



School of Chemical Engineering



**Professional Activity Report
2007 – 2008**

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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!

In July 2007, Purdue welcomed Dr. France A. Cordova as the 11th President of the University, founded in 1869. Dr. Cordova, an internationally recognized astrophysicist and experienced administrator, came to Purdue from the University of California-Riverside, where she was Chancellor since 2002. During the past year, several working groups along with many participating students, staff and faculty, have created the University's next strategic plan (2009-14) titled "New Synergies" that was approved by Purdue's Board of Trustees in June 2008. The strategic plan has three overall goals: launching tomorrow's leaders, promoting discovery with delivery, and meeting global challenges. At the core of the Plan is the maximization of synergies between disciplines for solving current and future world needs. The College of Engineering and the School of Chemical Engineering will play key roles in delivering on the University's Plan.

In the College of Engineering, the new \$53 million engineering administration building, Neil Armstrong Hall of Engineering, was dedicated in October 2007, and the School of Chemical Engineering continued to flourish in our expanded Forney Hall. The \$20-million Addition, dedicated in October 2004, is buzzing with activity, and the older building is undergoing a \$13 million renovation in phases, with the latest one starting this week! On another important note, our BS degree program received the full six-year ABET accreditation earlier this year.

This year, we welcomed faculty members Jim Litster and Julie Liu. Dr. Litster has primary appointment in Chemical Engineering and a secondary one in Industrial and Physical Pharmacy. He joined us in August 2007, coming from the University of Queensland, Australia, where was Professor of Chemical Engineering and Head, School of Engineering. Jim's research interests are in particle design and formulation, granulation and agglomeration, and crystallization of bioactives. He brings these strengths to our NSF Engineering Research Center on Structured Organic Composites. Dr. Liu joined us in January 2008, with research interests in engineering biomimetic materials that direct specific cellular response, and complement existing medical engineering research in the School. During the past year, the faculty received numerous recognitions, which are described in this report.

During this Centennial year of AIChE, several recognitions have come to Purdue faculty members, past and present, and alumni. Dr. Henry Rushton (Purdue ChE faculty member, 1955-71; AIChE President 1957) has been named one of the "50 Eminent Chemical Engineers of the Foundation Age;" 3 out of 30 "Groundbreaking ChE Books" were written by authors while they were on the Purdue ChE faculty: D.R. Coughanowr and L.B. Koppell, "Process Systems Analysis and Control"; J.M. Smith and H.C. van Ness, "Chemical Engineering Thermodynamics"; and R. Norris Shreve, "Chemical Process Industries." As an astronaut, Dr. Mary Ellen Weber (BS '84) is listed among the nine "Chemical Engineers in Space"; Henry T. Sampson (BS '56), co-inventor of gamma-electric cell technology used in cell phones is listed among the "Twenty Chemical Engineers in Other Pursuits"; Paul Orefice (BS '49; former CEO, Dow Chemical Co.) is among the top "25 Industrial Executives"; and faculty member Sangtae Kim is listed among the "100 Chemical Engineers of the Modern Era," along with former faculty member Nicholas A. Peppas

(1976-2002), and School alumni Kristi Anseth (BS '92), Mike Ladisch (MS '74, PhD '77) and Vern Weekman (BS '53, PhD '63).

In our 2007-2008 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 members 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.

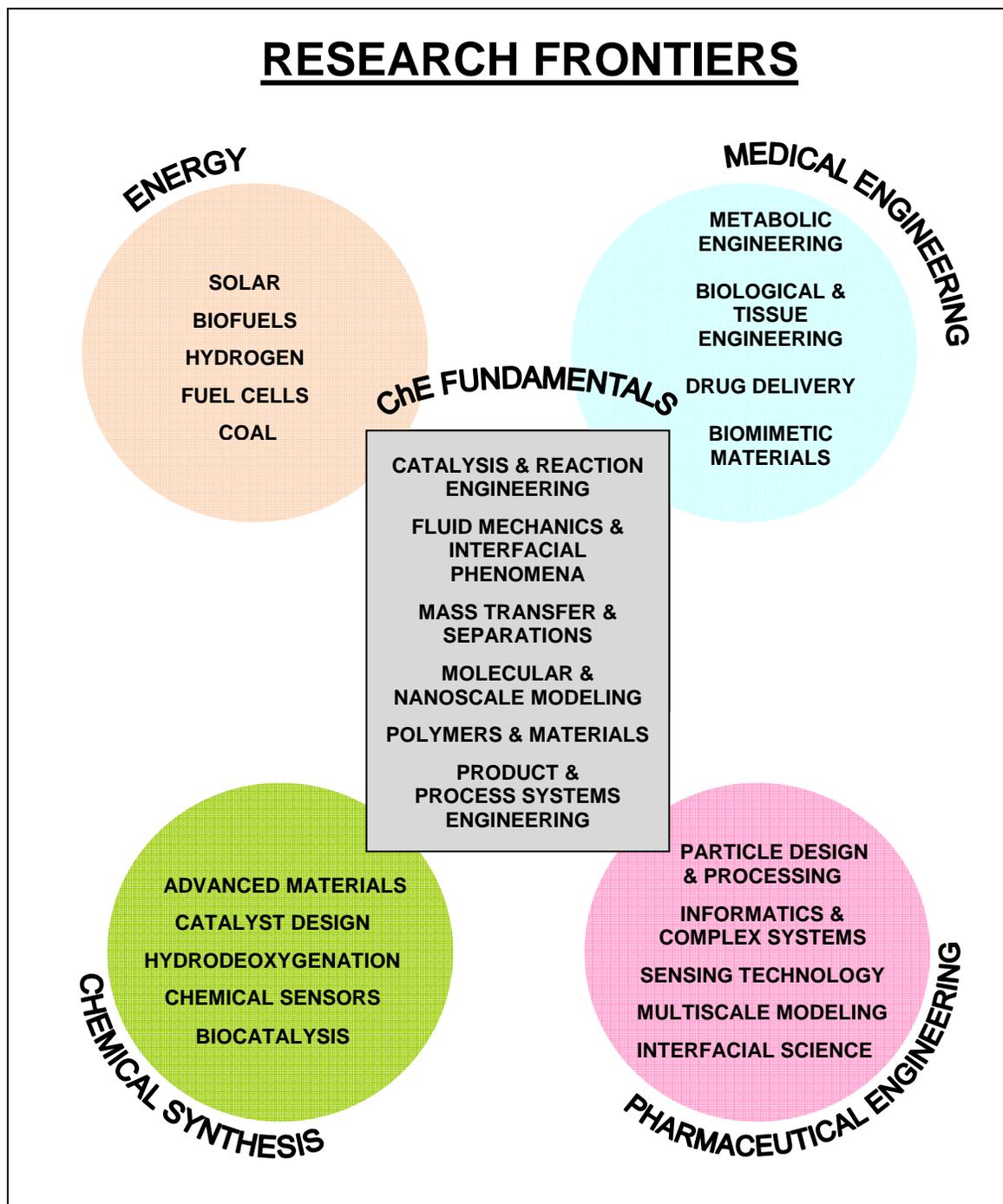
We hope that you will enjoy reading this summary of our progress and accomplishments. These successes are the result of the dedication and talent of our faculty, staff and students, along with tremendous support of our alumni, friends, corporate partners and funding agencies.

Sincerely,

A handwritten signature in black ink that reads "AVarma". The signature is written in a cursive style with a small flourish at the end.

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

RESEARCH FRONTIERS



Fields of Study

Catalysis and Reaction Engineering – Baertsch, Delgass, Ramkrishna, Ribeiro, Thomson, Varma

Fluid Mechanics and Interfacial Phenomena - Basaran, Beaudoin, Corti, Franses, Harris, Houze, Kim, Litster

Mass Transfer and Separations – Agrawal, Franses, Wang, Wankat

Molecular and Nanoscale Modeling - Corti, Harris, Thomson, Won

Polymers and Materials - Caruthers, Hillhouse, Litster, Pipes, Varma, Won

Product and Process Systems Engineering - Agrawal, Caruthers, Kim, Litster, Pekny, Reklaitis, Venkatasubramanian

Chemical Synthesis - Baertsch, Caruthers, Delgass, Morgan, Ribeiro, Thomson, Varma

Energy - Agrawal, Baertsch, Caruthers, Delgass, Hillhouse, Ho, Morgan, Pekny, Ribeiro, Varma

Medical Engineering - Caruthers, Franses, Liu, Morgan, Pekny, Pipes, Ramkrishna, Won

Pharmaceutical Engineering - Basaran, Beaudoin, Harris, Kim, Litster, Ramkrishna, Reklaitis, Venkatasubramanian

Faculty



Rakesh Agrawal

Sc. D. Massachusetts Institute of Technology, 1980

Winthrop E. Stone Distinguished Professor

National Academy of Engineering

Chemical Weekly's Padmashri Dr. G. P. Kane CHEMCON

Distinguished Speaker Award, IChE (2007)

Industrial Research Institute Achievement Award (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

Consulting Editor, Separations, *AIChE Journal*

Member, NRC Board on Energy and Environmental Sciences

Member, AIChE Board of Directors

Member, AIChE Energy Commission

Member, NRC Committee on Assessment of Resource Needs for Fuel Cell and Hydrogen Technologies

Member, AIChE Fellow Review Committee

Member, National Academies Panel for the Committee on America's Energy Future

Member, AIChE International Committee

Member, Technical Advisory Council, FOCAPD

Member, Technical Advisory Board: Dow Chemical Co., Kyrogen Ltd.

Consultant: Air Products & Chemicals, Exxon Mobil Research and Engineering Co.

Selected Invited Lectures

"Environmentally Friendly Energy Solutions", Department of Chemical and Environmental Engineering, University of California, Riverside, CA, May (2008), Department of Chemical and Environmental Engineering, University of Arizona, Tucson, AZ, May (2008), Dept. of Chemical Engineering and Material Science, University of Minnesota, Minneapolis, MN, January (2008), Achievement Award Lecture, Industrial Research Institute, Lincolnshire, IL, Oct. (2007).

"Thermochemical Methods for Biofuel Production from Biomass", 2008 AAAS Annual Meeting, Boston, MA, February (2008).

"Energy Saving Opportunities in Multicomponent Distillation: Optimum Configuration and Thermal Coupling between Distillation Columns", ExxonMobil, Annandale, NJ, February (2008).

"Development of Low-Cost CuInSe₂ Nanocrystal-Ink Based Solar Cells", Chemcon 2007, Kolkata, India, December (2007).

Selected Publications

Guo, Q.J., Kim, S.J., Kar, M., Shafarman, W.N., Birkmire, R.W., Stach, E.A., Agrawal, R., Hillhouse, H.W., "Development of a CuInSe₂ Nanocrystal and Nanoring Inks for Low-Cost Solar Cells, *Nano Lett.*, **8** (9), 2982 (2008).

Agrawal, R., Singh, N.R., Ribeiro, F.H., Delgass, W.N., Perkis, D.F., Tyner, W.E. "Environmentally Friendly Energy Solutions," *Proc. Foundations of Computer-Aided Process*

Operations (FOCAPO), Eds: M. Ierapetritou, M. Bassett and S. Pistikopoulos, 109 (2008).

Selected Conference Presentations

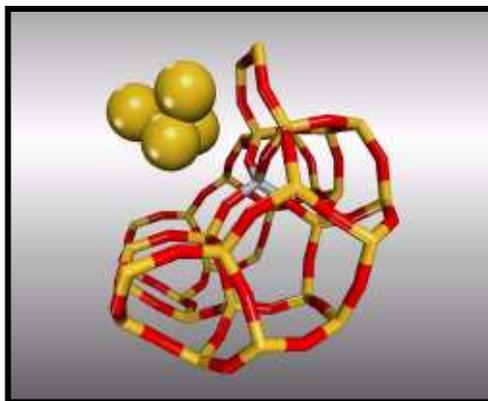
Giridhar, A. and Agrawal R., "Synthesis of Optimal Distillation Networks", AIChE Annual Meeting, Salt Lake City, UT, November (2007).

Agrawal, R., Hillhouse, H., Guo, Q., and Kar, M., "Development of Low-Cost CuInSe₂ Nanocrystal-Ink Based Solar Cells", AIChE Annual Meeting, Salt Lake City, UT, November (2007).

Pathare, R. and Agrawal, R., "New Insights into the Ideal Cascade Theory for Membrane Separation Processes", AIChE Annual Meeting, Salt Lake City, UT, November (2007).

Agrawal, R., Singh, N., Ribeiro, F., and Delgass, W. N., "An Environmentally Friendly Novel Route for the Transportation Fuel", AIChE Annual Meeting, Salt Lake City, UT, November (2007).

Agrawal, R. and Joglekar, G. S., "New and Novel Batch Distillation Processes", AIChE Annual Meeting, Salt Lake City, UT, November (2007).





Chelsey D. Baertsch

Ph. D. University of California at Berkeley, 2001

Assistant Professor

NSF Career Award (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

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)

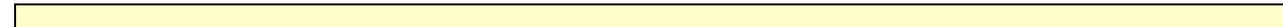
Selected Publications

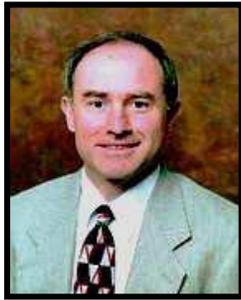
Nair, H., Liszka, M.J., Gatt, J.E., Baertsch, C.D., "Effects of Metal Oxide Domain Size, Dispersion, and Interaction in Mixed MoO_x/WO_x Catalysts Supported on Alumina for the Partial Oxidation of Ethanol to Acetaldehyde," *Journal of Physical Chemistry C* **112** (5), 1612 -1620 (2008).

Selected Conference Presentations

Gatt, J.E., Baertsch, C.D., "Application of VO_x-Al₂O₃ and Fe₂(MoO₄)₃ for Selective Catalytic Detection of Ethanol in Multicomponent Hydrocarbon Mixtures," AIChE Annual Meeting, Salt Lake City, UT, November (2007).

Polster, C.S., Baertsch, C.D., "Application of CuO_x-CeO₂ Catalysts as Sensor Substrates for Catalytic Detection of CO in H₂ Fuel," 2007 AIChE Annual Meeting, Salt Lake City, UT, November (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 Invited Lectures

“Exploiting Singularities and Instabilities to Produce Micro-scale Drops and Features”, Chemical Engineering Department, Lehigh University, Bethlehem, PA, April (2007), Mechanical Engineering Graduate Seminar, Purdue University, West Lafayette, IN, September (2007).

“Small-Scale Flows Exhibiting Singularity Formation, Interface Rupture, and Unexpected Dynamics,” Procter & Gamble Corporation, Cincinnati, Ohio, May (2007), Oryontech Corporation, Chandler, Arizona, August (2007), Cummins Corporation, Columbus, Indiana, November (2007), Chevron Corporation, Houston, Texas, March (2008).

Selected Publications

Collins, R. T., Jones, J. J., Harris, M. T., and Basaran O. A., “Electrohydrodynamic Tip Streaming and Emission of Charged Drops from Liquid Cones,” *Nature Phys.* **4**, 149-154, (2008).

Bhat, P. P., Basaran, O. A., and Pasquali, M., “Dynamics of Viscoelastic Liquid Filaments: Low Capillary Number Flows,” *J. Non-Newtonian Fluid Mech.* **150**, 211-225, (2008).

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

Collins, R. T., Harris, M. T., and Basaran, O. A., “Breakup of Electrified Jets,” *J. Fluid Mech.* **588**, 75-129, (2007).

Basaran, O. A. and Suryo, R., “The Invisible Jet,” *Nature Phys.* **3**, 679-680, (2007).

Xu, Q. and Basaran, O. A., “Computational Analysis of Drop-on-Demand Drop Formation,” *Phys. Fluids* **19**, 102111, (2007).

Yeoh, H. K., Xu, Q., and Basaran, O. A., “Equilibrium Shapes and Stability of a Liquid Film Subjected to a Non-Uniform Electric Field,” *Phys. Fluids* **19**, 114111, (2007).

Selected Conference Presentations

Collins, R. T., Jones, J. J., Harris, M. T., and Basaran, O. A., “Breakup of Electrified Drops,” 60th Annual Meeting of the Division of Fluid Dynamics (DFD) of the American Physical Society (APS), Salt Lake City, UT, November (2007).

Xu, Q. and Basaran, O. A., “Computational Analysis of DOD Drop Formation,” 60th Annual Meeting of the Division of Fluid Dynamics (DFD) of the American Physical Society (APS), Salt Lake City, UT, November (2007).

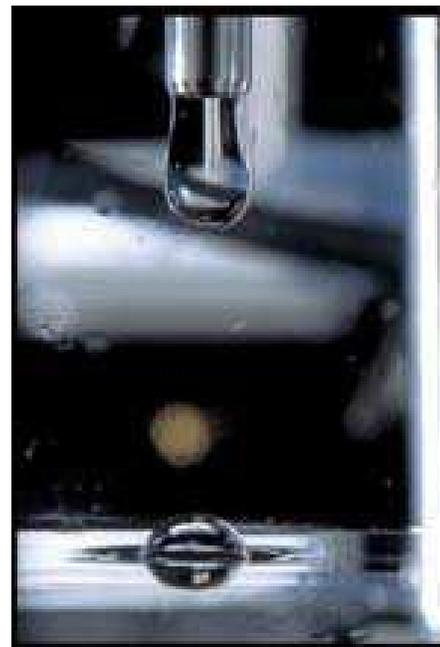
Lopez, C., Martinovic, I., Hirska, A., Ramalingam, S., and Basaran, O. A., “Coalescence and Breakup Between a Capillary Switch and a Pendant Drop,” 60th Annual Meeting of the Division of Fluid Dynamics (DFD) of the American Physical Society (APS), Salt Lake City, UT, November (2007).

Ramalingam, S., Basaran, O. A., Lopez, C., Martinovic, I., and Hirska, A., “Computational Analysis of Coalescence and Breakup Between a Capillary Switch and a Pendant Drop,” 60th Annual Meeting of the Division of Fluid Dynamics (DFD) of the American Physical Society (APS), Salt Lake City, UT, November (2007).

Suryo, R. and Basaran, O. A., “FEM Calculations of Drop Breakup Beyond the First Singularity,” 60th Annual Meeting of the Division of Fluid Dynamics (DFD) of the American Physical Society (APS), Salt Lake City, UT, November (2007).

Bhat, P., Pasquali, M., and Basaran, O. A., “Dynamics of Thinning of Viscoelastic Filaments: Scaling Analysis and Self-Similarity,” 60th Annual Meeting of the Division of Fluid Dynamics (DFD) of the American Physical Society (APS), Salt Lake City, UT, November (2007).

Subramani, J. S., Al-Housseiny, T., and Basaran, O. A., “Dynamics of Drop Impact on a Rectangular Slot,” 60th Annual Meeting of the Division of Fluid Dynamics (DFD) of the American Physical Society (APS), Salt Lake City, UT, November (2007).





Stephen P. Beaudoin
Ph. D. North Carolina State University, 1995

Professor
Director of Undergraduate Studies

Purdue University Faculty Scholar (2006-2011)

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

Selected Professional Activities

Chair, Particle Division of Adhesion Society
Session Chair: "Particles in Semiconductor Processing, AIChE Annual Meeting, Salt Lake City, UT, November (2007).
Member, Purdue University Provost's Diversity Leadership Group

Selected Invited Lectures

"Particle Adhesion over Multiple Length Scales," Lindsay Lecture Series, Texas A&M University Department of Chemical Engineering, November (2007).

Selected Publications

Kim, B.-S., Tucker, M.H., Kelchner, J.D., Beaudoin, S.P., "Study on the Mechanical Properties of CMP Pads, *IEEE Transactions on Semiconductor Manufacturing*, **21(3)**, 454-463 (2008).

Kumar, G., Smith, S., Jaiswal, R., and Beaudoin, S., "Scaling of Adhesion Forces from the Micro- to the Nano-scale", *Journal of Adhesion Science and Technology*, **22(5)**, 407-428, (2008).

Bearda, T., Beaudoin, S. and Mertens, P., "Chapter 5: Overview of Wafer Contamination and Defectivity", *Handbook of Silicon Wafer Cleaning Technology*, 2nd Ed., Kern, W. and Reinhardt, K. Eds. (2007).

Selected Conference Presentations

Jaiswal, R., and Beaudoin, S., "Van Der Waals Forces Between Micron-/nano-Scale Contaminants And Non-Homogenous/patterned Substrates- Implications In Photomask Cleaning", AIChE Annual Meeting, Salt Lake City, UT, November (2007).

Kilroy, C., Jaiswal, R., Kumar, G., and Beaudoin, S., "Particle Adhesion to Photomask Materials", AIChE Annual Meeting, Salt Lake City, UT, November (2007).

Smith, S., and Beaudoin, S., "Describing Protein Adsorption Behavior Based On Electrochemical Impedance Spectroscopy," AIChE Annual Meeting, Salt Lake City, UT, November (2007).

Soler, P., Smith, S., and Beaudoin, S., "Impedimetric Evaluation of Bovine Serum Albumin Bioadhesion to a Gold Electrode" AIChE Annual Meeting, Salt Lake City, UT, November (2007).

Kelchner, M., and Beaudoin, S., "Surface Forces and Protein Adsorption Characteristics of Polydimethylsiloxane Films Grafted with Dextran and Polyethylene glycol", AIChE Annual Meeting, Salt Lake City, UT, November (2007).

Pham, B., and Beaudoin, S., "AFM Force Characterization of Self-Assembled Monolayers and Their Resistance to Protein Adsorption", AIChE Annual Meeting, Salt Lake City, UT, November (2007).

Lee, K.M., and Beaudoin, S., "The Dynamics of Dextran Oxidation For Controlling Bioadsorption On Solid Surfaces", AIChE Annual Meeting, Salt Lake City, UT, November (2007).

Jaiswal, R., Banerjee, S., and Beaudoin, S., "Van Der Waals Forces Between Micron-/nano-Scale Contaminants And Non-Homogenous/patterned Substrates- Implications In Photomask Cleaning", Electrochemical Society Annual Meeting, October (2007).





James M. Caruthers

Sc. D. Massachusetts Institute of Technology, 1977

Professor

Purdue Faculty Fellowship in a Second Discipline

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
Director, Center of Impact Science

Selected Publications

Blau, G., Lasinski, M., Orcun, S., Hsu, S.-H., Caruthers, J.M., Delgass, W.N., Venkatasubramanian, V., "High Fidelity Mathematical Model Building with Experimental Data: A Bayesian Approach," *Computers and Chemical Engineering*, **32**, 971-989, (2008).

Selected Conference Presentations

Keynote, Medvedev, G. A. and Caruthers, J. M., "Stochastic Constitutive Model of Amorphous Polymers," 6th International Conference on Mechanics of Time-Dependent Materials Monterey, CA, March 30-April 4 (2008).

Keynote, Caruthers, J. M., Delgass, L., Wang, H., Dunlop, S., and Novstrup, K., "Rich Visualization For Representing Complex Data In The Chemical Sciences," AIChE Annual Meeting, Salt Lake City, UT, November (2007).

Caruthers, J. M., Ramkrishna, D., Ribeiro, F., Delgass, W. N., Zvinevich, Y., Corti, D. S., and Chhabra, R., "A Chemical Engineering Fundamentals Laboratory," AIChE Annual Meeting, Salt Lake City, UT, November (2007).

Novstrup, K. A., Cao, J., Medvedev, G., Midkiff, S.I.P. and Caruthers, J. M., "Optimizing Compiler for Parallelized Quantitative Kinetic Modeling of Single-Site Olefin Polymerization," AIChE Annual Meeting, Salt Lake City, UT, November (2007).

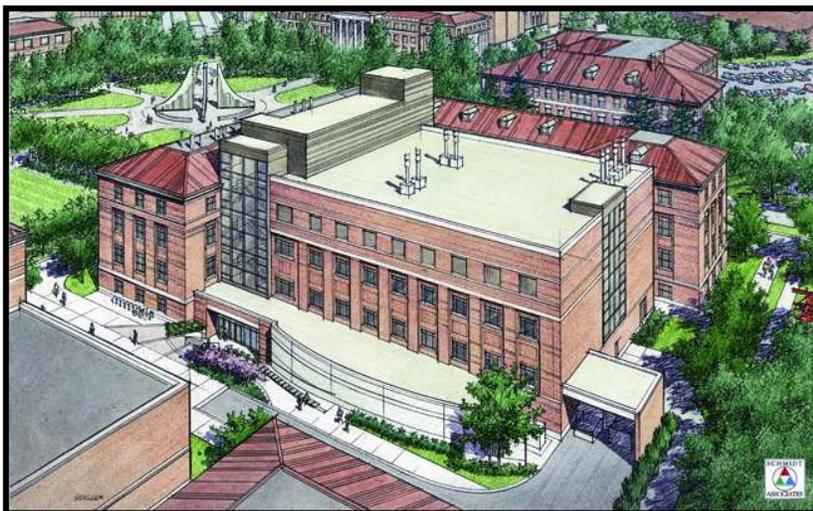
Cao, L., Kromer, B.R., Cumarantunge, L., Mulla, S., Ratts, J. L., Delgass, W. N., Ribeiro, F. H., and Caruthers, J. M., Yezerets, Aleksey, Currier, Neal W., "Storage On Pt/BaO/Al₂O₃ Catalysts," AIChE Annual Meeting, Salt Lake City, UT, November (2007).

Novstrup, K. A., Medvedev, G., Travia, N. E., Stanciu, C., Manz, T. A., Delgass, W. N., Abu-Omar, M., Caruthers, J. M., "Methodology of Kinetic Modeling of Single-Site Olefin Polymerization," AIChE Annual Meeting, Salt Lake City, UT, November (2007).

Krishnamurthy, B., Rao, P., Si, L., Caruthers, J. M. and Venkatasubramanian, V., "Automatic Extraction Of Catalyst Information From The Chemical Literature," AIChE Annual Meeting, Salt Lake City, UT, November (2007).

Cao, L., Kromer, B. R., Cumarantunge, L., Mulla, L. S., Ratts, J. L., Delgass, W. N., Ribeiro, F. H., Caruthers, J. M., Yezerets, A. and Currier, N. W., "A Nitrite-Nitrate Model For Nox Storage On Pt/BaO/Al₂O₃ Catalysts," AIChE Annual Meeting, Salt Lake City, UT, November (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 co-chair, "Kinetics and Transport Properties," Spring AICHE Meeting, New Orleans, LA, April (2008).

Member, Area 1a Programming Committee, AICHE

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)

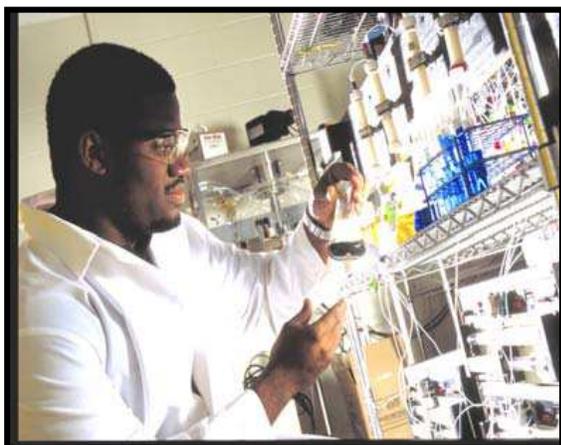
Selected Publications

M. J. Uline, D. W. Siderius and D. S. Corti, "On the Generalized Equipartition Theorem in Molecular Dynamics Ensembles and the Microcanonical Thermodynamics of Small Systems," *J. Chem. Phys.*, **128**, 124301(1-17), (2008).

M. J. Uline and D. S. Corti, "Molecular Dynamics in the Isothermal-Isobaric Ensemble: The Requirement of a 'Shell' Molecule, III. Discontinuous Potentials," *J. Chem. Phys.* **129**, 014107(1-17), (2008).

Siderius, D. W. and Corti, D. S., "On the Use of Multiple Interpolations in Scaled Particle Theory: Improved Predictions of the Thermophysical Properties of the Hard-Sphere Fluid," *J. Chem. Phys.* **127**, 144502(1-19) (2007).

Uline, M. J. and Corti, D. S., "Activated Instability of Homogeneous Bubble Nucleation in Superheated Liquids," *Phys. Rev. Lett.* **99**, 076102(1-4) (2007).



Selected Conference Presentations

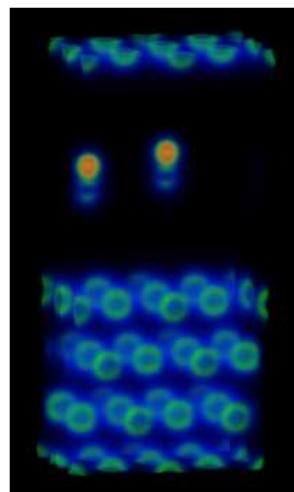
Invited, Corti, D. S., "Theories of First-Order Phase Transitions," within the session "Thermodynamics in Chemical Engineering: Prospects and Perspectives," Spring AICHE Meeting, New Orleans, LA, April (2008).

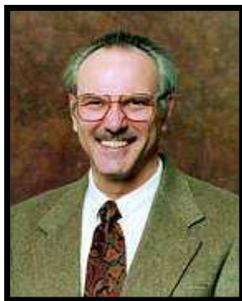
Caruthers, J., Ramkrishna, D., Ribeiro, F., Delgass, W. N., Zvinevich, Y., Corti, D. S., and Chhabra, R., "A Chemical Engineering Fundamentals Laboratory," AICHE National Meeting, Salt Lake City, UT, November (2007).

Uline, M. and Corti, D. S., "Activated Instabilities in Homogeneous Bubble and Droplet Nucleation," AICHE National Meeting, Salt Lake City, UT, November (2007).

Uline, M., Siderius, D. and Corti, D. S., "On the Apparent Breakdown of Equipartition in Molecular Dynamics Ensembles Applied to Nanoscale Systems," AICHE National Meeting, Salt Lake City, UT, November (2007).

Siderius, D. and Corti, D. S., "Extension of Gibbs' Dividing Surface Analysis to Cavities that Intersect a Planar Surface: Calculation of the Line Tension of the Hard-Sphere Fluid," AICHE National Meeting, Salt Lake City, UT, November (2007).





W. Nicholas Delgass

Ph. D. Stanford, 1969

Maxine Spencer Nichols Professor (2007)

Shreve Teaching Award, School of Chemical Engineering (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, AIChE
Editorial Board, *Journal of Catalysis*

Selected Invited Lectures

"Catalyst Design," Seminar, Department of Chemical Engineering, University of California Santa Barbara, May (2008).

Selected Publications

Blau, G. E., Lasinski, M., Orcun, S., Hsu, S.-H., Caruthers, J. M., Delgass, W. N., Venkatasubramanian, V., "High Fidelity Mathematical Model Building with High Throughput Experimentation: A Bayesian Approach," *Computers in Chemical Engineering*, **32**, 971-989 (2008).

Bhan, A. and Delgass, W. N., "Propane Aromatization on HZSM-5 and Ga/HZSM-5," *Catalysis Reviews*, **50**, 19-151 (2008).

Zhang, J. S., Delgass, W. N., Fisher, T. S. and Gore, J. P., "Kinetics of Ru-Catalyzed Sodium Borohydride Hydrolysis," *J. Power Sources*, **164**, 772-781 (2007).

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*, **123**, 50-58 (2007).

Joshi, A. M., 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," *J. Phys. Chem. C*, **111**, 7384-7395 (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).

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

Joshi, A. M., Delgass, W. N., and Thomson, K. T., "Mechanistic Implications of Au_n/Ti-Lattice Proximity for Propylene Epoxidation," *J. Phys. Chem. C*, **111**, 7841-7844 (2007).

Selected Conference Presentations

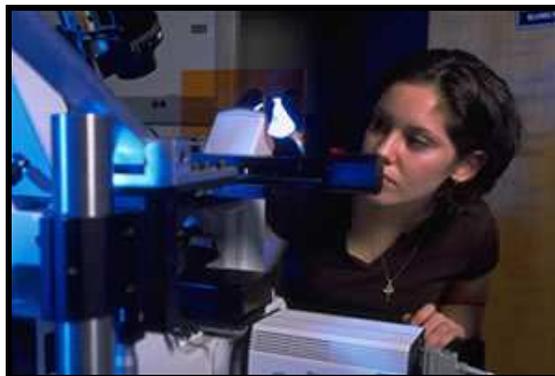
Invited, Delgass, W. N., "Toward the Design of Single Site Polymerization Catalysts," Workshop on Grand Challenges in Catalysis, UCSB, Santa Barbara, CA, August (2008).

Delgass, W. N., "Au/TS-1 Catalysts For Propylene Epoxidation," ACS National Meeting, New Orleans, LA, April (2008).

Krishnamurthy, G., Hsu, Shuo-Huan, Joshi, Y., Caruthers, J., Blau, G. E., Thomson, K. T., Venkatasubramanian, V. and Delgass, W. N., "Propane Aromatization on ZSM-5-Based Catalysts," NASCRE-2, Houston, TX, November (2007).

Blau, G., Lasinski, M., Orcun, S., Yeung, L., Ribeiro, F. H., Delgass, W. N. and Caruthers, J., "Mathematical Model Building with High Throughput Experimentation: A Case Study on Water Gas Shift Reaction Kinetics using a Bayesian Approach," NASRE-2, Houston, TX, November (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 Tension Equilibria and Dynamics of Surfactants and Proteins at Interfaces, Adsorption and Transport of Lung Surfactants and their Roles in Alveolar Respiratory Diseases. Sorbents and Sorbent-Solvent Sorbate Interactions of Chiral Molecules for Bioseparations of Enantiomers, Lipid/Protein Interactions in Solutions and at Surfaces

Selected Publications

Kasat, R.B., Wang, N.-H.L., and Franses, E.I., "Experimental Probing and Modeling of Key Sorbent-Solute Interactions of Norephedrine Enantiomers with Polysaccharide-Based Chiral Stationary Phases," *J. Chromatogr. A*, **1190**, 110-119 (2008).

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).

Kasat, R.B., Wang, N.-H.L., and Franses, E.I., "Effects of Backbone and Side Chain on the Molecular Environments of Chiral Cavities in Polysaccharide-Based Biopolymers," *Biomacromolecules*, **8**, 1676-1685 (2007).

Selected Conference Presentations

Kim, S. H., Park, Y. and Matalon, S., American Thoracic Society, "Dynamic Surface Tensions of DPPC Dispersions at Physiological Condition," American Thoracic Society, Annual International Meeting, Toronto, Ontario, Canada, May (2008).

Kim, S. H. and Phang, T.-L., "Interactions and Transport of Lipids and Proteins at Gas/Liquid Interfaces," AIChE Annual Meeting, Salt Lake City, UT, November (2007).

Kasat, R. B. and Wang, N.-H. L., "Fundamental Study of the Adsorption of Chiral Solutes on Polysaccharide Based Chiral Stationary Phases for Chiral Separation Applications;" AIChE Annual Meeting, Salt Lake City, UT, November (2007).



Robert E. Hannemann

M.D. Indiana University, 1959

Visiting Professor

Research Areas

Healthcare Engineering, Modeling Erythrocyte size distribution for evaluation of Lukemia chemotherapy, serum bilirubin determination by skin reflectance, surfactant in respiratory distress syndrome treatment.

Selected Professional Activities

Executive Committee Regenstrief Center on Healthcare Engineering, Purdue University
Chair, Healthcare Engineering Signature Area, Purdue University
Secretary's (Health and Human Services) Advisory Committee on Infant Mortality (1997-2008)
Board of Directors, National Center for Missing and Exploited Children
Surgeon General Conference on Preventing Preterm Birth, June (2008)

Selected Publications

Sherer, E., Tocce, E., Hannemann, R. E., Rundell, A., Ramkrishna, D., "Identification of Age-structured Models: Cell Cycle Phase Transitions," *Biotechnology and Bioengineering* **99(4)**: 960-974, (2008).

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*, 35:903-915, (2007).

Selected Conference Presentations

Sherer, E., Hannemann, R. E., Rundell, A., and Ramkrishna, D., "A Structured Model of RBC Differentiation for Predicting Efficacy in Childhood ALL," Paper No. 36b, AIChE Annual Meeting, Salt Lake City, UT, November (2007).

E. Sherer, R.E. Hannemann, A. Rundell, and D. Ramkrishna, "Applications of Stochastic Equations of Population Balances to Sterilization Processes," 3rd International conference on Population Balance Modelling, Quebec City, Canada, September (2007).



Michael T. Harris
Ph. D. University of Tennessee – Knoxville, 1992

**Professor and
Associate Dean of Undergraduate Education
Purdue University Faculty Scholar (2004-2008)**

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

Selected Professional Activities

Engineering Advisory Council, Mississippi State University
Associate Editor, *Journal of Nanomaterials*
Associate Editor, *Chemical Engineering Letters*
Committee on Minority Affairs, American Chemical Society
Chair, AIChE Minority Affairs Committee

Selected Publications

Widjaja, E., and Harris, M. T., "Particle Deposition Study during Sessile Drop Evaporation," *AIChE J*, **54**, 9, 2250-2260, September (2008).

Kurup, A. S., Subramani, H. J. and Harris, M. T., "A Monte Carlo-Based Error Propagation Analysis of Simulated Moving Bed Systems," *Separation and Purification Technology*, **62**, 3, 582-589, September (2008).

Collins, R. T., Jones, J. J., Harris, M. T. and Basaran, O. A., "Electrohydrodynamic Tip Streaming: Emission of Charged Jets/Drops from Liquid Cones," *Nature Physics*, **4**, 149-154 (2008).

Royston, E. S., Gosh, A., Kofinas, P., Harris M. T. and Culver, J. N., "Self-Assembly of Virus-Structured High Surface Area Nano-Materials and Their Application as Battery Electrodes," *Langmuir*, **24**, 906-912 (2008).

Zhao, Y., Carvajal, M. T., Won, Y. Y. and Harris, M. T., "Preparation of Calcium Alginate Microgel Beads by Electrodiposition Reaction Using Internal Source of Calcium Carbonate Nanoparticles," *Langmuir*, **23**, 12489-12496 (2007).

Widjaja, E., and Harris, M. T., "Numerical Study of Vapor Phase-Diffusion Driven Sessile Drop Evaporation," *Computers in Chemical Engineering*, **32**, 10, 2169-2178, October (2007).

Selected Conference Presentations

Zhao, Y., Won, Y. and Harris, M. T., "Study of Calcium Alginate Sol-Gel Transition by Population Balance Model," 542d, AIChE Annual Meeting, Salt Lake City, UT, November (2007).

Lim, J. S., Lee, S. Y., Culver, J. N., and Harris, M. T., "Gold-Nanoparticle Conjugation on Genetically Engineered Tobacco Mosaic Virus," 638d, AIChE Annual Meeting, Salt Lake City, UT, November (2007).

Oglesby, Patrick and Harris, M. T., "Modeling Electrokinetic Decontamination of Concrete by Petrov-Galerkin Finite Element Method," 329p, AIChE Annual Meeting, Salt Lake City, UT, November (2007).





Hugh W. Hillhouse

Ph. D. University of Massachusetts, 2000

Associate Professor

Frontiers of Engineering Program (2007)

Early Career Research Award, College of Engineering, Purdue University (2008)

Research Areas

Solar Energy Conversion, Nanomaterials, Colloidal & Interfacial Phenomena

Selected Professional Activities

Session Chair, "Nanostructured Thin Films" AIChE Annual Meeting, Salt Lake City UT, November (2007).

Selected Invited Lectures

"The Road to Low-Cost and High-Efficiency Solar Cells via Self-Assembled Nanomaterials," Departmental Seminar, Chemical Engineering, University of Massachusetts, April, (2008). Seminar, School of Engineering and Electronics, University of Edinburgh, Scotland, March, (2008). Departmental Seminar, Chemical Engineering, University of Delaware, February (2008).

"Self-Assembly of Nanostructured Films," Institute Seminar, Chemical Sciences Division, Oak Ridge National Laboratory, February (2008).

"Nanocrystal and Nanowire Solar Cells," Departmental Seminar, School of Materials Engineering, Purdue University, West Lafayette, IN, November (2007).

Selected Publications

Wei, T.C. and Hillhouse, H.W., "Mass Transport and Electrode Accessibility through Periodic Self-Assembled Nanoporous Silica Thin Films," *Langmuir* **23**, 5689-5699 (2007).

Tanaka, S., Katayama, Y., Tate, M. P., Hillhouse, H. W., Miyake, Y., "Fabrication of Continuous Mesoporous Carbon Films with Face-Centered Orthorhombic Symmetry through a Soft Templating Pathway," *J. Mater. Chem.* **17**, 3639-3645 (2007).

Tate M. P., Hillhouse H. W., "General Method for Simulation of 2D GISAXS Intensities for Any Nanostructured Film Using Discrete Fourier Transforms," *J. Phys. Chem. C* **111**, 7645-7654 (2007).

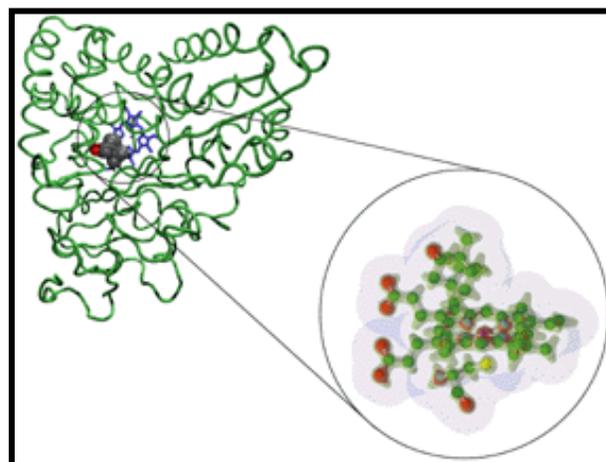
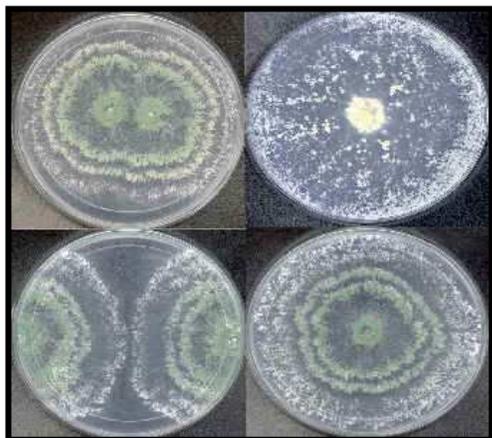
Selected Conference Presentations

Invited, Hillhouse, H.W., "Advances in the Self-Assembly of Highly Oriented Nanoporous Thin Films," Gordon Research Conference on Nanoporous Materials, Colby College, Waterville, ME, June (2008).

Hillhouse, H.W., "Development of Nanowire Arrays for Carrier Multiplication Solar Cells," AIChE Annual Meeting, Salt Lake City, UT, November (2007).

Hillhouse, H.W., "Double-Gyroid Topology Nanowire Array Thermoelectric Devices," MRS Fall Meeting, Boston, MA, November (2007).

Hillhouse, H.W., "A General Method for the Nanofabrication of Double-Gyroid Films: Controlling Interfacial Curvature," MRS Fall Meeting, Boston, MA, November (2007).





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)**

Research Areas

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



R. Neal Houze

Ph. D. University of Houston, 1968

Professor

Shreve Teaching Award, School of Chemical Engineering (2008)

Selected Professional Activities

Teaching Academy Committee for the Education of Teaching Assistants

University Committee on Superior Students

University Cooperative Education Coordinating Committee
Teaching Academy

Faculty Advisor for Mortar Board

Mediator for College of Engineering

Faculty Affiliate with Center for Instructional Excellence

Engineering ABET Committee



Sangtae Kim

Ph. D. Princeton, 1983

Donald W. Fedderson Distinguished Professor

National Academy of Engineering

AICHE George Lappin Award (2008)

Research Areas

**Pharmaceutical Informatics: Bioinformatics, Cheminformatics, Systems Biology;
Computational Microfluidics and Nanofluidics; Radio Frequency Identification (RFID) and
Enabling Information Technologies**

Selected Professional Activities

FDA Science Board Working Group, Chair – IT Subgroup

Vice Chair, World Technology Evaluation Center (WTEC)

Panel on Simulation Based Engineering & Science

Member, Awards Committee, AIChE

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

Dept. of Chemical Engineering, Tenn. Tech. University.

Center for Advanced Diagnostics and Therapeutics, University of Notre Dame

Selected Invited Lectures

Department Colloquia presented at: LSU, Center for Computation and Technology (2008); UIUC Fluid Mechanics Seminar Series, March (2008)

2007 Robert L. Pigford Memorial Lecture, University of Delaware, Dept. of Chemical Engineering, November (2007).

Inaugural Lecturer, University of Massachusetts, Dept. of Chemical Engineering newly endowed (to be named) lectureship, October (2007).

Invited panelist, Third International Conference on e-Social Science, Ann Arbor, MI, October (2007).



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 of Bioactives, Engineering Education

Selected Professional Activities

Member, Solae LLC (St Louis) Scientific Advisory Board
Member, Board of the Co-operative Research Centre for Rail
Member, NSF review panel on Particulate and Multiphase Processes (2007)
Consultant, International Fine Particle Research Institute
Chair, Mining Education Australia Board
International Organizing Committee, ECI Conference on Particulate Processes in the Pharmaceutical Industry II, Puerto Rico, February (2008)

Selected Invited Lectures

"Regime Separated Granulation Processes," UOP, Des Plaines, IL, February (2008).

"Granulation Rate Processes," Johnson and Johnson Inc. PA, October (2007).

Selected Publications

Poon, J. M.-H., Immanuel, C. D., Doyle, F. J. and Litster, J. D., "A Three Dimensional Population Balance of Granulation with a Mechanistic Representation of Nucleation and Aggregation Phenomena," *Chem. Eng. Sci.*, **63**, 1315-1329 (2008).

Hapgood, K.P., Iveson, S. M., Litster, J. D. and Liu, L. X., "Granulation Rate Processes," *Handbook of Powder Technology*, Volume II: Granulation, Salman, A. J., Hounslow, M. J. and Seville, J.P.K (eds), Elsevier, chapter 20 (2007).

Roberts, Slater, Catlow, Unwin, Anderson, Rodger, Schon, Hodnett, Sankar, Lewis, Vlieg, Terasaki, Mazzotti, Addadi, ter Horst, Jones, Kuroda, Davey, Litster, Caffrey, Kahr, Hughes, Vonk, Hare, "General Discussion on Crystallization," *Faraday Discussions*, **136**, 213-229 (2007).

Dombrowski, R. D., Litster, J. D., Wagner, N. J. and He, Y., Crystallisation of Alpha-Lactose Monohydrate in a Drop Based Microfluidic Crystallizer, *Chemical Engineering Science*, **62**, 4802-4810 (2007).

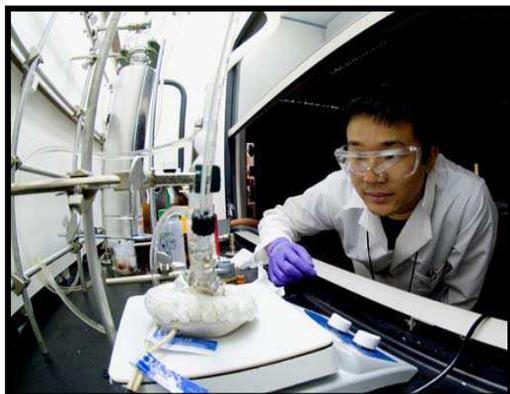
Lui, D. Y., White, E. T. and Litster, J. D., "The Dissolution Behaviour of Soy Proteins and the Effect of Initial Concentration," *Journal of Agricultural and Food Chemistry*, **55**, 2467-2473.

Selected Conference Presentations

Plenary, Litster, J., "Towards Quantitative Engineering Design of Wet Granulation for Pharmaceutical Processing," ECI Conference on Particulate Processes in the Pharmaceutical Industry, Puerto Rico, February (2008).

Plenary, Litster, J., "Understanding Granulation Rate Processes: Implications for Modeling and Design," 16th Nisshin Engineering Particle Technology International Seminar, Matsushima, Japan, December (2007).

Plenary, Litster, J., "Measurement and Control of Product Attributes during Wet Granulation – Challenges & Opportunities," AIChE Annual Meeting, Salt Lake City, UT, November (2007).





Julie C. Liu
Ph. D. Caltech, 2006

Assistant Professor
National Institutes of Health Postdoctoral Fellowship (2007)

Research Areas
Biomaterials, Tissue Engineering, Protein Engineering

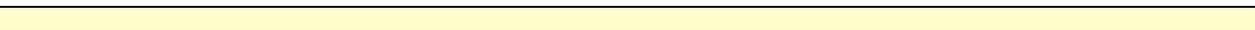
Selected Publications

Mukherjee, S., Raje, N., Schoonmaker, J. A., Liu, J. C., Hideshima, T., Wein, M. N., Jones, D. C., Vallet, S., Bouxsein, M. L., Pozzi, S., Chhetri, S., Seo, Y. D., Aronson, J. P., Patel, C., Fulciniti, M., Purton, L. E., Glimcher, L. H., Lian, J. B., Stein, G., Anderson, K. C. and Scadden, D. T., "Pharmacologic Targeting of a Stem/Progenitor Population *in vivo* Is Associated with Enhanced Bone Regeneration in Mice," *J. Clin. Invest.* **118**, 491-504 (2008).

Carrico, I. S., Maskarinec, S. A., Heilshorn, S. C., Mock, M. L., Liu, J. C., Nowatzki, P. J., Franck, C., Ravichandran, G. and Tirrell, D. A., "Lithographic Patterning of Photoreactive Cell-Adhesive Proteins," *J. Am. Chem. Soc.* **129**, 4874-4875 (2007).

Selected Conference Presentations

Liu, J. C., Jones, M., Schoonmaker, J., Mulay, S., Wixted, J. J., Bousein, M., Scadden, D. T., Stein, G. S., Mukherjee, S. and Lian, J. B., "The Proteasome Inhibitor Bortezomib Reduces Mammary Fat Pad Tumor Growth and Prevents Metastatic Breast Cancer Osteolysis in Mice," Poster Session, Skeletal Complications of Malignancy Symposium sponsored by The Paget Foundation and the University of Michigan Medical School, Philadelphia, PA, October (2007).



John A. Morgan
Ph. D. Rice, 1999

Associate Professor

Research Areas
Metabolic Engineering, Biocatalysis

Selected Professional Activities

Chair, Advances in Metabolic Engineering, AIChE National Meeting, Salt Lake City, UT, November (2007)
Associate Editor, *Bioprocess and Biosystems Engineering*

Selected Invited Lectures

Morgan, J. A., Ho, N. and Ramkrishna, D. "Metabolic Engineering of Microbes for Cellulosic Ethanol Production," M.I.T. presented to Shell Oil Company, August (2007).

Selected Publications

Jackson, A. U., Werner, S. R., Talaty, N., Song, Y., Campbell, K., Cooks, R. G., and Morgan, J. A. "Targeted Metabolomic Analysis of *Escherichia Coli* by Desorption Electrospray Ionization (DESI) and Extraction Electrospray Ionization (EESI) Mass Spectrometry," *Analytical Biochemistry* **375**: 272-281, (2008).

Young, J. D., Henne, K. L., Morgan, J. A., Konopka, A. E., and Ramkrishna, D., "Integrating Cybernetic Modeling with Pathway Analysis. A dynamic Systems Level Description of

Metabolic Control," *Biotechnology & Bioengineering*, **100**, 542-559, (2008).

Selected Conference Presentations

Shastri, A., Young, J., Stephanopoulos, G. and Morgan, J. "A Nonstationary ¹³C- labeling Approach for Metabolic Flux Analysis in a Photoautotrophic System," AIChE Annual Meeting, Salt Lake City, UT, November (2007).

Young, J., Noguchi, Y., Shastri, A., Morgan, J. and Stephanopoulos, G. "Nonstationary Metabolic Flux Analysis Of ¹³C Labeling Dynamics," AIChE Annual Meeting, Salt Lake City, UT, November (2007).



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

Professor
Interim Head, School of Industrial Engineering
Director, e-Enterprise Center at Discovery Park
Founding Director, Regenstrief Center for Healthcare Engineering

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, (2008)
Co-Founder of the National Healthcare Engineering Alliance

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*, **18**, No. 5, pp 388-406, (2007).

Selected Publications

Invited, Doebbeling B. N. and Pekny, J. F., "The Role of Systems Factors in Implementing Health Information Technology," *Journal of General Internal Medicine*, April (2008).

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).



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

John Leighton Bray Distinguished Professor of Engineering
Director, Purdue Institute for Defense Innovation

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
Member, NRC Committee Panel on Building and Fire Research

(Part II): Morphological Development During Bubble Growth," *Polymer Engineering & Science*, Vol. 47, No. 5, (2007).

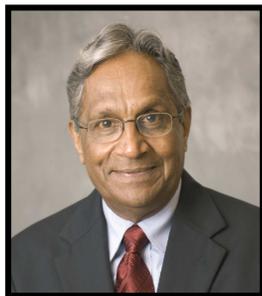
Caro, C. I., Kyu, T. and Pipes, R. B., "Modeling Particle Inflation from Poly(amic acid) Powdered Precursors (Part I): Preliminary Stages Leading to Bubble Growth," *Polymer Engineering & Science*, Vol. 47, No. 5, (2007).

Selected Publications

Strus, M. C., Zalamea, L., Raman, A., Pipes, R. B., Nguyen, C. and Stach, E. A., "Peeling Force Microscopy: Exposing the Peeling Nanomechanics of One-Dimensional Nanostructures," *Nano Lett.*, (2008).

Zalamea, L., Kim, H. and Pipes, R. B., "Stress Transfer in Multiwalled Carbon Nanotubes," *Composites Science and Technology*, Vol. 67, (2007).

Cano, C. I., Clark, M. I., Kyu, T. and Pipes, R. B., "Modeling Particle Inflation from Poly (amic acid) Powdered Precursors



Doraiswami Ramkrishna

Ph. D. University of Minnesota, 1965

H. C. Peffer Distinguished Professor

Research Areas

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

Selected Professional Activities

Fellow, AIChE

Selected Invited Lectures

“On Modeling Metabolic Systems. The Cybernetic Approach,” Department of Chemical Engineering, Tennessee Tech University, Cookeville, TN, October (2007). Dave C. Swalm School of Chemical Engineering, Mississippi State University, Mississippi State, MS, November (2007). Chemical Engineering Division, MUICT, Bombay, India, December (2007). Reliance Company, Chembur Mumbai, India, December (2007).

“The Road Ahead,” Talk to MSc. students about opportunities ahead, Ramnarain Ruia College, Mumbai, India, December (2007).

“Steady State Multiplicity in Biological Reactors,” Arvind Varma 60th Birthday Symposium, AIChE Annual Meeting, Salt Lake City, UT, November (2007).

“On Bubble Size Distributions in the Heterogeneous Regime,” L. K. Doraiswamy Symposium, AIChE, Annual Meeting, Salt Lake City, UT, November (2007).

“Modeling of Cancer Chemotherapy. Potential Benefits,” Department of Chemical Engineering, Indian Institute of Technology, Mumbai, India, August (2007).

Selected Publications

Trinh, S., Nere, N. K. and Ramkrishna, D., “Mathematical Methods for Chemical Engineers,” *Handbook of Chemical Engineers*, L. Albright, (2008).

Sherer, E., Rundell, A. E., Hannemann, R. E. and Ramkrishna, D., “Determination of Age-Dependent Cell Cycle Transition Rates,” *Biotechnol & Bioeng.*, **99**, 960-974, (2008).

Sherer, E., Hannemann, R. E., Rundell, A. and Ramkrishna, D., “Estimation of Likely Cancer Cure Using First- and Second-Order Product Densities of Population Balance Models,” *Ann. Bioeng.*, **35**, 903-915, (2007).

Nopens, I., Nandkishor N., Vanrolleghem P. A. and Ramkrishna, D., “Solving the Inverse Problem for Aggregation in Activated Sludge Flocculation Using a Population Balance Framework,” *Water Science and Technology*, **56**, 95-103, (2007).

Selected Conference Presentations

Sherer, E., Hannemann, R. E., Rundell A. E. and Ramkrishna, D., “A Structured Model of RBC Differentiation for Predicting 6MP Efficacy in Childhood ALL,” Paper #36b, AIChE Annual Meeting, Salt Lake City, UT, November (2007).

Song, H.-S., Kim, Jin-Il, Varner, J. D., Morgan, J. A. and Ramkrishna, D., “Dynamic Simulation of Fermentation Systems by Recombinant *S. Cerevisiae* Using a Hybrid Cybernetic Model,” Paper #132d, AIChE Annual Meeting, Salt Lake City, UT, November (2007).

Song-H.-S. and Ramkrishna, D., “Reduction of the EFM Set, Using Yield-Vector Analysis for Metabolic Models,” Paper #242c, AIChE Annual Meeting, Salt Lake City, UT, November (2007).

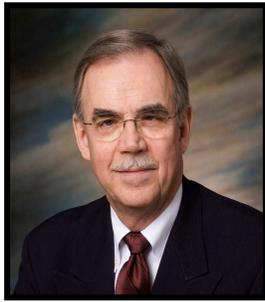
Borchert, C., Nere, N. K., Voigt, A., Sundmacher, K. and Ramkrishna, D., “Prediction of Crystal Shape and Size Distributions Using Multidimensional Population Balances,” Paper #225a, AIChE. Annual Meeting, Salt Lake City, UT, November (2007).

Nopens, I., Nere, N. K., Vanrolleghem, P. and Ramkrishna, D., “Formulation of Effective Mechanistic Aggregation Kernels for the Flocculation Process with Concurrent Mechanisms Using Inverse Problem Solution,” Paper #542c, AIChE Annual Meeting, Salt Lake City, UT, November (2007).

Borchert, C., Nere, N. K., Voigt, A., Sundmacher, K. and Ramkrishna, D., “On the Prediction of Crystal Shape Distribution through Multidimensional Population Balances,” Third International Conference on Population Balance Modeling, Quebec City, Canada, September (2007).

Sherer, E., Hannemann, R., Rundell, A. E. and Ramkrishna, D., “Application of Population Balance Product Densities to Sterilization Processes,” Third International Conference on Population Balance Modeling, Quebec City, Canada, September (2007).





Gintatas V. "Rex" Reklaitis

Ph. D. Stanford University, 1969

Edward W. Comings Distinguished Professor

National Academy of Engineering

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*
AICHE 2008 Centennial Steering Committee
Chair, National Program Committee, Executive Board
Chair, Centennial Topical Symposium
National Institute for Pharmaceutical Technology & Education
Chair, Technology Roadmap Initiative
Chair, Faculty Committee

Selected Invited Lectures

"Decision Support for Pharmaceutical Product Pipeline Management," New Jersey Institute of Technology, Newark, NJ, February (2008).

"Engineering Research Center for Structured Organic Composites," Baxter Pharmaceutical Solutions, Bloomington IN, November (2007).

"Innovations in Pharmaceutical Development and Manufacturing," Purdue Silicon Valley Seminars, Santa Clara, CA, July (2007).

Selected Publications

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**, pp. 307-319 *Special Issue: Selected Papers of PSE /ESCAPE 16*, (2008).

Varma, V.A., Blau, G. E., Pekny, J. F. and Reklaitis, G. V., "A Framework for Addressing Stochastic and Combinatorial Aspects of Scheduling and Resource Allocation in Pharmaceutical R&D Pipelines," *Computers & Chem Engr*, **32**, pp.1000-1016 (2008) .

Zapata, J.C., Suresh, P. and Reklaitis, G. V., "DES: Strengths and Weaknesses," *OR/MS Today*, October (2007).

Selected Conference Presentations

"Hub Cyberinfrastructure for Collaboration in Research and Education," EURECHA session, European Symposium on Computer Aided Process Engineering -18, Lyon, France, June (2008).

"PharmaHUB: Collaboration for Pharmaceutical Engineering," NSF Building Virtual Organization Workshop, Washington D.C., January (2008).

Plenary, "Technology Roadmap for Pharmaceutical Development and Manufacturing," Pharmaceutical Engineering as an Emerging Academic Field – Challenges and Opportunities, AIChE Annual Meeting, Salt Lake City, UT, November (2007).

"Balancing Managing and Leading a Department," 2007 Department Heads Forum, AIChE Annual Meeting, Salt Lake City, UT, November (2007).





Fabio H. Ribeiro

Ph. D. Stanford University, 1989

Professor

Purdue University Faculty Scholar (2006 – 2011)

Research Areas

Surface Science and Kinetics of Heterogenous Catalytic Reactions

Selected Professional Activities

Editorial Board, *Catalysis Letters*

2nd Vice Chair, Catalysis and Reactor Engineering, Division, AIChE

Proposal Review Committee Member, Center for Nanophase Materials Sciences, Oak Ridge National Laboratory

Selected Publications

Smeltz, A. D., Getman, R. B., Schneider, W. F. and Ribeiro, F. H. "Coupled Theoretical and Experimental Analysis of Surface Coverage Effects in Pt-Catalyzed NO and O₂ Reaction to NO₂ on Pt(111)," *Catalysis Today*, **136**, 84-92, March (2008).

Kromer, B. R., Cao, L., Cumarantunge, L., Mulla, S. S., Ratts, J. L., Yezerets, A., Currier, N. W. Ribeiro, F. H., Delgass, W. N., Caruthers, J. M., "Modeling of NO Oxidation and NOx Storage on Pt/BaO/Al₂O₃ NOx Traps," *Catalysis Today*, **136**, 93-103, (2008).

Mulla, S. S., Chaugule, S. S., Yezerets, A., Currier, N. W., Delgass, W. N., Ribeiro, F. H., "Regeneration Mechanism of Pt/BaO/Al₂O₃ Lean NOx Trap catalyst with H₂," *Catalysis Today*, **136**, 136-145, January (2008).

Selected Conference Presentations

Agrawal, R., Singh, N. R., Ribeiro, F. H. and Delgass, W. N., "An Environmentally Friendly Novel Route for Transportation Fuel," AIChE Annual Meeting, Salt Lake City, UT, November (2007).

Bollmann, L., Joshi, A. M., Williams, W. D., Ratts, J. L., Miller, J. T., Delgass, W. N. and Ribeiro, F. H., "Kinetics and Drifts Study of Water-Gas Shift Reaction on Supported Pt Catalysts," AIChE Annual Meeting, Salt Lake City, UT, November (2007).

Caruthers, J. M., Ramkrishna, D., Ribeiro, F., Delgass, W. N., Zvinevich, Y., Corti, D. S. and Chhabra, R., "A Chemical Engineering Fundamentals Laboratory," AIChE Annual Meeting, Salt Lake City, UT, November (2007).

Ratts, J. L., Cumarantunge, L., Delgass, W. N., Currier, N. W., Yezerets, A. and Ribeiro, F., "In-Situ Drifts Study On Model Pt/Ba/Al₂O₃ NOx Storage/Reduction Monolithic Catalysts," AIChE Annual Meeting, Salt Lake City, UT, November (2007).

Cao, L., Kromer, B. R., Cumarantunge, L., Mulla, S., Ratts, J. L., Delgass, W. N., Ribeiro, F. H., Caruthers, J. M., Yezerets, A. and Currier, N. W., "A Nitrite-Nitrate Model For NOx Storage On Pt/BaO/Al₂O₃ Catalysts," AIChE Annual Meeting, Salt Lake City, UT, November (2007).

Mulla, S., Cumarantunge, L., Zhao, W., Smeltz, A., Kim, S. M., Stach, E., Miller, J. T., Delgass, W. N. and Ribeiro, F. H., "Effect Of Pt Cluster Size and Support on the Reaction of NO and O₂ to NO₂," AIChE Annual Meeting, Salt Lake City, UT, November (2007).



Kendall T. Thomson

Ph. D. University of Minnesota, 1999

Associate Professor

Purdue University Faculty Scholar (2008-2013)

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

Session Chair, "Computational Catalysis II," AIChE Annual Meeting, Salt Lake City, UT, November (2007).

Session Chair, "First-Principles Simulations of Condensed Phases," AIChE Annual Meeting, Salt Lake City, UT, November (2007).

Selected Publications

Schaffer, C. L. and Thomson, K. T., "Density Functional Theory Investigation into Structure and Reactivity of Prenucleation Silica Species," *Journal of Physical Chemistry C*, in Press (2008).



Arvind Varma
Ph. D. Minnesota, 1972

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

**Honoree, 60th Birthday Sessions – I&II, AIChE Annual Meeting (2007)
Golden Jubilee Visiting Fellow, UICT-Mumbai (March 2008)**

Research Areas

**Chemical and Catalytic Reaction Engineering, Clean Energy Sources,
Synthesis of Advanced Materials**

Selected Professional Activities

Series Editor, *Cambridge Series in Chemical Engineering*,
Cambridge University Press
Member, ISCRE Board
Chair, Diversity Award Committee, Council for Chemical
Research, 2008
Member, GCEP Proposal Review Panel,
Stanford University, May 2008

Selected Invited Lectures

Golden Jubilee Lecture, UICT-Mumbai, March (2008)
Reliance Industries Ltd, Mumbai, India, March (2008)
New Jersey Institute of Technology, Newark, NJ,
March (2008)
University of Pittsburgh, Pittsburgh, PA, September (2007)
Carnegie-Mellon University, Pittsburgh, PA,
September (2007)

Selected Publications

Shafirovich, E., Teoh, S. K. and Varma, A., "Combustion of
Levitated Titanium Particles in Air," *Combustion and Flame*,
152, 262-271 (2008).

Diwan, M., Diakov, V., Shafirovich, E. and Varma, A.,
"Noncatalytic Hydrothermolysis of Ammonia Borane,"
International Journal of Hydrogen Energy, **33**, 1135-1141
(2008).

Erri, P., Nader, J. and Varma, A., "Controlling Combustion
Wave Front Propagation for Transition Metal/Alloy/Cermet
Foam Synthesis," *Advanced Materials*, **20**, 1243-1245 (2008).

Diakov, V., Diwan, M., Shafirovich, E. and Varma, A.
"Mechanistic Studies of Combustion Stimulated Generation of
Hydrogen from Sodium Borohydride," *Chemical Engineering
Science*, **62**, 5586-5591 (2007).

Andrzejak, T., Shafirovich, E., Taylor, D. and Varma, A.,
"Apparatus for Studies of High-Temperature Chemical
Reactions in Single Particle Systems," *Review of Scientific
Instruments*, **78** (8), art. 085102, 7 pages (2007).

Erri, P. and Varma, A., "Solution Combustion Synthesized
Oxygen Carriers for Chemical Looping Combustion,"
Chemical Engineering Science, **62**, 5682-5687 (2007).

Erri, P. and Varma, A., "Spinel-Supported Oxygen Carriers
for Inherent CO₂ Separation during Power Generation,"
Industrial & Engineering Chemistry Research, **46**, 8597-8601
(2007).

Selected Conference Presentations

"Catalytic Conversion of Glycerol to High-Value Chemicals",
Biofuels Symposium, Discovery Park Energy Center, Purdue
University, West Lafayette, IN, May (2008).

"Increasing Productivity of Bioethanol. A Model-Driven
Approach to Process Optimization and Strain Improvement"
Biofuels Symposium, Discovery Park Energy Center, Purdue
University, West Lafayette, IN, May (2008).

"Transition Metal / Alloy Foams By Combustion Technique,"
AIChE Annual Meeting, Salt Lake City, UT, November
(2007).

"Modeling of Combustion Wave Propagation in
Heterogeneous Mixtures for Hydrogen Generation," AIChE
Annual Meeting, Salt Lake City, UT, November (2007).

"Heterogeneous Mixtures of Boron Compounds with Metals
and Water for Hydrogen Generation," AIChE Annual
Meeting, Salt Lake City, UT, November (2007).

"Hydrogen Generation for Portable Fuel Cells by Using Novel
Chemical Mixtures," 234th ACS National Meeting, Boston,
MA, August (2007).

"Ignition of Aluminum Particles Coated by Nickel or Iron:
Studies under Normal and Reduced Gravity Conditions," 43rd
AIAA/ASME/SAE/ASEE Joint Propulsion Conference,
Cincinnati, OH, July (2007).

"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)

Honorary Visiting Professor, Indian Institute of Information Technology (IIT-B), Bangalore, India

Fellow of the Teaching Academy, Purdue University

Best Paper Prize, Computers and Chemical Engineering (2008)

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*
Guest Editor, *Computers and Chemical Engineering*, Prof. Rex Reklaitis 65th Birthday Special Issue (2008)

Selected Invited Lectures

Drinking from a Fire Hose: Modeling and Informatics Challenges and Opportunities in Product Design, University of Texas at Austin, October (2007), Virginia Polytechnic Institute, October (2007), Texas Tech University, February (2008).

Keynote Speaker, European Congress of Chemical Engineering ECCE-6, Copenhagen, Denmark, September (2007).

GE JFW Tech Center, Bangalore, India: Discovery Informatics and Product Design, July (2007).

Indian Institute of Information Technology, Bangalore, Complex Adaptive Networks, July (2007).

Reliance Chemicals, Bombay, India, Abnormal Events Management, July (2007).

Selected Publications

Venkatasubramanian, V., "A Theory of Design of Complex Teleological Systems: Unifying the Darwinian and Boltzmannian Perspectives," *Complexity*, **12**(3), 14-21, (2007).

Maurya, M. R., Rengaswamy R. and Venkatasubramanian, V., "Fault Diagnosis Using Dynamic Trend Analysis: A Review and Recent Developments," *Engineering Applications of Artificial Intelligence*, **20**, 133-146, (2007).

Selected Conference Presentations

Venkatasubramanian, V., "Tower of Babel: Intelligent Data and Knowledge Management for Decision Support in Pharmaceutical Engineering," paper 183a, AIChE Annual Meeting, Salt Lake City, UT, November (2007).

Suresh, P., Joglekar, G., Hsu, S-H., Hailemariam, L., Jain, A., Akkisetty, P., Venkatasubramanian, V. and Reklaitis, G.V., "Ontomodel: Ontology Based Mathematical Model Solving Using The Semantic Web," paper 161b, AIChE Annual Meeting, Salt Lake City, UT, November, (2007).

Krishnamurthy, B.B., Rao, P., Si, L., Caruthers, J.M. and Venkatasubramanian, V., "Automatic Extraction Of Catalyst Information From The Chemical Literature," paper 161d, AIChE Annual Meeting, Salt Lake City, UT, November, (2007).

Venkatasubramanian, V., "Cyberinfrastructure for Pharmaceutical Product Development," paper 236e, AIChE Annual Meeting, Salt Lake City, UT, November, (2007).

Shukla, A., Agarwal, V., Hailemariam, L.M. and Venkatasubramanian, V., "A Holistic Optimization Method for Semi-Batch Chemical Process Supply Chains Under Disruptions and Uncertainties in Demand and Supply," paper 380e, AIChE Annual Meeting, Salt Lake City, UT, November (2007).

Hsu, S-H., Joglekar, G., Reklaitis, G.V. and Venkatasubramanian, V., "Model Predictive Control on Roller Compaction for Pharmaceutical Manufacturing," paper 409b, AIChE Annual Meeting, Salt Lake City, UT, November (2007).

Akkisetty, P., Lasinski, M., Nere, N., Venkatasubramanian, V., Reklaitis, G.V., Ramkrishna, D., Bell III, W.V. and Blau, G., "Computationally Efficient Hybrid Method for the Inversion of Chord Length Distributions to Particle Size Distributions," paper 391g, AIChE Annual Meeting, Salt Lake City, UT, November (2007).

Krishnamurthy, B.B., Giridhar, A. and Venkatasubramanian, V., "Descriptors For Modeling Undirected Networks," paper 581f, AIChE Annual Meeting, Salt Lake City, UT, November (2007).





Nien-Hwa Linda Wang

Ph. D. Minnesota, 1978

Professor

Violet Hass Award, Purdue University (2008)

Research Areas

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

Selected Professional Activities

Chair of the Symposium on Adsorption of Macromolecules, AIChE Annual Meeting, Salt Lake City, UT, (2007).
Chair, Bioseparations in the Separations Division, AIChE (2006-2007)
Vice-Chair, Adsorption and Ion Exchange in the Separations Division, AIChE
Member, AIChE Separations Division Networking Committee

Selected Invited Lectures

“Simulated Moving Bed Technologies for Producing High Purity Insulin,” Dept. of Chemical Engineering, National Taiwan University, Taipei, Taiwan, December (2007).
“Simulated Moving Bed Technologies for Producing High Purity Biochemicals and Pharmaceuticals,” Dept. of Chemical Engineering, Ohio State University, Columbus, OH, October (2007).
“New Chromatography Processes for Insulin and Proinsulin Purification,” Eli Lilly & Co., Indianapolis, IN, August (2007).

Selected Publications

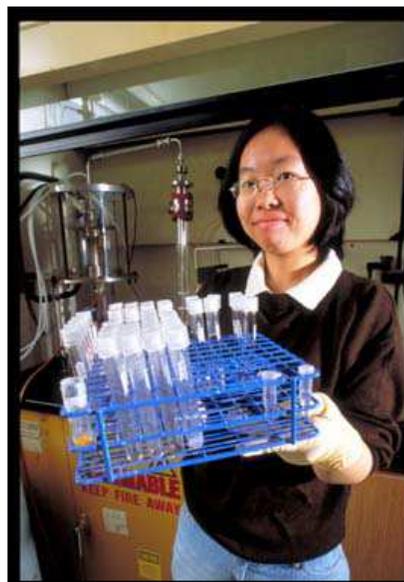
Kasat, R. B., Wang, N.-H. L. and Franses, E. I., “Effects of Backbone and Side-chain on the Molecular Environments of Chiral Cavities in Polysaccharide-Based Biopolymers,” *Biomacromolecules*, **8**, 1676-1685 (2007).
Kim, S. H., Haimovich-Caspi, L., Omer, L., Yu, C. M., Talmon, Y., Wang, N.-H. L., and 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., Franses, E. I. and Wang, N.-H. L., “Characterization of Polysaccharide Based Chiral Sorbents using ATR-IR, XRD, C13 CP/MAS and MAS Solid State NMR, and DFT Modeling,” AIChE Annual Meeting, Salt Lake City, UT, November (2007).
Kasat, R., Wang, N.-H. L. and Franses, E. I., “Fundamental Study of the Adsorption of Chiral Solutes on Polysaccharide Based Chiral Stationary Phases for Chiral Separation Applications,” AIChE Annual Meeting, Salt Lake City, UT, November (2007).

Nieves Ramacha, J. and N.-H. L. Wang, N.-H. L., “Design and Simulation of Simulated Moving Bed Based on Monolithic Silica Columns,” Symposium on Simulated Moving Bed Technologies, AIChE Annual Meeting, Salt Lake City, UT, November (2007).

Kasat, R. (speaker), Wee, S. Y., Loh, J.X., Franses, E. I. and Wang, N.-H. L., “Separation of Chiral Pharmaceuticals: Direct Probing and Modeling for Elucidating the Mechanisms of Molecular Recognition,” Pharmaceutical Poster Session, AIChE Annual Meeting, Salt Lake City, UT, November (2007).





Phillip C. Wankat

Ph. D. Princeton University, 1970

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

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*
ASEE: Fellows Selection Committee, 2005-2007
Co-chair & presenter, Career Development Workshop for New Faculty, ASEE ChED Summer School, Pullman, WA, August (2007)
Co-chair & presenter in Active Learning Techniques Workshop, AIChE Annual Meeting, Salt Lake City, UT, November (2007)
Co-chair of session on Computing and Simulation in ChE Curriculum, AIChE Annual Meeting, Salt Lake City, UT, November (2007)
Co-Chair, "PSA/TSA/LSA Simulations," AIChE Annual Meeting, Salt Lake City, UT, November (2007)

Selected Invited Lectures

"Reducing Distillation Column Diameters with Applications to Ethanol Biorefineries," Mississippi State University, Starkville, MS, October (2007).

Selected Publications

Hur, J.-S., and Wankat, P. C., "Chromatographic and SMB Center-Cut Separations of Ternary Mixtures," *Separ. Sci. Technol.*, **43**, 1273-1295 (2008).

Kostroski, K. and Wankat, P. C., "Separation of Dilute Binary Gases by Simulated-Moving Bed with Pressure-Swing Assist," *Ind. Engr Chem. Research*, **47**, 3138-3149 (2008).

Wankat, P.C. and Knaebel, K. S., "Mass Transfer," Section 5B, in *Perry's Handbook of Chemical Engineering*, 8th ed., Green, D. (Ed.), McGraw-Hill, New York, p. 5-1, 5-2, 5-43 to 5-83 (2008).

Jin, W. and Wankat, P. C., "Hybrid Simulated Moving Bed Processes for the Purification of p-Xylene," *Separ. Sci. Technol.*, **42**, 669-700 (2007).

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.*, **42**, 911-930 (2007).

Jin, W. and Wankat, P. C., "Thermal Operation of Four-Zone Simulated Moving Beds," *Ind. Engr. Chem. Research*, **46**, 7208-7220 (2007).

Wankat, P. C., "Balancing Diameters of Distillation Column with Vapor Feeds," *Ind. Engr. Chem. Research*, **46**, 8813-8826 (2007).

Wankat, P. C., "Reducing Diameters of Distillation Column with Largest Calculated Diameter at the Bottom," *Ind. Engr. Chem. Research*, **46**, 9223-9231 (2007).

Martin, F. B., Hjalmarson, M. A. and Wankat, P. C., "When the Model is a Program," in R. A. Lesh, E. Hamilton, and J. J. Kaput (Eds.), *Foundations for the Future in Mathematics Education*, Lawrence Erlbaum and Associates, Mahwah, NJ, 395-408 (2007).

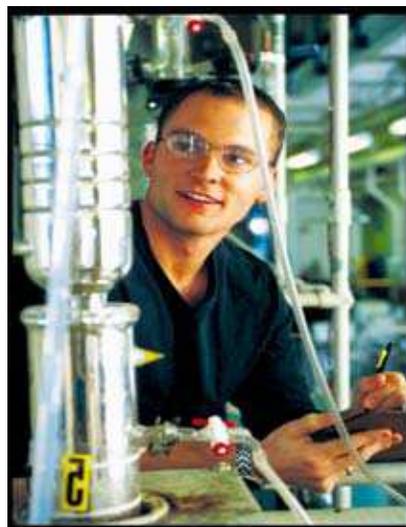
Wankat, P. C., "Survey of K-12 Engineering Oriented Student Competitions," *Intl. J. Eng. Educ.*, **23** (1), 73-83 (2007).

Selected Conference Presentations

Invited, Wankat, P. C., "Balancing Distillation Column Diameter with Vapor Feeds," paper 168, AIChE Annual Meeting, Salt Lake City, UT, November (2007).

Invited, Wankat, P. C., "Time Management for Busy New Faculty," New Faculty Forum, Session 367, AIChE Annual Meeting, Salt Lake City, UT, November (2007).

Keynote, Wankat, P. C., "Engineering Education: Teaching & Research," Pre-ChED Summer School Symposium, Educational Research Options in University & College Engineering & Science Programs, Washington State University, Pullman, WA, July (2007).





You-Yeon Won

Ph. D. Minnesota, 2000

Assistant Professor

Assistant Professor of Materials Science Engineering (by courtesy)

3M Nontenured Faculty Grant Award

KIChE-US Outstanding Young Investigator Award (2007)

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

Vice-Chair, Nanoscale Structure in

Polymers II: Nanostructured Polymeric Material, AICHE

Annual Meeting, Salt Lake City, UT, November (2007)

Selected Invited Lectures

"Triblock Copolymer Micelle-Based DNA/siRNA Delivery,"

Departmental Seminar, Department of Chemical and Biomolecular Engineering, University of Maryland, College Park, MD, April (2008), Department of Chemical Engineering and Materials Science, Michigan State University, East Lansing, MI, February (2008), Department of Chemistry, University of Memphis, Memphis, TN, November (2007), Department of Pharmaceutics and Pharmaceutical Chemistry, University of Utah, Salt Lake City, UT, November (2007).

"Polymer Nanoparticle-Based Gene Delivery," KIChE-US Chapter Outstanding Young Investigator Award Seminar, Open Forum for Korean American Chemical Engineers, AICHE Annual Meeting, Salt Lake City, UT, November (2007).

Selected Publications

Hur, J. and Won, Y.-Y., "Fabrication of High-Quality Non-Close-Packed 2D Colloid Crystals by Template-Guided Langmuir-Blodgett (LB) Particle Deposition," *Soft Matter*, **4(6)**, 1261-1269, (2008).

Hur, J. and Won, Y.-Y., "Two-Dimensional Colloid Crystals Templated by Polyelectrolyte Multilayer Patterns," *Langmuir*, **24(10)**, 5382-5392, (2008).

Witt, K. N. and Won, Y.-Y., "Effect of Interfacial Curvature of Mixed Polyelectrolyte and Neutral Polymer Brushes: An SCF Numerical Analysis," *Macromolecules*, **41(7)**, 2735-2738, (2008).

Zhao, Y., Carvajal, M. T., Won, Y.-Y. and Harris, M. T., "Preparation of Calcium Alginate Microgel Beads by Electrodispersion Precipitation Using an Internal Source of Calcium Carbonate Nanoparticles," *Langmuir*, **23(25)**, 12489-12496, (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*, **40(21)**, 7730-7732, (2007).

Selected Conference Presentations

Witte, K. N. and Won, Y.-Y., "Unifying Self-Consistent Field Theory for Weak Polyelectrolytes," APS March Meeting, New Orleans, LA, March (2008).

Hur, J. and Won, Y.-Y., "Template-Guided Langmuir-Blodgett Deposition of Colloidal Particles," APS March Meeting, New Orleans, LA, March (2008).

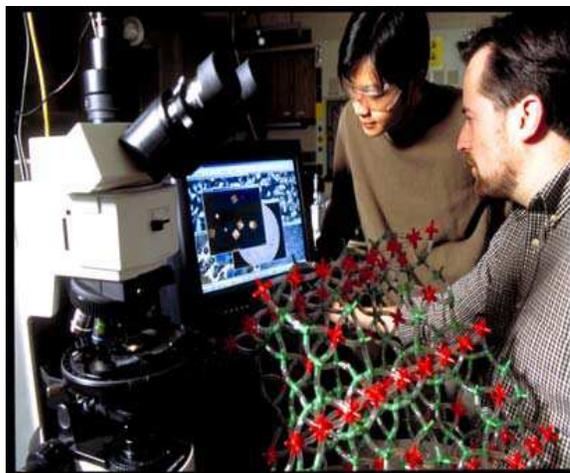
Gary, D. J. and Won, Y.-Y., "An A-B-C Triblock Copolymer Micelle-Based Approach for Intracellular Delivery of Gene-Silencing siRNA," AICHE Annual Meeting, Salt Lake City, UT, November (2007).

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).



Graduate Degrees Awarded

(July 1, 2007 to June 30, 2008)

| | |
|--------|-----------|
| M. S. | 4 |
| Ph. D. | <u>22</u> |
| Total | 26 |

M. S. Degrees

August 2007

1. Rebecca A. Martin

Investigation of the Linear and Nonlinear Viscoelastic Behavior of Polymethylmethacrylate, (Caruthers), EG&G Technical Services, Crane Naval Service Center, Crane, IN - Elastomer Engineer

December 2007

2. Chen, Shuang

A Study of the Folding of Methionine-Arginine Human Proinsulin S-Sulfonate, (Wang), Purdue University, West Lafayette, IN – Continuing for PhD

3. Paul D. Hobson

Ab Initio Studies of the Properties of Carbon Nanotubes and Silicon Nanowires, (Thomson), Chevron Phillips Chemical Co., Houston, TX – R & T Process Development Engineer

May 2008

4. C. Rocio Misiego Arpa

Polyimide-Carbon Nanotube Foam Nanocomposites from Powder Precursors: Synthesis and Characterization, (Pipes/Caruthers), SABIC Innovative Plastics, Mt. Vernon, IN – Process Engineer



Ph. D. Degrees

August 2007

1. Ankur Jain

An Ontological Framework for Knowledge Modeling and Decision Support for Pharmaceutical Product Development, (Reklaitis/Venkatasubramanian), United Airlines, Elk Grove Village, IL – Senior Analyst

2. Sridhar V.V.S. Maddipati

Advanced Computational and Machine Learning Tools in Pharmaceutical Informatics, (Kim/Venkatasubramanian), Fair Issac, San Diego, CA – Analytic Scientist

3. Ravi K. Nandigam

Advanced Informatics Based Approches for Data Driven Drug Discovery, (Kim), Aspen Technology, Cambridge, MA – Senior Software Developer R & D

4. Elizabeth S. Royston

Assembling Inorganic Nanomaterials using Tobacco Mosaic Virus Templates, (Harris), University of Maryland – Research Associate

5. Daniel W. Siderius

Statistical Geometric Models of Hard-Sphere Colloidal Dispersions: Application to Interfacial Thermodynamics and the Calculations of Depletion Forces, (Corti), Washington University, St. Louis, MO – Postdoc

6. Ervina Widjaja

Deposition of Colloidal Particles During Sessile Drop Evaporation, (Harris), Antares Offshore, L.L.C., Houston, TX – Project Engineer

7. Hak Koon Yeoh

Instabilities and Pattern Formation Under an Applied Non-Uniform Electric Field, (Basaran), University of Malaya, Kuala Lumpur, Malaysia – Senior Lecturer

8. Luis Zalamea

On the Cohesion of Carbon Nanotubes in Nanostructures, (Pipes), Dow Europe GmbH, Frinbach, Switzerland – R & D Engineer

December 2007

9. Timothy Andrzejak

Experimental Studies on the Ignition of Single Ni/Al, Fe/Al, and Ti Particles, (Varma), Schlumberger, Rosharon, TX – R & D Engineer

10. Ajay Joshi

Density Functional Theory (DFT) Study of Reaction Pathways, (Delgass/Thomson), Air Products & Chemicals, Allentown, PA – Career Development Program Engineer

11. Shadab S. Mulla

Kinetic Measurement on Lean NOx Traps, (Delgass/Ribeiro), Johnson Matthey Inc., Wayne, PA – Staff Scientist

12. Charles Schaffer

Investigators into the Reactivity and Catalytic Activity of Nanoporous Aluminosilicates and their Synthesis Precursors, (Thomson), Air Products & Chemicals, Allentown, PA – Career Development Program Engineer

13. Eric A. Sherer

Age-Structured Cell Models in the Treatment of Leukemia: Identification, Inversion, and Stochastic Methods for the Evaluation and Design of Chemotherapy Protocols, (Ramkrishna), IU Medical School, Indianapolis, IN – Postdoc

14. Shivani Syal

The Prediction of Glass Transition Temperature of Polycarbonates Using Physical Descriptors and Neural Networks, (Caruthers/Venkatasubramanian), Exxon Mobil, Houston, TX – Senior Research Engineer

15. Vikrant N. Urade

Self-Assembly of Photovoltaic Nanomaterials, (Hillhouse), Shell Technology India Pvt. Ltd., Bangalore, Karnataka, India – Tech, Development Engineer

16. Hsiang-Yu Wang

Microfluidic Electroporation and Cell Arrays, (Wang/Lu), Brigham Young University, Provo, UT – Postdoc; National Cheng Kung University, Taiwan, ROC – Assistant Professor (starting Feb. 2009)

May 2008

17. Jennifer G. Bugayong

Model-Based Design and Optimization of Reversed-Phase Chromatographic Processes for Proinsulin Purification, (Wang), Praxair, Inc., Tonawanda, NY – R & D Engineer

18. Robert T. Collins

Electrohydrodynamics of Free Surface Flows, (Basaran/Harris), Sandia National Labs, Albuquerque, NM – Postdoc

19. Jin Il Kim

A Hybrid Cybernetic Modeling for the Growth of Escherichia coli in Glucose-Pyruvate Mixtures, (Ramkrishna), Samsung Engineering, Giyeonggi-do, South Korea – Research Engineer

20. Gowri Krishnamurthy

Propane Aromatization over ZSM-5 Based Catalysts, (Delgass), Air Products & Chemicals, Allentown, PA – Career Development Program Engineer

21. Avantika Shastri

Metabolic Flux Analysis of Photosynthetic Systems, (Morgan), SABIC Innovative Plastics, Bangalore, India – Research Scientist

22. Michael P. Tate

Nanomaterials for Thermoelectric Energy Conversion, (Hillhouse), Dow Chemical, Midland, MI - Engineer



**Forney Hall of
Chemical Engineering**



Graduate Student Enrollment

Fall 2007

| <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 |
| Santosh Appathurai | Basaran/Harris | Indian Institute of Tech, Madras | Fall 2007 |
| 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 Phillipines | 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 |
| Shuang Chen | Wang | Zhejiang University | Fall 2005 |
| Ye Chen | Reklaitis/Pekny | Zhejiang University | Fall 2007 |
| Pei-Lun Chung | Wang | National Taiwan University | Fall 2003 |
| Robert Collins | Basaran/Harris | University of Tennessee | Fall 2001 |
| Moiz Diwan | Varma | Indian Institute of Technology, Madras | Fall 2005 |
| Heather Emady | Litster/Wassgren | University of Arizona, Tuscon | Fall 2007 |
| Matthew Entorf | Caruthers/Pipes | Iowa State University | Fall 2006 |
| Bradley Fingland | Delgass/Ribeiro | University of Missouri | Fall 2004 |
| Grayson Ford | Agrawal/Hillhouse | University of California | Fall 2006 |
| Steven Gaik | Agrawal/Hillhouse | Pennsylvania State University | Fall 2007 |
| 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 |
| Wenbin Hu | Varma | Tsinghua University | Fall 2006 |
| Shisheng Huang | Agrawal/Pekny/Reklaitis | National University of Singapore | Fall 2007 |
| Jaehyun Hur | Won | Seoul National University | Fall 2003 |
| Ravi Prakash Jaiswal | Beaudoin | Indian Institute of Technology, Kanpur | Fall 2004 |
| Kyungjae Jeong | Beaudoin | Seoul National University | Fall 2002 |
| Ajay Joshi | Thomas/Delgass | UICT - Mumbai | Fall 2003 |
| Clancy Kadrmas | Caruthers/Won | University of North Dakota | Fall 2007 |
| Julie Kadrmas | Liu | University of North Dakota | Fall 2007 |
| 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 |
| Caitlin Kilroy | Beaudoin | University of Notre Dame | Fall 2004 |
| Bum Soo Kim | Beaudoin | Sogang University | Fall 2002 |
| Dae Hwan Kim | Won | Seoul National University | Fall 2007 |
| Jin Il Kim | Ramkrishna | Korea University/Purdue University* | Fall 2002 |
| Vincent Kispersky | Delgass/Ribeiro | University of California, Santa Barbara | Fall 2007 |
| 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 |
| 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 |
| Wen-Sheng Lee | Delgass/Ribeiro | National Taiwan University | Fall 2007 |
| Jianfeng Li | Litster/Wassgren | Tsinghua University | Fall 2007 |
| Jung Sun Lim | Harris | Kyung Hee University | Fall 2005 |
| Thomas Manz | Caruthers/Thomson | University of Toledo/Purdue University* | Fall 2003 |
| Shatara Mayfield | Liu | North Carolina Agricultural Tech Univ. | Fall 2007 |
| Robert McCarthy | Agrawal/Hillhouse | Washington University | Fall 2007 |
| Patrick McGough | Basaran | Purdue University/Purdue University* | Spring 2007 |
| 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 |
| Krista Novstrup | Caruthers/Delgass | University of Washington | Fall 2004 |
| Patrick Oglesby | Harris | Purdue University | Fall 2005 |

| <u>Student</u> | <u>Major Professor</u> | <u>Undergraduate School</u> | <u>Date Enrolled</u> |
|---------------------|--------------------------------------|---|----------------------|
| 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 |
| Christopher Polster | Baertsch | Purdue University | Fall 2004 |
| Chris Pommer | Basaran/Harris | Purdue Unviersity | Fall 2007 |
| Rasika Prabhu | Caruthers | University of Bombay | Fall 2007 |
| Santhosh Ramalingam | Basaran | Indian Institute of Technology, Madras | Fall 2005 |
| Joshua Ratts | Ribeiro | Rose Hulman Institute of Tech/ Purdue University* | Fall 2003 |
| 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 |
| Anirudh Shenvi | Agrawal/Reklaitis/Venkatasubramanian | UICT - Mumbai | Fall 2007 |
| Eric Sherer | Ramkrishna | Caltech | Fall 2001 |
| Che-Chi Shu | Ramkrishna | National Taiwan University | Fall 2007 |
| Aviral Shukla | Venkat/Morris | Indian Institute of Technology, Madras | Fall 2006 |
| 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 |
| Sang Ha Son | Caruthers | Yonsei University | Fall 2007 |
| 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 |
| Korosh Torabi | Corti | Ispan University/IIT-Chicago* | Fall 2007 |
| Mark Uline | Corti | Purdue University | Fall 2003 |
| Vikrant Urade | Hillhouse | UICT - Mumbai | Fall 2002 |
| Shaunak Vora | Litster | UICT-Mumbai | Fall 2007 |
| Hsiang-Yu Wang | Wang | National Taiwan University | Fall 2003 |
| Sean Werner | Morgan | University of Illinois | Fall 2005 |
| W. Damion Williams | Delgass/Ribeiro | University of Oklahoma | Fall 2006 |
| Kevin Witte | Won/Kim | Ohio State University | Fall 2004 |
| J. Camilo Zapata | Reklaitis/Pekny | Universidad Pontificia Bolivariana/ Purdue University* | Fall 2005 |
| Rong Zhang | Baertsch | Jilin University/Miami University* | Fall 2007 |
| 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. Luis Puigjaner

UPC - ETSEIB
Dpt. Ingeniería Química, Barcelona, Spain
(7/7/08-9/23/08)

Dr. G.D. Yadav

Head, Dept. of Chemical Engineering
University Institute of Chemical Technology (UICET)
University of Mumbai
(9/1/07-11/30/07)

Academic Advisory Board

Formed in 2006 to provide input on academic issues, the Academic Advisory Board had its 2008 meeting on February 26 and 27. Current Board members, serving a 3-year term, are **Kristi Anseth**, Distinguished Professor, University of Colorado, Boulder; **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. Auhl Professor and Dean of Engineering, UC-Santa Barbara.

Seminar Speakers

Professor Richard D. Noble, Department of Chemical Engineering, University of Colorado – Boulder, "Gas Separations Using Ionic Liquids & Polymers" (August 28, 2007)

Dr. Xiaomin Yang, Regional Technology Coordinator, BP, "Cellulosic Ethanol/Biofuel Production – Challenges, Technologies & Economics" (September 4, 2007)

Dr. Theo H. Fleisch, BP Distinguished Advisor, BP, "The New Syngas Conversion Business: Opportunities & Challenges" (September 11, 2007)

Professor Supriyo Datta, Department of Electrical & Computer Engineering, Purdue University, "Nanodevices & Maxwell's Demon" (September 18, 2007)

Professor John M. Vohs, Department of Chemical & Biomolecular Engineering, University of Pennsylvania, "Mechanistic Studies of Hydrogen Production from Methanol on PdZn Alloy Catalysts" (September 25, 2007)

Professor Steven M. Cramer, Department of Chemical & Biomolecular Engineering, Rensselaer Polytechnic Institute, "Protein Separations in Chromatographic Systems: A-priori prediction of protein affinity, selective displacers & generic antibody purification processes" (October 2, 2007)

Professor G. D. Yadav, Department of Chemical Engineering, University Institute of Chemical Technology University of Mumbai, "Selectivity Engineering in Synthesis of Fine Chemicals & Pharmaceuticals" (October 16, 2007)

Professor Christopher J. Roberts, Department of Chemical Engineering, University of Delaware, "Nonnative Protein Aggregation from a Multi-scale Biophysical & Modeling Approach" (October 23, 2007)

Professor Pedro E. Arce, Department of Chemical Engineering, Tennessee Tech University, "Tailoring the Nano-Architecture of Gel Materials for the Motion of Macromolecules: DNA vs. Nanoparticles" (November 13, 2007)

Professor Yan-Tin (Elizabeth) Shiu, Department of Bioengineering, University of Utah, "Effects of Hemodynamic Forces on Endothelial Cell Function" (November 27, 2007)

Professor Manos Mavrikakis, Department of Chemical & Biological Engineering, University of Wisconsin - Madison "Remarkable Catalysis by Core-Shell Alloy Nanoparticles" (December 4, 2007)

Professor Susannah Scott, Departments of Chemical Engineering and Chemistry & Biochemistry, University of California, Santa Barbara, "Activation of Polymerization Catalysts by and on Oxide Surfaces" (January 15, 2008)

Associate Dean Audeen Fentiman, College of Engineering, Purdue University "Responsible Conduct of Research" (January 17, 2008)

Dr. Ellen B. Stechel, Manager, Fuels and Energy Transitions, Sandia National Laboratories, "Moving Beyond a Fossil Fuel Dominated Energy System: Opportunities and Challenges" (February 5, 2008)

Professor Leonard Uitenham, Department of Chemical Engineering, North Carolina A&T State University, "Biodegradable Polymer Nano-composites" (February 12, 2008)

Professor Norman J. Wagner, Department of Chemical Engineering, University of Delaware, "The Rheology of Colloidal and Nanoparticle Dispersions: "STF Armor" – Nanoparticle Composites for Flexible Ballistic Materials" (February 19, 2008)

Professor B. Wayne Bequette, Department of Chemical & Biological Engineering, Rensselaer Polytechnic Institute, "Biomedical and Pharmaceutical Applications of Systems and Control" (February 26, 2008)

Professor Yi Tang, Department of Chemical & Biomolecular Engineering, University of California, Los Angeles, "Exploring Natural Product Biosynthetic Pathways for Novel Enzymes and Useful Biocatalysts" (March 4, 2008)

Kelly Lectures

Dr. Pablo Debenedetti, Department of Chemical Engineering, Princeton University, "Water in Confinement" (March 18, 2008), "Statistical Characterization of Structure in Complex Systems" (March 19, 2008)

Dr. David Mirth, Vice President of Innovation for Insulating, Systems Business, Owens Corning, "Sustainability: How (and Why) Corporations Are Making a Difference" (April 1, 2008)

Professor Anuj Chauhan, Department of Chemical Engineering, University of Florida , “Ophthalmic Drug Delivery by Contact Lenses” (April 8, 2008)

Professor Matteo Pasquali, Department of Chemical & Biomolecular Engineering, Rice University, "Single Walled Carbon Nanotubes in Liquids." (April 22, 2008)