



School of Chemical Engineering



**Professional Activity Report
2006 – 2007**

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Purdue University

School of Chemical Engineering



Message from the Head

Purdue University and the School of Chemical Engineering had another exciting year!

The University continued to make significant strides toward achieving the goals defined in our President's bold strategic plan. Purdue raised more than \$1.7 billion and concluded a seven-year Campaign for Purdue fundraising effort, surpassing the \$1.5 billion goal. The funds will target areas of student support, faculty support, programs, facilities and equipment, and other areas of University need. As an example, our new \$53 million engineering administration building, Neil Armstrong Hall of Engineering, will be dedicated this Fall. In conjunction with our fundraising effort, other key areas of the strategic plan were completed. By August 2007, Purdue has added nearly 300 new faculty, including 11 in Chemical Engineering since August 2003. And, since 2002, Discovery Park has grown from an idea to a \$350 million interdisciplinary research, learning and engagement complex. Simultaneously, the School of Chemical Engineering has flourished in our expanded Forney Hall. The \$20 million new wing has been fully occupied, and modernization of the old building is underway and will be completed in 2008.

This year, we attracted two top-flight researchers and educators. One, Dr. Nancy Ho, brings her innovative research in the field of molecular genetic engineering, particularly as related to the conversion of cellulosic biomass to biofuels and other valuable products. Dr. Ho has recently been awarded a \$5 million DOE grant for conversion of cellulosic biomass to ethanol. The second, Dr. James Litster, joined our faculty from the University of Queensland, Australia. Dr. Litster is active in the areas of particle design and formulation, particularly related to pharmaceutical applications. Our long standing faculty member, Dr. Gintaras "Rex" Reklaitis was inducted into the National Academy of Engineering this year. He has been honored "for developing the theory and application of batch design, scheduling, and optimization tools and for outstanding contributions to education."

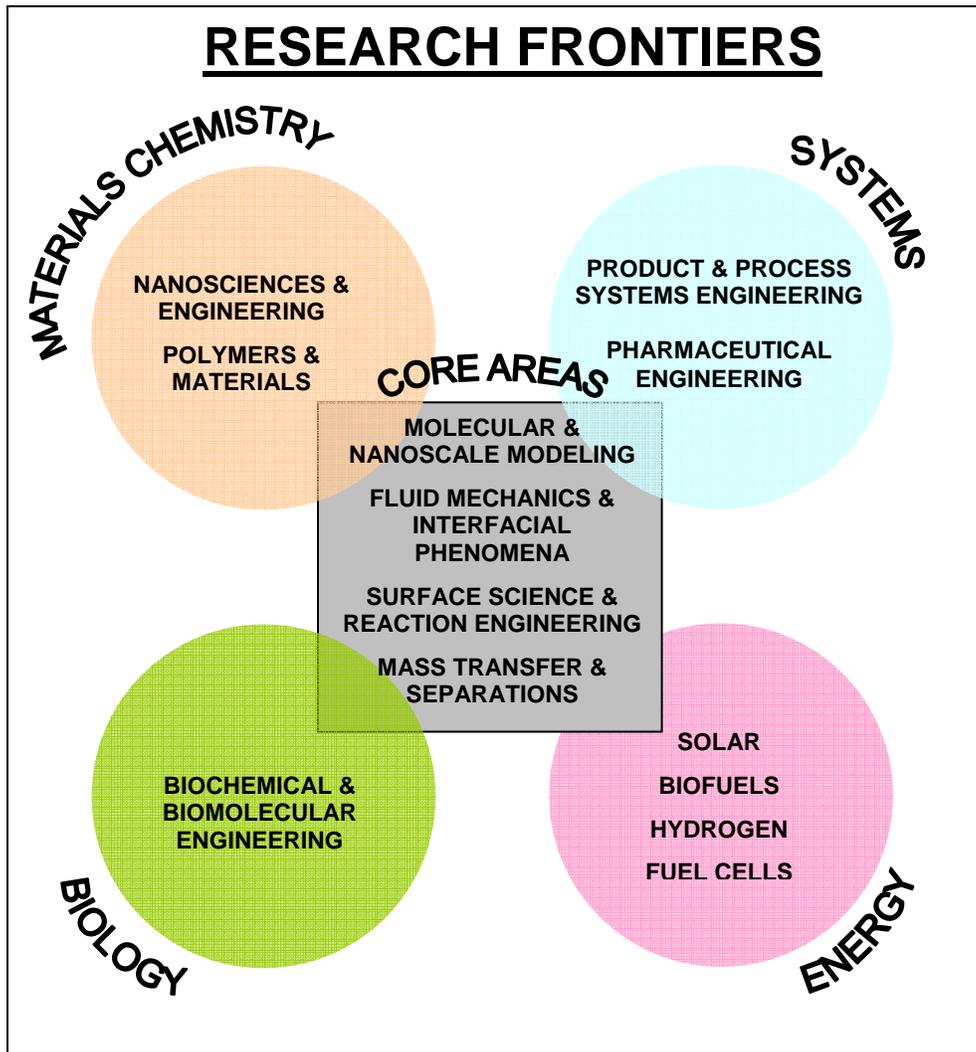
In our 2006-2007 Professional Activity Report, you will read how the School has continued field-defining research in key areas – from nanostructured materials to future energy sources. Our mix of young faculty augmenting seasoned researchers fosters unparalleled collaboration, creativity and innovation. The faculty remain active in professional societies, journal and book series editorships, and serve on academic, industrial and government advisory boards. They serve at all levels of professional and national responsibility, and are in great demand as lecturers around the globe. Our faculty members provide expertise and solutions to grand challenge problems that the world faces today – whether in energy, nanotechnology, biotechnology, healthcare or advanced materials.

We hope that you will enjoy reading this summary of our accomplishments. These successes are the result of the dedication and talent of our faculty, staff and students, along with tremendous support of our alumni, friends, corporate partners and funding agencies.

Sincerely,

A handwritten signature in black ink that reads "Arvind Varma". The signature is written in a cursive, flowing style.

Arvind Varma
R. Games Slayter Distinguished Professor
Head, School of Chemical Engineering



Fields of Study

Biochemical and Biomolecular Engineering

Beaudoin, Franes, Ho, Kim, Lee, Liu, Morgan, Ramkrishna, Wang

Energy

Agrawal, Baertsch, Caruthers, Delgass, Hillhouse, Ho, Morgan, Ribeiro, Varma

Fluid Mechanics and Interfacial Phenomena

Basaran, Beaudoin, Corti, Franes, Harris, Houze, Kim, Litster

Mass Transfer and Separations

Agrawal, Franes, Hillhouse, Thomson, Wang, Wankat

Molecular and Nanoscale Modeling

Corti, Harris, Thomson, Won

Nanoscience and Engineering

Beaudoin, Harris, Hillhouse, Lee, Litster, Ribeiro, Thomson, Won

Polymer and Materials

Caruthers, Hillhouse, Litster, Pipes, Varma, Won

Product and Process Systems Engineering

Agrawal, Caruthers, Kim, Litster, Pekny, Reklaitis, Venkatasubramanian

Surface Science and Reaction Engineering

Baertsch, Delgass, Ramkrishna, Ribeiro, Thomson, Varma

Faculty



Rakesh Agrawal

Ph. D. Massachusetts Institute of Technology, 1980

Winthrop E. Stone Distinguished Professor

National Academy of Engineering

AIChE Chemical Engineering Practice Award (2006)

V.V. Mariwala Visiting Professorship, UICT, Mumbai, India (2007)

Research Areas

Energy transformation and use issues for solar, coal, biomass and hydrogen economy; Novel separation processes using distillation, membranes and adsorption; Process development, cryogenics and gas liquefaction processes

Selected Professional Activities

Member, AIChE Chemical Engineering Technology Operating Council (CTOC)
Consulting Editor, Separations, AIChE Journal
Member, NRC Board on Energy and Environmental Sciences
Member, AIChE Board of Directors
Member, NRC Committee on Assessment of Resource Needs for Fuel Cell and Hydrogen Technologies
Member, NAE Peer Committee, Chemical Engineering Section

Selected Invited Lectures

Agrawal, R., "Hydrogen as an Energy Carrier – Its Promises and Challenges," Society of Automotive Engineers, Fort Wayne, IN, (2006).

Agrawal, R., "The Challenges in the Synthesis of Multicomponent Separation Configurations in Chemical Industry," University of Colorado, Boulder, CO, (2006).

Agrawal, R., "Separations: Perspective of a Process Developer/Designer," Department of Chemical Engineering, Tianjin University, Tianjin, China, May (2006).

Agrawal, R., "Energy Supply Challenges and Opportunities," Peking University, Beijing, China, May (2006).

Agrawal, R., "Energy Supply Challenges and Opportunities," Department of Chemical Engineering, Tsinghua University, Beijing, China, May (2006).

Agrawal, R., "Separations: Perspective of a Process Developer/Designer," Department of Chemical Engineering, Tsinghua University, Beijing, China, May (2006).

Agrawal, R., "Environmentally Friendly Energy Solutions," Department of Chemical Engineering, Illinois Institute of Technology, Chicago, October (2006).

Agrawal, R., "Energy Supply Challenges and Opportunities for Chemical Engineers," PLAPIQUI (UNS-CONICET), Bahia Blanca, Argentina, October (2006).

Agrawal, R., "New Energy-Efficient and Low-Cost Multicomponent Distillation Configurations," Texas Technology Showcase, Galveston, TX, December (2006).

Agrawal, R., "Environmentally Friendly Energy Solutions," NRC Board on Energy and Environmental Systems, Washington D.C., December (2006).

Agrawal, R., "Separations: Perspective of a Process Developer/Designer," University Institute of Chemical Technology, Mumbai, India, January (2007).

Agrawal, R., "The Challenges in the Synthesis of Multicomponent Separation Configurations in Chemical Industry," University Institute of Chemical Technology, Mumbai, India, January (2007).

Agrawal, R., "Hydrogen as an Energy Carrier – Its Promises and Challenges," University Institute of Chemical Technology, Mumbai, India, January (2007).

Agrawal, R., "Environmentally Friendly Energy Solutions," Shri M.V. Mariwala Visiting Professorship Lecture, University Institute of Chemical Technology, Mumbai, India, January (2007).

Selected Publications

Agrawal, R., Singh, N.R., Ribeiro, F. H., and Delgass, W. N., "Sustainable Fuel for the Transportation Sector," *PNAS*, **104** (12), 4828 (2007).

Selected Conference Presentations

Invited Plenary Agrawal, R., "Energy Supply Challenges and Opportunities for Chemical Engineers," 4th Pacific Basin Conference on Adsorption Science and Technology, Tianjin, China, (2006).

Keynote Agrawal, R., "Energy Supply Challenges and Opportunities," Summit on Energy Sustainability, Texas Tech University, Lubbock, TX, September (2006).

Keynote Agrawal, R., "Environmentally Friendly Energy Solutions," Chemical Heritage Foundation Innovation Conference, Philadelphia, PA, September (2006).

Plenary Agrawal, R., "Energy Supply Challenges and Opportunities for Chemical Engineers," XXII Interamerican Congress of Chemical Engineering and V Argentinean Congress of Chemical Engineering, October (2006).

Keynote Agrawal, R., "The Challenges in the Synthesis of Multicomponent Separation Configurations in Chemical Industry," Session in honor of Gerhold Award Winners, AIChE Annual Meeting, San Francisco, CA, November (2006).

Giridhar, A., Agrawal, R., and Venkatasubramanian, V., "A Novel Search Space Formulation for the Synthesis of Separation Networks," AIChE Annual Meeting, San Francisco, CA, November (2006).



Chelsey D. Baertsch

Ph. D. University of California at Berkeley, 2001

Assistant Professor

NSF Career Award (2007)

Team Excellence Award, College of Engineering, Purdue University (2007)

Research Areas

Heterogeneous catalysis, microchemical systems, MEMS, micro gas sensors and materials, high-throughput *operando* catalyst characterization, complex oxide nanostructures, natural gas conversion and H₂ production

Selected Professional Activities

Reviewer, NSF SBIR Program, General Catalysis

Reviewer, NSF CBET, Catalysis and Biocatalysis

Chair, AIChE Annual Meeting, Two sessions: 1) In-situ and Operando Spectroscopy of Catalysts, 2) Fundamentals of Oxide Catalysts, San Francisco, CA, November (2006)

Chair, AIChE Annual Meeting, Two Sessions: 1) In-situ and Operando Spectroscopy of Catalysts, 2) Industrial, Catalytic, and Environmental Gas Sensors, Salt Lake City, UT, November (2007)

Co-chair, AIChE Annual Meeting, Fundamentals of Oxide Catalysts, Salt Lake City, UT, November (2007)

Selected Conference Presentations

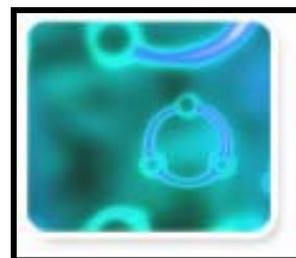
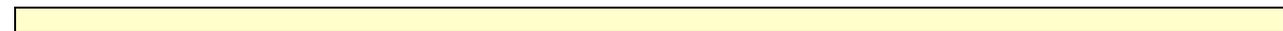
Baertsch, C.D., "Nanostructured Catalytic Materials for Chemical Sensors," Session: Young Faculty in Catalysis and Reaction Engineering: Trends and Visions in Research and Education, AIChE Annual Meeting, San Francisco, CA, November (2006).

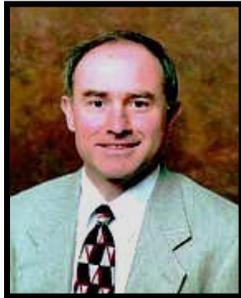
Nair, H., Gatt, J., Liska, M., and Baertsch, C.D., "Synergistic Interactions Between WO_x and MoO_x Domains in Mixed MoO_x-WO_x-Al₂O₃ Catalysts," Session: Fundamentals of Oxide Catalysts, AIChE Annual Meeting, San Francisco, CA, November (2006).

Tan, C.-K., and Baertsch, C.D., "A Silicon Microreactor for In-situ Spectroscopic Characterization of Working NSR Catalysts," Session: In-situ and Operando Characterization of Catalysts, AIChE Annual Meeting, San Francisco, CA, November (2006).

Nair, H., Gatt, J., Liska, M., and Baertsch, C.D., "Synergistic Interactions Between WO_x and MoO_x Domains in Mixed MoO_x-WO_x-Al₂O₃ Catalysts," North American Catalysis Society, Houston, TX, (2007).

Polster, C.P., and Baertsch, C.D., "Application of CuCeO_x Catalysts for the Selective Detection of CO in H₂," North American Catalysis Society, Houston, TX, (2007).





Osman Basaran

Ph. D. University of Minnesota, 1984

Reilly Professor of Fluid Mechanics
Director of Graduate Studies

Research Areas

Fluid Mechanics, Rheology, Drop Dynamics, Interfacial Phenomena, Finite Element Computational Analysis, Ink-Jet Printing, MEMS, Electroseparations

Selected Professional Activities

Minisymposium Organizer (with Matteo Pasquali of Rice),
“Jet, Drop, and Bubble Breakup in Small-Scale Flows,”
USNCTAM15, Boulder, CO, June (2006)
Session Co-Chair, “Minisymposium on Flows of Complex and
Biological Fluids,” The Seventh World Congress on
Computational Mechanics (WCCM VII), Los Angeles, CA,
July (2006)

Selected Invited Lectures

Basaran, O. A., “Small-Scale Flows Exhibiting Singularity
Formation, Interface Pinch-off, and Unexpected Dynamics”,
Chemical Engineering Department, Princeton University,
Princeton, NJ, September (2006).

Basaran, O. A., “Exploiting Singularities and Instabilities to
Produce Micro-Scale Drops and Features”, School of Polymer,
Textile and Fiber Engineering, Georgia Tech, April (2007).

Selected Publications

Xu, Q., Liao, Y.-C., and Basaran, O. A., “Can Surfactant Be
Present at Pinch-off of a Liquid Filament?” *Physics Review
Letters*, **98** (Article 054503) (2007).

Widjaja, E., Liu, N.-C., Li, M., Collins, R. T., Basaran, O. A.,
and Harris, M. T., “Dynamics of Sessile Droplet Evaporation:
A Comparison of the Spine and the Elliptic Mesh Generation
Methods,” *Computers and Chemical Engineering*, **31**, 2129
(2007).

McGough, P. T. and Basaran, O. A., “Repeated Formation of
Fluid Threads in Breakup of a Surfactant-Covered Jet,”
Physics Review Letters, **96** (Article 054502) (2006).

Liao, Y.-C., Franses, E. I., and Basaran, O. A., “Deformation
and Breakup of a Stretching Liquid Bridge Covered with an
Insoluble Surfactant Monolayer,” *Physics of Fluids*, **18**
(Article 022101) (2006).

Subramani, H. J., Yeoh, H. J., Suryo, R., Xu, Q.,
Ambravaneswaran, B., and Basaran, O. A., “Simplicity and
Complexity in a Dripping Faucet,” *Physics of Fluids*, **18**
(Article 032106) (2006).

Suryo, R. and Basaran, O. A., “Local Dynamics During Pinch-
off of Liquid Threads of Power Law Fluids: Scaling Analysis
and Self-Similarity,” *Journal of Non-Newtonian Fluid
Mechanics*, **138**, 134 (2006).

Selected Conference Presentations

Invited Plenary Basaran, O. A., “Analysis of Pinch-off
Singularities,” Minisymposium on Jet, Drop, and Bubble
Breakup in Small-Scale Flows, The Fifteenth US National
Congress on Theoretical and Applied Mechanics
(USNCTAM15), Boulder, CO, June (2006).

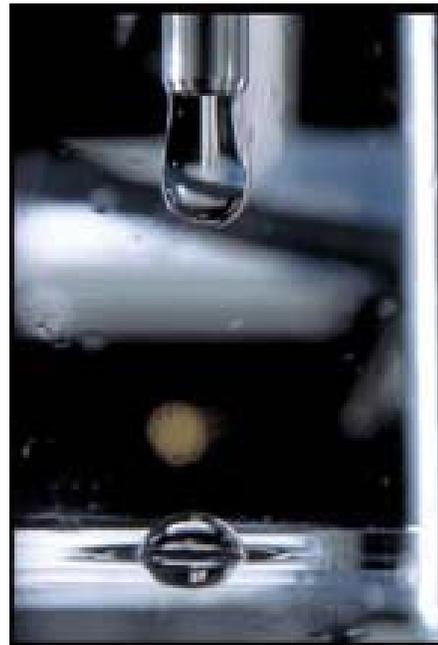
Invited Plenary Basaran, O. A., “Pinch-off of Drops of
Complex Fluids,” Minisymposium on Flows of Complex and
Biological Fluids, The Seventh World Congress on
Computational Mechanics (WCCM VII), Los Angeles, CA,
July (2006).

Al-Housseiny, T., Subramani, H. J., and Basaran, O. A.,
“Dynamics of Impact of Drops on a Substrate with Small-
scale Features,” AICHE Annual Meeting, San Francisco, CA,
November (2006).

Suryo, R., and Basaran, O. A., “Accurate Continuation of
Multi-dimensional FEM Calculations Involving Drop Breakup
Beyond the First Singularity,” AICHE Annual Meeting, San
Francisco, CA, November (2006).

Xu, Q., and Basaran, O. A., “Oscillations of Drops Covered
with a Monolayer of Insoluble Surfactant,” AICHE Annual
Meeting, San Francisco, CA, November (2006).

Yeoh, H. K., Xu, Q., and Basaran, O. A., “Finite-Amplitude
Deformation of Liquid Films Subjected to Electric Fields,”
AICHE Annual Meeting, San Francisco, CA, November
(2006).





Stephen P. Beaudoin

Ph. D. North Carolina State University, 1995

**Professor and
Associate Head, School of Chemical Engineering**

**Omega Chi Epsilon Outstanding Mentor Award (2007)
Purdue University Faculty Scholar (2007- 2012)**

Research Areas

**Particle and Thin Film Adhesion, Electronic Materials, Chemical Mechanical Polishing,
Biosensors**

Selected Professional Activities

Member, Purdue University Provost's Diversity Leadership Group
Member, Purdue Schools of Engineering Grade Appeals Committee
Member, Ad-Hoc Committee on Environmental Engineering
Faculty Mentor, Purdue ChE Student Advisory Council
Director, Undergraduate Recruiting, Purdue University School of Chemical Engineering
Co-Director (with C. Baertsch), Student Supplemental Instruction Program
Faculty Chaperone: Purdue student visits to Exxon-Mobil (2x), and Criterion Catalysts
Member ChE New Directions Committee Industrial Advisory Council Executive Committee

Selected Invited Lectures

Raghavan, S., and Beaudoin, S. P., "Particle Adhesion and Removal," FSI International Knowledge Services Seminar Series, Seoul, Korea, April (2007).
Raghavan, S., and Beaudoin, S. P., "Particle Adhesion and Removal," FSI International Knowledge Services Seminar Series, Singapore, (2007).
Beaudoin, S. P., "Particle Adhesion and Removal," FSI International Knowledge Services Seminar Series, Shanghai, China, April (2007).
Beaudoin, S. P., "Particle Adhesion and Removal," FSI International Knowledge Services Seminar Series, Hsinchu, Taiwan, April (2007).
Kumar, G., and Beaudoin, S. P., "Particle Adhesion over Multiple Length Scales," Fifth International Surface Cleaning Workshop, Northeastern University/NSF Center for Microcontamination Control, November (2006).
Smith, S. J., and Beaudoin, S. P., "Modeling Protein Adsorption with Electrochemical Impedance Spectroscopy," AIChE Annual Meeting, San Francisco, CA, November (2006).
Butterbaugh, J., and Beaudoin, S. P., "Particle Adhesion and Removal," FSI International Knowledge Services Seminar Series, Tel Aviv, Israel, October (2006).
Beaudoin, S. P., "Particle Adhesion and Removal," FSI International Knowledge Services Seminar Series, Grenoble, France, October (2006).

Beaudoin, S. P., "Particle Adhesion and Removal," FSI International Knowledge Services Seminar Series, Dresden, Germany, October (2006).

Kumar, G., and Beaudoin, S. P., "Particle Adhesion to Advanced Lithographic Materials Over Multiple Length Scales," SEMATECH Mask Cleaning Workshop, Monterey, CA, September (2006).

Beaudoin, S. P., "Particle Adhesion During Microelectronic Manufacturing," Eighth International Symposium on Ultraclean Processing of Silicon Surfaces, Antwerp, Belgium, September (2006).

Selected Publications

Jung, M.-H., Beaudoin, S. P., and Choi, H.-S., "Comparison of He/O₂ and Ar/O₂ Atmospheric-Pressure Plasma for Photoresist Etching," *Journal of the Electrochemical Society*, **154**(6), H422 (2007).
Visintin, P., Eichenlaub, S., Portnow, L., Carbonell, R., Beaudoin, S. P. (corresponding author), Schauer, C., and Desimone, J., "Studies on CO₂-Based Slurries and Fluorinated Silica and Alumina Particles for Chemical Mechanical Polishing of Copper Thin Films," *Journal of the Electrochemical Society*, **153**, G1064 (2006).
Eichenlaub, S., Kumar, G., and Beaudoin, S. P., "A Modeling Approach to Describe the Adhesion of Rough Asymmetric Particles to Surfaces," *Journal of Colloid and Interface Science*, **299**(2), 656-664 (2006).
Kumar, G. and Beaudoin, S. P., "Undercut Removal of Micron-Scale Particles from Surfaces," *Journal of the Electrochemical Society*, **153**, G175-G181 (2006).

Selected Conference Presentations

Kumar, G., Smith, S., and Beaudoin, S. P., "Adhesion of Particles to Surfaces – Scaling from the Micron to the Nanometer Size," Adhesion Society Annual Meeting, February (2006).
Smith, S. J., and Beaudoin, S. P., "Modeling Protein Adsorption with Electrochemical Impedance Spectroscopy," AIChE Annual Meeting, San Francisco, CA, November (2006).



James M. Caruthers

Ph. D. Massachusetts Institute of Technology, 1977

Professor

Team Excellence Award, College of Engineering, Purdue University (2007)

Research Areas

Materials Design, Non-linear Viscoelasticity of Polymers, Glass-to-Rubber Transition, Engineering Elastomers, Catalyst Design, Bioinformatics

Selected Professional Activities

Board of Directors, Discovery Park Cyber Center

Selected Publications

Sharma, R., Goyal, A., Caruthers, J. M., and Won, Y.-Y., "Inhibitive Chain Transfer to Ligand in the ATRP of n-Butyl Acrylate," *Macromolecules*, **39**(14), 4680-4689 (2006).

Cao, J., Goyal, A., Midkiff, S. P., and Caruthers, J. M., "An Optimizing Compiler for Parallel Chemistry Simulations," 21st IEEE International Parallel & Distributed Processing Symposium, Long Beach, CA, March (2007).

Blau, G., Lasinski, M., Orcun, S., Hsu, S.-H., Caruthers, J. M., Delgass, W. N., and Venkatasubramanian, V., "High Fidelity Mathematical Model Building with Experimental Data: A Bayesian Approach," *Computers and Chemical Engineering*, in press, (2007).

Manz, T. A., Phomphrai, K., Medvedev, G., Krishnamurthy, B. B., Sharma, S., Haq, J., Novstrup, K. A., Thomson, K. T., Delgass, W. N., Caruthers, J. M., and Abu-Omar, M. M., "Structure-Activity Correlation in Titanium Single-Site Olefin Polymerization Catalysts Containing Mixed Cyclopentadienyl/Aryloxide Ligation," *Journal American Chemical Society – Communications*, **129**(13), 3776-3777 (2007).

Goyal, A., Cao, J., Patkar, P., Medvedev, G., Midkiff, S. P., Venkatasubramanian, V., and Caruthers, J. M., "Population Balance Kinetic Model for Interaction of 2-Bisbenzothiazole-2'-2'-disulfide (MBTS) with Sulfur," *Rubber Chemistry & Technology*, in press, (2007).

Selected Conference Presentations

Caruthers, J. M., and Medvedev, G. A., "A Stochastic Model for Describing Glassy Materials Subjected to Complex Thermal and Loading Histories," AIChE Annual Meeting, San Francisco, CA, November (2006).

Goyal, A., Cao, J., Midkiff, S., and Caruthers, J. M., "A Parallel System for Describing and Analyzing Complex Chemical Kinetics," AIChE Annual Meeting, San Francisco, CA, November (2006).

Delgass, W. N., Caruthers, J. M., Abu-Omar, M. M., Thomson, K. T., Venkatasubramanian, V., Blau, G. E., Phomphrai, K., Medvedev, G., Stanciu, C., Sharma, S., Manz, T., Haq, J., Novstrup, K., and Krishnamurthy, B., "Model-Based Design of Single-Site Olefin Polymerization Catalysts," AIChE Annual Meeting, San Francisco, CA, November (2006).

Manz, T. A., Medvedev, G., Novstrup, K. A., Delgass, W. N., Abu-Omar, M. M., Thomson, K. T., and Caruthers, J. M., "A DFT Study of Olefin Polymerization by Ti and Zr Single-Site Catalysts Containing Mixed Cyclopentadienyl/Aryloxide Ligation," AIChE Annual Meeting, San Francisco, CA, November (2006).

Syal, S., Caruthers, J. M. and Venkatasubramanian, V., "Prediction of Glass Transition Temperature using Hybrid Neural Networks," AIChE Annual Meeting, San Francisco, CA, November (2006).

Hsu, S.-H., Caruthers, J. M., Delgass, W. N., and Venkatasubramanian, V., "Mathematical Model Building with High

Throughput Experimentation: A Bayesian Approach," AIChE Annual Meeting, San Francisco, CA, November (2006).

Cao, L., Kromer, B., Cumarantunge, L., Mulla, S., Ratts, J., Delgass, W. N., Ribeiro, F. H., Caruthers, J. M., Yezerets, A., and Currier, N. W., "Modeling NOx Storage on Pt/BaO/Al₂O₃ Catalysts," AIChE Annual Meeting, San Francisco, CA, November (2006).

Hsu, S.-H., Delgass, W. N., Caruthers, J. M., Ribeiro, F. H., Blau, G. E., Lasinski, M. E., and Orcun, S., "A Bayesian Approach to Mathematical Building with MODQUEST: Kinetic Model Discrimination on A Catalytic Surface," 2007 NASCRE Meeting, Houston, TX; February (2007).

Mulla, S. S., Cumarantunge, L., Kromer, B., Cao, L., Ratts, J., Yezeret, A., Currier, N. W., Delgass, W. N., Caruthers, J. M., and Ribeiro, F. H., "Kinetic Measurements and Modeling on Lean NOx Traps," 2007 NASCRE Meeting, Houston, TX, February (2007).

Krishnamurthy, G., Hsu, S.-H., Joshi, Y., Caruthers, J. M., Blau, G. E., Venkatasubramanian, V., Thomson, K. T., and Delgass, W. N., "Propane Aromatization of ZSM-5 Based Catalysts," 2007 NASCRE Meeting, Houston, TX, February (2007).

Stanciu, C., Travia, N., Novstrup, K., Delgass, W. N., Caruthers, J. M., and Abu-Omar, M., "Advances in the Synthesis of Group 4 Catalysts for Single Site Olefin Polymerization Reactions," ACS, Chicago, IL, March (2007).

Caruthers, J. M., Martin, R., and Medvedev, G., "Prediction of Creep Behavior in PMMA," APS, Denver, CO, March (2007).

Medvedev, G., and Caruthers, J. M., "Role of Fluctuations in Predicting the Glass Formation Line," APS, Denver, CO, March (2007).

Cao, J., Goyal, A., Midkiff, S., and Caruthers, J. M., "An Optimizing Compiler for Parallel Chemistry Simulations," Gelato ICE – Titanium Conference and Expo, San Jose, CA, April (2007).

Medvedev, G. A., and Caruthers, J. M., "The Incorporation of Fluctuations in the Development of a Nonlinear Viscoelastic Constitutive Model of Amorphous Polymers," ASME Applied Mechanics and Materials Conference (McMat 2007), Austin, TX, June (2007).

Cao, J., Novstrup, K., Caruthers, J. M., and Midkiff, S., "A Parallel Levenberg-Marquardt Algorithm," IEEE Conference on Supercomputing - SC '07, San Antonio, TX, October (2007).

Bhattacharya, A., Medvedev, G., and Caruthers, J. M., "A Constitutive Model of Elastomers That Includes Non-linear Viscoelasticity and Permanent Set Due To Network Breakage and Reformation," ACS Rubber Division, 172nd Technical Meeting, Cleveland, OH, October (2007).



David S. Corti
Ph. D. Princeton University, 1997

Associate Professor

Research Areas

Molecular Thermodynamics, Metastable Liquids, Nucleation Phenomena, Colloidal Dispersions, Computer Simulation Techniques

Selected Professional Activities

Session chair, "Nucleation and Growth," AIChE Annual Meeting, San Francisco, CA, November (2006)
Session chair, "Thermodynamics and Phase Behavior I," AIChE Annual Meeting, Salt Lake City, UT, November (2007)
Session chair, "Thermodynamics and Phase Behavior IV," AIChE Annual Meeting, Salt Lake City, UT, November (2007)
Session co-chair, "Nucleation and Growth," AIChE Annual Meeting, Salt Lake City, UT, November (2007)

Selected Publications

Invited Siderius, D. W., and Corti, D. S., "Thermodynamically Consistent Adaptation of Scaled Particle Theory to an Arbitrary Hard Sphere Equation of State," Eduardo Glandt Festschrift, *Ind. Chem. Eng. Res.*, **45**, 5489-5500 (2006).

Uline, M. J., and Corti, D. S., "The Ammonia Synthesis Reaction: An Exception to the Le Chatelier Principle and Effects of Nonideality," *J. Chem. Educ.*, **83**, 138-144 (2006).

Siderius, D. W., and Corti, D. S., "Extension of Scaled Particle Theory to Inhomogeneous Hard Particle Fluids. III. Entropic Force Exerted on a Cavity that Intersects a Hard Wall," *Phys. Rev. E.*, **75**, 011108(1-21), (2007).

Uline, M. J., and Corti, D. S., "Activated Instability of Homogeneous Bubble Nucleation in Superheated Liquids," *Phys. Rev. Lett.*, in press.

Uline, M. J., and Corti, D. S., "Response to Letter from T. R. Herrington: 'Reaction to Article in *J. Chem. Educ.* 2006, **83**, 138,'" *J. Chem. Educ.*, in press.

Siderius, D. W., and Corti, D. S., "On the Use of Multiple Interpolation Functions in Scaled Particle Theory to Improve the Predictions of the Properties of the Hard-Sphere Fluid," *J. Chem. Phys.*, in press.

Selected Conference Presentations

Uline, M. J., and Corti, D. S., "The Influence of Critical Cavities on Homogeneous Bubble Nucleation: A New Picture of Bubble Formation?" Midwest Thermodynamics and Statistical Mechanics Conference, Akron, OH, May (2006).

Siderius, D. W., and Corti, D. S., "Geometric Model of Depletion Forces in Hard-Sphere Colloidal Dispersions Exposed to Various Surfaces," Midwest Thermodynamics and Statistical Mechanics Conference, Akron, OH, May (2006).

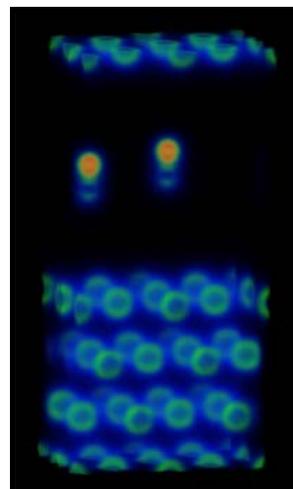
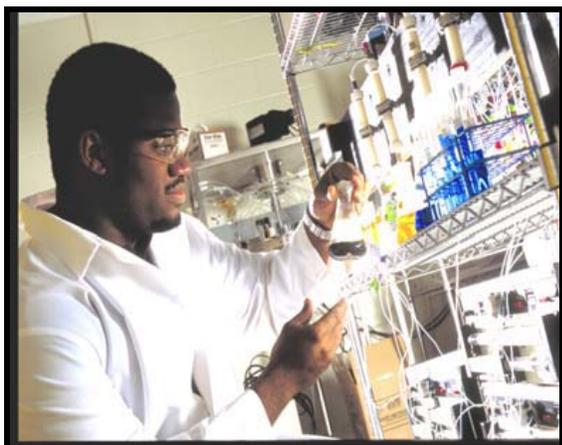
Siderius, D. W. and Corti, D. S., "Geometric Model of Depletion Forces in Hard-Sphere Colloidal Dispersions Exposed to Various Surfaces," 80th ACS Colloid & Surface Science Symposium, Boulder, CO, June (2006).

Uline, M. J., and Corti, D. S., "The Influence of Critical Cavities on Homogeneous Bubble Nucleation: A New Picture of Bubble Formation?" 80th ACS Colloid & Surface Science Symposium, Boulder, CO, June (2006).

Uline, M. J. and Corti, D. S., "The Influence of Critical Cavities on Homogeneous Bubble Nucleation: A New Picture of Bubble Formation?" AIChE Annual Meeting, San Francisco, CA, November (2006).

Siderius, D. W., Corti, D. S., "Geometric Model of Depletion Forces in Hard-Sphere Colloidal Dispersions Exposed to Various Surfaces," AIChE Annual Meeting, San Francisco, CA, November (2006).

Siderius, D. W., and Corti, D. S., "On the Use of Scaled Particle Theory to Determine a Broad Range of Hard-Sphere Fluid Properties with High Accuracy," AIChE Annual Meeting, San Francisco, CA, November (2006).





W. Nicholas Delgass

Ph. D. Stanford, 1969

Maxine Spencer Nichols Professor (2007)

Excellence in Catalysis Award, Catalysis Society of Metropolitan New York (2006)

Team Excellence Award, College of Engineering, Purdue University (2007)

Research Areas

Heterogeneous catalysis, catalyst design by *Discovery Informatics*, olefin polymerization, alkane aromatization, water gas shift reaction, propylene epoxidation over Au nanoparticles, spectroscopy of surfaces

Selected Professional Activities

Director, Catalysis and Reaction Engineering Division of AIChE
Editorial Board, *Journal of Catalysis*
Co-Chairman, Symposium on High Throughput Screening for Catalysts and Processes, North American Symposium on Catalysis and Reaction Engineering, Houston, TX, February (2007)

Selected Invited Lectures

Delgass, W. N., "Catalyst Design by Discovery Informatics," Argonne National Laboratories, November (2006).

Selected Publications

Manz, T. A., Phomphrai, K., Medvedev, G., Krishnamurthy, B. B., Sharma, S., Haq, J., Novstrup, K. A., Thomson, K. T., Delgass, W. N., Caruthers, J. M., and Abu-Omar, M. M., "Structure-Activity Correlation in Titanium Single-Site Olefin Polymerization Catalysts Containing Mixed Cyclopentadienyl/Aryloxy Ligation," *J. Am. Chem. Soc.*, **129**(13), 3776-3777 (2007).

Blau, G. E., Lasinski, M., Orcun, S., Hsu, S. H., Caruthers, J. M., Delgass, W. N., and Venkatasubramanian, V., "High Fidelity Mathematical Model Building with High Throughput Experimentation: A Bayesian Approach," *Computers in Chemical Engineering*, accepted.

Taylor, B., Lauterbach, J., and Delgass, W. N., "The Effect of Mesoporous Scale Defects on the Activity of Au/TS-1 for the Epoxidation of Propylene," *Catalysis Today*, in press.

Agrawal, R, Singh, N. R., Ribeiro, F. H., and Delgass, W. N., "Sustainable Fuel for the Transportation Sector," *Proceedings of the National Academy of Sciences*, **104**, 4828-4833 (2007).

Cumaranatunge, L., Mulla, S. S., Yezerets, A., Currier, N. W., Delgass, W. N., and Ribeiro, F. H., "Ammonia is a hydrogen carrier in the regeneration of Pt/BaO/Al₂O₃ NOx traps with H₂," *J. Catal.*, **246**, 29-34 (2007).

Joshi, A. M., Delgass, W. N., and Thomson, K. T., "H₂ Adsorption and H/D Exchange on Au/TS-1 and Au/S-1 Catalysts," *Topics in Catalysis (Special issue on Gold Catalysis, D. W. Goodman and G. J. Hutchings, Eds.)*, in press

Selected Conference Presentations

Delgass, W. N., Caruthers, J. M., Abu-Omar, M. M., Thomson, K. T., Venkatasubramanian, V., Blau, G. E., Phomphrai, K., Medvedev, G., Stanciu, C., Sharma, S., Manz, T., Haq, J., Novstrup, K., and Krishnamurthy, B., "Model-Based Design of Single-Site Olefin Polymerization Catalysts," AIChE Annual Meeting, San Francisco, CA, November (2006).

Manz, T. A., Medvedev, G., Novstrup, K. A., Delgass, W. N., Abu-Omar, M. M., Thomson, K. T., and Caruthers, J. M., "A DFT Study of Olefin Polymerization by Ti and Zr Single-Site Catalysts Containing Mixed Cyclopentadienyl/Aryloxy Ligation," AIChE Annual Meeting, San Francisco, CA, November (2006).

Hsu, S.-H., Caruthers, J. M., Delgass, W. N., and Venkatasubramanian, V., "Mathematical Model Building with High Throughput Experimentation: A Bayesian Approach," AIChE Annual Meeting, San Francisco, CA, November (2006).

Cao, L., Kromer, B., Cumaranatunge, L., Mulla, S., Ratts, J., Delgass, W. N., Ribeiro, F. H., Caruthers, J. M., Yezerets, A., and Currier, N. W., "Modeling NOx Storage on Pt/BaO/Al₂O₃ Catalysts," AIChE Annual Meeting, San Francisco, CA, November (2006).

Hsu, S.-H., Delgass, W. N., Caruthers, J. M., Ribeiro, F. H., Blau, G. E., Lasinski, M. E., and Orcun, S., "A Bayesian Approach to Mathematical Building with MODQUEST: Kinetic Model Discrimination on A Catalytic Surface," 2007 NASCRE Meeting, Houston, TX; February (2007).

Mulla, S. S., Cumaranatunge, L., Kromer, B., Cao, L., Ratts, J., Yezeret, A., Currier, N. W., Delgass, W. N., Caruthers, J. M., and Ribeiro, F. H., "Kinetic Measurements and Modeling on Lean NOx Traps," 2007 NASCRE Meeting, Houston, TX, February (2007).

Krishnamurthy, G., Hsu, S.-H., Joshi, Y., Caruthers, J. M., Blau, G. E., Venkatasubramanian, V., Thomson, K. T., and Delgass, W. N., "Propane Aromatization of ZSM-5 Based Catalysts," 2007 NASCRE Meeting, Houston, TX, February (2007).

Stanciu, C., Travia, N., Novstrup, K., Delgass, W. N., Caruthers, J. M., and Abu-Oma, M., "Advances in the Synthesis of Group 4 Catalysts for Single Site Olefin Polymerization Reactions," ACS, Chicago, IL, March (2007).

Keynote Delgass, W. N., Joshi, A. M., and Thomson, K. T., "Epoxidation of Propylene by H₂ + O₂ over Au/TS-1 Catalysts," Symposium on "Mechanism of Homogeneous and Heterogeneous Epoxidation," ACS National Meeting, Boston, MA, August (2007).



Elias I. Franses

Ph. D. Minnesota, 1979

Professor

Research Areas

Adsorption and Dynamics of Surfactants and Proteins at Interfaces,
Thin Organic Coatings, Infrared Spectroscopy and Ellipsometry
of Thin Films

Selected Professional Activities

Co-chair, "Nanoscale Modeling of Interfacial Systems,"
AIChE Annual Meeting, November (2005)
Co-chair, "Transport at Interfaces I and II," AIChE Annual
Meeting, San Francisco, CA, November (2006)

Selected Invited Lectures

Franses, E. I., "Physically Self-Assembled Monolayers
(PSAMs) of Lecithin Lipids on Hydrophilic Silicon Oxide
Interfaces", Sandia National Laboratories, Livermore,
California, January (2006).

Selected Publications

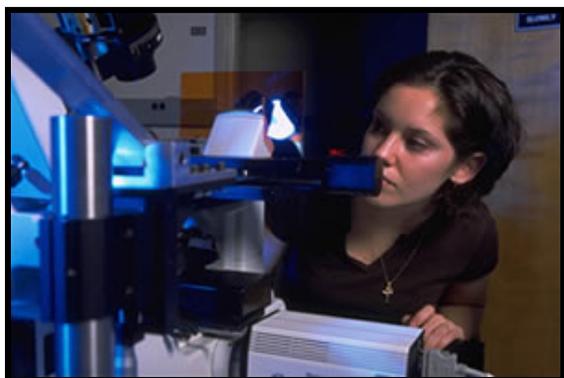
Liao, Y.-C., Basaran, O.A., and Franses, E.I., "The Effects of
Dynamic Surface Tension and Fluid Flow on the Oscillations
of a Supported Bubble," *Colloids Surfaces A*, **282-283**, 183-
202 (2006); invited article for Special Issue in Honor of I.B.
Ivanov.

Yu, C.-M., Chin, C.Y. Franses, E.I., and Wang, N.-H.L., "In-
Situ Probing of Insulin Aggregation in Chromatography
Effluents with Spectroturbidimetry," *J. Colloid Interf. Sci.*,
299, 733-739 (2006).

Kasat, R.B., Zvinevich, Y., Hillhouse, H.W., Thomson, K.T.,
Wang, N.-H.L., and Franses, E.I., "Direct Probing of Sorbent—
Solvent Interactions for Amylose Tris(3,5-
dimethylphenylcarbamate) Using Infrared Spectroscopy, X-
Ray Diffraction, Solid-State NMR, and DFT Modeling," *J.*
Phys. Chem. B, **110**, 14114-14122 (2006).

Kasat, R.B., Chin, C.Y., Thomson, K.T., Franses, E.I., and
Wang, N.-H.L., "Interpretation of Chromatography Retentions
of Simple Solutes with an Amylose-Based Sorbent Using
Infrared Spectroscopy and DFT Modeling", *Adsorption*, **12**,
405-416 (2006); invited paper for Special Issue Honoring Dr.
John Sherman.

Kim, S.H., Haimovich-Caspi, L., Omer, L., Talmon, Y., and
Franses, E.I., "Effect of Sonication and Freezing-Thawing on
the Aggregate Size and Dynamic Surface Tension of Aqueous
DPPC Dispersions," *J. Colloid Interf. Sci.*, **311**, 217-227
(2007).



Kim, S.H., Haimovich-Caspi, L., Omer, L., Yu, C.-M.,
Talmon, Y., Wang, N.-H.L., and Franses, E.I., "Stability and
State of Aggregation of Aqueous Fibrinogen and
Dipalmitoylphosphatidylcholine Lipid Vesicles," *Langmuir*,
23, 5657-5664 (2007).

Selected Conference Presentations

Kasat, R.B., Wee, S.Y., Hillhouse, H. W., Thompson, K. T.,
Wang, N.-H.L. and Franses, E. I., "Direct Probing of
Interactions of Solvents and Chiral Solutes with Amylose tris
(3,5 dimethylphenylcarbonate) Sorbent," 18th International
Symposium on Chirality (ISCD-18), Busan, Korea, June
(2006).

Kasat, R.B., Zvinevich, Y., Thompson, K. T., Hillhouse,
H.W., Wang, N.-H.L. and Franses, E.I., "Studies of
Interactions of an Amylose-Based Sorbent with Various
Solvents for Chiral Separation Applications," AIChE Annual
Meeting, San Francisco, CA, November (2006).

Yu, C.M., Chin, C.Y., Wang, N.-H.L., and Franses, E.I., "In-
Situ Probing of Insulin Aggregation in Chromatography
Effluents with Spectroturbidimetry", AIChE Annual Meeting,
San Francisco, CA, November (2006).

Kim, S.H., Haimovich-Caspi, L., Omer, L., Talmon, Y., and
Franses, E.I., "Stability and Aggregation of
Dipalmitoylphosphatidylcholine (DPPC) Vesicles and DPPC-
Fibrinogen Interactions," AIChE Annual Meeting, San
Francisco, CA (November 2006).

Phang, T.L., Airine, A., and Franses, E.I., "Interactions of
Dilauroylphosphatidylcholine (DLPC) Lipid Vesicles with
Albumin in Aqueous Solution," AIChE Annual Meeting, San
Francisco, CA, November (2006).

Kasat, R.B., Wang, N.-H.L., and Franses, E.I., "Effects of
Backbone and Side-Chain on the Molecular Environments of
Chiral Cavities and Chiral Recognition in Polysaccharide-
Based Sorbents", 19th International Symposium on Chirality
(ISCD-19), San Diego, CA, July (2007).





Robert E. Hannemann

M.D. Indiana University, 1959

Visiting Professor

Research Areas

Aerosols in medical practice, Surfactants in respiratory distress syndrome treatment, Non-invasive diagnostic techniques, Serum bilirubin determination by skin reflectance

Selected Professional Activities

Secretary's (Health and Human Services) Advisory Committee on Infant Mortality
Board of Directors, National Center for Missing and Exploited Children

Sherer, E., Hannemann, R., Rundell, A., and Ramkrishna, D., "Estimation of Likely Cancer Cure Using First and Second Order Product Densities of Population Balance Models," *Annals of Bioengineering*, accepted.

Selected Publications

Sherer, E., Hannemann, R., Rundell, A., and Ramkrishna, D., "Analysis of Resonance Chemotherapy in Leukemia Treatment via Multi-staged Population Balance Models," *Journal of Theoretical Biology*, **240**, 648-661 (2006).



Forney Hall of Chemical Engineering – Building Plan



Michael T. Harris

Ph. D. University of Tennessee – Knoxville, 1992

**Professor and
Associate Dean of Undergraduate Education**

Research Areas

**Nanoparticle Technology, Synthesis of Nanowires and Nanotubes, Micropatterning,
Protein Crystallization, Interfacial and Transport Phenomena**

Selected Professional Activities

Chair, "Manipulation of Nanophases by External Fields,"
AIChE Annual Meeting, San Francisco, CA, November
(2006)
Vice-Chair, Minority Faculty Forum/Minority Affairs of the
AIChE (2006-2007)
Engineering Advisory Council, Mississippi State University
Associate Editor, *Journal of Nanomaterials*

Selected Publications

Lee, S. Y., and Harris, M. T., "Surface Modification of
Maghemite Nanoparticles Capped by Oleic Acids:
Characterization and Colloidal Stability in Polar Solvents," *J.
Colloid Interface Sci.*, **293**(2), 401-408 (2006).

Lee, S. Y., Royston, E., Culver, J. N., and Harris, M. T.,
"Effect of the Concentration of CuCl₂ on the Aggregation and
Mineralization of the Wild- type Tobacco Mosaic Virus
Template," *J. Colloid Interface Sci.*, **297**(2), 554-560 (2006).

Lee, S. Y., Choi, J., Royston, E., Janes, D., Culver, J. N., and
Harris, M. T., "Deposition of Platinum Clusters on the Surface
Modified Tobacco Mosaic Virus" *J. Nanoscience and
Nanotechnology*, **6**(4), 974-981 (2006).

Royston, E. S., Lee, S. Y., Culver, J. N., and Harris, M. T.,
"Characterization of Silica-Coated Tobacco Mosaic Virus,"
Journal of Colloid and Interface Science, **298**(2), 706-712
(2006).

Widjaja, E., Liu, N. C., Li, M., Collins, R. T., Basaran, O. A.,
and Harris, M. T., "Dynamics of Sessile Droplet Evaporation:
A Comparison of the Spine and the Elliptic Mesh Generation
Methods," *Computers in Chemical Engineering*, **31**, 219-232
(2007).

Collins, R. T., Harris, M. T., and Basaran, O. A., "Electrified
Jet Breakup," **in press**, *J. Fluid Mechanics* (January 2007).

Selected Conference Presentations

Widjaja, E., and Harris, M. T., "A Finite Element Study of the
Time Dependent 3-D Axisymmetric Sessile Droplet
Evaporation Dynamics: the Fluid Flow Application for
Particles Deposition," 70ax, AIChE Annual Meeting, April
(2006).

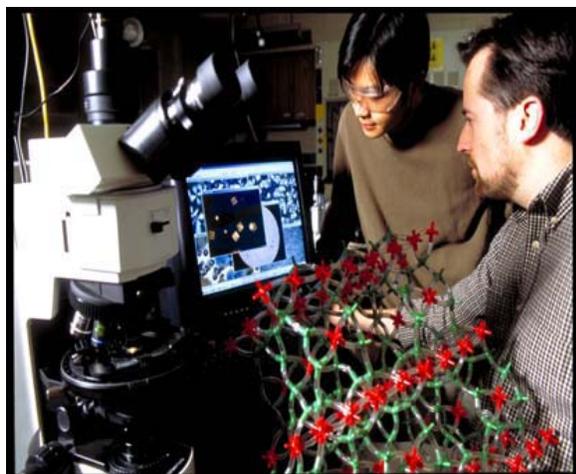
Zhao, Y., Won, Y. Y., and Harris, M. T., "Synthesis of Calcium
Alginate Gel Beads by Electrodipersion in Vegetable Oil,"
164e, AIChE Annual Meeting, April (2006).

Royston, E. S., Culver, J. N., and Harris, M. T., "Dual-Layer
Deposition on Tobacco Mosaic Virus," 521e, AIChE Annual
Meeting, San Francisco, CA, November (2006).

Collins, R. T., Harris, M. T., and Basaran, O. A., "Numerical
Analysis of the Nonlinear Deformation and Breakup of Semi-
Insulating Electrified Liquid Jets," 617a, AIChE Annual
Meeting, San Francisco, CA, November (2006).

Zhao, Y., Won, Y. Y., and Harris, M. T., "Preparation of
Calcium Alginate Microbeads by Electrodipersion for Protein
Drug Controlled Release," 80g, AIChE Annual Meeting, San
Francisco, CA, November (2006).

Widjaja, E., Sloan, J. T., and Harris, M. T., "Controlled
Deposition of Nanoparticles on a Solid Substrate: Numerical
and Experimental Investigation of the Effect of Fluid Flow
Both in the Absence and Presence of External Electric Field,"
80d, AIChE Annual Meeting, San Francisco, CA, November
(2006).





Hugh W. Hillhouse

Ph. D. University of Massachusetts, 2000

Associate Professor

Team Excellence Award, College of Engineering, Purdue University (2007)

Research Areas

Solar Energy Conversion, Thermoelectric Energy Conversion, Nanomaterials, Colloidal & Interfacial Phenomena

Selected Professional Activities

Session Chair, "Thin Films and Functional Materials," International Symposium on Zeolites and Microporous Materials (ZMPC), Yonago, Japan, Aug. 2, 2006.
Session Chair, "Nanostructured Thin Films" AIChE Annual Meeting, San Francisco CA, November (2006)
Session co-Chair, "Self-assembly of Templated Inorganic Materials I," AIChE Annual Meeting, San Francisco CA, November (2006)

Selected Invited Lectures

Hillhouse, H. W., "A New Class of Electrodes: Controlling Structure at the 5 nm Length Scale," Departmental Seminar, Chemistry Department, Carnegie Mellon University, Pittsburgh PA, March (2006).

Hillhouse, H. W., "Controlling Interfacial Curvature with Nanoclusters: A Robust Route to Fabricate Double Gyroid Thin Films out of Virtually Any Material," Nanoparticle Science & Engineering NSF IGERT Seminar Series, University of Minnesota, March (2006).

Hillhouse, H. W., "Developing Nanostructured Thermoelectric Films," Lockheed Martin Corporation, Palmdale CA, June (2006).

Hillhouse, H. W., "Using Grazing-angle-of-Incidence Small-Angle X-ray Scattering (GISAXS) to Characterize Nanoporous Films," International Symposium on Zeolites and Microporous Crystals (ZMPC) Presymposium, Tokyo, Japan, July (2006).

Hillhouse, H. W., "Thoughts on Research: Starting-up as a New Faculty Member," New Faculty Orientation, Purdue University, August (2006).

Invited Lecturer for Short Course: "SAXS Master Class," University of Minnesota, August 2006. Enrollment of 32 academics and industrial representatives. Prof. Hillhouse was invited to give a lecture on x-ray scattering focusing on grazing-angle-of-incidence small angle x-ray scattering (GISAXS).

Hillhouse, H. W., "Self-Assembled Nanostructured Films," Rohm and Haas Company, Spring House PA, September (2006).

Hillhouse, H. W., "Development of New Nanomaterials for Solid-State Energy Conversion: Light to Electricity and Heat to Electricity," Departmental Seminar, Chemical Engineering, University of Louisville, Feb (2007).

Selected Publications

Urade, V.N., Wei, T.C., Tate, M.P., Kowalski, J.D., and Hillhouse, H.W., "Nanofabrication of Double Gyroid Films," *Chemistry of Materials* **19**, 768-777 (2007).

Bollmann, L., Urade, V.N., and Hillhouse, H.W., "Controlling Interfacial Curvature in Nanoporous Silica Films formed by Evaporation Induced Self-Assembly from Nonionic Surfactants: I. Evolution of Nanoscale Structures in Coating Solutions," *Langmuir* **23** (8), 4257-4267 (2007).

Urade, V.N., Bollmann, L., Kowalski, J.D., Tate, M.P., and Hillhouse, H.W., "Controlling Interfacial Curvature in Nanoporous Silica Films formed by Evaporation Induced Self-Assembly from Nonionic Surfactants: II. Effect of Processing Parameters on Film Structure," *Langmuir* **23** (8), 4268-4278 (2007).

Tate, M.P., Urade, V.N., Kowalski, J.D., Wei, T.C., Hamilton, B.D., Eggiman, B.W., and Hillhouse, H.W., "Simulation and Interpretation of 2D Diffraction Patterns from Self-Assembled Nanostructured Films at Arbitrary Angles of Incidence: from Grazing Incidence (above the critical angle) to Transmission Perpendicular to the Substrate," *J. Phys. Chem. B* **110**, 9882-9892 (2006).

Eggiman, B.W., Tate, M.P., and Hillhouse, H.W., "Rhomboidal Structure of Highly Ordered and Oriented Self-Assembled Nanoporous Silica Thin Films," *Chem. Mater.* **18**, 723-730 (2006).

Selected Conference Presentations

Hillhouse, H.W., "Self-Assembly and Electrochemical Characterization of Highly Ordered and Oriented Mesoporous Silica Films," International Symposium on Zeolites and Microporous Crystals, Yonago, Japan, August (2006).

Hillhouse, H.W., "Electrochemistry and Nanofabrication with Mesoporous Silica Film Coated Electrodes," 5th International Mesoporous Materials Symposium, Shanghai, Peoples Republic of China, August (2006).

Hillhouse, H.W., "Electrochemical Investigation of Transport Through Self-Assembled Nanoporous Silica Thin Films," AIChE Annual Meeting, San Francisco CA, November (2006).

Hillhouse, H.W., "Fabrication of Chalcogenide Nanowire Thin Films for Solid State Energy Conversion," AIChE Annual Meeting, San Francisco CA, November (2006).

Hillhouse, H.W., "Fabrication of Double-Gyroid Structure Nanowire Arrays," AIChE Annual Meeting, San Francisco CA, November (2006).

Hillhouse, H.W., "Self-Assembly of Double-Gyroid Phase Block Copolymer/Silica Thin Films," AIChE Annual Meeting, San Francisco CA, November (2006).



Nancy W. Y. Ho

Ph. D. Purdue University, Molecular Biology

Research Professor

**Senior Research Scientist and Group Leader of Molecular Genetics Group
Laboratory of Renewable Resources Engineering (LORRE)**

Energy Patriot (2006)

Honored at President's State of the Union Address (2007)

Research Areas

Genetic engineering of the *Saccharomyces* yeast to convert sugars from cellulosic biomass to ethanol

Selected Professional Activities

Member., American Society of Biochemistry and Molecular Biology

Member, The American Chemical Society

Member, The Society of Sigma Xi for the Encouragement of Scientific Research

Member, American Institute of Chemical Engineers

Member, American Society for the Advancement of Science

Selected Invited Lectures

Ho, N. W. Y., " Fermentation Results from using Specific Recombinant Yeast, the LNH-ST Strains, to Produce Cellulosic Ethanol From Real Feedstocks," World Congress on Industrial Biotechnology and Bioprocessing, March (2007).

Ho, N. W. Y., "Development of Recombinant *Saccharomyces* Yeast for Efficient and Cost-Effective Cellulosic Ethanol Production.," UC Berkeley Synthetic Biology 2.0 meeting, May (2006).

Ho, N. W. Y., " Development of Recombinant *Saccharomyces* Yeast for Efficient Cellulosic Ethanol Production.," 2006 World Biofuel Symposium-China, September (2006).

Ho, N. W. Y., was " Development of Recombinant *Saccharomyces* Yeast for cost-effective Cellulosic Ethanol Production," Washington University St. Louis, October (2006).

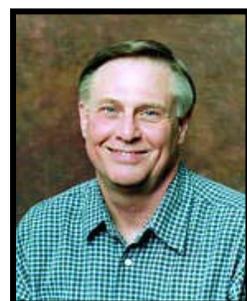
Selected Conference Presentations

Sedlak, M. and Ho, N. W. Y., "Co-fermentation of Glucose, Xylose and Cellobiose by Genetically Modified *Saccharomyces* Yeast," 28th Symposium on Biotechnology for Fuels and Chemicals, Nashville, TN, April (2006).

Bai, Y., Sedlak M. and Ho, N. W. Y., "Developing Desulfurization Biocatalysts for Removing Organic Sulfur from Fossil Fuels at Higher Temperatures," 28th Symposium on Biotechnology for Fuels and Chemicals, Nashville, TN, April (2006).

Warner, R., Sedlak, M., Ho, N. W. Y, and Mosier N. S., "Effect of Furfural and HMF on the Cofermentation of Glucose and Xylose from Pretreated Lignocellulosic Biomass by Recombinant Yeast," 28th Symposium on Biotechnology for Fuels and Chemicals, Nashville, TN, April (2006).

Warner, R., Sedlak, M., Ho, N. W. Y, and Mosier N. S., "Conditioning and Glucose/Xylose Cofermentation of Pretreated Lignocellulosic Biomass," 28th Symposium on Biotechnology for Fuels and Chemicals, Nashville, TN, April (2006).



R. Neal Houze

Ph. D. University of Houston, 1968

Professor

OXE Outstanding Mentor Award (2006)

Selected Professional Activities

University

Teaching Academy Committee for the Education of Teaching Assistants

University Committee on Superior Students

Cooperative Engineering Education Committee

University Cooperative Education Coordinating Committee

Teaching Academy

Faculty Advisor for Mortar Board

Mediator for College of Engineering

Affiliate with Center for Instructional Excellence

Engineering ABET Coordinator Committee

School

Undergraduate Committee

ABET Coordinator



Sangtae Kim

Ph. D. Princeton, 1983

Donald W. Fedderson Distinguished Professor

National Academy of Engineering

Research Areas

Pharmaceutical Informatics; Bioinformatics, Cheminformatics, Systems Biology;
Computational Microfluidics and Nanofluidics; Radio Frequency Identification (RFID)

Selected Professional Activities

Committee of Visitors, NSF CTS Division, March (2006)
FDA Science Board Working Group, Chair – IT Subgroup,
FDA, December 2006 – September 2007
Organizational Committee (with M. Tuominen and M. Roco),
Nano-Informatics Workshop, NSF, June (2007)
Supercomputing06, Chair – Awards Committee, November
2005 – November 2006
Member, Awards Committee, American Institute of Chemical
Engineers
Advisory Boards (academic)
Dept. of Chemical Engineering, University of Arizona
Dept. of Chemical Engineering, University of California Santa
Barbara
College of Engineering, Illinois Institute of Technology

Selected Invited Lectures

Kim, S., Departmental Seminar, Tennessee Technological
University, March (2007).

Kim, S., CISE Distinguished Lecture, National Science
Foundation, January (2007).

Kim, S., A.G. Fredrickson Lecture, University of Minnesota,
October (2006).

Kim, S., “Initiative in Innovative Computing,” Harvard
University, October (2006).

Kim, S., Departmental Seminar, Texas Tech University,
Lubbock, TX, October (2006).

Kim, S., Departmental Seminar, Ohio State University,
Columbus, OH, April (2006).

Kim, S., Departmental Seminar, University of Arizona,
January (2006).

Kim, S., Departmental Seminar, University of California –
Santa Barbara, CA, January (2006).

Selected Publications

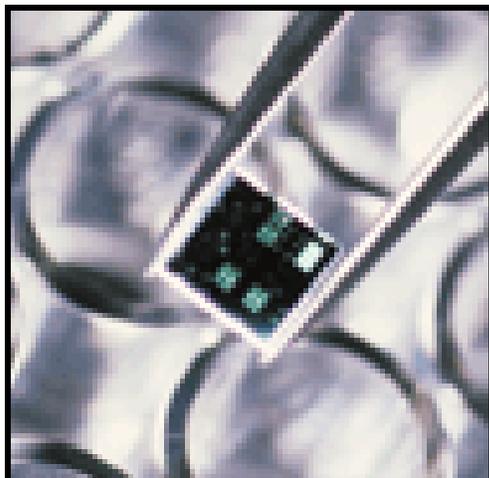
Kim, S. and Heller, M., “Emerging Cyberinfrastructure:
Challenges for the Chemical Process Industry”, *Computers
and Chemical Engineering*, **30(10-12)**, 1497 (2006).

Sridhar Maddipati, “A *priori* inference of cross reactivity for
drug-targeted kinases”, *J. Medicinal Chemistry*, **49**:3092-3100
(2006).

Selected Conference Presentations

Invited Kim, S., Biotechnology/Transport Phenomena
Session, Fine Particle Society, San Diego, CA, December
(2007).

Plenary Kim, S., “Integration and Commercialization of
Micro-Nano-Systems”, Sanya, China, January (2007).





Gil Lee

Ph. D. University of Minnesota, 1992

Associate Professor

ETS Walton Fellow (2006 – 2007)

Research Areas

Nanometer Scale Science in Medicine and Biotechnology, Surface Forces in Macromolecular Systems, Ultrasensitive Biosensors

Selected Professional Activities

Executive Board, National Programming Committee of the AIChE (2004-2007)
Executive Board, Nanoscale Science and Engineering Forum of the AIChE (2005-2008)
Co-Chair, 2nd International Conference for Bioengineering and Nanotechnology (September 2006)
Co-Chair, 4th International Conference for Bioengineering and Nanotechnology (July 2008)

Selected Invited Lectures

Lee, G. U., "Magnetic Tweezers Measurements of the Bond Lifetime-Force Behavior of the IgG-Protein A Specific Molecular Interaction," Department of Micro and Nanotechnology, Technical University of Denmark, April (2007).

Lee, G. U., "Magnetic Tweezers Measurements of the Bond Lifetime-Force Behavior of the IgG-Protein A Specific Molecular Interaction," CRANN, Trinity College Dublin, April (2007).

Lee, G. U., "AFM and Src Tyrosine Kinase Imaging in Neuronal Growth Cones," Department of Neurobiology and Anatomy, Drexel University, Philadelphia, March (2007).

Lee, G. U., "Magnetic Tweezers Measurement of the Bond Lifetime-Force Behavior of the IgG-Protein A Specific Molecular Interaction," Department of Physics, University of Bristol, UK, February (2007).

Lee, G. U., "Application of Superparamagnetic Microparticles to Single Molecule Measurements and Diagnostic Devices," Department of Chemical Engineering, University of Florida, September (2006).

Lee, G. U., "Application of Magnetic Nanotechnology to Diagnostic Devices," Department of Chemical Engineering, Pennsylvania State University, March (2006).

Lee, G. U., "Novel Magnetic Materials for Diagnostic and Separation Applications," DuPont, Research Station, Delaware, March (2006).

Selected Publications

Mahapatro, A., Jeong, K., Lee, G., and Janes, D., "Sequence Specific Electronic Conduction Through Polyion Stabilized Double Stranded DNA in Nanoscale Break Junctions," *Nanotechnology* **18**, 195202.

Shang, H., and Lee, G. U., "Magnetic Tweezers Measurement of the Bond Lifetime-Force Behavior of the IgG-Protein A Specific Molecular Interaction," *Journal of the American Chemical Society* **129**, 6640-6646 (2007).

Chang, W. S., Park, J. W., Rawatt, V., Sands, T., and Lee, G. U., "Templated Synthesis of Gold-Iron Alloyed Magnetic Nanoparticles by Pulsed Laser Deposition," *Nanotechnology* **17**, 5131-5135 (2006).

Wang, Z., Shang, H., and Lee, G. U., "Nanoliter Scale Reactor Arrays for Biochemical Sensing," *Langmuir* **22**, 6273-6276 (2006).

Grzywa, E. L., Lee, A. C., Lee, G. U., and Suter, D., "Comparative Atomic Force and Optical Microscopy Study of Neuronal Growth Cones," *J. Neurobiology* **55**, 1529-1543 (2006).

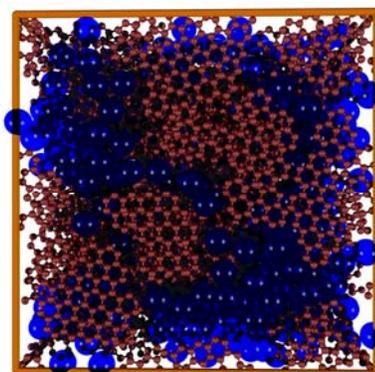
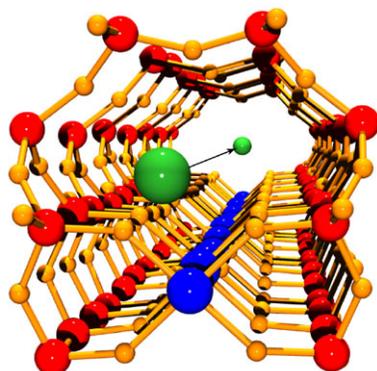
Park, J. W., and Lee, G. U., "Properties of Mixed Lipid Monolayers Assembled on Hydrophobic Surfaces through Vesicle Adsorption," *Langmuir* **22**, 5057-5063 (2006).

Selected Conference Presentations

Lee, G. U., "Magnetic Tweezers Measurements of the Bond Lifetime-Force Behavior of the IgG-Protein A Specific Molecular Interaction," International Conference on Bioengineering and Nanotechnology 2007, Singapore, August (2007).

Lee, G. U., "Synthesis and Characterization of High Uniformity Superparamagnetic Microparticles," BioMag House 2006, Department of Mechanical Engineering, University of Karlsruhe, Germany September (2006).

Lee, G. U., "Application of Magnetic Nanotechnology to Diagnostic Devices," InterMag 2006, San Diego, CA, May (2006).





James D. Litster

Ph. D. University of Queensland, 1985

Professor of Chemical Engineering
Professor of Industrial and Physical Pharmacy
Honorary Visiting Professor, University of Queensland (2007)

Research Areas

Particle Design and Formulation - Granulation and Agglomeration; Crystallization and precipitation

Selected Professional Activities

Member, Solae LLC (St Louis) Scientific Advisory Board
Member, Board of the Co-operative Research Centre for Rail
Editorial Board, *Powder Technology*
Editorial Board, *Particle and Particulate Systems Characterization*
Fellow, Institution of Chemical Engineers (UK)

Selected Publications

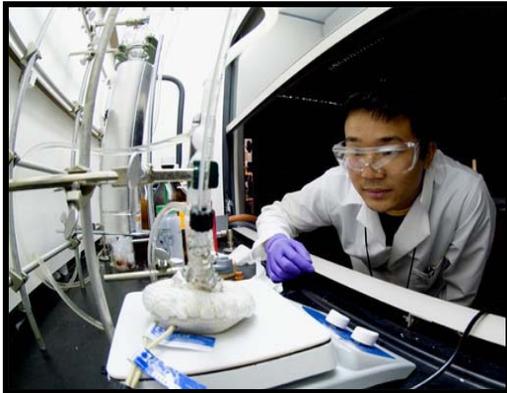
Iveson, S. M., Liu, L. X., Hapgood, K., and Litster, J. D.,
Chapter 23 - Granulation Mechanisms, *Handbook of Granulation*, A. Salman (Ed.), Elsevier (2006).

Crosthwaite, C., Cameron, I. T., Lant, P. A., and Litster, J. D., "Balancing Curriculum Processes and Content in a Project Centred Curriculum – in Pursuit of Graduate Attributes," *Chemical Engineering Research and Design*, **84**, 619-628 (2006).

Gantt, J.A., Cameron, I. T., Litster, J. D., and Gatzke, E. P.,
"Determination of Coalescence Kernels for High Shear Granulation Using DEM Simulations", *Powder Technology*, **170(2)**, 53-63 (2006).

Liu, D.Y., Litster, J. D., and White, E. T., "Precipitation of Soy Proteins: Particle Formation and Protein Separation", *AIChE Journal*, Vol 53, Issue 2, 514-522 (2007).

Wildeboer, W.J., Koppendraaier, E., Litster, J. D., Howes, T., and Meesters, G., "A Novel Nucleation Apparatus for Regime Separated Granulation", *Powder Technology*, **171(2)**, 96-105 (2007).



Julie C. Liu

Ph. D. Caltech, 2006

Assistant Professor

Research Areas

Biomaterials, Tissue Engineering, Protein Engineering

Dr. Liu will be joining the School in January 2008.



John A. Morgan

Ph. D. Rice, 1999

Associate Professor
Director of Undergraduate Studies

Research Areas
Metabolic Engineering, Biocatalysis

Selected Professional Activities

Advisor, Purdue Undergraduate AIChE chapter
Associate Editor, *Bioprocess and Biosystems Engineering*
Session Chair, Systems Biotechnology, AIChE Annual Meeting, San Francisco, CA, November (2006)

Selected Invited Lectures

Morgan, J. A., "Engineering of Flavonoid Biosynthesis in Yeast," University of Tennessee, Knoxville, TN, October (2006).

Morgan, J. A., "13C Metabolic Flux Analysis," Eli Lilly Technology Research Center, Indianapolis, IN, March (2007).

Selected Publications

Chen, H., Jiang, H., and Morgan, J.A., "Non-Natural Cinnamic Acid Derivatives as Substrates of Cinnamate 4-hydroxylase," *Phytochemistry* **68**, 306-311 (2007).

Shastri, A., and Morgan, J. A., "A Transient Isotopic Labeling Methodology for 13C - Metabolic Flux Analysis of Photoautotrophic Microorganisms," *Phytochemistry* **68**, 2302-2312 (2007).

Selected Conference Presentations

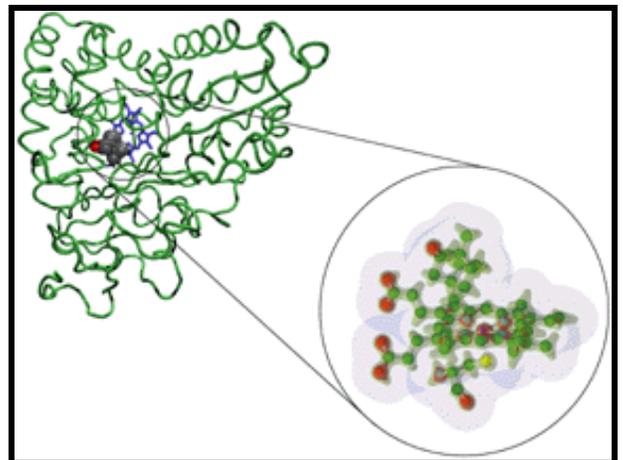
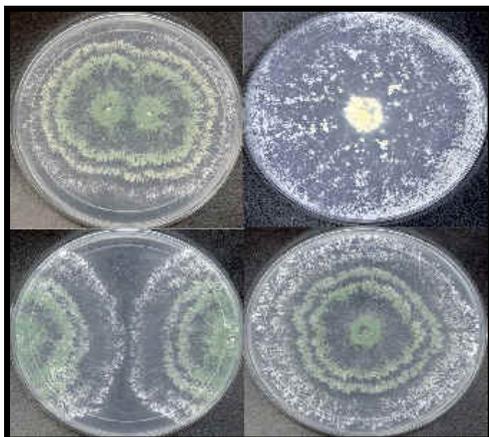
Boyle, N. and Morgan, J.A. "Stoichiometric Modeling of Eukaryotic Photoautotrophic Metabolism in *Chlamydomonas reinhardtii*" AIChE Annual Meeting, San Francisco, CA. November (2006).

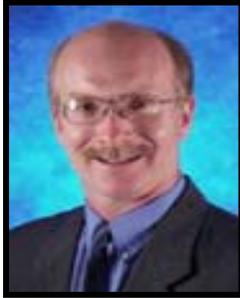
Chen, H. and Morgan, J.A. Biosynthesis of novel flavonoids through an engineered phenylpropanoid pathway in *Saccharomyces cerevisiae*. AIChE Annual Meeting, San Francisco, CA, November (2006).

Shastri, A. and Morgan, J.A. "Design of Transient Isotopic Labeling Studies for the Experimental Measurement of Autotrophic Metabolic Fluxes". AIChE Annual Meeting, San Francisco, CA, November (2006).

Shastri, A., and Morgan, J. A., "Development of 13C Metabolic Flux Analysis for Photoautotrophic Metabolism," Metabolic Engineering VI, From recDNA Towards Engineering Biological Systems, Noordwijkerhout, Netherlands, October (2006).

Morgan, J. A., Chen, H., and Jiang, H., "Engineering of Flavonoid Biosynthesis in Yeast," Natural Products Discovery and Production: New Challenges, New Opportunities, Santa Fe, NM, June (2006).





Joseph F. Pekny
Ph. D. Carnegie Mellon University, 1989

Professor
Director, e-Enterprise Center at Discovery Park
Founding Director, Regenstrief Center for Healthcare Engineering

Purdue University “One Brick Higher Award” (2007)

Research Areas

Systems analysis; combinatorial optimization; supply chain management, planning and scheduling systems; pharmaceutical pipeline management; model-based and data driven management; systems analysis and decision models in healthcare engineering, real-time decision systems

Selected Professional Activities

Invited Session Chair, “Financing, Forecasting, and Risk Management”, Foundations of Computer Aided Process Operations, to be delivered (2008)

Selected Invited Lectures

Pekny, J. F., “Optimizing the Dynamics of Change: The Role of Process Systems in the Formation, Implementation, and Feedback of Strategies for Improving Complex Societal Systems,” Imperial College, London (2007).

Selected Publications

Varma, V. A., Uzsoy, R. E., Blau, G. E., and Pekny, J. F., “Lagrangian Heuristics for Large-Scale Pharmaceutical Operations Scheduling,” *The Journal of Heuristics*, in press.

Varma, V. A., Blau, G. E., Pekny, J. F., and Reklaitis, G. V., “Enterprise-Wide Modeling and Optimization: An Overview of Emerging Research Challenges and Opportunities,” *Computers and Chemical Engineering*, special issue, in press.

Orcun, S., Asmundsson, J., Uzsoy, R., Clement, J., Pekny, J., and Rardin, R., “Supply Chain Optimization Protocol Environment (SCOPE) for Rapid Prototyping and Analysis of Complex Supply Chains”, *Production Planning & Control*, in press.

Aydogan, S., Orcun, S., Blau, G., Pekny, J. F. and Reklaitis, G. V., “Effect of Different Waste Recovery Systems on the Overall Waste Generation Rates for an Advanced Life Support System,” *International Journal of Environment and Pollution*, **29**, 232 (2007).

Selected Conference Proceedings

Aydogan, S., Orcun, S., Blau, G., Pekny, J. F. and Reklaitis, G. V., “An Optimization Framework to Design and Integrated Advanced Life Support System,” *Proceedings of the 36th International Conference on Environment Systems (ICES)*, SAE Technical Paper 2006-01-2246, (2006).

Selected Conference Presentations

Orcun, S., Aydogan, S., and Pekny, J. F., “Life Support Supply Chain for Long-Term Distant Manned Planetary Exploration,” INFORMS, Puerto Rico, (2007).

Aydogan, A., Orcun, S., Blau, G., Pekny, J. F., and Reklaitis, G. V., “Using a Simulation-Based Optimization Approach for Space Missions,” AIChE Annual Meeting, San Francisco, CA (2006).



R. Byron Pipes
Ph. D. University of Texas – Arlington, 1972

John Leighton Bray Distinguished Professor of Engineering

National Academy of Engineering

Research Areas

Application of nanotechnology to engineering disciplines including aerospace, composite materials and polymer science and engineering

Selected Professional Activities

Fellow, American Society of Mechanical Engineers
Fellow, Society for Advanced Materials and Process Engineering

Selected Publications

Zalamea, L. and Pipes, R.B., “Harmonic Oscillators of Carbon Nanotube Arrays,” *Nanoscience and Nanotechnology*, **6**, 1 (2006).

Pipes, R.B. and Zalamea, L., “Energetics of Imperfectly Bonded Carbon Nanotube Arrays in Flexure,” *Composites Science and Technology*, **66**, 2844 (2006).

Salvetat, J-P, Bhattacharyya, S., and Pipes, R.B., “Progress on Mechanics of Carbon Nanotubes and Derived Materials,” *Journal of Nanoscience and Nanotechnology*, **6**, 1 (2006).

Coffin D.W., Carlsson, L.A. and Pipes, R.B., “On the Separation of Carbon Nanotubes,” *Composites Science and Technology*, **66(9)**, 1132 (2006).

Pipes, R.B., Hubert, Salvétat, J.-P. and Zalamea, L., “Flexural Deformation of the CNT Array as a Measure of van der Waals Interaction Forces,” *Composites Science and Technology*, **66(9)**, 1125 (2006).



Doraiswami Ramkrishna

Ph. D. University of Minnesota, 1965

H. C. Peffer Distinguished Professor

2006 Jewel of Ruia Award (Outstanding Alumnus Award from Undergraduate Alma Mater)

Research Areas

Applied Mathematics, Dispersed phase systems, Biochemical engineering, Chemical reaction engineering

Selected Professional Activities

First Chairman, Area 10D on Applied Mathematics of CAST Division of the American Institute of Chemical Engineers

Selected Invited Lectures

Ramkrishna, D., "The Potential of Mathematical Models in Cancer Treatment," Amrita Institute of Medical Sciences, Cochin, June (2006).

Ramkrishna, D., "On Modeling Metabolic Systems. The Cybernetic Approach," Department of Chemical Engineering, Indian Institute of Technology, Chennai, July (2006).

Ramkrishna, D., "On Modeling Metabolic Systems," Computer Research Institute (CRI) CS&E/CLS SEMINAR SERIES, Purdue University, November (2006).

Selected Publications

Ramkrishna, D., "Rutherford Aris: Chemical Engineer Extraordinaire," *Indian Chemical Engineer*, **48**, 288-292 (2006). (By invitation: Not reviewed).

Young, J. D., and Ramkrishna, D., "On the Matching & Proportional Laws of Cybernetic Models," *Biotech.Progress.*, **23**, 83-99 (2007).

Bhole, M. R., Joshi, J. B., and Ramkrishna, D., "Population Balance Modeling for Bubble Columns Operating in the Homogeneous Regime," *A.I.Ch.E. J.*, **53**, 579-588 (2007).

Nere, N., Ramkrishna, D., Parker, B. E., and Mohan, P., "Transformation of Chord Length Distributions to Size Distributions for Non-Spherical Particles with Orientation Bias," *Ind. Eng. Chem.* **46** (10), 3041 -3047 (2007).

Sherer, E., Hannemann, R. E., Rundell, A., and Ramkrishna, D., "Evaluation of Chemotherapy using the Stochastic Equations of Population Balance Models," *Ann. Bioeng.*, in press.

Trinh, S., Nere, N. K., and Ramkrishna, D., *Mathematics for Chemical Engineers*, Chapter in Handbook edited by L. S. Albright, in press.

Selected Conference Presentations

Ramkrishna, D., and Young, J. D., "Cybernetic Models of Metabolism. A Dynamic Framework for Metabolic Engineering," ISCRE 19, Potsdam, Germany, September (2006).

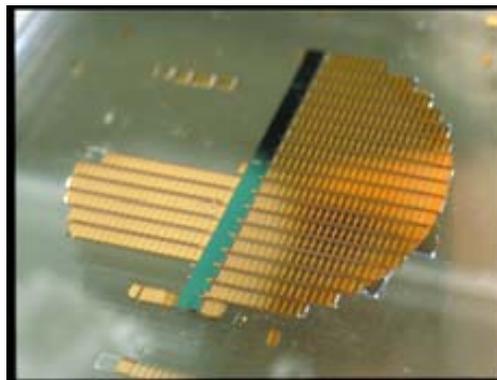
Ramkrishna, D., "On Amundson's Legacy," Paper # 136b, Session in Honor of Neal R. Amundson's 90th Birthday: *Invited talk*, AIChE Annual Meeting, San Francisco, CA, November (2006).

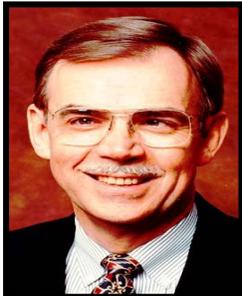
Nere, N. K., and Ramkrishna, D., "Simulation of Drop Breakage in a Turbulent Pipe Flow with Computational Fluid Dynamics and Population Balances via Operator Methods," (*Invited talk* by D. Ramkrishna: Special Session honoring Larry Tavlarides), Session in Honor of Larry Tavlarides on his 65th Birthday: *Invited talk*, AIChE Annual Meeting, San Francisco, CA, November (2006).

Mehra, S., Jayapal, K., Charanya, S., Castro, M., Ramkrishna, D., and Hu, W.-S., "Unveiling the Regulation of Secondary Metabolism in *Streptomyces*," AIChE Annual Meeting, San Francisco, CA, November (2006).

Sherer, E., Hannemann, R. E., Rundell, A. E., and Ramkrishna, D., "Evaluation of Leukemia Chemotherapy using Stochastic Equations of Population Balance Models," AIChE Annual Meeting, San Francisco, CA, November (2006).

Young, J. D., Kim, J. I., Ramkrishna, D. and Varner, J. D., Poster on "On Modeling Metabolism," in Session on Computational Systems Biology, First International Conference on Biomolecular Engineering, San Diego, CA, January (2007).





Gintatas V. "Rex" Reklaitis

Ph. D. Stanford University, 1969

Edward W. Comings Professor

Professional Achievement Award, Illinois Institute of Technology (2006)
National Academy of Engineering (2007)

Research Areas

Process systems engineering, design and operation of batch/semicontinuous systems, enterprise-wide modeling and optimization, applications to pharmaceutical product development, process design and manufacturing

Selected Professional Activities

Editor-in-Chief, *Computers & Chemical Engineering*
Editorial Board, *Computer Applications in Engineering Education*
Editorial Board, *Journal of Pharmaceutical Innovation*
Vice-Chair (2006), Chair (2007), AIChE Executive Board

Selected Invited Lectures

Keynote Reklaitis, G. V., "Enterprise-wide Perspectives in Engineering Decisions", Fourth International Conference on Chemical and Food Engineering, Puebla, Mexico, March (2007).

Keynote Reklaitis, G. V., "Perspectives on Process Systems Engineering R&D in Support of Pharmaceutical Product/Process Development and Manufacturing", European Symposium on Computer Aided Process Engineering -17, Bucharest, Romania, May (2007).

Selected Publications

Yi, G., and Reklaitis, G. V., "Optimal Design of Batch-Storage Network with Uncertainty and Waste Treatment," *AIChE Journal*, **52**, 3473-3490 (2006).

Hlinak, A., Kuriyan, K., Morris, K., Reklaitis, G. V., and Basu, P., "Understanding Critical Material Properties for Solid Dosage Form Design," *Journal of Pharm. Innovation*, **1**(1), 12-18 (2006). (Perspective)

Zhao, C.-H., Jain, A., Hailemariam, L., Suresh, P., Akkiseti, P., Joglekar, G., Venkatasubramanian, V., Reklaitis, G. V., Morris, K., and Basu, P., "Towards Intelligent Decision Support for Pharmaceutical Product Development," *Journal of Pharm. Innovation*, **1**(1), 23-36 (2006).

Varma, V.A., Blau, G. E., Pekny, J. F., and Reklaitis, G. V., "Enterprise-wide Modeling and Optimization: An Overview of Emerging Research Challenges and Opportunities," *Computers & Chem Engr*, **32**, *Special Issue: Selected Papers of ESCAPE 15*, 692-711 (2007).

Yi, G., and Reklaitis, G. V., "Optimal Design of Batch-Storage Network Considering Exchange Rates and Taxes," *AIChE Journal*, **53**, May (2007).

Zapata, J.C., Varma, V. A., and Reklaitis, G. V., "Impact of Tactical and Operational Policies in the Selection of a New Product Portfolio," *Computers & Chem Engr*, **32**, 692-711, *Special Issue: Selected Papers of PSE 2006/ESCAPE 16*, (2007).

Selected Conference Presentations

Reklaitis, G. V., "A Continuous Approach to Multi-Mode Resource Project Scheduling," AIChE Annual Meeting, San Francisco, CA, November (2006).

Reklaitis, G. V., "An Ontology-based Approach for Managing General Recipes in Batch Processes", AIChE Annual Meeting, San Francisco, CA, November (2006).

Reklaitis, G. V., "An Ontology-based Approach for Knowledge Modeling in Pharmaceutical Product Development," AIChE Annual Meeting, San Francisco, CA, November (2006).

Reklaitis, G. V., "Technology Roadmap: Manufacturing", AIChE Annual Meeting, San Francisco, CA, November (2006).

Reklaitis, G. V., "Discrete Event Simulation Software: An Evaluation from the Simulation-optimization Perspective", 2007 IIE Annual Conference, Nashville, TN, May (2007).

Reklaitis, G. V., "Assessment of Discrete Event Simulation Software for Enterprise-wide Stochastic Decision Problems", European Symposium on Computer Aided Process Engineering -17, Bucharest, Romania, May (2007).





Fabio H. Ribeiro

Ph. D. Stanford University, 1989

Professor

Purdue University Faculty Scholar (2006 – 2010)

Team Excellence Award, College of Engineering, Purdue University (2007)

Research Areas

Surface Science and Kinetics of Heterogenous Catalytic Reactions

Selected Professional Activities

Editorial Board, *Applied Catalysis B: Environmental*

Editorial Board, *Catalysis Letters*

Director, Catalysis and Reaction Engineering Division AIChE (2005-2008)

Selected Invited Lectures

Ribeiro, F. H., "What Is Catalysis and How It Is Improving Our Environment", Oak Ridge Chapter of ASM International, Educational Symposium on Heterogeneous Catalysis, Oak Ridge, TN, April (2006).

Selected Publications

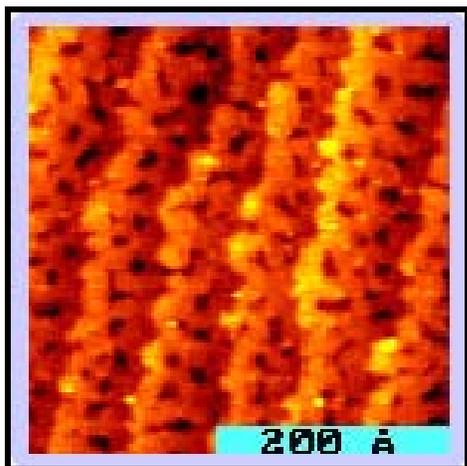
Cumaranatunge, L., Mulla, S. S., Yezerets, A., Currier, N. W., Delgass, W. N., and Ribeiro, F. H., "Ammonia is a Hydrogen Carrier in the Regeneration of Pt/BaO/Al₂O₃ NO_x Traps with H₂," *Journal of Catalysis*, **246**, 29-34 (2007).

Agrawal, R., Singh, N. R., Ribeiro, F. H., and Delgass, W. N., "Sustainable Fuel for the Transportation Sector," *Proceedings of the National Academy of Sciences*, **104** (12), 4828-4833 (2007).

Phatak, A. A., Koryabkina, N., Rai, S., Ratts, J. L., Ruettinger, W. F., Farrauto, R. J., Blau, G. E., Delgass, W. N., and Ribeiro, F. H., "Kinetics of the Water-Gas Shift Reaction on Pt Catalysts Supported on Alumina and Ceria," *Catalysis Today*, **123**, 224-234 (2007).

Mulla, S. S., Chen, N., Cumaranatunge, L., Blau, G. E., Zemlyanov, D. Y., Delgass, W. N., Epling, W. S., and Ribeiro, F. H., "Reaction of NO and O₂ to NO₂ on Pt: Kinetics and Catalyst Deactivation," *Journal of Catalysis*, **241**, 389-399 (2006).

Han, J., Zemlyanov, D. Y., and Ribeiro, F. H., "Interaction of O₂ with Pd Single Crystals in the range 1-150 Torr: Oxygen Dissolution and Reaction," *Surface Science*, **600**, 2752-2761 (2006).



Selected Conference Presentations

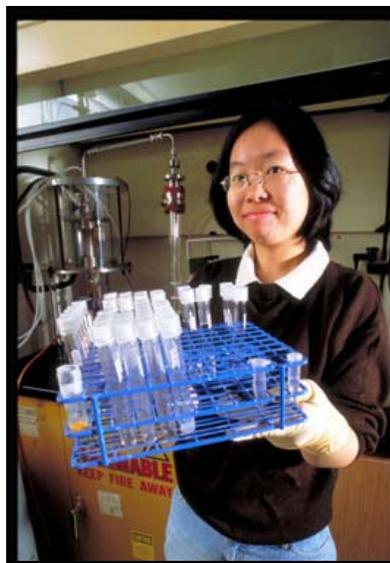
Ribeiro, F. H., Mulla, S. S., Chen, N., Cumaranatunge, L., Kromer, B. R., Cao, L., Delgass, W. N., Caruthers, J. M., and Epling, W. S., "Trapping of NO_x on Pt/Ba/Al₂O₃ Using Simulated Diesel Exhausts", Symposium Honoring ACS Somorjai Award Winner James Dumesic, Division of Colloid and Surface Chemistry, The 231st ACS National Meeting, Atlanta, GA, March (2006).

Mulla, S. S., Cumaranatunge, L., Smeltz, A. D., Delgass, W. N., and Ribeiro, F. H., "Oxidation of NO to NO₂ on Pt", Surface Chemistry Symposium in Honor of Gabor Somorjai, The 232nd ACS National Meeting, San Francisco, CA, September (2006).

Ribeiro, F. H., Smeltz, A. D., Zemlyanov, D., Schlögl, R., Knop-Gericke, A., Gabasch, H., and Klötzer, B., "Investigation of the Oxidation Mechanism of Pd in O₂ by in situ XPS", Operando Spectroscopy of Working Catalysts, The 232nd ACS National Meeting, San Francisco, CA, September (2006).

Chen, N., Rioux, R. M., Barbosa, L. A. M. M., and Ribeiro, F. H., "Kinetic Study of the Hydrodechlorination Reaction for CH₄-xCl_x (x=1-4) and CF₄-xCl_x (x=1-3) Compounds on Pd/Carbon Catalyst," 20th North American Meeting of the Catalysis Society, Houston, TX, June (2007).

Schneider, W. F., Getman, R. B., Mun, B. S., Rioux, R. M., Epling, W. S., Zemlyanov, D., Smeltz, A. D., Delgass, W. N., and Ribeiro, F. H., "Coupled Theoretical and Experimental Analysis of Surface Coverage Effects in Pt-catalyzed NO Oxidation," 20th North American Meeting of the Catalysis Society, Houston, TX, June (2007).





Kendall T. Thomson
Ph. D. University of Minnesota, 1999

Associate Professor

Team Excellence Award, College of Engineering, Purdue University (2007)

Research Areas

Computational Catalysis Design, Computer-Aided Design of Nanoporous Materials, Ab Initio Molecular Dynamics, Molecular Electronics, Modeling Nano- and Mesoporous Materials

Selected Professional Activities

Member, American Institute of Chemical Engineers
Member, American Chemical Society
Member, American Association for the Advancement of Science

Selected Invited Lectures

Thomson, K. T., "Towards the Design of Novel Catalytic Materials Using Computational Chemistry," New York Catalysis Society, January (2006).

Thomson, K. T., "Computational Methods for Designing Catalytic Materials: State-of-the-art Through Example," Northwestern University, April (2007).

Thomson, K. T., "Developing Ab Initio and DFT-Based Descriptors for Catalytic Activity," Center of Catalysis and Surface Science, Northwestern University, May (2007).

Selected Publications

Joshi, A., Delgass, W. N., and Thomson, K. T., "Analysis of O₂ Adsorption on Binary-Alloy Clusters of Gold: Energetics and Correlations," *Journal of Physical Chemistry B*, **110**, 23372 (2006).

Joshi, A., Tucker, M. T., Delgass, W. N., and Thomson, K. T., "CO Adsorption on Pure and Binary-Alloy Gold Clusters: A Quantum Chemical Study," *Journal of Chemical Physics*, **125**, 194707 (2006).

Manz, T. A., Phomphrai, K., Medvedev, G., Krishnamurthy, B. B., Sharma, S., Haq, J., Knowstrup, K., Thomson, K. T., Delgass, W. N., Caruthers, J. M., and Abu-Omar, M. M., "Structure-Activity Correlation in Single-Site Olefin Polymerization Catalysts Containing Mixed Cyclopentadienyl/Aryloxy Ligand," *Journal of the American Chemical Society, Communications*, **129**(13), 3776-3777(2007).

Joshi, Y., and Thomson, K. T., "High Ethane Dehydrogenation Activity of Al-Al Pair Sites in Ga/H-[Al]ZSM-5: A DFT Thermochemical Analysis of the Catalytic Sites under Reaction," *Journal of Catalysis* **246**, 249-265 (2007).

Joshi, A., Delgass, W. N., and Thomson, K. T., "Investigation of Gold-Silver, Gold-Copper, and Gold-Palladium Clusters for Hydrogen Peroxide Formation from H₂ and O₂," *Journal of Physical Chemistry C* **111**, 7384-7395 (2007).

Joshi, A., Delgass, W. N., and Thomson, K. T., "Mechanistic Implications of Au/Ti-Lattice Proximity for Propylene Epoxidation," *Journal of Physical Chemistry C* **111**, 7841-7844 (2007).

Joshi, A., Delgass, W. N., and Thomson, K. T., "Adsorption of Copper Clusters in TS-1 Pores: Ti versus Si and Gold versus Copper," *Journal of Physical Chemistry C* **111**, 11888-11896 (2007).

Joshi, A., Delgass, W. N., and Thomson, K. T., "Interaction of Carbon Monoxide with Small Gold Clusters Inside TS-1 Pores," *Journal of Physical Chemistry C* **111**, 11424-11436 (2007).

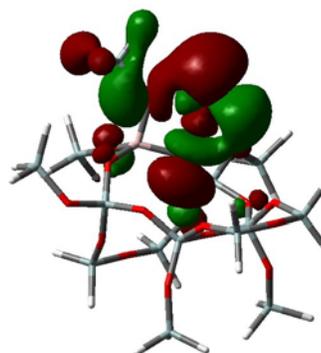
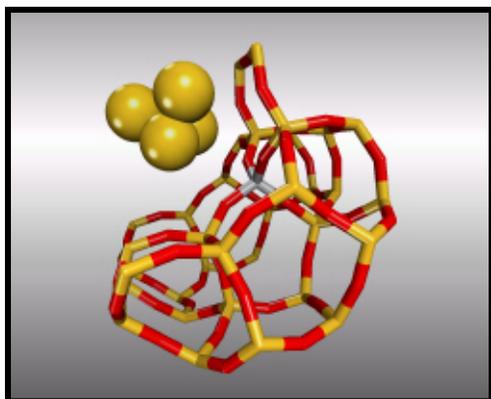
Selected Conference Presentations

Kromer, B. R., Ribeiro, F. H., and Thomson, K. T., "A Density Functional Theory Investigation of Methane Activation on a Palladium Oxide Catalyst," AIChE Annual Meeting, San Francisco, CA, November (2006).

Joshi, A. M., Delgass, W. N., and Thomson, K. T., "A Density Functional Theory Study of Reaction of H₂ and O₂ to Form H₂O₂ on Gas-Phase Au-Alloy Clusters," AIChE Annual Meeting, San Francisco, CA, November (2006).

Joshi, A. M., Delgass, W. N., and Thomson, K. T., "A Quantum-Mechanics/Molecular-Mechanics Study of Potential Steps in Direct Propylene Epoxidation Using H₂ and O₂ on Au/Titanium-Silicalite-1 Catalysts," AIChE Annual Meeting, San Francisco, CA, November (2006).

Delgass, W. N., Caruthers, J. M., Abu-Oma, M., Thomson, K. T., Venkatasubramanian, V., Blau, G. E., Phomphrai, K., Medvedev, G., Stanciu, C., Sharma, S., Manz, T. A., Haq, J., Knowstrup, K. A., and Krishnamurthy, B. B., "Model-Based Design of Single-Site Olefin Polymerization Catalysts," AIChE Annual Meeting, San Francisco, CA, November (2006).





Arvind Varma
Ph. D. Minnesota, 1972

**R. Games Slayter Distinguished Professor and
Head, School of Chemical Engineering**

G. P. Kane Visiting Professor, UICT-Mumbai (January 2007)

Research Areas

**Chemical and Catalytic Reaction Engineering, Heterogeneous Combustion,
New Energy Sources, Synthesis of Advanced Materials**

Selected Professional Activities

Series Editor, *Cambridge Series in Chemical Engineering*,
Cambridge University Press
Board of Directors, ISCRE Inc.
Chair, Amundson Award Committee, ISCRE (2006)
Member, Scientific Committee, ISCRE-19, Potsdam/Berlin,
Germany September (2006)
Chair, Sessions (2) in honor of Neal Amundson's 90th
Birthday, AIChE Annual Meeting, San Francisco, CA,
November (2006)
Chair, Sessions (2) in honor of Wilhelm Award Recipient,
AIChE Annual Meeting, San Francisco, CA, November
(2006)

Selected Invited Lectures

Drexel University, Philadelphia, PA, May (2006)
Rose-Hulman Inst of Technology, Terre Haute, IN,
October (2006)
G. P. Kane Lectures, UICT – Mumbai, India, January (2007)
Texas Tech University, Lubbock, TX, March (2007)
University of Houston, Houston, TX, March (2007)

Selected Publications

Diakov, V., Shafirovich, E., and Varma, A., "A Numerical
Study of Combustion Stability in Emergency Oxygen
Generators," *AIChE Journal*, **52**, 1495-1501 (2006).

Fan, Y.-Y., Kaufmann, A., Mukasyan, A., and Varma, A.,
"Single and Multi-Wall Carbon Nanotubes by Floating
Catalyst Method: Synthesis, Purification and Hydrogen-uptake
Measurements," *Carbon*, **44**, 2160-2170 (2006).

Erri, P., Dinka, P., and Varma, A., "Novel Perovskite-Based
Catalysts for Autothermal JP-8 Fuel Reforming," *Chemical
Engineering Science*, **61**, 5328-5333 (2006).

Shafirovich, E., Zhou, C., Ekambaram, S., Varma, A.,
Kshirsagar, G., and Ellison, J., "Catalytic Effects of Metals on
Thermal Decomposition of Sodium Chlorate for Emergency
Oxygen Generators," *Industrial & Engineering Chemistry
Research*, **46**, 3073-3077 (2007).

Shafirovich, E., Diakov, V., and Varma, A., "Combustion-
Assisted Hydrolysis of Sodium Borohydride for Hydrogen
Generation," *International Journal of Hydrogen Energy*, **32**,
207-211 (2007).

Andrzejak, T., Shafirovich, E., and Varma, A., "Ignition
Mechanism of Nickel-Coated Aluminum Particles,"
Combustion and Flame, **150**, 60-70 (2007).

Selected Conference Presentations

Varma, A., "Hydrogen Generation by Combustion," ISCRE-
19, Potsdam/Berlin, Germany, September (2006).

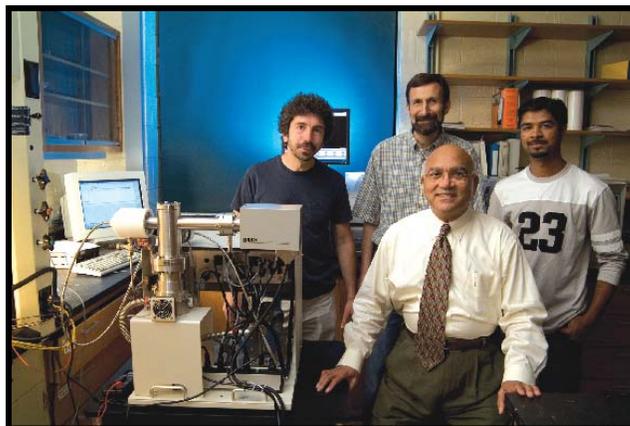
Varma, A., "Ignition Mechanisms of Metal-Coated Aluminum
Particles," AIChE Annual Meeting, San Francisco, CA,
November (2006).

Varma, A., "Combustion-Assisted Hydrolysis of Sodium
Borohydride for Hydrogen Generation," MRS Fall Meeting,
Boston, MA, November (2006).

Plenary Varma, A., "Evolving Trends in Chemical
Engineering Education and the Energy Challenge,"
CAMURE-6 and ISMR-5 Symposia, National Chemical
Laboratory, Pune, India, January (2007).

Varma, A., "Doped Oxygen Carriers for Inherent CO₂ Capture
Using Chemical Looping Combustion," NASCRE-2, Houston,
TX, February (2007).

Varma, A., "Metal-CO₂ Propulsion for Mars Missions:
Current Status and Opportunities," 43rd
AIAA/ASME/SAE/ASEE Joint Propulsion Conference,
Cincinnati, OH, July (2007).





Venkat Venkatasubramanian

Ph. D. Cornell, 1984

Professor

Professor of Industrial and Physical Pharmacy (Courtesy)

Shreve Award for Outstanding Teaching (2006)

Team Excellence Award, College of Engineering, Purdue University (2007)

Research Areas

Pharmaceutical Informatics, Abnormal Events Management and Process Safety, Discovery Informatics for Molecular Products Design, Systems Biology, Complex Adaptive Systems, Artificial Intelligence, Artificial Life, Statistical Mechanics

Selected Professional Activities

Editorial Board, *Computers and Chemical Engineering*
Member, Board of Trustees, *CACHE Corporation*
President and CEO, *Integrated Process Solutions, Inc.*
Guest Editor, *Computers and Chemical Engineering*, Prof. Rex Reklaitis 65th Birthday Special Issue (2007)

Selected Publications

Maurya, M. R., Katare, S. R., Patkar, P. R., Rundell, A. E., and Venkatasubramanian, V., "A Systematic Framework for the Design of Reduced-order Models for Signal Transduction Pathways from a Control Theoretic Perspective," *Comp. Chem. Engg.*, **30**, 437-452 (2006).

Invited Zhao, C., Jain, A., Hailemariam, L., Suresh, P., Akkisetty, P., Joglekar, G., Venkatasubramanian, V., Reklaitis, G. V., Morris, K., and Basu, P., "Towards Intelligent Decision Support for Pharmaceutical Product Development", *Journal of Pharmaceutical Innovation*, **1(1)**, 25-35 (2006).

Invited Venkatasubramanian, V., Zhao, C., Joglekar, G., Jain, A., Hailemariam, L., Sureshbabu, P., Akkisetty, P., Morris, K., and Reklaitis, G. V., "Ontological Informatics Infrastructure for Chemical Product Design and Process Development", *Computers and Chemical Engineering, CPC 7 Special Issue*, **30(10-12)**, 1482-1496 (2006).

Maurya, M. R., Rengaswamy, R., and Venkatasubramanian, V., "A Signed Directed Graph-Based Systematic Framework for Steady-State Malfunction Diagnosis Inside Control Loops", *Chem. Engg. Sci.*, **61**, 1790-1810 (2006).

Maurya, M. R., Bornheimer, S. J., Venkatasubramanian, V. and Subramanian, S., "Reduced-Order Modeling of Biochemical Networks: Application to the GTPase-Cycle Signaling Module", *IEE Systems Biology*, **152(4)**, 229-242 (2006).

Selected Conference Presentations

Plenary Venkatasubramanian, V., "Ontological Informatics Infrastructure for Chemical Product Design and Process Development," Chemical Process Control CPC 7, Lake Louise, Alberta, Canada, January (2006).

Keynote Venkatasubramanian, V., "A Theory of Design for Evolving Optimal Collaboration Topologies," Workshop on Evolutionary Models of Collaboration, International Joint Conference on Artificial Intelligence IJCAI 2007, Hyderabad, India, January (2007).

Jain, A., Joglekar, G., Zhao, C., Hailemariam, L., Akkisetty, P., Suresh, P., Venkatasubramanian, V., Morris, K., and Reklaitis, G. V., "A Decision Support System for Pharmaceutical Product Formulation," AAPS Annual Meeting and Exposition, San Antonio, TX, October (2006).

Suresh, P., Zhao, C., Joglekar, G., and Venkatasubramanian, V., "Informatics Based Approach for Mathematical

Knowledge Modeling in Process Operations," AIChE Annual Meeting, San Francisco, CA, November (2006).

Syal, S., Caruthers, J. M., and Venkatasubramanian, V., "Prediction of Glass Transition Temperature Using Hybrid Neural Networks," AIChE Annual Meeting, San Francisco, CA, November (2006).

Suresh, P., Basu, P. K., and Venkatasubramanian, V., "Improving Pharmaceutical Product Development and Manufacturing: Impact on Cost of Goods Sold of Pharmaceuticals and Cost of New Drug Development," AIChE Annual Meeting, San Francisco, CA, November (2006).

Giridhar, A., Agrawal, R., and Venkatasubramanian, V., "A Novel Search Space Formulation for the Synthesis of Separation Networks," AIChE Annual Meeting, San Francisco, CA, November (2006).

Hailemariam, L., Zhao, C., Joglekar, G., Whittinghill, D., Jain, A., Venkatasubramanian, V., Reklaitis, G. V., Morris, K. R., and Basu, P. K., "An Ontology-Based Information Management System for Pharmaceutical Product Development," AIChE Annual Meeting, San Francisco, CA, November (2006).

Delgass, W. N., Caruthers, J. M., Abu-Omar, M., Thomson, K. T., Venkatasubramanian, V., Blau, G. E., Phomphrai, K., Medvedev, G., Stanciu, C., Sharma, S., Manz, T. A., Haq, J., Novstrup, K. A., and Krishnamurthy, B. B., "Model-Based Design of Single-Site Olefin Polymerization Catalysts," AIChE Annual Meeting, San Francisco, CA, November (2006).

Akkisetty, V. P. K., Suresh, P., Giridhar, A., Hailemariam, L., and Venkatasubramanian, V., "Topological Paradigms for Supply Network Optimization," AIChE Annual Meeting, San Francisco, CA, November (2006).

Hsu, S.-H., Caruthers, J. M., Delgass, W. N., Venkatasubramanian, V., Blau, G. E., Lasinski, M. E., and Seza, O., "A Bayesian Approach to Mathematical Model Building," AIChE Annual Meeting, San Francisco, CA, November (2006).

Jain, A., Zhao, C., Joglekar, G., Hailemariam, L., Akkisetty, V. P. K., Suresh, P., Venkatasubramanian, V., Morris, K. R., and Reklaitis, G. V., "An Ontology Based Approach for Knowledge Modeling in Pharmaceutical Product Development," AIChE Annual Meeting, San Francisco, CA, November (2006).

Joglekar, G., Zhao, C., Venkatasubramanian, V., and Reklaitis, G. V., "An Ontology Based Approach for Managing General Recipes in Batch Processes," AIChE Annual Meeting, San Francisco, CA, November (2006).



Nien-Hwa Linda Wang

Ph. D. Minnesota, 1978

Professor

Research Areas

Chemical and Biochemical Separations, Ion Exchange, Adsorption, Simulated Moving Bed Chromatography, Complex Adaptive Systems

Selected Professional Activities

Co-chair, Symposium on Simulated Moving Bed Technologies, AIChE Annual Meeting, San Francisco, CA (2006)

Chair, Symposium on Advances in Adsorptive Bioseparations, AIChE Annual Meeting, San Francisco, CA (2006)

Chair, Symposium on Bioseparations Honoring Ed Lightfoot, I (2006)

Co-chair, Symposium on Bioseparations Honoring Ed Lightfoot, II (2006)

Co-chair, Networking Session for the Separations Division, AIChE Annual Meeting, San Francisco, CA (2006)

Selected Invited Lectures

Wang, N.-H.L., "Adsorption and Ion Exchange Processes for the Remediation or Recovery from Dilute Solutions," Sandia Laboratories, Livermore, CA, January (2006).

Wang, N.-H.L., "Novel Processes for Insulin Purification," Eli Lilly & Company, November (2006).

Selected Publications

Mun, S.Y., Chin, C., Xie, Y., and Wang, N.-H. L., "Standing Wave Design of Carousel Ion Exchange Process for the Removal of Zinc Ions from a Protein Mixture," *IEC Research*, **45**, 316-329 (2006).

Yu, C. M., Franses, E. I., and Wang, N.-H. L., "In-Situ Probing of Insulin Aggregation in Chromatography Effluents with Spectroturbidimetry," *J. of Colloid and Interface Sci.*, **299**, 733-739 (2006).

Chin, C., Alford, J., Xie, Y., and Wang, N.-H. L., "Analysis of Pump and Zone Configurations in SMB for Insulin Purification," *AIChE J.*, **52**(7), 2447-2460 (2006).

Yu, C. M., Mun, S.-Y., and Wang, N.-H. L., "Theoretical Analysis of the Effects of Reversible Dimerization in Size Exclusion Chromatography," *J. of Chromatography. A*, **1132**, 99-108 (2006).

Kasat, R. B., Chin, C. Y., Thomson, K. T., Franses, E. I., and Wang, N.-H. L., "Interpretation of Chromatographic Retentions of Simple Solutes with an Amylose-based Sorbent Using Infrared Spectroscopy and DFT Modeling," *Adsorption J.*, **12**, 405-416 (2006).



Wang, N.-H.L., and Chin, C.Y. "Versatile Simulated Moving Bed Systems," US Patent 7,141,172 B2, Nov.28, 2006.

Selected Conference Presentations

Kasat, R., Thomson, K., Hillhouse, H., Wang, N.-H. L. and Franses, E. I., "Direct Probing and Modeling of Solute-Sorbent Interactions in ADMPC," 18th International Symposium on Chirality, Busan, Korea, June (2006),

Cauley, F., and Wang, N.-H. L., "Application of Stochastic Optimization to the Problem of Recovery and Purification of Bio-Chemicals," 2006 Inform International Conference, Hong Kong, China, June (2006),

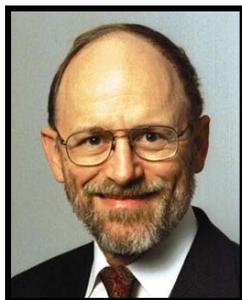
Chin, C., Xie, Y., Alford, J., and Wang, N.-H. L., "Analysis of Zone and Pump Configurations in Simulated Moving Bed Purification of Insulin," Technical Session: Optimization Techniques, AIChE Annual Meeting, San Francisco, CA, November (2006).

Yu, C. M., Franses, E. I., and Wang, N.-H. L., "In-Situ Probing of Insulin Aggregation in Chromatography Effluents with Spectroturbidimetry," Symposium on SMB Separations Technology, AIChE Annual Meeting, San Francisco, CA, November (2006).

Kasat, R., Thomson, K., Hillhouse, H., Wang, N.-H. L. and Franses, E. I., "Studies of Interactions of an Amylose-Based Sorbent with Various Solvents for Chiral Separation Applications," Session on Fundamentals of Adsorption and Ion Exchange, AIChE Annual Meeting, San Francisco, CA, November (2006).

Cauley, F., Cauley, S., and Wang, N.-H. L., "Application of Stochastic Optimization for the Design of Simulated Moving Bed Systems: Hybrid Simulated Annealing/Genetic Algorithm," Symposium on Biological Polymers, The 7th International Conference on Fundamentals of Adsorption (FOA 7), Giardini Naxos, Sicily, Italy, May (2007).





Phillip C. Wankat
Ph. D. Princeton University, 1970

C. L. Lovell Distinguished Professor
Director, Undergraduate Degree Programs,
Department of Engineering Education

Distinguished Education Alumni Award of Distinction, College of Education, Purdue University (2007)

Research Areas

Adsorption Operations, Large-scale Chromatography, Distillation, Engineering Education

Selected Professional Activities

Editorial board, *Separation Science and Technology*
Editorial Board, *Adsorption*
Editorial board, *Separation and Purification Reviews*
Associate Editor, *Chemical Engineering Education*
Associate Editor, *Annals of Research in Engineering Education*
International Editorial Advisory Board, *Journal of STEM Education*
Contributing Editor, *College Teaching*
Member, Scientific Advisory Committee for Fundamentals of Adsorption 9 (FOA9), Giardini Naxos-Sicily, Italy, May (2007).
NSF Phase 2 and Phase 3 Review Panel, EHR, March (2006)
Co-Chair, "PSA/TSA Simulations," AIChE Annual Meeting, Slat Lake City, UT, November (2007)

Selected Invited Lectures

Invited Theme Group leader, Engineering Education Summit, Schulich School of Engineering, University of Calgary, Calgary Canada, May (2007).

Selected Publications

Hur, J.-S. and Wankat, P. C., "Two-Zone SMB Chromatography for Center-Cut Separations," *Ind. Engr Chem. Research*, **45**, 1426-1433 (2006).

Jin, W. and Wankat, P. C., "Scaling Rules and Increasing Feed Rates in Two-Zone and Four-Zone SMB Systems," *Ind. Engr Chem. Research*, **45**, 2793-2807 (2006).

Abunasser, N. and Wankat, P. C., "Improving the Performance of One Column Analogs to SMBs," *AIChE Journal*, **52**, 2461 (2006).

Jin, W. and Wankat, P. C., "Hybrid Simulated Moving Bed Processes for the Purification of p-Xylene," *Separ. Sci. Technol.*, in press.

Kostroski, K. and Wankat, P. C., "New Cycles for Gas Separations by Pressure-Swing Adsorption" *Ind. Engr Chem. Research*, **45**, 8117-8133 (2006).

Hur, J.-S. and Wankat, P. C., "Simulated Moving Bed and Chromatography Hybrid Systems for Center-Cut Separation from Quaternary Mixtures: Linear Isotherm Systems," *Ind. Engr Chem. Research*, in press.

Hur, J.-S., Wankat, P. C., Kim, J.-I., Kim, J.-K. and Koo, Y.-M., "Purification of L-Phenylalanine from a Ternary Amino Acid Mixture Using a Two-Zone SMB/Chromatography Hybrid System," *Separ. Sci. Technol.*, in press.

Wankat, P. C., "Using a Commercial Simulator to Teach Sorption Separations," *Chem. Engr Educ.*, **40**, 165-172 (2006).

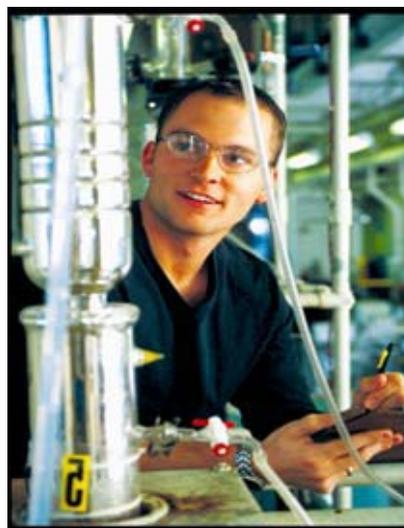
Wankat, P. C., "Survey of K-12 Engineering Oriented Student Competitions," *Intl. J. Eng. Educ.*, **23** (1), 73-83 (2007).

Selected Conference Presentations

Invited Wankat, P. C., Abunasser, N. J., and Hur, J.-S., "Are SMBs Better Than Chromatography? Revisiting the Comparisons," ACS Meeting, Chicago, IL, March (2007).

Poster by Jin Seok Hur, Jinil Kim, Jeung Kun Kim, Yoon-Mo Koo, and Phillip C. Wankat, "Production of L-Phenylalanine from a Ternary Amino Acid Mixture Using a Two-Zone SMB/Chromatography Hybrid System: Linear Isotherm," won the Best Poster Award in the Separation Division, KICChE Annual Conference, Daegu, Korea, April (2006).

Invited Co-chair & presenter of Career Development Workshop for New Faculty, (Tim Anderson, Chair); ASEE ChED Summer School, Pullman, WA, August (2007).





You-Yeon Won
Ph. D. Minnesota, 2000

Assistant Professor
Assistant Professor of Materials Science Engineering (by courtesy)

Research Areas

Physics of polymers, polyelectrolytes, and block copolymers; polymer synthesis; polymer-based gene delivery; colloid self-assembly at liquid interfaces; scattering; microscopy; rheology

Selected Professional Activities

Member, American Institute of Chemical Engineers (AIChE): Society of Biological Engineering; Nanoscale Science and Engineering Forum
Member, American Physical Society (APS): Divisions of Polymer Physics; Division of Biological Physics
Member, American Chemical Society (ACS): Division of Polymer Chemistry
Member, Materials Research Society (MRS)
Member, Neutron Scattering Society of America (NSSA)
Vice-Chair for a session titled *Nanoscale Structure in Polymers II: Nanostructured Polymeric Material*, AIChE Annual Meeting, Salt Lake City, UT, November (2007)

Selected Invited Lectures

Won, Y.-Y., "Mixed Polyelectrolyte and Neutral Polymer Brushes: Fundamentals and Applications," Departmental Seminar, Department of Chemistry, University of Memphis, Memphis, TN, November (2007).
Won, Y.-Y., "Polymer Micelle-Based Gene Delivery," Departmental Seminar, Department of Pharmaceutics and Pharmaceutical Chemistry, University of Utah, Salt Lake City, UT, November (2007).
Won, Y.-Y., "Mixed Polyelectrolyte and Neutral Polymer Brushes: Fundamentals and Applications," 3M Tech Forum, 3M Company, St. Paul, MN, June (2007).
Won, Y.-Y., "Mixed Polyelectrolyte and Neutral Polymer Brushes: Fundamentals and Applications," Medtronic Forum, Medtronic Inc., Minneapolis, MN, June (2007).
Won, Y.-Y., "Block Copolymers for Nano Engineered Gene Delivery," Samsung Medical Center, Seoul, Korea, December (2006).
Won, Y.-Y., "Block Copolymers for Gene Delivery," Dong-A Pharmaceutical Company, Seoul, Korea, December (2006).

Selected Publications

Gary, D. J., Puri, N., and Won, Y.-Y., "Polymer-Based siRNA Delivery: Perspectives on the Fundamental and Phenomenological Distinctions from Polymer-Based DNA Delivery," *Journal of Controlled Release*, **121(1-2)**, 64-73 (2007).
Zhu, D., Haidekker, M. A., Lee, J.-S., Won, Y.-Y., and Lee, J. C.-M., "Application of Molecular Rotors to the Determination of the Molecular Weight-Dependence of Viscosity in Polymer Melts," *Macromolecules*, in press, 2007.
Won, Y.-Y., and Bates, F. S., "Nonionic Block Copolymer Wormlike Micelles," *Giant Micelles: Properties and Applications* (Editors: R. Zana, E. W. Kaler), CRC Press/Taylor & Francis, Boca Raton, FL (2007).
Witte, K. N., and Won, Y.-Y., "Self-Consistent Field (SCF) Analysis of Mixed Polyelectrolyte and Neutral Polymer Brushes," *Macromolecules*, **39(22)**, 7757-7768 (2006).

Sharma, R., Goyal, A., Caruthers, J. M., and Won, Y.-Y., "Inhibitive Chain Transfer to Ligand in the ATRP of *n*-Butyl Acrylate," *Macromolecules*, **39(14)**, 4680-4689 (2006).

Selected Conference Presentations

Gary, D. J., Won, Y.-Y., "An A-B-C Triblock Copolymer Micelle-Based Approach for Intracellular Delivery of Gene-Silencing siRNA," AIChE Annual Meeting, Salt Lake City, UT, November (2007).
Witte, K. N., and Won, Y.-Y., "Mixed Polyelectrolyte and Neutral Polymer Brushes: Macroscopic or Microscopic Phase Separation," AIChE Annual Meeting, Salt Lake City, UT, November (2007).
Zhao, Y., Won, Y.-Y. and Harris, M. T., "Study of Calcium Alginate Sol-Gel Transition by Population Balance Model", AIChE Annual Meeting, Salt Lake City, UT, November (2007).
Sharma, R., Konieczny, S. F., and Won, Y.-Y., "Novel Polymer Micelle-DNA Complexes for Targeted In Vivo Gene Delivery," AIChE Annual Meeting, Salt Lake City, UT, November (2007).
Hur, J., and Won, Y.-Y., "Fabrication of High-Quality Non-Close-Packed 2D Colloid Crystals by Template-Guided Langmuir-Blodgett Particle Deposition," AIChE Annual Meeting, Salt Lake City, UT, November (2007).
Won, Y.-Y., and Witte, K. N., "Effect of Interfacial Curvature on the Miscibility of Mixed Charged and Neutral Polymer Brushes," APS March Meeting, Denver, CO, March (2007).
Witte, K. N., and Won, Y.-Y., "Self Consistent Field (SCF) Calculations of Mixed Neutral and Charged Polymer Brushes", AIChE Annual Meeting, San Francisco, CA, November (2006).
Zhao, Y., Won, Y.-Y. and Harris, M. T., "Preparation of Calcium Alginate Microbeads by Electrodiposition for Protein Drug Controlled Release," AIChE Annual Meeting, San Francisco, CA, November (2006).
Sharma, R., Lee, J.-S., and Won, Y.-Y., "Micelleplexes: Terpolymer Micelle-Based Gene Delivery Vectors with Superior DNA Protection against Enzymatic Degradation," AIChE Annual Meeting, San Francisco, CA, November (2006).
Sharma, R., Goyal, A., Caruthers, J. M., and Won, Y.-Y., "Inhibitive Chain Transfer to Ligand in Atom Transfer Radical Polymerization of *N*-Butyl Acrylate," AIChE Annual Meeting, San Francisco, CA, November (2006).
Hur, J., and Won, Y.-Y., "Unexpected Correlations Observed in Two-Dimensional Ordered Arrays of Colloidal Particles Deposited on Patterned Polyelectrolyte Multilayer Surfaces," AIChE Annual Meeting, San Francisco, CA, November (2006).

Graduate Degrees Awarded

(July 1, 2006 to June 30, 2007)

M. S.	7
Ph. D.	<u>17</u>
Total	24

M. S. Degrees

August 2006

1. Ayush Goyal

Population Balance Models of Vulcanization Kinetics using Advanced Computational Methods, (Caruthers & Venkatasubramanian), Continuing for PhD in Chemical Engineering at Purdue

2. Ankita Jain

Synthesis of Cu-In-Se and TiO₂ Nanoparticles for Applications In Solar Cells, (Agrawal & Hillhouse), Micron Technologies, Manassas, VA – Fabrication Engineer

3. Saket Rai

Kinetic Studies of Water Gas Shift Reaction on Alumina Supported Platinum and Palladium Catalysts, (Ribeiro & Delgass), Continuing for M.S. in Industrial Engineering at Purdue

December 2006

4. Bryce Sturtevant

Continued Development of an Integral Equation for the Structure of Hard-Particle Fluids from Scaled Particle Theory, (Corti), Continuing on for PhD in Chemical Engineering at Purdue

5. Soon Kay Teoh

Combustion of Single Titanium Particles, (Varma), Trinity Consultants, Frederick, MD – Environmental Consultant

May 2007

6. James G. Kissel

Investigation of Bovine Serum Albumin Adsorption onto Gold Biosensors using Surface Plasmon Resonance, (Beaudoin), Heritage Environmental, Indianapolis, IN – Research Engineer

7. Javier Nieves Remacha

Design and Optimization of Simulated Moving Bed Based Monolithic Columns, (Wang), GE Plastics, Mt. Vernon, IN – High Performance Polymer Technology Engineer

Ph. D. Degrees

August 2006

1. Shang Hao

Preparation of Paramagnetic Microparticles and Their Applications in the Study of Ligand-Receptor Binding Characteristics, (Lee), Purdue University, West Lafayette, IN – Postdoc with Dr. Lee

December 2006

2. Selen Aydogan

A Simulation Based Optimization Approach to Model and Design Life Support Systems for Manned Space Missions, (Pekny, Reklaitis & Blau), Purdue University, West Lafayette, IN – Postdoc at e-Enterprise Center, Discovery Park

3. Hao Chen

Protein Engineering of Cinnamate 4-hydroxylase for Production of Non-Natural Phenylpropanoids, (Morgan), Becton, Dickinson & Co, Sparks, MD – Scientist

4. Lasitha Cumararatunge

Synthesis and Kinetics of Supported Catalysts for Green Chemistry, (Delgass), NxtGen Emission Controls, Inc., British Columbia, Canada – Catalytic After-Treatment Engineer

5. Shuo-Huan Hsu

Bayesian Model Building Strategy and Chemistry Knowledge Compilation for Kinetic Behaviors of Catalytic Systems, (Caruthers & Venkatasubramanian), Purdue University, West Lafayette, IN – Postdoc for Drs. Reklaitis & Venkatasubramanian

6. Jin Seok Hur

Simulated Moving Bed and Chromatography Processes for Multicomponent Separation, (Wankat), Novasep Inc., Bonthwyn, PA – Research Engineer

7. Yogesh Joshi

Light Alkane Aromatization Using ZSM-5 Based Catalysts: Application of Density Functional, (Thomson), Purdue University, West Lafayette, IN – Postdoc for Drs. Thomson, Delgass & Caruthers

8. William Ketterhagen

Modeling Granular Segregation During Hopper Discharge, (Curtis & Basaran), Pfizer, Groton, CT – Senior Scientist

9. Tze Lee Phang

Adsorption of Lecithin Lipids and Proteins at Air/Aqueous and Aqueous/Solid Interfaces, (Franses), Shell Global Solutions, Houston, TX – Research Engineer

10. Abhijit Phatak

Kinetic Modeling and First Principles Study of the Water-Gas Shift and Methanation Reaction on Group VIII Metal Catalysts, (Ribeiro), Post doc for Dr. Schneider at University of Notre Dame

11. Ta-Chen Wei

Electrode Accessibility and Mass Transport Through Nanoporous Silica Films Determined by Electrochemical Methods, (Hillhouse), Agilent Technologies, Delaware – R & D Scientist

May 2007

12. Peter Erri

Solution Combustion Synthesis for Catalytic and Power Generation Applications, (Varma), Purdue University, West Lafayette, IN – Postdoc for Dr. Varma

13. Hariprasad Janakiram Subramani

Dynamics of Formation and Deposition of Drops for MEMS Applications, (Basaran), Chevron Energy Technology Company, Houston, TX – Flow Assurance Specialist

14. Weihua Jin

Development and Applications of Two-Zone SMB Processes for Binary Separations, (Wankat), GTC Technology, Houston, TX – Process Engineer

15. Sook Heun Kim

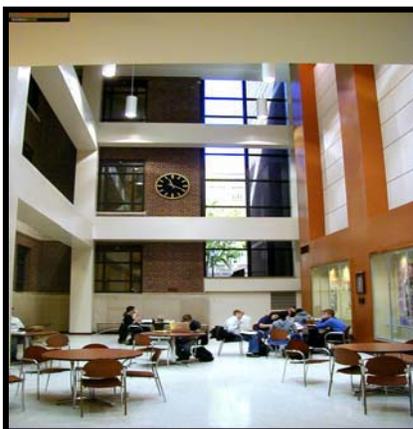
Adsorption and Interactions of Lung Surfactant Lipids and Proteins at Air/Aqueous Interfaces and in Aqueous Solution, (Franses), Purdue University, West Lafayette, IN – Postdoc for Dr. Franses

16. Gautam Kumar

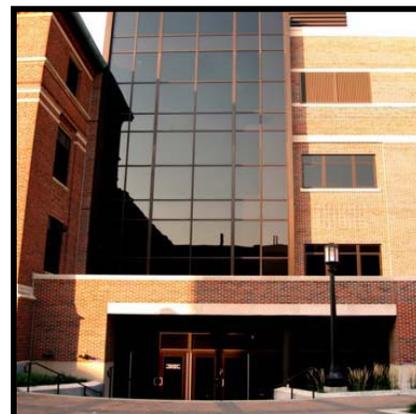
A Theoretical and Experimental Investigation of the Adhesion and Removal of Particles from Surfaces, (Beaudoin), Intel Corporation, Hillsboro, OR – Process Engineer

17. Qi Xu

Computational and Theoretical Analysis of Ink-Jets Drop Formation and Breakup, (Basaran), BP, Naperville, IL – Research Engineer



**Forney Hall of
Chemical Engineering**



Graduate Student Enrollment

Fall 2006

<u>Student</u>	<u>Major Professor</u>	<u>Undergraduate School</u>	<u>Date Enrolled</u>
Pavan Akkisetty	Reklaitis/Venkatasubramanian	Indian Institute of Tech, Madras	Fall 2004
Timothy Andrzejak	Varma	University of Detroit	Fall 2003
Selen Aydogan	Pekny	Bogazici University	Fall 2002
Dave Balachandran	Beaudoin	University of Wisconsin	Fall 2006
Aparajita Bhattacharya	Caruthers	UICT - Mumbai	Fall 2004
Luis Bollmann	Hillhouse	University of Notre Dame	Fall 2003
Nanette Boyle	Morgan	Arizona State University	Fall 2004
Jennifer Bugayong	Wang	University of Phillippines	Fall 2002
Lei Cao	Caruthers/Delgass	Tianjin University	Fall 2004
Michelle Chaffee	Reklaitis/Venkatasubramanian	Tri-State University	Fall 2006
Saurabh Chaugule	Delgass/ Ribeiro	UICT - Mumbai	Fall 2006
Hao Chen	Morgan	Zhejiang University	Fall 2002
Shuang Chen	Wang	Zhejiang University	Fall 2005
Pei-Lun Chung	Wang	National Taiwan University	Fall 2003
Robert Collins	Basaran/Harris	University of Tennessee	Fall 2001
Lasitha Cumaranatunge	Delgass	University of Wisconsin	Fall 2002
Moiz Diwan	Varma	Indian Institute of Technology, Madras	Fall 2005
Matthew Entorf	Caruthers/Pipes	Iowa State University	Fall 2006
Peter Erri	Varma	University of Denmark/ University of Notre Dame*	Spring 2005
Bradley Fingland	Delgass/Ribeiro	University of Missouri	Fall 2004
Grayson Ford	Agrawal/Hillhouse	University of California	Fall 2006
Haijing Gao	Basaran/Harris	Tsinghua University	Fall 2006
Dana Gary	Won	Carnegie Mellon University	Fall 2005
Joseph Gatt	Baertsch	University of Michigan	Fall 2004
Arun Giridhar	Agrawal/Venkat	Indian Institute of Technology, Madras	Fall 2002
Qijie Guo	Agrawal/Hillhouse	University of Rochester	Fall 2004
Leaelaf Hailemariam	Venkat/Okos	Addis Ababa University	Fall 2002
Talesha Hall	Harris	North Carolina A&T University	Fall 2005
Intan Hamdan	Reklaitis/Venkat	Purdue University	Fall 2006
Robert Hamilton	Curtis/Ramkrishna	University of Missouri/Purdue University*	Fall 1999
Paul Hobson	Thomson	Ohio State University	Fall 2003
Bri-Mathias Hodge	Reklaitis/Pekny	Carnegie Mellon University/Abo Akademi*	Fall 2006
Shuo-Huan Hsu	Caruthers/Venkat	National Taiwan University	Fall 2001
Wenbin Hu	Varma	Tsinghua University	Fall 2006
Jaehyun Hur	Won	Seoul National University	Fall 2003
Jin Seok Hur	Wankat	Ajou University	Fall 2002
Ankur Jain	Reklaitis/Venkat	Indian Institute of Technology, Bombay	Fall 2002
Ravi Prakash Jaiswal	Beaudoin	Indian Institute of Technology, Kanpur	Fall 2004
Hari Janakiram Subramani	Basaran	Anna University	Fall 2002
Kyungjae Jeong	Beaudoin	Seoul National University	Fall 2002
Weihua Jin	Wankat	Tsinghua University	Fall 2002
Ajay Joshi	Thomas/Delgass	UICT - Mumbai	Fall 2003
Yogesh Joshi	Thomson	UICT - Mumbai	Spring 2001
Mahaprasad Kar	Agrawal/Hillhouse	UICT - Mumbai	Fall 2005
Rahul Kasat	Franses/Wang	Nagpur University	Fall 2002
Megan Kelchner	Beaudoin	University of Notre Dame	Fall 2003
William Ketterhagen	Curtis/Basaran	University of Wisconsin	Fall 2001
Caitlin Kilroy	Beaudoin	University of Notre Dame	Fall 2004
Bum Soo Kim	Beaudoin	Sogang University	Fall 2002
Jin Il Kim	Ramkrishna	Korea University/Purdue University*	Fall 2002
Sook Heun Kim	Franses	Korea University	Fall 2003
James Kissel	Beaudoin	University of Notre Dame	Fall 2004
Kyle Kostroski	Wankat	Purdue University	Fall 2004
Bala Krishnamurthy	Venkat	Indian Institute of Technology, Madras	Fall 2003
Gowri Krishnamurthy	Delgass	Indian Institute of Technology, Madras	Fall 2003
Brian Kromer	Ribeiro/Thomson	University of Minnesota	Fall 2003
Gautam Kumar	Beaudoin	Birla Institute of Science & Technology	Fall 2003
Eunwoong Lee	Caruthers	Seoul National University	Fall 2006
Joonhyung Lee	Lee/Savran	Seoul National University	Fall 2004
Kyung Min Lee	Beaudoin/Franses	Korea University/Purdue University*	Fall 2003
Jung Sun Lim	Harris	Kyung Hee University	Fall 2005
Sridhar Maddipati	Kim/Venkat	Indian Institute of Technology, Madras	Fall 2002
Thomas Manz	Caruthers/Thomson	University of Toledo/Purdue University*	Fall 2003
Rebecca Martin	Caruthers	Rose Hulman Institute of Technology	Fall 2005

<u>Student</u>	<u>Major Professor</u>	<u>Undergraduate School</u>	<u>Date Enrolled</u>
Carmen Misiego Arpa	Caruthers/Pipes	Universidad of Valladolid	Fall 2006
Shadab Mulla	Delgass/Ribeiro	UICT - Mumbai	Fall 2003
Hari Nair	Baertsch/Kim	UICT - Mumbai	Fall 2004
Ravi Nandigam	Kim	Indian Institute of Technology, Madras	Spring 2004
Javier Nieves Remacha	Wang	Universidad Computense de Madrid/ Purdue University*	Fall 2005
Krista Novstrup	Caruthers/Delgass	University of Washington	Fall 2004
Patrick Oglesby	Harris	Purdue University	Fall 2005
Yoon Jee Park	Franses	Seoul National University	Fall 2006
Rugved Pathare	Agrawal/Venkat	UICT - Mumbai	Fall 2005
Jorge Pazmino	Delgass/Ribeiro	U. San Fran De Quito, Ecuador	Fall 2006
Bich-Van Pham	Beaudoin	Northwestern University	Fall 2004
Tze Lee Phang	Franses	Purdue University	Fall 2002
Abhijit Phatak	Ribeiro	UICT - Mumbai	Fall 2003
Christopher Polster	Baertsch	Purdue University	Fall 2004
Santhosh Ramalingam	Basaran	Indian Institute of Technology, Madras	Fall 2005
Joshua Ratts	Ribeiro	Rose Hulman Institute of Tech/ Purdue University*	Fall 2003
Elizabeth Royston	Harris	University of Maryland	Fall 2002
Charles Schaffer	Thomson	University of Arkansas	Fall 2003
Neelanjan Sengupta	Morgan	Indian Institute of Technology, Bombay	Fall 2006
Vishesh Shah	Agrawal/Reklaitis	UICT - Mumbai	Fall 2006
Pradeep Sharma	Wankat	Indian Institute of Technology, Madras	Fall 2006
Rahul Sharma	Won	Indian Institute of Technology, Kanpur	Fall 2003
Avantika Shastri	Morgan	UICT - Mumbai	Fall 2002
Eric Sherer	Ramkrishna	Caltech	Fall 2001
Aviral Shukla	Venkat/Morris	Indian Institute of Technology, Madras	Fall 2006
Daniel Siderius	Corti	Michigan Technological University/ Purdue University*	Fall 2002
Navneet Singh	Agrawal/Delgass/Ribeiro	UICT - Mumbai	Fall 2005
Andrew Smeltz	Delgass/Ribeiro	Ohio University	Fall 2004
Shanna Smith	Beaudoin	University of Cincinnati	Fall 2003
Stephen Stamatis	Caruthers/Delgass	University of Michigan	Fall 2005
Bryce Sturtevant	Corti	North Carolina State University	Fall 2004
Pei-Fang Sung	Harris	National Taiwan University	Fall 2006
Pradeep Suresh Babu	Reklaitis/Venkat	Indian Institute of Technology, Madras	Fall 2004
Jeffrey Switzer	Caruthers/Thomson	University of California	Fall 2006
Shivani Syal	Caruthers/Venkat	Indian Institute of Technology, Delhi	Fall 2002
Christopher Tan	Baertsch	Purdue University	Fall 2004
Michael Tate	Hillhouse	Washington State University	Fall 2002
Soon Kay Teoh	Varma	University of California	Fall 2004
Mark Uline	Corti	Purdue University	Fall 2003
Vikrant Urade	Hillhouse	UICT - Mumbai	Fall 2002
Hsiang-Yu Wang	Wang	National Taiwan University	Fall 2003
Ta-Chen Wei	Hillhouse	National Taiwan University	Fall 2001
Sean Werner	Morgan	University of Illinois	Fall 2005
Ervina Widjaja	Harris	Purdue University	Fall 2002
W. Damion Williams	Delgass/Ribeiro	University of Oklahoma	Fall 2006
Kevin Witte	Won/Kim	Ohio State University	Fall 2004
Qi Xu	Basaran	Zhejiang University	Fall 2001
Hak Koon Yeoh	Basaran	University of Malaya	Fall 2002
Luis Zalamea	Pipes	Universidade de Columbia/ Univ. of De Los Andes	Fall 2004
J. Camilo Zapata	Reklaitis/Pekny	Universidad Pontificia Bolivariana/ Purdue University*	Fall 2005
Yinyan Zhao	Harris	Tsinghua University	Fall 2003
Zhu, Qing	Harris/Taylor	Zhejiang University/ Zhejiang University*	Fall 2006

* B. S./M. S.

Facilities



Forney Hall of Chemical Engineering

In October 2004, the School of Chemical Engineering dedicated a 100,000 ft² expansion that more than doubled the size of our building. The building was then re-named the Forney Hall of Chemical Engineering. With new lecture facilities and new bioengineering, catalysis, and nanoscience research laboratories, the School has, for the first time in decades, space to grow. The old building is currently undergoing modernization, particularly in the laboratory and associated spaces. Renovation is scheduled to be completed in 2008.

Discovery Park

Since 2002, Discovery Park - made up of 10 centers - has grown from an idea to a \$350 million interdisciplinary research, learning and engagement complex. More than 1,000 faculty have been involved in Discovery Park. Nearly 3,000 students have participated in Discovery Park programs, and 250 graduate students have offices there. Our faculty are involved in cutting edge research in the Bindley Bioscience, Birck Nanotechnology, Energy, e-Enterprise, Advanced Manufacturing, and Oncological Sciences Centers.



Bindley Bioscience Center

The Bindley Bioscience Center initiates and facilitates multi-investigator, multidisciplinary research that blends life sciences and engineering. State-of-the-art research programs focus along strategic lines that advance proteomic science and technology, bionanotechnology and biomicrotechnology, spectroscopy-microscopy for cellular and tissue imaging, tissue engineering, and bio-informatics.



Birck Nanotechnology Center

The Birck Nanotechnology Center is a leading-edge national center for nanoscale research. The BNC leverages advances in nano-scale science and engineering to create innovative nanotechnologies that address challenges in computing, communications, the environment, security, energy independence and health. The Center is located in a \$54 million state-of-the-art building that houses specialized laboratories for nano-scale chemistry, physics, and biology; semiconductor-grade cleanrooms; and office space.

Energy Center

The Energy Center is a multidisciplinary community of researchers, scientists, engineers, political scientists and economists. Their goal is create the energy solutions needed by Indiana, the Nation, and the World. Energy research areas include clean coal, solar, bio, wind, electrochemical, electric machines and power electronics, hydrogen and nuclear. Global partnerships and the social, economic and political aspects of energy use and policy are also being advanced. Research on the conversion of agricultural waste into transportation fuels is conducted in the Laboratory for Renewable Resource Engineering (LORRE) in the Energy Center.

e-Enterprise Center

The e-Enterprise Center focuses on new technology activities in three core areas: 1) network security and reliability, 2) management of distributed e-enterprise, and 3) logistics and product distribution and marketing of e-Enterprise. The Center brings together faculty and students with strengths in database systems design and integration engineering, software engineering, communication, management, operations systems, production systems, decision theory applications, system performance, risk evaluation, marketing, customer service and model simulation. Through this center, an entire business - commerce, supply chain, management, operations, product life-cycle control, customer service and data security - can be modeled, analyzed and made more efficient.

Center for Advanced Manufacturing

At the Center for Advanced Manufacturing, Purdue University researchers work to solve state and global manufacturing issues. The Center matches researchers with existing and emerging businesses in multiple technology areas – food and beverage, pharmaceuticals, petroleum and chemicals, computer and electronic components, transportation and more. Research is conducted on topics such as product and process design, foundational sciences, engineering, management, and workforce development. Chemical Engineering's NSF-sponsored Pharmaceutical Engineering Research Center (ERC) is part of this Center.

Oncology Center

The Oncological Sciences Center's mission is to eliminate cancer as a cause of suffering and death by applying and synergizing Purdue's strengths in the biological, chemical, engineering and human behavioral sciences. The Oncological Sciences Center builds and expands on the strong foundation of Purdue's NCI-designated Cancer Center. The Center has established strategic research partnerships with the Walther Cancer Institute and the Indiana University Simon Cancer in Indianapolis. The relationship with the Indiana University Simon Cancer Center provides the clinical setting necessary to advance and refine early-stage detection and treatment of cancers.

Visitors

Visiting Faculty

Dr. Raj P. Chhabra, Professor
Department of Chemical Engineering
Indian Institute of Technology, Kanpur, India
(12/30/06-5/31/07)

Dr. Luis Puigjaner
UPC - ETSEIB
Dpt. Ingeniería Química, Barcelona, Spain
(9/1/06-11/17/07)

Academic Advisory Board

Formed in 2006 to provide input on academic issues, the Academic Advisory Board had its 2007 meeting on April 24 and 25. Current Board members, serving a 3-year term, are **Alex Bell**, Warren and Katharine Schlinger Distinguished Professor of Chemical Engineering, UC-Berkeley; **Ignacio Grossman**, Rudolph R. and Florence Dean University Professor of Chemical Engineering, Carnegie-Mellon University; **Michael Ramage**, Executive Vice President, ExxonMobil, (Retired); **Greg Stephanopoulos**, Bayer Professor of Chemical Engineering, MIT; and **Matt Tirrell**, Richard A. Uhll Professor and Dean of Engineering, UC-Santa Barbara.

External Review Board

An external review of the School was completed on April 2 and 3, 2007. Review committee members included **H. Ted Davis**, Regents Professor of Chemical Engineering and Materials Science, University of Minnesota (Chair); **Deborah E. Leckband**, Reid T. Milner Professor of Chemical & Biomolecular Engineering and Professor of Chemistry at the University of Illinois; **George Stephanopoulos**, Arthur D. Little Professor of Chemical Engineering at the Massachusetts Institute of Technology; **Levi T. Thompson**, Richard E. Balzhiser Professor of Chemical Engineering and Associate Dean for Undergraduate Education in the College of Engineering at the University of Michigan; and **T. Kyle Vanderlick**, Professor of Chemical Engineering and Chair of the Department of Chemical Engineering at Princeton University.

Seminar Speakers

Professor Tim Sands, Department of Mechanical Engineering and Electrical and Computer Engineering, Purdue University, "Nanostructured Thermoelectrics" (September 12, 2006)

Professor Wei-Shou Hu, Department of Chemical Engineering and Materials Science, University of Minnesota, "Dissecting A Gene Switch For Microbial Antibiotic Biosynthesis" (September 19, 2006)

Professor Ravi Kane, Department of Chemical Engineering, Rensselaer Polytechnic Institute, "The Design of Nanoscale Therapeutics and Nanostructured Materials" (September 26, 2006)

Andreas Acrivos, Professor Emeritus, Department of Chemical Engineering, City University of New York, "The Rheology of Concentrated Suspensions of non-Brownian Spherical Particles: Latest Variations on a Theme by Albert Einstein" (October 3, 2006)

Professor Tate T.H. Tsang, Department of Chemical and Materials Engineering, University of Kentucky, "Parallel Least-Squares Finite Element Method for Large Scale Transport Processes on PC Clusters" (October 17, 2006)

Dr. A.J. Nozik, Center for Basic Sciences, National Renewable Energy Laboratory, Department of Chemistry, University of Colorado, "Carrier Dynamics and Multiple Exciton Generation in Semiconductor Nanocrystals: Applications to Third Generation Solar Photon Conversion" (January 16, 2007)

Professor Christine M. Hrenya, Department of Chemical and Biological Engineering, University of Colorado, "Cohesive Forces in Gas-Solid Systems" (January 30, 2007)

Professor Edmund G. Seebauer, Department of Chemical and Biomolecular Engineering, University of Illinois at Urbana-Champaign, "New Methods for Defect Engineering in Semiconductors" (February 6, 2007)

Professor Chris Roberts, Department of Chemical Engineering, University of Delaware, "Kinetics and Thermodynamics of Nonnative Protein Aggregation" (February 13, 2007)

Professor Mark Barteau, Center for Catalytic Science and Technology, Department of Chemical Engineering, University of Delaware, "Moving Catalysis from Analysis to Design: Progress in Olefin Epoxidation" (February 20, 2007)

Professor Susan Muller, Department of Chemical Engineering, University of California, Berkeley, "Controlling Flow and Macromolecular Conformation in Microfluidic Devices" (February 27, 2007)

Professor Carlos Rinaldi, Department of Chemical Engineering, University of Puerto Rico at Mayaguez, "Response of Suspensions of Magnetic Particles to Time Varying Magnetic Fields" (March 6, 2007)

Professor Antonios Mikos, Department of Chemical Engineering, Rice University, "Nanobiomaterials for Tissue Engineering" (March 20, 2007)

Kelly Lectures

Professor Manfred Morari, Automatic Control Laboratory, Swiss Federal Institute of Technology, Zurich, "Control of Hybrid Systems: Theory, Computation and Applications" (March 27, 2007), "Beyond Process Control" (March 28, 2007)

Dr. Joseph S. Alford, Eli Lilly and Company, Retired, "Bioprocess Control: Advances and Challenges" (April 3, 2007)

Professor Guangzhao Mao, Department of Chemical Engineering and Materials Science, Wayne State University "Probing Molecular Assembly and Disassembly by Atomic Force Microscopy" (April 17, 2007)

Professor David Weitz, Department of Physics and of Applied Physics, Harvard University, "Dripping, Jetting, Drops and Wetting: the Magic of Microfluidics" (May 1, 2007)