spain, July 9-14, 2000, in Studies in Surface Science and Catalysis 130, eds, A. Corma, F.V. Melo, S. Mendioroz and J.L.G. Fierro, Elsevier Science B.V. 2000.

"*In Situ* Studies of VOH PO₄•0.5H₂O Transformation and Evolution of (VO)₂P₂O₇ Catalysts", V.V. Gulians, J.B. Benziger, P. Heaney, D. Yates, and I.E. Wachs, 12th International Congress of Catalysis, Granada, Spain, July 9-14, 2000, in Studies in Surface Science and Catalysis 130, eds, A. Corma, F.V. Melo, S. Mendioroz and J.L.G. Fierro, Elsevier Science B.V. 2000.

Abstracts:

"In Situ Characterization of Supported Metal Oxide Oxidation Catalysts: Molecular Structure-Reactivity Relationships"" G. Deo, L. Burcham, X. Gao and I.E. Wachs, National Catalysis Workshop, Hyderabad, India, January 7-8, 2000.

"Quantitative Determination of the Number of Active Sites and TOFs for CH₃OH Oxidation over Metal Oxide Catalysts", Philadelphia Catalysis Society, Wilmington, DE, March 16, 2000.

"Methanol: A Smart Chemical Probe Molecule", Dept. of Chemical Engineering, Univ. of Delaware, Newark, DE, March 17, 2000.

"*In Situ* UV-vis Diffuse Reflectance Spectroscopy Studies of Supported Vanadium Oxide Catalysts during Alkane Oxidation Reactions", X. Gao, M.A. Banares, J.-M. Jehng and I.E. Wachs, 2000 Spring Symposium, Catalysis Society of Metropolitan New York, Bethlehem, PA, March 22, 2000.

"Methanol: A 'Smart' Chemical Probe Molecule", M. Badlani and I.E. Wachs, 2000 Spring Symposium, Catalysis Society of Metropolitan New York, Bethlehem, PA, March 22, 2000.

"Selective Oxidation of CS₂ and COS to CO and SO₂ Over Supported Vanadia Catalysts", C.J. Cho, F. Ciron, and I.E. Wachs, 2000 Spring Symposium, Catalysis Society of Metropolitan New York, Bethlehem, PA, March 22, 2000.

"*In Situ* Raman Spectroscopy of Catalysts", Shell USA, Houston, TX, March 30, 2000.

"Methanol: A 'Smart' Chemical Probe Molecule", Dept. of Chemical Engineering, University of Cincinnati, OH, March 31, 2000.

"Quantitative Determination of the Number of Active Sites and TOFs for CH₃OH Oxidation over Metal Oxide Catalysts"" Chicago Catalysis Society, Chicago, IL, April 10, 2000.

"Molecular Engineering of Supported Metal Oxide Catalysts", Universal Oil Products (UOP), Chicago, IL, April 11, 2000.

"*In Situ* Characterization of Supported Metal Oxide Oxidation Catalysts: Molecular Structure-Reactivity Relationships", ACS – 74th Colloid and Surface Science Symposium, Lehigh University, Bethlehem, PA, June 19-21, 2000.

"Structural Characteristics and Reactivity Properties of Highly Dispersed Al₂O₃/SiO₂ and V₂O₅/Al₂O₃/SiO₂ Catalysts", X. Gao and I.E. Wachs, ACS – 74th Colloid and Surface Science Symposium, Lehigh University, Bethlehem, PA, June 19-21, 2000.

Israel Wachs (continued)

"Quantitative Determination of the Number of Active Sites on Metal Oxide Surfaces" Gordon Research Conference on Catalysis, Colby-Sawyer College, NH, June 25-30, 2000.

"*In Situ* Studies of VOH PO₄•0.5H₂O Transformation and Evolution of (VO)₂P₂O₇ Catalysts", V.V. Gulianti, J.B. Benziger, P. Heaney, D. Yates, and I.E. Wachs, 12th International Congress of Catalysis, Granada, Spain, July 9-14, 2000.

"Identification and Role of the Different Active Sites in Supported Vanadia Catalysts by *In Situ* Techniques", M. Martinez-Huerta, M.A. Banares, X. Gao, I.E. Wachs, J.L.G. Fierro, 12th International Congress of Catalysis, Granada, Spain, July 9-14, 2000.

"Quantitative Determination of the Number of Active Surface Sites and the Turnover Frequencies for Methanol Oxidation over Metal Oxide Catalysts", L.E. Briand and I.E. Wachs, 12th International Congress of Catalysis, Granada, Spain, July 9-14, 2000.

"Dynamic Behavior of Supported Vanadia Catalysts in the Selective Oxidation of Ethane", M.A. Banares, M. Martinez-Huerta, X. Gao, J.L.G. Fierro, and I.E. Wachs, ACS Meeting, Washington, D.C., August 20-24, 2000.

"Solid State V-51 NMR Studies of Vanadium Oxide Catalysts", C. Klug and I.E. Wachs, ACS Meeting, Washington, DC, August 20-24, 2000.

"Selective Chemisorption and Oxidation of Methanol over V-P-O Catalysts", V.V. Gulianti and I.E. Wachs, ACS Meeting, Washington, DC, August 20-24, 2000.

"Selective Chemisorption and Oxidation of Methanol over V-P-) Catalysts", V.V. Gulianti and I.E. Wachs, AIChE Meeting, Los Angeles, CA, November 12-17, 2000.

Invited Lectures at National / International Meetings

"*In Situ* Characterization of Supported Metal Oxide Oxidation Catalysts: Molecular Structure-Reactivity Relationships", ACS – 74th Colloid and Surface Science Symposium,

Lehigh University, Bethlehem, PA, June 19-21, 2000.

"Quantitative Determination of the Number of Active Sites on Metal Oxide Surfaces" Gordon Research Conference on Catalysis, Colby-Sawyer College, NH, June 25-30, 2000.

Invited Academic Seminars / Presentations

"Methanol: A Smart Chemical Probe Molecule", Dept. of Chemical Engineering, Univ. of Delaware, Newark, DE, March 17, 2000.

"Methanol: A 'Smart' Chemical Probe Molecule", Dept. of Chemical Engineering, University of Cincinnati, OH, March 31, 2000.

Invited Industrial Seminars / Presentations

"*In Situ* Raman Spectroscopy of Catalysts", Shell USA, Houston, TX, March 30, 2000.

"Molecular Engineering of Supported Metal Oxide Catalysts", Universal Oil Products (UOP), Chicago, IL, April 11, 2000.

Invited Seminars / Presentations

"Quantitative Determination of the Number of Active Sites and TOFs for CH₃OH Oxidation over Metal Oxide Catalysts", Philadelphia Catalysis Society, Wilmington, DE, March 16, 2000.

"Quantitative Determination of the Number of Active Sites and TOFs for CH₃OH Oxidation over Metal Oxide Catalysts" Chicago Catalysis Society, Chicago, IL, April 10, 2000.

Presentations made by Advisees

"*In Situ* Characterization of Supported Metal Oxide Oxidation Catalysts: Molecular Structure-Reactivity Relationships" G. Deo, L. Burcham, X. Gao and I.E. Wachs, National Catalysis Workshop, Hyderabad, India, January 7-8, 2000.

"*In Situ* UV-vis Diffuse Reflectance Spectroscopy Studies of Supported Vanadium Oxide Catalysts during Alkane Oxidation Reactions", X. Gao, M.A. Banares, J.-M. Jehng

Israel Wachs (continued)

and I.E. Wachs, 2000 Spring Symposium, Catalysis Society of Metropolitan New York, Bethlehem, PA, March 22, 2000.

“Methanol: A ‘Smart’ Chemical Probe Molecule”, M. Badlani and I.E. Wachs, 2000 Spring Symposium, Catalysis Society of Metropolitan New York, Bethlehem, PA, March 22, 2000.

“Structural Characteristics and Reactivity Properties of Highly Dispersed $\text{Al}_2\text{O}_3/\text{SiO}_2$ and $\text{V}_2\text{O}_5/\text{Al}_2\text{O}_3/\text{SiO}_2$ Catalysts”, X. Gao and I.E. Wachs, ACS – 74th Colloid and Surface Science Symposium, Lehigh University, Bethlehem, PA, June 19-21, 2000.

“Quantitative Determination of the Number of Active Surface Sites and the Turnover Frequencies for Methanol Oxidation over Metal Oxide Catalysts”, L.E. Briand and I.E. Wachs, 12th International Congress of Catalysis, Granada, Spain, July 9-14, 2000.

Active Grants and Contracts

“An Integrated Chemical Reforming Microplant for MW Fuel Cell Applications”, NSF.

“Selective Catalytic Oxidation of Organosulfur Compounds to Valuable Chemical Intermediates”, NSF.

“Fundamental Studies of Propane Oxidation and Ammoxidation Over Model Vanadium and Molybdenum Oxide Catalysts”, DOE.

“Tantalum Oxide Catalytic Compounds”, Starck Chemical Co.

**ACTIVE AND COMPLETED RESEARCH PROJECTS SPONSORED BY
INDUSTRIAL LIAISON PROGRAMS DURING JULY 1, 2000 - JUNE 30, 2001**

**Chemical Process Modeling and Control Research Center - a National Science
Foundation Sponsored Industry / University Cooperative Research Center**

Nonlinear Transition Control using RS-MPC

Luis Claudio Oliveria Lopes and Christos Georgakis

Assessment of Multivariable Controller Performance

Stella Bezergianni and Christos Georgakis

Transition Control Techniques in Nonlinear Process Control

Leyla Ozkan, Christos Georgakis, and Mayuresh V. Kothare

Anti-windup Controller Synthesis Using Piecewise Quadratic Lyapunov Functions

Eric F. Mulder and Mayuresh V. Kothare

Steady-State and Dynamic Operability Analysis of CSTR Systems

Sivakumar Subramanian, Derya Uzturk, and Christos Georgakis

Performance Assessment of Model Predictive Controllers

Lilong Huang and Christos Georgakis

Design of Multivariable Identification Signals for Constrained Systems

Tong Li and Christos Georgakis

Interaction between Design and Control for a Methyl Acetate Reactive Distillation Column

Muhammad Al-Arfaj and William L. Luyben

Effect of Desired Product Splits on the Design of Process with Reversible Consecutive Reactions

Kulchanat Kapilakarn and William L. Luyben

Application of Multivariate Statistical Process Control to a Continuous Polymerization Process

Marc Silie and Christos Georgakis

Comparison of Univariate and Multivariate Methods for the Performance Assessment for SISO Controllers for Multivariable Processes

Mark A. Snyder, Stella Bezergianni, and Christos Georgakis

A Computationally Efficient Formulation of Robust Model Predictive Control using Linear Matrix Inequalities

Zhaoyang Wan and Mayuresh V. Kothare

**ACTIVE AND COMPLETED RESEARCH PROJECTS SPONSORED BY
INDUSTRIAL LIAISON PROGRAMS DURING JULY 1, 2000 - JUNE 30, 2001**

**The Polymer Interfaces Center – a National Science Foundation Sponsored Industry/
University Cooperative Research Center**

Poly(Dimethylaminoethyl Methacrylate) Adsorption Investigated by the Brewster Angle Reflectivity Method

N. Hansupalak and M.M. Santore

Adsorption Studies of Polyelectrolytes on Colloidal Silica by Means of NMR, Electrophoresis, pH, and Conductometric Titrations

Y. Shin, J.E. Roberts and M.M. Santore

The Response Tensor Due to the Force Transduction Between Two Hydrodynamically-Coupled Colloidal Particles

L.A. Hough and H.D. Ou-Yang

An *In Situ* Chemical/Electrical Sensor for Investigating Water-Induced Failure at Substrate/Polymer Interfaces

R. Sweder, G. Simmons, and G. Ferguson

An Arrhenius Method to Study the Hydrolytic Stability of Polymer-Metal Adhesion

A. Namkanisorn and M.K. Chaudhury

Using AFM to Measure Surface Energy with Micron Resolution

D.I. Malotky and M.K. Chaudhury

Toughening Mechanisms in Nanocomposites

X. Zhang and R.A. Pearson

Self-Exchange Adsorption of Cationic Polyelectrolyte

N. Hansupalak and M.M. Santore

Novel Characterization of a Polyelectrolyte and its Adsorption Studies by Means of NMR Relaxation Phenomena, pH, and Conductometric Titrations

Y. Shin, J.E. Roberts and M.M. Santore

Microrheology of Polymer Networks in Aqueous Solutions

L.A. Hough and H.D. Ou-Yang

A Kinetic Approach to Study the Hydrolytic Stability of Polymer-Metal Adhesion

A. Namkanisorn and M.K. Chaudhury

Verifying the Zero Laplace Pressure Assumption for AFM Liquid Bridging Measurements

D.L. Malotky and M.K. Chaudhury

**ACTIVE AND COMPLETED RESEARCH PROJECTS SPONSORED BY
INDUSTRIAL LIAISON PROGRAMS DURING JULY 1, 2000 - JUNE 30, 2001**

The Emulsion Polymers Institute's Industrial Liaison Program

Nanosize Latex Particles via Miniemulsion Polymerization

C.D. Anderson, E.D. Sudol and M.S. El-Aasser

Effect of Varying Process Parameters on Miniemulsion Formation and Polymerization

K. Antoine, C.D. Anderson, E.D. Sudol and M.S. El-Aasser

Preparation of Urethane/Acrylic Hybrid Miniemulsion Nanoparticles

M. Li, E.S. Daniels, V.L. Dimonie, E.D. Sudol and M.S. El-Aasser

Living Free Radical Miniemulsion Polymerization of Styrene

G. Pan, V.L. Dimonie, E.D. Sudol and M.S. El-Aasser

Controlled Radical Miniemulsion Polymerization via Reversible Addition-Fragmentation Chain Transfer (RAFT)

X. Huang, V.L. Dimonie, E.D. Sudol and M.S. El-Aasser

Encapsulation of Inorganic Particles via Miniemulsion Polymerization and Film Formation of Inorganic Pigment/Polymer Composite Latex Particles

G.H. Al-Ghamdi, E.D. Sudol, V.L. Dimonie and M.S. El-Aasser

PVA Stabilization of Acrylic Emulsion Polymers Using a Miniemulsion Approach

N. Kim, E.D. Sudol, V.L. Dimonie and M.S. El-Aasser

Role of Polymerizable Surfactants in Emulsion Polymerization

T. Durand, V.L. Dimonie, E.D. Sudol and M.S. El-Aasser

Role of Reactive Surfactants in the Emulsion Polymerization of Styrene

Z. Lai, E.D. Sudol, V.L. Dimonie and M.S. El-Aasser

Study of the Incorporation of Alkoxysilane Monomers into Model Latex Systems

I. Marcu, E.S. Daniels, V.L. Dimonie, M.S. El-Aasser and J.E. Roberts

Some Aspects of Film Formation from Pigmented Latex Systems

T. Ding, E.S. Daniels and A. Klein

Film Formation from Reactive Latexes

B. Boyars, E.S. Daniels and A. Klein

Hybrid Composite Latexes

P. Jeong, E.S. Daniels, V.L. Dimonie and M.S. El-Aasser

Morphology and Film Formation of Low T_g Core-Shell Latex Particles

K. Seven, V.L. Dimonie, E.S. Daniels, M.S. El-Aasser and A. Klein

The Emulsion Polymers Institute's Industrial Liaison Program (continued)

Effects of Agitation in the Emulsion Polymerization of *n*-Butyl Methacrylate and its Copolymerization with N-Methylol Acrylamide

S. Krishnan, E.D. Sudol, A. Klein and M.S. El-Aasser

Kinetics and Morphology of Particle Aggregates

S. Phattanasuddee, C.A. Silebi and M.S. El-Aasser

Effects of Dissolved Polymers on the Transport of Colloidal Particles in a Microcapillary

S. Amnuaypanich and C.A. Silebi

Encapsulation of Inorganic Particles via Miniemulsion Polymerization and Film Formation of Resulting Composite Latex Particles

G.H. Al-Ghamdi, E.D. Sudol, V.L. Dimonie and M.S. El-Aasser

SEMINARS PRESENTED IN THE DEPARTMENT

FALL 2000 SEMESTER

“Dynamics of Self-Aggregation of Particles on Electrodes”, **Professor John L. Anderson**, Center for Complex Fluids Engineering, Department of Chemical Engineering, Carnegie Mellon University.

“Novel Methods for the Study and Control of Nucleation”, **Professor Allan S. Myerson**, Dean, Armour College of Engineering and Science, Illinois Institute of Technology.

“Maxwell, Stefan, and the Modelling of Multicomponent Mass Transfer Rate Based Processes”, **Professor Ross Taylor**, Department of Chemical Engineering, Clarkson University.

“Laboratory Safety at Lehigh”, **Barbara Plohocki**, Director, **Elaine Kuchera**, Hazardous Materials Manager, **Randy Shebby**, Occupational Safety Manager, Environmental Health and Safety, Lehigh University.

“Colloidal Sol-Gel Processing of Large Silica Tubes for Optical Fiber Manufacturing”, **Dr. Michael Bohrer**, Lucent Technologies.

“The Difference Between Invention and Innovation”, **Dr. Patrick J. Foley, Jr.**, President, New Businesses, DuPont iTechnologies.

“Designing Environmentally Friendly Chemical Processes”, **Dr. Raymond L. Smith**, National Risk Management Research Laboratory, U.S. Environmental Protection Agency.

“Some Things We have Learned about Rheology from the Behavior of Drops and Bubbles in Shear Fields”, **Professor William R. Schowalter**, Dean, College of Engineering, University of Illinois at Urbana-Champaign.

“How Do We Know?: The Case of the Kinetic Theory of Heat”, **Professor Christos Georgakis**, Department of Chemical Engineering, Lehigh University.

SEMINARS PRESENTED IN THE DEPARTMENT (continued)

SPRING 2001 SEMESTER

“Effect of Pressure on Self-Assembly in Aqueous Solution”, **Professor Michael E. Paulaitis**, Department of Chemical Engineering, Johns Hopkins University.

“Microstructure Formation and Phase Transitions in Complex Fluids”, **Professor Athanassios Z. Panagiotopoulos**, Department of Chemical Engineering, Princeton University.

“A Practical Friction-based Approach to Modeling Multicomponent Diffusion in Polymeric Systems”, **Dr. John M. Zielinski**, Corporate Research Services, Analytical Technology Center, Air Products and Chemicals, Inc.

“Sandia’s CHEMLAB™ Program”, **Dr. Alan P. Sylwester**, Sandia National Laboratories.

“Emulsion Templating of Photonic Crystals”, **Professor David J. Pine**, Department of Chemical Engineering, University of California, Santa Barbara.

“Extensional Rheometry of Complex Fluids and the Uniaxial Elongation of Viscoelastic Filaments (or Why some Fluids are Stickier than Others!)”, **Professor Gareth H. McKinley**, Department of Mechanical Engineering, Massachusetts Institute of Technology.

“Single-Molecule Hydrodynamics of Polymer DNA Molecules”, **Professor Ronald G. Larson**, Department of Chemical Engineering, University of Michigan.

“Computer Modeling of Climate Change”, **Dr. Warren M. Washington**, Senior Scientist and Section Head, Climate Change Research Section, National Center for Atmospheric Research. [This seminar was presented as part of The William E. Schiesser Lecture Series in Computational Approaches to Interdisciplinary Problems in Science and Engineering.]