PURDUE CHEMICAL ENGINEERING

Chemical Engineering

Professional Activity REPORT

2012-13

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Message from the Head

This fall we celebrate a wonderful milestone in our School and building history, the renovation and upgrade of the Unit Operations Laboratory. Ever since the beginning of the ChE program at Purdue in 1911, the Unit Operations Laboratory has been a cornerstone of our undergraduate education, the place where our seniors apply all the concepts they have acquired during their professional journey in Chemical Engineering. Through generous donations from alumni, corporations, and a Purdue University Repair and Rehabilitation contribution, we were able to not only complete the physical renovation of the lab and introduce several new experiments, but also to gratefully secure an endowment for the laboratory from alumnus Alan H. Fox (BSChE ’55) so that all future annual operation and upgrade needs will be covered in perpetuity.

We are entering a period of unprecedented growth in our School, which will begin by hiring several additional faculty members, which in turn will lead to a 10% increase in our undergraduate student population and significant growth of the graduate program. This growth is implemented as a part of the College of Engineering plan to align our student per faculty ratios to the same levels as our peers, and a need to expand and deepen our expertise into game changing areas, such as energy storage and personalized medicine. As a prelude to this growth, this spring we welcomed Associate Professor Jeffrey Greeley (Ph. D., University of Wisconsin-Madison, 2004), and this fall Assistant Professor Raj Gounder (PhD, University of California – Berkeley, 2011). In January 2014, we’ll be joined by two new Associate Professors: Drs Carl Laird (PhD, Carnegie Mellon University, 2006) and Vilas Pol (PhD, University of Bar-Ilan, Israel, 2005).

The 2012-13 academic year brought a number of prestigious recognitions to our School. Distinguished Professor Sangtae Kim received the 2013 Ho-Am Engineering Prize from Korea, that nation's highest engineering research award. We are delighted to welcome Professor Kim back to Purdue and to our School after a leave of absence for a few years. Professor Rakesh Agrawal, Winthrop E. Stone Distinguished Professor of Chemical Engineering, was elected to be a member of the prestigious American Academy of Arts & Sciences. The 2013 AIChE annual meeting is again an occasion for celebration for our School - yours truly will receive the 2013 AIChE Warren K. Lewis Award for Chemical Engineering Education. Our alumni also received stellar recognitions this past year: Kristi Anseth (BSChE '92) was elected a member of the National Academy of Sciences and Antonios Mikos (MS’85, PhD ’88) was elected to the Institute of Medicine of the National Academies. Anthony Lowman (PhD ’97) was named Dean of Engineering at Rowan University; Chris Bowman (BS ChE ‘88, PhD ’91) was named a Distinguished Professor at the University of Colorado and Bruce Dale (PhD ‘79) was named Distinguished Professor at Michigan State University.

With 541 undergraduate students (sophomores to seniors) and 142 graduate students (including 6 NSF Graduate Fellowship recipients) enrolled for fall 2013, we are among the largest Chemical Engineering educational programs in the United States. As always, the quality of our students is exemplified by their achievements. For example, for the second year in a row, the Indiana Soybean Alliance Innovation Competition $20,000 top prize went to a team including a Purdue ChE graduate student, Anshu Gupta, for their soy protein fiber insulation that can be used in bedding, sleeping bags and apparel. We are proud of our faculty, staff, students and alumni, and look forward to showcase their work and accomplishments - just stop by for a visit!

Sincerely,

Arvind Varma
R. Games Slayter Distinguished Professor
Jay and Cynthia Ihlenfeld Head of Chemical Engineering

PURDUE
UNIVERSITY

School of Chemical Engineering
Strategic Plan 2010-2014

Vision:

Be widely recognized among the premier ranks of chemical engineering programs in the world.

Mission:

Provide students with a rigorous and relevant education, conduct field-defining research, and enhance the School's global impact.

Values:

Leadership;
excellence and innovation;
relevance and impact;
commitment and responsibility;
teamwork and partnership;
diversity and respect;
safety and sustainability.

Research: To pursue breakthrough research that extends the boundaries of chemical engineering into areas which promote sustainability and which will have the greatest positive impact on our global society.

Education:

Graduate Programs - Recruit and retain high caliber graduate students from top-tier chemical engineering programs, provide challenging and relevant research programs, and a quality graduate level education.

Undergraduate Programs - Recruit and retain the most capable, motivated and diverse class of undergraduates, and help them to obtain a solid and relevant education throughout their Purdue experience.

Global Impact: Educate undergraduate and graduate students who will be successful in a global environment. Cultivate and expand research relationships with prominent international research organizations.

Development: Secure and improve the School's financial foundation as a means to continually improve its programs and physical facilities, while balancing short and long term goals.

Engagement: Encourage faculty, staff and students to develop a sense of personal responsibility and accountability for service at both the local and national levels. Promote entrepreneurial activity, leading to intellectual property, including invention disclosures and patents. Become a leader in sustainability on the Purdue campus.

Professional Development and Recognition: Encourage all faculty, staff and students to participate in activities that will enhance their career, develop their skills, and help them become more creative and productive. Actively promote recognition by internal and external award nominations.

Culture and Environment: Create an environment where faculty, staff and students are treated with respect and where superior teamwork is achieved. Enhance and expand safety activities and safety education.

Research Areas

Research by Fundamental Topic Area

Biochemical and Biomolecular Engineering: Franses, Morgan, Ramkrishna, Wang, Won

Catalysis and Reaction Engineering: Andres, Delgass, Gounder, Greeley, Ramkrishna, Ribeiro, Thomson, Varma

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

Mass Transfer and Separations: Agrawal, Boudouris, Wang, Wankat

Nanoscale Science and Engineering: Agrawal, Andres, Beaudoin, Boudouris, Corti, Delgass, Franses, Harris, Ribeiro, Thomson, Won

Polymers and Materials: Boudouris Caruthers, Harris, Litster, Pipes, Varma, Won, Wu

Product and Process Systems Engineering: Agrawal, Kim, Litster, Nagy, Pekny, Reklaitis

Thermodynamics, Molecular and Nanoscale Modeling: Corti, Greeley, Thomson, Won

Research by Application Area

Biotechnology: Franses, Harris, Liu, Ramkrishna, Wang, Won, Yuan

Electronics: Agrawal, Beaudoin, Boudouris, Wu

Energy: Agrawal, Boudouris, Gounder, Greeley, Morgan, Pekny, Reklaitis, Ribeiro, Varma, Wu

Manufacturing: Agrawal, Basaran, Corti, Franses, Harris, Kim, Pekny, Reklaitis, Varma, Wang

Pharmaceuticals: Basaran, Beaudoin, Harris, Kim, Litster, Nagy, Reklaitis

Security: Beaudoin, Boudouris

Rakesh Agrawal

Sc. D., Massachusetts Institute of Technology, 1980

Winthrop E. Stone Distinguished Professor

Member, National Academy of Engineering
Elected Member, American Academy of Arts and Sciences, 2013
IIT-Kanpur Distinguished Alumnus Award, 2013

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

Fellow, AIChE
Member, Editorial Advisory Board, I&EC Research
Consulting Editor, AIChE Journal
Member, ChE Department Advisory Committee, WPI
Visiting Chair Professor, ExxonMobil, Dept. of ChE & Biomolecular Engr., National University of Singapore, 2011-present
Member, ATMI, 2010-present
Member, Editorial Board, Current Opinion in ChE, 2011-present
Member, Editorial Advisory Board, ChE Progress, 2012-present
Member, Advisory Council, Dept. of Chemical and Biomolecular Engineering, University of Delaware, 2012-present
Member, Consulting Editors Board, AIChE Journal, 2012-2016
Member, Editorial Board, Energy Technology, 2012-present
Member, Aspen Tech Academy, Aspen Tech, 2012-present

Selected Invited Lectures

"Thin Film Solar Cells from Nanocrystal Inks of Quaternary Chalcogenides," AVS Materials for Energy Meeting, University of Illinois at Urbana-Champaign, Urbana, IL; Brookhaven National Lab, Upton, NY, September (2012); Plenary talk, 7th Singapore International Chemistry Conference (SICC-7), Singapore, December (2012)

"Improved Performace of Earth-Abundant Cu2ZnSn(SxSel-x)4 Solar Cells Through Ge Incorporation," AIChE Annual Meeting, Pittsburgh, PA, October (2012)

"Kinetics of High Pressure Catalytic Reaction Pathways for Dihydroeugenol Over Pt/ZrO2," AIChE Annual Meeting, Pittsburgh, PA, October (2012)

"Thin Film Solar Cells from Nanocrystals of Quaternary Semiconductors," Joint Symposium of Korean Institute of Chemical Engineering (KIChE) and AIChE to Celebrate 50th Anniversary of KIChE, Pittsburgh, PA, October (2012); Indian Institute of Petroleum, Dehradun, India, January (2013); Keynote Lecture, Columbia-US Workshop, Nanotechnology in Energy and Medical Applications, Medellin, Colombia, March (2013)

"Copper-zinc-tin Chalcogenide Absorbers Derived from Controlled Sulfide Nanocrystals of Wurtzite and Kesterite Structures," MRS Fall Meeting, Boston, MA, November (2012)

"Nanocrystal Ink based route for Cu(In,Ga)Se2 and Cu2ZnSnS4 Based Efficient Solar Cells," National University of Singapore, Singapore, December (2012)

"Novel Energy Efficient Distillation Configurations for Sustainable Era," Padmavibhushan Professor Sharma, M. M. Lecture, Indian Institute of Chemical Engineers, Jallanndhar, India, December (2012)

"Direct Production of Molecules in the Fuel Range by Selective Tailoring of Biomass Fast," Indian Institute of Petroleum, Dehradun, India, January (2013)

"Limiting Efficiencies for Solar Thermal Conversion to Fuels," Keynote Lecture, Session Solar Energy and Solar Fuels, ACS Meeting, New Orleans, LA, April (2013)

"Analysis of Recombination in Cu2ZnSn1-xGexSySe4-y thin films by Photoluminescence Spectroscopy," MRS Spring Meeting, San Francisco, CA, April (2013)

"Novel Metal-selenide Nanoparticle Synthesis from Phosphorous-free Routes," MRS Spring Meeting, San Francisco, CA, April (2013)

"Scalable Photovoltaics through Nanotechnology," MRS Spring Meeting, San Francisco, CA, April (2013)

Selected Publications

Shenvi, A. A., Shah, V. H., Zeller, J. A., and Agrawal, R., "A Synthesis Method for Multicomponent Distillation Sequences with Fewer Columns," *AIChE Journal*, **58**(8), 2479 (2012)

Agrawal, R. and Sikdar, S., "Energy, environment and sustainability challenges and opportunities for chemical engineers," *Current Opinion in Chemical Engineering,* **1**, 201 (2012)

Nallasiviam, U., Shah, V. H., Shenvi, A. A., Tawarmalani, M., and Agrawal, R., "Global Optimization of Multicomponent Distillation Configurations: 1. Need for a Reliable Global Optimization Algorith," *AIChE Journal,* **59**(3), 971-981 (2013)

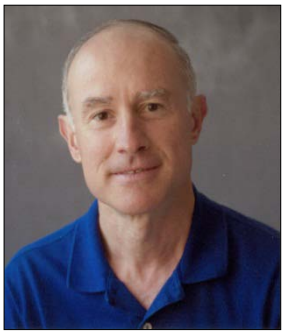
Guo, Q. J., Ford, G. M., Agrawal, R., and Hillhouse, H. W., "Ink Formulation and Low-Temperature Incorporation of Sodium to Yield 12% Efficient Cu(In,Ga)(S,Se)2 Solar Cells from Sulfide Nanocrystal-Inks," *Progress in Photovoltaics: Research and Applications,* **21**(1), 64 (2013)

Shenvi, A. A., Shah, V. H., and Agrawal, R., "New Multicomponent Distillation Configurations with Simultaneous Heat and Mass Integration," *AIChE Journal,* **59**(1), 272 (2013)

Dongaonkar, S., Loser, S., Sheets, E. J., Zaunbrecher, K., Agrawal, R., Marks, T. J., and Alam, M. A., "Universal statistics of parasitic shunt formation in solar cells, and its implications for cell to module efficiency gap," *Energy Environ. Sci.,* **6**, 782 (2013)

Book Chapters

Shah, V. H. and Agrawal, R., "Conceptual Design of Zeotropic Distillation Processes," *Distillation: Fundamentals and Principles,* **1**(1), Chapter 8, in press (2013)



Osman A. Basaran

Ph. D., University of Minnesota, 1984

Burton and Kathryn Gedge Professor

Research Areas: Fluid Mechanics, Rheology, Drop Dynamics, Interfacial Phenomena, Finite Elements, Computational Analysis, Ink-Jet Printing, MEMS, Electroseparations

Selected Professional Activities

Fellow, American Physical Society
Chair, National Committee on Membership, American Physical Society

Selected Invited Lectures

"Drop dynamics and small-scale flows exhibiting singularity formation, interface rupture, and unexpected physics," Beckman Coulter Corporation, Indianapolis, IN, October (2012)

"Fluid dynamics of electrosprays," Beckman Coulter Corporation, Indianapolis, IN, December (2012)

"Universal Scaling Laws for the Disintegration of Electrified Drops," Department of Mechanical Science and Engineering, University of Illinois at Urbana-Champaign, Urbana, IL, April (2013)

"Universal Scaling Laws for the Disintegration of Electrified Drops," Department of Mechanical Engineering, Johns Hopkins University, Baltimore, MD, May (2013)

Selected Publications

Ramalingam, S., Ramkrishna, D., Basaran, O. A., "Free vibrations of a spherical drop constrained at an azimuth," *Phys. Fluids,* **24**, 082102 (A Highlight Paper) (2012)

Bhat, P. P., Appathurai, S., Harris, M. T., Basaran, O. A., "On self-similarity in the drop-filament corner region formed during pinch-off of viscoelastic fluids," *Phys. Fluids,* **24**, 083101 (2012)

Basaran, O. A., Gao, H., Bhat, P. P., "Nonstandard inkjets," *Ann. Rev. Fluid Mech.,* **45**, 85-113 (Invited Review Article) (2013)

Collins, R. T., Sambath, K., Harris, M. T., and Basaran, O. A., "Universal scaling laws for the disintegration of electrified drops," *PNAS,* **110**, 4905-4910 , www.pnas.org/cgi/doi/10.1073/pnas1213708110 (2013)

Selected Conference Presentations

Basaran, O. A., "EHD tip streaming: size and charge of electrospray droplets," AIChE Annual Meeting, Pittsburgh, PA, October-November (Sole Invited Talk in Symposium Organized Jointly with the American Electrophoresis Society, AES) (2012)

Appathurai, S., Harris, M. T., Basaran, O. A., Paulsen, J., Burton, J., Nagel, S. R., "Unexpected dynamics of drop coalescence," AIChE Annual Meeting, Pittsburgh, PA, October-November (2012)

Sambath, K. and Basaran, O. A., "Electrohydrostatics of capillary switches," AIChE 2012 Annual Meeting, Pittsburgh, PA, October-November (2012)

Pommer, C. A., Harris, M. T., Basaran, O. A., "Scaling in the transition from selective withdrawal to entrainment," AIChE Annual Meeting, Pittsburgh, PA, October-November (Received Best Paper Award in Session 353, Interfacial and Nonlinear Flows I) (2012)

Sambath, K., Subramani, H. J., Basaran, O. A., "Collision and coalescence of liquid drops in a dynamically active fluid," 65th Annual Meeting of the Division of Fluid Dynamics (DFD) of the American Physical Society (APS), San Diego, CA, November (2012)

Thete, S., Appathurai, S., Gao, S., Basaran, O. A., "Fluid dynamics following flow shut-off in bottle filling," 65th Annual Meeting of the Division of Fluid Dynamics (DFD) of the American Physical Society (APS), San Diego, CA, November (2012)

Devlin, N. R., Sambath, K., Harris, M. T., Basaran, O. A., "Contraction dynamics of planar liquid filaments," 65th Annual Meeting of the Division of Fluid Dynamics (DFD) of the American Physical Society (APS) San Diego, CA, November (2012)

Olles, J., Hirsa, A., Sambath, K., Basaran, O. A., "Magnetic actuation of immersed coupled droplets: experiments and stimulations," 65th Annual Meeting of the Division of Fluid and Dynamics (DFD) of the American Physical Society (APS), San Diego, CA, November (2012)

Dr. Basaran with
Graduate Student Krishnaraj Sambath

Stephen P. Beaudoin

Ph. D., North Carolina State University, 1995

Professor

Research Areas: Particle and Thin Film Adhesion, Explosives Detection, Electronic Materials

Selected Professional Activities

Member, American Heart Association Science Council, 2002-present
Member, National Programming Committee, American Institute of Chemical Engineers, 2000-present
Fundamentals Division Programming Chair, Environmental Division, American Institute of Chemical Engineers, 1997-present
Technical Reviewer, NSF Sensors Panelist, Chemical and Transport Systems
Technical Reviewer, NSF Nanoscale Interdisciplinary Research Teams (NIRT) Panelist, Chemical and Transport Systems
Technical Reviewer, NSF CAREER Panelist, Chemical and Transport Systems
Technical Reviewer, NSF-Small Business Innovation Research Panel Review, Machines and Process Development
Technical Reviewer, NSF-Small Business Innovation Research Panel Review, Electrochemical and Photochemical Devices
Technical Reviewer, NSF/EPA-Technology, Sustainable Environment Panelist
Technical Reviewer, Oklahoma State University Environmental Institute Energy Research Grant Program
Technical Reviewer, University of Minnesota/NSF, Fluid Mechanics Modules Panel Review

Selected Publications

Jaiswal, R. and Beaudoin, S., "An Approximate Scheme for Calculating van Der Waals Forces between Finite Cylindrical Volume Elements," *Langmuir,* **28**(2), 8359-5370 (2012)

Balachandran, D., Jallo, L., Davé, R., and Beaudoin, S., "Adhesion of Dry Nano-coated Microparticles to Stainless Steel: A Physical Interpretation," *Powder Technology,* **226**, 1-9 (2012)

Chaffee-Cipich, M., Sturtevant, B., and Beaudoin, S., "Adhesion of Explosives," *Analytical Chemistry,* **85**, 5358-5366 (2013)

Zarate, N., Harrison, A., Litster, J., and Beaudoin, S., "Effect of Relative Humidity on Onset of Capillary Forces for Rough Surfaces," *Journal of Colloid and Interface Science,* http://dx.doi.org/10.1016/j.jcis.2013.5.048 (2013)

Smith, K. M., Butterbaugh, J. W., and Beaudoin, S. P., "Effects of Varying Surface Film Thickness on Particle Adhesion in Semiconductor Material-Based Systems," in press, *Journal of the Electrochemical Society* (2013)

Selected Conference Presentations

Beaudoin, S., "Fundamentals of Small Particle-Substrate Interactions," Tutorial at the 11th International Symposium on Ultraclean Processing of Silicon Surfaces, Ghent, Belgium, September (2012)

Zarate, N., Litster, J., and Beaudoin, S., "Roughness Effects on Particle Adhesion," Annual Meeting of the American Institute of Chemical Engineers, Pittsburgh, PA, October (2012)

Beaudoin, S., "Predictive Particle Interactions," American Association of Pharmaceutical Scientists (AAPS) Arden Conference, Arlington, VA, March (2013)

Harrison, A., Chaffee-Cipich, M., Sweat, M., and Beaudoin, S., "Advances in Understanding Contact-Based Sampling for Explosives Detection," 5th Annual Trace Explosives Detection Workshop, Philadelphia, PA, April (2013)

Dr. Beaudoin with Gerald Forney

Bryan W. Boudouris

Ph. D., University of Minnesota, 2009

Assistant Professor

AFOSR Young Investigator Award, 2012
DARPA Young Faculty Award, 2012

Research Areas: Synthesis, Nanostructural Characterization, and Device Physics of Novel Functional Homopolymers and Block Copolymers for Advanced Photovoltaic, Thermoelectric, Biomedical, and Homeland Security Device Applications

Selected Professional Activities

Founding Program Director, Purdue Section's ACS Project SEED Program

Session Chair, American Physical Society (APS) National March Meeting, "Focus Session: Polymers for Energy Storage and Conversion – Nanostructures and Phase Separated Morphologies," 2012

Proposal Reviewer, National Science Foundation (NSF), the Department of Energy (DOE), and Air Force Office of Scientific Research (AFOSR)

Reviewer, Stanford Synchrotron Radiation Lightsource (SSRL) and Molecular Foundry Lawrence Berkeley National Laboratory (LBNL) User Proposals

Selected Invited Lectures

"Design of Optoelectronically-Active Polymers for Organic Photovoltaic Applications," Purdue Solar Research Series, Birck Nanotechnology Center, West Lafayette, IN, January (2013)

"Designing Macromolecules with Specific Optoelectronic and Chemical Functionalities for Advanced Energy and Biomedical Applications," Purdue University, Department of Chemistry (Organic Chemistry Division), West Lafayette, IN, April (2013)

Selected Publications

Chapler, B. C., Mack, S., Ju, L., Elson, T. W., Boudouris, B. W., Namdas, E., Yuen, J. D., Heeger, A. J., Samarth, N., Di Ventra, M., Segalman, R. A., Awschalom, D. D., Wang, F., and Basov, D., N., "Infrared Conductivity of Hole Accumulation and Depletion Layers in (Ga,Mn)As- and (Ga,Be)As-based Field-effect Devices, *Physical Review B,* **86**, 165-302 (2012)

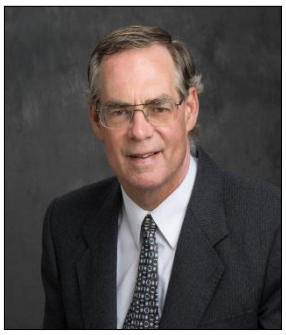
Selected Conference Presentations

Poster Presentation, Hadley, S. F. and Boudouris, B. W., "Development of Active Nanorod Arrays for Improved Adhesion in Trace Detection of Explosives," AIChE Midwest Regional Conference, Chicago, IL, February (2013)

Oral Presentation, "Aliphatic Polymers Bearing Pendant Radical Groups as Charge Carrying Moieties in Organic Electronic Applications," APS March Meeting, Baltimore, MD, March (2013)

Poster Presentation, Rostro, L. and Boudouris, B. W., "Solid State Charge Transport in Radical Polymers," APS March Meeting, Baltimore, MD, March (2013)

Graduate Student Edward Tomlinson with Dr. Boudouris.



James M. Caruthers

Sc. D., Massachusetts Institute of Technology, 1977

Reilly Professor

Research Areas: Non-linear Viscoelasticity of Polymer Glasses and Elastomers, Olefin Polymerization Catalysis, Epoxy Cure Kinetics, Battery Sensory Technology

Selected Professional Activities

Chair, NSF Working Group on Life Performance of Polymer Based Engineering Materials: The Interaction between Mechanics and Chemistry
Associate Editor, Rubber Chemistry and Technology
Associate Editor, Journal of Time Dependent Materials

Selected Invited Lectures

"Viscoelastic Behavior of Glassy Polymers: The Consequences of Dynamic Heterogeneity," University of Massachusetts, Boston, MA, October (2012)

"Development of Constitutive Models for the Long Term Performance of Glassy Polymers," Durability of Polymers and Composites: Current Challenges and Future Prospects, Monterey, CA, March (2013)

Selected Publications

Lli, C., Lee, E. W., Medvedev, G. A., Caruthers, J. M., and Strachan, A., "Molecular Dynamics Simulations and Experimental Studies of the Thermomechanical Response of an Epoxy Thermoset Polymer," *Polymer,* **53**(19), 4222-4230 (2012)

Medvedev, G. A., Starry, A. B., Ramkrishna, D., and Caruthers, J. M., "Stochastic Model for Volume Relaxation in Glass Forming Materials: Local Specific Volume Model," *Macromolecules,* **45**, 7237-7259 (2012)

Ogebule, O., Medvedev, G. A., and Caruthers, J. M., "Necking in Flumed Silica Filled Poly(dimethyl siloxane) and the Resulting Mechanical Properties of the Necked Material," *Polymer,* http://dx.doi.org/10.1016/j.poymer.2012.12.065 (2012)

Manz, T. A., Caruthers, J. M., Sharma, S., Phomphrai, K., Thomson, K. T., Delgass, W. N., and Abu-Omar, M. M., "Structure-Activity Correlation for Relative Chain Initiation to Propagation Rates in Single-Site Olefin Polymerization Catalysis," *Organometallics,* **31**, 602-618 (2012)

Prabhu, R., Klitkou, R., Medvedev, G. A., and Caruthers, J. M., "A Critical Analysis of the Effect of Cross-Linking on the Linear Viscoelastic Behavior of Styrene-Butadiene Rubber and Other Elastomers," *Journal Polymer Science: Part B Polymer Physics,* **51**, 687-697 (2012)

Ogebule, O., Medvedev, G. A., and Caruthers, J. M., "Necking in Flumed Silica Filled Poly(dimethyl siloxane) and the Resulting Mechanical Properties of the Necked Material," *Polymer,* **54**(3), 1190-1196 (2013)

Kim, J. W., Medvedev, G. A., and Caruthers, J. M., "Nonlinear Stress Relaxation in an Epoxy Glass and Its Relationship to Deformation Induced Mobility," *Polymer,* **54**, 3949-3960 (2013)

Medvedev, G. A. and Caruthers, J. M., "Development of a Stochastic Constitutive Model for Prediction of Post-Yield Softening in Glassy Polymers," *Journal of Rheology,* **57**(3), 949-1002 (2013)

Steelman, D. K., Xiong, S., Pletcher, P., Smith, E., Switzer, J., Medvedev, G. A., Delgass, W. N., Caruthers, J. M., and Abu-Omar, M., "Effects of Pendant Ligand Binding Affinity on Chain Transfer for 1-Hexene Polymerization Catalyzed by Single-Site Zirconium Amine Bis-PPhenolate Complexes," *Journal of American Chemical Society,* in press (2013)

Kim, J. W., Medvedev, G. A., and Caruthers, J. M., "Observation of Yield in Triaxial Deformation of Glassy Polymers," *Polymer,* in press (2013)

Steelman, D. K., Xiong, S., Pletcher, P. D., Switzer, J. M., Medvedev, G. A., Delgass, W. N.,. Caruthers, J. M., and Abu-Omar, M., "Comparison of Selected Zirconium and Hafnium Amin Bis(pehnolate) Catalysts for 1-Hexene Polymerization," *Organometallics,* in press (2013)

Selected Conference Presentations

Ogebule, O., Medvedev, G. A., and Caruthers, J. M., "Necking in Silica Filled Poly(dimethyl siloxane) and the Resulting Mechanical Properties of the Necked Material," ACS Rubber Division, 182nd Technical Meeting, Cincinnati, OH, October (2012)

Medvedev, G. A., Kim, J., and Caruthers, J. M., "Observation of yield in a triaxial deformation of a glassy thermoset polymer," APS, Baltimore, MD, March (2013)

Steelman, D. K., Pletcher, P. D., Xiong, S., Switzer, J. M., Medvedev, G. A., Caruthers, J. M., Delgass, W. N., and Abu-Omar, M. M., "Structure-Activity Relationships in Single Site Polymerization," poster, Gordon Research Conference on Inorganic Reaction Mechanisms, Galveston, TX, March (2013)

Son, S. H. and Caruthers, J. M., "Kinetic study of epoxy resin cure with amines: Quantitative analysis methodology," ACS Spring National Meeting, New Orleans, LA, April (2013)

Dr. Caruthers and Dr. Ramkrishna

David S. Corti

Ph. D., Princeton University, 1997

Professor
Director of Undergraduate Studies
University Faculty Scholar, Purdue University, 2011-2016

Research Areas: Molecular Thermodynamics, Metastable Liquids, Nucleation Phenomena, Collodial Dispersions, Computer Simulation Techniques, Molecular Simulation

Selected Professional Activities

Chair, Area 1a Programming Committee, AIChE, 2010-2013
Editorial Board, ISRN Computational Mathematics

Selected Publications

Kelkar, A. V., Dong, J., Franses, E. I., and Corti, D. S., "New Models and Predictions for Brownian Coagulation of Non-Interacting Spheres," *J. Coll. Int. Sci.,* **389**, 188-198 (2012)

Selected Conference Presentations

Dong, J., Ng, H. T., Franses, E. I., and Corti, D. S., "Measuring Hamaker Constants by Atomic Force Microscopy from the "Jump-into-Contact" Distance: Quasi-Static Models and Dynamic Stimulations," selected "Best Paper" of its session, AIChE National Meeting, Pittsburgh, PA, October-November (2012)

Torabi, K. and Corti, D. S., "Towards a Molecular Theory for Homogenous Bubble Nucleation in Metastable Liquids," AIChE National Meeting, Pittsburgh, PA, October-November (2012)

Kelkar, A. V., Dong, J., Franses, E. I., and Corti, D. S., "On the Brownian Coagulation of Colloidal Dispersions," AIChE National Meeting, Pittsburgh, PA, October-November (2012)

Dong, J., Zhao, Y., Ng, H. T., Franses, E. I., and Corti, D. S., "New Method for Determining the Hamaker Constant of a Solid with Atomic Force Microscopy," 87th ACS Colloid & Surface Science Symposium, Riverside, CA, June (2013)

Kelkar, A. V., Franses, E. I., and Corti, D. S., "Brownian Coagulation Kinetics in Concentrated Dispersions," 87th ACS Colloid & Surface Science Symposium, Riverside, CA, June (2013)

Professor Corti and Professor Varma announcing the 2013 Student Awards

Elias I. Franses

Ph. D., Minnesota, 1979

Professor

Research Areas: Adsorption and Tension Equilbria and Dynamics of Surfactants and Proteins at Fluid/Fluid and Fluid/Solid Interfaces, Sorbents and Sorbent-Solvent-Sorbate Interactions of Chiral Molecules for Chiral Bioseparations of Enantiomers, Coloidal Stability of Aqueous Dispersions of Pigment Nanoparticles and of Hydrocarbon Hydrate Particles in Hydrocarbons

Selected Publications

Kelkar, A., Dong, J., Franses, E. I., and Corti, D. S., "New Models and Predictions for Brownian Coagulation of Non-Interacting Spheres," *J. Colloid Interf. Sci.,* **389**, 188-198 (2013)

Tsui, H. W., Hwang, M. Y., Lin, L., Franses, E. I., and Wang, N. H. L., "Retention Models and Interaction Mechanisms of Acetone and Other Catonyl-Containing Molecules with Amylose Tris[(S)-α-methylbenzylcarbamate] Sorbent," *J. Chromatogr. A.,* **1279**, 36-48 (2013)

Selected Conference Presentations

Franses, E. I., Tsui, H. W., and Wang, N. H. L, "Mechanistic Studies of Enantioselective Interactions of a Polysaccharide Sorbent with Benzoin and Ethyl Lactate," PREP, 25th International Symposium on Preparative and Process Chromatography, Cambridge, MA, July (2012)

Tshu, H. W., Wang, N. H. L., and Franses, E. I., presented by Tsui, H. W., "Mechanistic Studies of Chiral Recognition of Solutes by Amylose Tris[(S)-α-Methylbenzylcarbamate]," AIChE Annual Meeting, Pittsburgh, PA, October (2012)

Dong, J., Ng, H. T., Franses, E. I., and Corti, D. S., presented by Dong, J., "Measuring Hamaker Constants by Atomic Force Microscopy From the "Jump-Into-Contact" Distance: Quasi-Static Models and Dynamic Simulations," Awarded "Best Presentation," AIChE Annual Meeting, Pittsburgh, PA, October (2012)

Tsui, H. W., Hwang, M., Ling, L., Franses, E. I., and Wang, N. H. L., presented by Tsui, H. W., "Retention Models and Interaction Mechanisms of Acetone and Related Molecules with Amylose Tris[(S)-α-Methylbenzylcarbamate] Sorbent," AIChE Annual Meeting, Pittsburgh, PA, November (2012)

Kelkar, A. V., Dong, J., Franses, E. I., and Corti, D. S., presented by Kelkar, A. V., "On the Brownian Coagulation of Colloidal Dispersions," AIChE Annual Meeting, Pittsburgh, PA, November (2012)

Dong, J., Zhao, Y., Ng, H. T., Franses, E. I., and Corti, D. S., presented by Corti, D. S., "A new method for determining the Hamaker constant of a solid with Atomic Force Microscopy," 87th ACS Colloid and Surface Science Symposium, UC Riverside, CA, June (2013)

Kelkar, A. V., Franses, E. I., and Corti, D. S., presented by Kelkar, A. V., "The Importance of Non-Ideal Diffusion and Entropic Packing Effects in Brownian Aggregation of Hard Spheres," 87th ACS Colloid and Surface Science Symposium, UC Riverside, CA, June (2013)

Graduate Students (left to right) Mary Brennan, Ramon Pena, Darby Hoss, and Paulani Majumdar attending the 2013 New Graduate Students Welcome Picnic

Jeffrey P. Greeley

Ph. D., University of Wisconsin-Madison, 2004

Associate Professor

Research Areas: Heterogeneous Catalysis, Electrocatalysis, Energy Storage in Batteries

Selected Invited Lectures

"First principles studies of trends in metal deposition and dissolution," Gordon Research Conference on Electrodeposition, Biddeford, ME, August (2012)

"A first principles view of reactivity and trends in heterogeneous catalysis and electrocatalysis," Department of Materials Science, Johns Hopkins University, Baltimore, MD, March (2013)

"A first principles view of reactivity and trends in heterogeneous catalysis and electrocatalysis," Molecular Foundry, Lawrence Berkeley National Laboratory, Berkeley, CA, March (2013)

"First principles analysis of activity and selectivity trends in heterogeneous biomass conversion," American Chemical Society Spring Meeting, New Orleans, LA, April (2013)

Selected Publications

Chan, M. K. Y., Wolverton, C., and Greeley, J. P., "First Principles Simulations of the Electrochemical Lithiation and Delithiation of Faceted Crystalline Silicon," *Journal of the American Chemical Society,* **134**, 14362-14374 (2012)

Ferguson, G. A., Yin, C. R., Kwon, G., et al., "Stable Subnanometer Cobalt Oxide Clusters on Ultrananocrystalline Diamond and Alumina Supports: Oxidation State and the Origin of Sintering Resistance," *Journal of Physical Chemistry C,* **116**, 24027-24034 (2012)

Greeley, J. and Markovic, N. M., "The road from animal electricity to green energy: combining experiment and theory in electrocatalysis," *Energy & Environmental Science,* **5**, 9246-9256 (2012)

Greeley, J. P., "Active Site of an Industrial Catalyst," *Science,* **336**, 810-811 (2012)

Lei, Y., Liu, B., and Lu, J. L., et al., "Synthesis of Pt-Pd Core-Shell Nanostructures by atomic Layer Deposition: Application in Propane Oxidative Dehydrogenation to Propylene," *Chemistry of Materials,* **24**, 3525-3533 (2012)

Liu, B. and Greeley, J., "Density Functional Theory Study of Selectivity Considerations for C-C Versus C-O Bond Scission in Glycerol Decomposition on Pt(111)," *Topics in Catalysis,* **55**, 280-289 (2012)

Lu, J. L., Liu, B., and Greeley, J. P., et al., "Porous Alumina Protective Coatings on Palladium Nanoparticles by Self-Poisoned Atomic Layer Deposition," *Chemistry of Materials,* **24**, 2047-2055 (2012)

Mehmood, F., Rankin, R. B., and Greeley, J., et al., "Trends in methanol decomposition on transition metal alloy clusters from scaling and Bronsted-Evans-Polanyi relationships," *Physical Chemistry Chemical Physics,* **14**, 8644-8652 (2012)

Rankin, R. B. and Greeley, J., "Trends in Selective Hydrogen Peroxide Production on Transition Metal Surfaces from First Principles," *Acs Catalysis,* **2**, 2664-2672 (2012)

Subbaraman, R., Tripkovic, D., and Chang, K. C., et al., "Trends in activity for the water electrolyser reactions on 3d M(Ni,Co,Fe,Mn) hydr(oxy)oxide catalysts," *Nature Materials,* **11**, 550-557 (2012)

van der Vliet, D. F., Wang, C., and Li, D. G., et al., "Unique Electrochemical Adsorption Properties of Pt-Skin Surfaces," *Angewandte Chemie-International Edition,* **51**, 3139-3142 (2012)

Wang, C., Li, D. G., and Chi, M. F., et al., "Rational Development of Ternary alloy Electrocatalysts," *Journal of Physical Chemistry Letters,* **3**, 1668-1673 (2012)

Xiong, H., Yildirim, H., and Shevchenko, E. V., et al., "Self-Improving Anode for Lithium-Ion Batteries Based on Amorphous to Cubic Phase Transition in TiO2 Nanotubes," *Journal of Physical Chemistry C,* **116**, 3181-3187 (2012)

Yildirim, H., Greeley, J. P., and Sankaranarayanan, S., "The effect of concentration on Li diffusivity and conductivity in rutile TiO2," *Physical Chemistry Chemical Physics,* **14**, 4565-4576 (2012)

Li, L., Larsen, A. H., and Romero, N. A., et al., "Investigation of Catalytic Finite-Size-Effects of Platinum Metal Clusters," *Journal of Physical Chemistry Letters,* **4**, 222-226 (2013)

Trahey, L., Karan, N. K., and Chan, M. K. Y., et al., "Synthesis, Characterization, and Structural Modeling of High-Capacity, Dual Functioning MnO2 Electrode/Electrocatalysts for Li-O2 Cells," *Advanced Energy Materials,* **3**, 75-84 (2013)

Xiong, H., Yildirim, H., and Podsiadlo, P., et al., "Compostional Tuning of Structural Stability of Lithiated Cubic Titania via a Vacancy-Filling Mechanism under High Pressure," *Physical Review Letters,* **110** (2013)

Liu, B. and Greeley, J., "A density functional theory analysis of trends in glycerol decomposition on close-packed transition metal surfaces," *Physical Chemistry Chemical Physics,* **15**, 6475-6485 (2013)

Selected Conference Presentations

Gordon Research Conference on Electrodeposition, Biddeford, ME, August (2012) (invited)

American Chemical Society Spring Meeting, New Orleans, LA, April (2013) (invited)

Robert E. Hannemann

M.D., Indiana University, 1959

Visiting Professor

Research Areas: Healthcare Engineering, Modeling Erythrocyte Size Distribution for Evaluation of Leukemia Therapy, Serum Bilirubin Determination by Skin Reflectance, Surfactant in Respiratory Distress Syndrome Treatment

Selected Professional Activities

Executive Committee and Liaison, Center for Assistive Technology, Regenstrief Center on Healthcare Engineering, Purdue University
Chair, Healthcare Engineering Signature Area, Purdue University
Board of Directors, National Center for Missing and Exploited Children
Indiana Clinical and Transitional Sciences Institute Project Development Team

Selected Conference Presentations

Purdue Neurotrauma Group: Nauman, E., Leverenz, L., and Hannemann, R. E., Public Comment, IOM Committee on Sports-Related Concussions in Youth, First Public Workshop, Washington, DC, February (2013)

R. Neal Houze

Ph.D., University of Houston, 1966

Professor

Selected Professional Activities

Member, American Institute for Chemical Engineers
Member, American Society for Engineering Education
Member, Tau Beta Pi
Member, Phi Kappa Phi
Member, Sigma Xi
Member, Omega Chi Epsilon
Honorary Member, Mortar Board
Reviewer, Journal of Engineering Education, 2004-present
Reviewer, McGraw-Hill Company, 2003-present
Reviewer, J. Wiley & Sons, 2004-present
Reviewer, Chemical Engineering Education, 2002-present

Professor Franses and Professor Houze at the 2012 GSO Symposium

Michael T. Harris

Ph. D., University of Tennessee-Knoxville, 1992

Professor
Director of Graduate Studies, School of Chemical Engineering
Associate Dean, Undergraduate Education, College of Engineering

Research Areas: Colloids and Interfacial Phenomena, Materials Synthesis using Biotemplates, Environmental Control Technology, Transport Phenomena, Microwave Sensing of Powder Properties, Drop Printing of Pharmaceuticals

Selected Professional Activities

Fellow, AIChE
Chair, Minorities in Engineering Division, ASEE

Selected Publications

Bhat, P. P., Appathurai, S., Harris, M. T., Pasquali, M., and Basaran, O. A., "On self-similarity in the drop-filament corner region formed during pinch-off of viscoelastic fluids," *Phys. Fluids,* **24**, 083101, doi: 10.1063/1.4745179 (2012)

Austin, J., Rodriguez, S., Sung, P. F., and Harris, M. T., "Using Microwaves for the Determination of Moisture Content Independent of Density," *Powder Technology* doi: 10.1016/j.powtec.2012.06.069 (2012)

Freer, A. S., Guarnaccio, L., Wafford, K., Smith, J., Steilberg, J., Culver, J. N., and Harris, M. T., "Surface Mineralization and Characterization of Palladium Nanoparticles on Biotemplates," *Journal of Colloids and Interface Science,* **392**, 213-218 doi: 10.1016/j.jcis.2012.09.072 (2013)

Hsu, H., Toth, S., Simpson, G., Taylor, L. S., and Harris, M. T., "Effect of Substrates on Naproxen/Polyvinylpyrrolidone Solide Dispersions Formed via the Drop Printing Technique," *Journal of Pharmaceutical Sciences,* **102**(2), 638-648 doi: 10.1002/jps.23397 (2013)

Zhu, Q., Toth, S., Simpson, G., Hsu, H., Taylor, L. S., and Harris, M. T., "Crystallization and dissolution behavior of naproxen/polyethylene glycol solid dispersions," *Journal of Physical Chemistry B,* **117**(5), 4794-1500 (2013)

Collins, R. T., Sambath, K., Harris, M. T., and Basaran, O. A., "Universal scaling laws for the disintegration of electrified drops," *PNAS,* **110**, 4905-4910, (URL: www.pnas.org/cgi/doi/10.1073/pnas.1213708110) (2013)

Austin, J., Gupta, A., McDonnell, R., Reklaitis, G. V., and Harris, M. T., "The Use of Near Infrared and Microwave Resonance Sensing to Monitor a Continuous Roller Compaction Process," *Journal of Pharmaceutical Sciences,* **102**(6), 1895-1904 (2013)

Selected Conference Presentations

Austin, J., Liew, S. C., McDonnell, R., Sung, P. F., and Harris, M. T., "Investigating the Effects of Particle Size and Bulk Powder Properties on Microwave Sensor Measurements," paper 19c, AIChE Annual Meeting, Pittsburgh, PA, October (2012)

Hsu, H. Y. and Harris, M. T., "Microstructural Characterization and Dissolution Behavior of Drug/Semicrystalline Polymer Systems on Substrates," paper 23a, AIChE Annual Meeting, Pittsburgh, PA, October (2012)

Zhao, Y., Li, F., and Harris, M. T., "Formulation of Bovine Serum Albumin Encapsulated Cal-Alginate Microspheres by Electrodispersion for a Simulated Release in a Gastric Fluid," paper 262e, AIChE Meeting, Pittsburgh, PA, October (2012)

Pommer, C., Harris, M. T., and Basaran, O. A., "Scaling in the Transition from Selective Withdrawal to Entrainment," paper 353h, AIChE Meeting, Pittsburgh, PA, October (2012)

Hirschfield, L., Giridher, A., Reklaitis, G. V., Harris, M. T., and Venkatsubramanian, V., "Automation and Control of Drug-on-Demand Technology," paper 533g, AIChE Meeting, Pittsburgh, PA, October (2012)

Basaran, O. A., Sambath, K., Collins, R. T., and Harris, M. T., "EHD Tip Streaming: Size and Charge of Electrospray Droplets," paper 552a, AIChE Meeting, Pittsburgh, PA, October (2012)

Sung, P. F. and Harris, M. T., "Deposits formed from the Evaporation of Sessile Drops," paper 559b, AIChE Meeting, Pittsburgh, PA, October (2012)

Appathurai, S., Harris, M. T., Basaran, O. A., Paulsen, J., Burton, J., and Nagel, S. R., "Unexpected dynamics of drop coalescence," AIChE 2012 Annual Meeting, Pittsburgh, PA, October-November (2012)

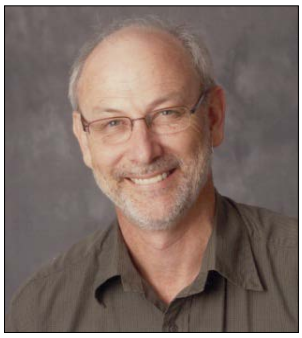
Pommer, C. A., Harris, M. T., and Basaran, O. A., "Scaling in the transition from selective withdrawal to entrainment," AIChE 2012 Annual Meeting, Pittsburgh, PA, October-November (2012) (Presentation received best paper award in session 353, Interfacial and Nonlinear Flows I)

Appathurai, S., Harris, M. T., Paulsen, J., Burton, J., and Nagel, S., "Unexpected Dynamics of Drop Coalescence," paper 628b, AIChE Meeting, Pittsburgh, PA, November (2012)

Gao, H., Subramani, H. J., Harris, M. T., and Basaran, O. A., "Wall Effect in Stokes Experiment with a Liquid Foam," paper 628c, AIChE Meeting, Pittsburgh, PA, November (2012)

Devlin, N. R., Sambath, K., Harris, M. T., and Basaran, O. A., "Contraction dynamics of planar liquid filaments," 65th annual Meeting of the Division of Fluid Dynamics (DFD) of the American Physical Society (APS), San Diego, CA, November (2012)

Freer, A., Guarnaccio, L., Wafford, K., Smith, J., Steilberg, J., Culver, J., and Harris, M. T., "Surface Mineralization and Characterization of Palladium Nanoparticles on Genetically Engineered Tobacco Mosaic Virus (TMV) Templates," paper 651b, AIChE Meeting, Pittsburgh, PA, November (2012)



James D. Litster

Ph. D., University of Queensland, 1985

Professor of Chemical Engineering and Industrial and Physical Pharmacy

Research Areas: Particle Design and Formulation, Granulation and Agglomeration, Crystallization of Bioactives, Engineering Education

Selected Professional Activities

Member, Australian Academy of Technological Sciences
Honorary Professor, University of Queensland
Member, Solae LLC, St Louis, Scientific Advisory Board
Fellow, Institution of Chemical Engineers, UK
Consultant, International Fine Particle Research Institute
Editorial Board, Particle and Particulate Systems Characterization, 2003-present
Editorial Board, AAPS Pharmaceutical Science and Technology, 2009-present
Member, National Institute of Pharmaceutical Technology and Education (NIPTE) Faculty Committee

Selected Invited Lectures

"Multiscale design models for continuous agglomeration for solids dosage form manufacture," CMAC Open Day, Strathclyde University, Scotland, October (2012)

"ObD for wet granulation in pharmaceutical processing: Improving models for a priori design and scaling," Dr. Reddy's Laboratories, Hyderabad, India, January (2013)

Selected Publications

Smith, R. M. and Litster, J. D., "Examining the failure modes of wet granular materials using dynamic diametrical compression," *Powder Technology,* **224**, 189-195 (2012)

Emady, H. N., Kayrak-Talay, D., and Litster, J. D., "A Regime Map for Granule Formation by Drop Impact on Powder Beds," *AIChE J.,* doi: 10.1002/aic.13952 (2012)

Acevedo, D., Muliadi, A., Giridhar, A., Litster, J. D., and Romañach, R. J., "Evaluation of Three Approaches for Real-Time Monitoring of Roller Compaction with Near-Infrared Spectroscopy," *AAPS Pharm. Sci. Tech.,* **13**(3), 1005-1012 (2012)

Liu, L. X., Rashid, A., Marziano, I., White, E. T., Howes, T., and Litster, J. D., "Flowability of binary mixtures of commercial and reprocessed ibuprofen through high shear wet milling (HSWM) with lactose," *Advanced Powder Technology,* **23**(4), 454-458 (2012)

Kayrak-Talay, D., Dale, S., Wassgren, C. R., and Litster, J. D., "Quality by design for wet granulation in pharmaceutical processing: Assessing models for a priori design and scaling," *Powder Technology,* doi: 10.1016/j.powtec.2012.07.013 (2012)

El Hagrasy, A. S., Hennenkamp, J., Burke, M., Cartwright, J., and Litster, J. D., "Twin Screw Granulation: Influence of Formulation Parameters on Granule Properties and Growth Behavior," *Powder Technology,* www.doi.org/10.1016/j.powtec.2012.04.035 (2012)

Muliadi, A. R., Litster, J. D., and Wassgren, C. R., "Modeling the powder roll compaction process: Comparison of 2-D finite element method and the rolling theory for granular solids (Johnanson's model)," *Powder Technology,* **221**, 90-100 (2012)

Mehta, C. M., White, E. T., and Litster, J. D., "Correlation of Second Virial Coefficient with Solubility for Proteins in Salt Solutions," *Biotechnology Progress,* **28**(1), 163-170 (2012)

Li, J., Freireich, B., Wassgren, C., and Litster, J. D., "A General Compartment-based Population Balance Model for Particle Coating and Layered Granulation," *AIChE J.,* **58**(5), 1397-1408 (2012)

Muliadi, A. R., Litster, J. D., and Wassgren, C. R., "Validation of 3-D finite element analysis for predicting the density distribution 6 of roll compacted pharmaceutical powder," *Powder Technology,* doi: 10.1016/j.powtec.2012.12.023 (2013)

Li., J., Freireich, B., Wassgren, C., and Litster, J. D., "Multi-scale modeling of a spray coating process in a paddle mixer/coater: The effect of particle size distribution on particle segregation and coating uniformity," *Chem. Eng. Sci.,* **95**, 203-210 (2013)

Li., J., Freireich, B., Wassgren, C., and Litster, J. D., "Experimental Validation of a 2-D Population Balance Model for Spray Coating Processes," *Chem. Eng. Sci.,* **95**, 360-365, doi: 10.1016/j.ces.2012.02.036 (2013)

Emady, H. N., Kayrak-Talay, D., and Litster, J. D., "Modeling the granule formation mechanism from single drop impact on a powder bed," *J. Colloid Interface Science,* **393**, 369-376 (2013)

El Hagrasy, A. S., Cruise, P., Jones, I., and Litster, J. D., "In-line Size Monitoring of a Twin Screw Granulation Process Using High-Speed Imaging," *J. Pharm. Innov.,* doi: 10.1007/s12247-013-9149-y (2013)

Liu, L. X., Marziano, I., Bentham, A. C., Litster, J. D., White, E. T., and Howes, T., "Influence of particle size on the direct compression of ibuprofen and its binary mixtures," *Powder Technology,* **240**, 66-73 (2013)

Abbou Oucherif, K., Raina, S., Taylor, L. S., and Litster, J. D., "Quantitative Analysis of the Inhibitory Effect of HPMC on Felodipine Crystallization Kinetics Using Population Balance Modeling," *Crystal Engineering Communications,* **15**(12), 2197-2205, featured on the front cover (2013)

Selected Conference Presentations

Litster, J. D., "A Mechanistic Understanding of Wet Granulation," World Conference on Crystallization, Fluidization and Drying, ICT, Mumbai, India, January (2013)

Abbou Oucherif, K., Lu, J., Taylor, L. S., and Litster, J. D., "Solubility and Metastable Zone Width of Dipyridamole," Proceedings Partec, paper 107, Nurnberg, Germany, April (2013)

El Hagrasy, A. and Litster, J. D., "Mechanistic Studies for Characterization of a Twin Screw Granulation Process," Proceedings Partec, paper 108, Nurnberg, Germany, April (2013)

Litster, J. D., "Wet Granulation-Fundamentals, Modeling and Pharmaceutical Applications," 6th International Symposium on Solid Oral Dosage Forms, Malmo, Sweden, April (2013)

Litster, J. D., "Multiscale modeling for design of granulation processes in the food, consumer goods and enzyme industries," 6th International Granulation Workshop, Sheffield, UK, June (2013)

Julie C. Liu

Ph. D., Caltech, 2006

Assistant Professor
3M Non-Tenured Faculty Award, 2011-2014

Research Areas: Biomaterials, Tissue Engineering, Protein Engineering

Selected Professional Activities

American Institute of Chemical Engineers
- Women's Initiatives Committee, past chair, November 2011 – November 2012
- Engineering Fundamentals in Life Science (Area 15d/e), vice programming chair, 2011-2012, programming chair, 2012-2013

Society for Biomaterials
- Elected Member, National Membership Committee, 2011-2012
- Biomaterials Education Special Interest Group, Vice Chair, 2011-2013, Chair, 2013-2015

Review Panel, NSF

Selected Invited Lectures

"Protein-based Biomaterials for Stem Cell Differentiation and Tissue Regeneration," Materials Science and Engineering, University of Delaware, February (2013)

"Protein-based Biomaterials for Stem Cell Differentiation and Tissue Regeneration," Basic Medical Sciences, Purdue University, West Lafayette, IN, February (2013)

Selected Publications

Renner, J. N., Cherry, K. M., Su, R. S.-C., and Liu, J. C., "Characterization of Resilin-based Materials for Tissue Engineering Applications," *Biomacromolecules,* **13**, 3678-3685 (2012)

Renner, J. N., Kim, Y., and Liu, J. C., "Bone Morphogenic Protein-derived Peptide Promotes Chondrogenic Differentiation of Human Mesenchymal Stem Cells," *Tissue Engineering, Part A,* **18**, 2581-2589 (2012)

Renner, J. N., Emady, H. N., Galas, R. J., Zhang, R., Baertsch, C. D., and Liu, J. C., "Analyzing the Function of Cartilage Replacements: A Laboratory Activity to Teach High School Students Chemical and Tissue Engineering Concepts," *Chemical Engineering Education,* **47**, 99-106 (2013)

Galas, R. J. and Liu, J. C., "Vascular Endothelial Growth Factor Does Not Accelerate Endothelial Differentiation of Human Mesenchymal Stem Cells," *Journal of Cellular Physiology,* doi: 10.1002/jcp.24421, in press (2013)

Su, R. S.-C., Kim, Y., and Liu, J. C., "Resilin: Protein-based Elastomeric Biomaterials," *Acta Biomaterialia,* doi: 10.1016/j.actbio.2013.06.038, in press (2013)

Selected Conference Presentations

Galas, R. J. and Liu, J. C., "Microenvironment Cues to Differentiate Mesenchymal Stem Cells into Endothelial Cells," Signal Transduction by Engineered Extracellular Matrices Gordon Research Conference, Biddeford, ME, July (2012)

Kim, Y., Renner, J. N., and Liu, J. C., "Protein-based Biomaterials for Bone Regeneration," Biomaterials Day, Lexington, KY, September (2012)

Su, R. S.-C., Renner, J. N., Cherry, K. M., and Liu, J. C., "Characterization of Modular Resilin-based Proteins for Application in Cartilage Engineering," Biomaterials Day, Lexington, KY, September (2012)

Su, R. S.-C., Renner, J. N., Cherry, K. M., and Liu, J. C., "Tuning the Gelation Temperature of Resilin-based Proteins Designed for Tissue Engineering Applications," AIChE Annual Meeting, Pittsburgh, PA, October (2012)

Su, R. S.-C., Renner, J. N., Cherry, K. M., and Liu, J. C., "Characterization of Modular Resilin-based Proteins for Application in Cartilage Engineering," AIChE Annual Meeting, Pittsburgh, PA, October (2012)

Kim, Y. and Liu, J. C., "Protein-based Biomaterials Containing a BMP Peptide Accelerate Osteogenic Differentiation," AIChE Annual Meeting, Pittsburgh, PA, November (2012)

Renner, J. N., Su, R. S.-C., Kim, Y., Cherry, K. M., and Liu, J. C., "Resilin-based Protein Materials for Tissue Engineering Applications," MRS Spring Meeting, San Francisco, CA, April (2013)

Su, R. S.-C. and Liu, J. C., "Characterization of Modular Resilin-based Biomaterials with Tunable Mechanical Properties for Cartilage Engineering," SFB Annual Meeting, Boston, MA, April (2013)

Kim, Y. and Liu, J. C., "Protein-based Biomaterials Accelerate Osteogenic Differentiation," SFB Annual Meeting, Boston, MA, April (2013)

Su, R. S.-C. and Liu, J. C., "Characterization of Recombinant Resilin-based Biomaterials for Cartilage Engineering," 17th Annual Conference of the Chinese American Chemical Society – Great Lakes Chapter, Round Lake, IL, May (2013)

Su, R. S.-C., Renner, J. N., Galas, R. J., and Liu, J. C., "Engineering Protein Polymers with Tunable Material-based Cues for Directing Stem Cell Differentiation," 3M Science and Engineering Faculty Day, St. Paul, MN, June (2013)

John A. Morgan

Ph. D., Rice, 1999

Associate Professor

Research Areas: Metabolic Engineering, Biocatalysis

Selected Professional Activities

Associate Editor, Biprocess and Biosystems Engineering
Reviewer, Consortium for Plant Biotechnology Research
Review Panel, NSF CBET division
Review Panel, DOW-ARPA-E
Review Panel, DOE-Young Investigator Program

Selected Invited Lectures

"Metabolic flux analysis of photosynthetic bacteria," Department of Chemical and Biological Engineering, University of British Columbia, Canada (2013)

Selected Publications

Muhlemann, J., Maeda, H., Chang, C. Y., San Miguel, P., Baxter, I., Cooper, B., Perera, M., Nikolau, B. J., Vitek, O., Morgan, J. A., and Dudareva, N., "Developmental Changes in the Metabolic Network of Snapdragon Flowers," *PLoS One,* e40381 (2012)

Jazmin, L. J., O'Grady, J., Ma, F., Allen, D. K., Morgan, J. A., and Jamey, D., "Young Istopically nonstationary MFA (INST_MFA) of autotrophic metabolism," *Methods in Molecular Biology,* in press (2013)

Fernie, A. R. and Morgan, J. A., "Analysis of metabolic flux using non-steady state dynamics of isotopes and metabolic modeling," *Plant cell and Environment,* in press (2013)

Selected Conference Presentations

O'Grady, J. and Morgan, J. A., "An examination of lipid production by *Chlorella protothecoides* using compartmentalized metabolic flux analysis," AIChE National Conference, Pittsburgh, PA, October (2012)

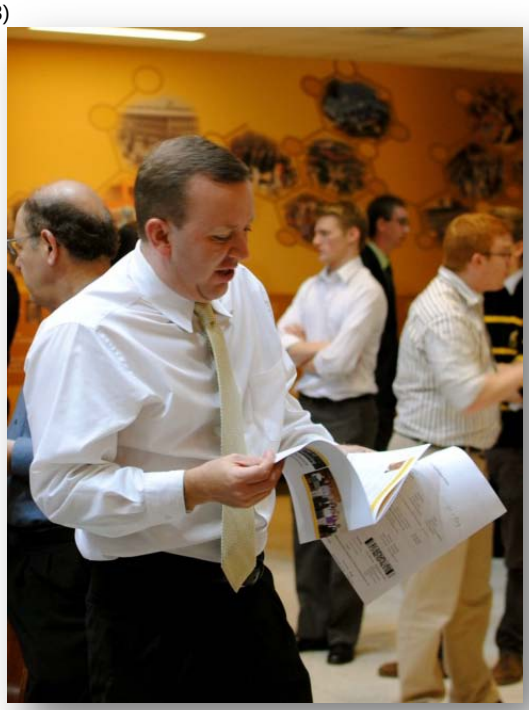
Morgan, J. A., "Metabolic flux analysis of photoautotrophic cyanobacteria," 10th International Congress on Plant Molecular Biology, Jeju Island, Republic of Korea, October (2012)

Morgan, J. A., "Metabolic network construction and dynamic modeling," Plant Systems Biology and Engineering Workshop, North Carolina State University, Raleigh, NC, November (2012)

Morgan, J. A., "Metabolic flux profiling of *Synechocystis sp.* PCC 6803 by isotopically non-stational flux analysis," INDO-US Workshop on Cyanobacteria, Lonavala, India, December (2012)

Morgan, J. A., "Metabolic engineering of flavonoids in yeast," International Conference on Cellular and Molecular Biology, Singapore, December (2012)

Morgan, J. A., "Insights into CHO Cell Metabolism with Comparative Proteomics and Isotopic Metabolic Flux Analysis," PepTalk Conference, Palm Springs, CA, January (2013)



Dr. Morgan attending the
2012 Outstanding Chemical Engineer Awards

Zoltan K. Nagy

Ph. D., Babes-Bolyai University, Romania, 2001

Professor

Research Areas: Process Modeling, Control and Optimization, Crystallization Systems Engineering, Product and Process Engineering for Batch and Continuous Pharmaceutical Systems, Process Analytical Technologies and Process Informatics Systems, Technology Enhanced Learning & Systems Pedagogy

Selected Professional Activities

Associate Editor, Journal of Process Control
Associate Editor, Control Engineering Practice
Associate Editor, Chemical Engineering Research and Design
Associate Editor, Asia-Pacific Journal of Chemical Engineering
Member, Steering Committee of the American Association for Crystallization Technology
Member, Steering Committee of the Crystallization Working Party of the European Federation of Chemical Engineering
Member, Steering Committee of the Process Management and Control Group of the IChemE
Chair, Young Author Prize Committee of International Federation of Automatic Control
Member, Review Panels for Proposal, UK, Netherlands, Switzerland, Canada, Romania, France, Ireland, Belgium, Croatia, Denmark, and others

Selected Invited Lectures

"Recent advances in the model-based and model-free control of crystallization processes," University of Szeged, Szeged, Hungary, October (2012) and Pfizer, Groton, New London, CT, February (2013)

"Recent advances in crystallization systems engineering," Ranbaxy, Delhi, India, February (2013)

"Recent advances in the process analytical technology based crystallization process monitoring and control," BASF Schweiz AG Schweizerhalle, Switzerland, April (2013)

"Advanced Process Control in Pharmaceutical Manufacturing," The Future of Pharmaceutical Manufacturing, NIPTE Research Conference, The University at Shady Grove, Rockville, MD, June (2013)

"Recent advances in the model-based and model-free control of crystallization systems," AbbVie, Chicago, IL, June (2013)

Selected Publications

Aamir, E., Rielly, C. D., and Nagy, Z. K., "Experimental evaluation of the targeted direct design of temperature trajectories for growth dominated crystallization processes using an analytical crystal size distribution estimator," *Ind. Eng. Chem. Res.,* **51**(51), 16677-16687 (2012)

Nagy, Z. K. and Aamir, E., "Systematic design of supersaturation controlled crystallization processes for shaping the crystal size distribution using an analytical estimator," *Chemical Engineering Science,* **84**, 656-670 (2012)

Saleemi, A., Onyemelukwe, I. I., and Nagy, Z. K., "Effects of a structurally related substance on the crystallization of paracetamol," *Front. Chem. Sci. Eng.,* **7**(1), 79-87 (2013)

Ray, J., Smith, K. W., Bhaggan, K., Nagy, Z. K., and Stapley, A. G. F., "Kinetic study of the acidolysis of high oleic sunflower oil with stearic-palmitic acid mixtures catalyzed by immobilized Rhizopus oryzae lipase," *Biochemical Engineering Journal,* **73**, 17-28 (2013)

Selected Conference Presentations

Nagy, Z. K., "Applications of Process Analytical Technologies for the monitoring, optimization and control of pharmaceutical crystallization processes," Workshop of the Crystallization and Pharmaceutical Formulation Subject Group of the Hungarian Chemical Society, Budapest, Hungary, opening plenary talk, October (2012)

Invited: Nagy, Z. K., "Rapid Development of Robust Crystallization Processes using Automated Direct Nucleation Control," 18th Larson Workshop of the Association for Crystallization Technology, Santa Barbara, CA, October (2012)

Majumder, A. and Nagy, Z. K., "Optimization and Control of Growth Modifier Concentration Profile for Achieving Target Crystal Shape Distribution, AIChE Meeting, Pittsburgh, PA, November (2012)

Majumder, A. and Nagy, Z. K., "Simulation of the Crystal Shape Distribution in the Presence of Growth Modifiers, AIChE Meeting, Pittsburgh, PA, November (2012)

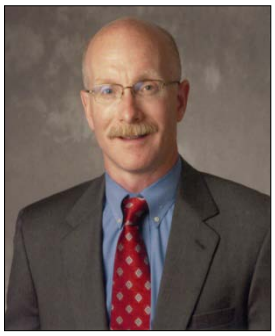
Featured Invited: Nagy, Z. K., "Novel feedback control-based Quality by Design approaches for crystallization processes using composite PAT-array and a Crystallization Process Informatics System," Quality by Design Conference, London, UK, January (2013)

Simone, E., Saleemi, A., and Nagy, Z. K., "Application of quantitative Raman spectroscopy for the monitoring and feedback control of polymorphic transformations in crystallization processes," 9th European Congress of Chemical Engineering, The Hague, Netherlands, April (2013)

Nagy, Z. K., "Rapid Development of Robust Crystallization Processes using Automated Direct Nucleation Control," Mettler-Toledo Info Day, Chicago, IL, opening plenary talk, May (2013)

Majumder, A. and Nagy, Z. K., "Spatially distributed fines removal in a continuous plug flow crystallizer by optimal temperature profile with controlled dissolution," 23rd European Symposium, Computer Aided Process Engineering (ESCAPE 23), Lappeenranta, Finland, June (2013)

Majumder, A. and Nagy, Z. K., "Solution Mediated Polymorphic Transformation of L-Glutamic Acid in a Continuous Plug Flow Crystallizer," The 2013 Conference of the British Association for Crystal Growth, Manchester, UK, June (2013)



Joseph F. Pekny

Ph. D., Carnegie Mellon University, 1989

Professor

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

Interim Director, Burton D. Morgan Center for Entrepreneurship
Faculty Director, Engineering Entrepreneurship, College of Engineering
Faculty Liaison, Purdue West Coast Partnership Center
Technical Advisor, Advanced Process Combinatorics, Inc.

Selected Publications

Huang, S., Xiao, J., Pekny, J. F., and Reklaitis, G. V., "Optimal Residential Solar Photovoltaic Capacity in Grid Connected Applications," *Computer Aided Process Engineering,* **30**, 357-361 (2012)

Hodge, B. S., Huang, S., Shukla, A., Pekny, J. F., Venkatasubramanian, V., and Reklaitis, G. V., "The Effects of Vehicle-to-Grid Systems on Wind Power Integration," *Wind Energy*, **15**(7), 903-914 (2012)

Dink, D., Langer, M. P., Rardin, R. L., Pekny, J. F., Reklaitis, G. V., and Saka, B., "Intensity Modulated Radiation Therapy with Field Rotation – A Time-Varying Fractionation Study," *Health Care Management Science*, **15**, 138-154 (2012)

Lainez, J., Orcun, S., Pekny, J. F., Reklaitis, G. V., Suvannasankha, A., Fausel, C., Anaissie, E. J., and Blau, G., "Comparison of an Assumption-Free Bayesian Approach with Optimal Sampling Schedule to a Maximum a Posteriori Approach for Personalizing Cyclophosphamide Dosing," *Pharmacotherapy*, doi: 10.1002/phar.1346 (2013)

Chen, Y., Pekny, J. F., and Reklaitis, G. V., "Risk Pooling Strategy in the Pharmaceutical Clinical Trial Supply Chain Management," *I&EC Research,* **52**, 152-165 (2013)

Selected Conference Presentations

"Capstone Design at Purdue University," AIChE Regional Meeting, Chicago, IL, January (2013)

"Knowledge Acquisition Frameworks and Deliberate Innovation – Perspectives from and Next Steps for a Journey in Engineering Complexity," Faculty Career Celebration, College of Engineering, Purdue University, West Lafayette, IN, March (2013) (invited)

Professor Varma with Students (left to right) Joshua Andrejko, Evan Hanley, and Jacob Haine at the 2013 Awards Banquet

R. Byron Pipes

Ph. D., University of Texas-Arlington, 1972

John Leighton Bray Distinguished Professor
Director, Purdue Institute for Defense Innovation
Member, 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
Fellow, American Society of Composites
Key Note, ASC Conference, Arlington, TX, 2012
Session Chair ICCM-19 Conference, Montreal, CA
Chairman, Army Research Laboratory Technical Assessment Board, 2013-2015

Selected Invited Lectures

"Historic Perspective and Vision for the Future of Modeling in Composite Materials and Structures," MSC Software Technical Conference, Irvine, CA (2013)

Selected Publications

Cadena, M., Misiego, R., Smith, K. C., Avia, A., Pipes, R. B., Reifenberger, R., and Raman, A., "Subsurface Imaging of Carbon Nanotube-polymer Composites Using Dynamic AFM Methods," *Nanotechnology,* **24**, 135706 (2013)

Carlsson, L. A., Adams, D. F., and Pipes, R. B., "Basic Experimental Characterization of Polymer Matrix Composite Materials," *Polymer Reviews,* **53**(2), 277-302 (2013)

Cadena, M. J., Misiego, R., Smith, K. C., Avila, A., Pipes, R. B., Reifenberger, R., and Raman, R., "Sub-surface imaging of carbon nanotube-polymer composities using dynamic AFM methods," *Nanotechnology,* in press (2013)

Gao, C., Shin, Y., and Pipes, R. B., "Etching of Long Fiber Composite Materials by Nanosecond Laser Induced Water Breakdown," *Applied Surface Science,* in press (2013)

Goodsell, J., Pagano, N. J., Krachenko, O., and Pipes, R. B., "Interlaminar Stresses in Composite Laminates Subjected to Anticlastic Bending Deformation," *Journal of Applied Mechanics,* in press (2013)

Misiego, C. R. and Pipes, R. B., "Dispersion and its Relation to Carbon Nanotube Concentration in Polymide Nanocomposites," *Composites Science and Technology,* in press (2013)

Adams, D., Carlsson, L., and Pipes, R. B., "Experimental Characterization of Advanced Composite Materials," *CRC Press*, fourth edition expected (2013)

Selected Conference Presentations

"Composite Materials and Structures 1972 – 2012: Grand Challenges," Defense Manufacturing Conference, Washington, DC (2012)

"The Composites Manufacturing HUB," SAMPE Technical Conference, Baltimore, MD (2012)

"Field Repair of Composite Structures by VARTM," SAMPE Technical Conference, Baltimore, MD (2012)

"VARTM Adhesion to Pre-cured Composite Substrates," SAMPE Technical Conference, Wichita, KS (2013)

Graduate Students Caleb Miskin and Charles Hages

Doraiswami Ramkrishna

Ph. D., University of Minnesota, 1965

H. C. Peffer Distinguished Professor
Member, National Academy of Engineering

Research Areas: Applied Mathematics, Dispersed Phase Systems, Biochemical Engineering, Chemical Reaction Engineering

Selected Professional Activities

Fellow, AIChE
Fellow, American Institute of Medical and Biological Engineering
Member, Advisory Council, Pacific Northwest National Laboratory, Richland, WA
Member, AIChE Awards Committee
Member, Peer Committee of Section 3, National Academy of Engineering

Selected Invited Lectures

"Dynamic Modeling of Metabolism. The Cybernetic Approach," Department of Chemical and Biological Engineering, University of Wisconsin, Madison, WI, November (2012)

Doraiswamy, L. K., Department of Chemical & Biological Engineering, Iowa State University, Ames, IA, March (2013)

Selected Publications

Shu, C. C., Chatterjee, A., Hu, W. S., and Ramkrishna, D., "Modeling of Gene Regulatory Processes by Population Mediated Signaling. New Applications of Population Balances," *Chem. Eng. Sci.,* **70**, 188-199 (2012)

Song, H. S., Kim, S. J., and Ramkrishna, D., "Synergistic Optimal Integration of Continuous and Fed-Batch Reactors for Enhanced Productivity of Lignocellulosic Bioethanol," *Ind. Eng. Chem. (*Nigam Issue), **52**, 1690-1696 (2012)

Song, H. S. and Ramkrishna, D., "Prediction of dynamic behavior of mutant strains from limited wild-type data," *Metabolic Engineering,* **14**, 69-80 (2012)

Ramkrishna, D. and Song, H. S., "Dynamic Models of Metabolism. A Review of the Cybernetic Approach," AIChE *Jl.,* (Journal Review) **58**, 986-997 (2012)

Geng, J., Song, H. S., Yuan, J., and Ramkrishna, D., "On Enhancing Productivity of Bioethanol with Multiple Species," *Biotechnol. & Bioeng.,* ***109***, 1508-1517 (2012)

Adler, P., Song, H. S., Kastner, K., Ramkrishna, D., and Kunz, B., "Prediction of dynamic metabolic behavior of *Pediococcus pentosaceous* producing lactic acid from lignocellulosic sugars," *Biotechol. Progress,* **28**, 623-635 (2012)

Ramalingam, S., Ramkrishna, D., and Basaran, O., "Free Vibrations of a Spherical Drop Constrained at an Azimuth," *Phys. Fluids,* **25**, Article Number: 082102, doi: 10.1063/1.4742339 (2012)

Sowbna, P. R., Yadav, G. D., and Ramkrishna, D., "Process Modeling of Mandelic Acid from Benzaldehyde by Phase Transfer Catalysis," *A.I.Ch.E. J.,* **58**, 3799-3809 (2012)

Kim, J. I., Song, H. S., Sunkara, S. R., Lali, A., and Doraiswami, R., "Exacting Predictions vy Cybernetic Model Confirmed Experimentally. Steady State Multiplicity in the Chemostat," *Biotechnology Progress,* **28**, 1160-1166 (2012)

Medvedev, G. A., Starrty, A. B., Ramkrishna, D., and Caruthers, J. M., "Stochastic Model for Volume Relaxation in Glass Forming Materials: Local Specific Volume Model," *Macromolecules,* **45**, 7237-7259 (2012)

Song, H. S., Ramkrishna, D., Pinchuk, G., Beliaev, A. S., Konopka, A. E., and Fredrickson, J. K., "Dynamic Modeling of Aerobic Growth of *Shewanella oneidensis.* Predicting Energy Requirement for Growth, Triauxic Growth, and Flux Distributions," *Metabolic Engineering,* **15**, 25-33 (2013)

Chatterjee, A., Cook, L. C., Shu, C. C., Ramkrishna, D., Dunny, G. M., and Hu, W. S., "Antagonistic self-sensing and mate-sensing signaling controls antibiotic-resistance transfer," *PNAS,* early edition: http://www.pnas.org/content/early/2013/04/05/1212256110 (2013)

Ramkrishna, D., "The Neal Amundson Era. Rapid Evolution of Chemical Engineering Science," *AIChE,* Special Issue (2013)

Singh, M. R. and Ramkrishna, D., "Equation Chapter 1A Comprehensive Approach to Predicting Crystal Morphology Distributions with Population Balances," *Crystal Growth and Design,* in press (2013)

Singh, M., Chakraborty, J., Nere, N., Tung, H. H., Bordawekar, S., and Ramkrishna, D., "Screening Crystal Morphologies from Crystal Structure," *Crystal Growth and Design,* in press (2013)

Selected Conference Presentations

"Paradigms in systems Biology, "Dynamic Modeling of Metabolism. The Cybernetic Approach," Paper 42b, AIChE Annual Meeting, Pittsburgh, PA, October-November (2012)

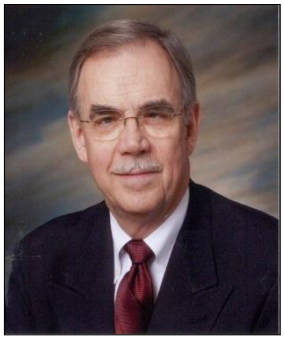
Singh, M. R. and Ramkrishna, D., "The Morphological Population Balance Model (M-PBM) Generator: Application to Additive Controlled Crystallization of KAP," Paper 23f, AIChE Annual Meeting, Pittsburgh, PA, October-November (2012)

Song, H. S., Goldberg, N., Mahajan, A., Leyffer, S., and Ramkrishna, D., "Linear Programming-Based Algorithm for Computing Metabolic Pathways from Genome-Scale Networks," paper 430f, AIChE Annual Meeting, Pittsburgh, PA, October-November (2012)

Singh, M. R., and Ramkrishna, D., "On Predicting Nuclei Shape Distribution," paper 514e, AIChE Annual Meeting, Pittsburgh, PA, October-November (2012)

Devaraj, J. and Ramkrishna, D., "Modeling Hematopoiesis. Clinical Application of Population Balance Models," paper 596at, AIChE Annual Meeting, Pittsburgh, PA, October-November (2012)

Devaraj, J., "Model-Based Individualized Treatment for Acute Lymphoblastic Leukemia," paper 596au, AIChE Annual Meeting, Pittsburgh, PA, October-November (2012)



Gintaras V. "Rex" Reklaitis

Ph. D., Stanford University, 1969

Member, National Academy of Engineering
Deputy Director, NSF ERC on Structured Organic Particulate Solids

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

Fellow, AIChE
AIChE Foundation, Board of Trustees, 2010-present
Smart Manufacturing Leadership Coalition, 2011-present
Editorial Advisory Boards
- Computers & Chemical Engineering
- Journal of Pharmaceutical Innovation
- Computer Applications in Engineering Education
- Journal of Process Systems Engineering

Selected Invited Lectures

"Process Engineering: Quo Vadis?" 11th International Symposium of Process Systems Engineering, Opening Plenary, Singapore, July (2012)

"Peck Lecture, Progress and Prospects for the Engineering Research Center on Structured Organic Particulate Systems ChE," Illinois Institute of Technology, Chicago, IL, April (2013)

"Progress and Prospects for the Engineering Research Center on Structured Organic Particulate Systems," ChE & Bio, Tufts University, Evanston, IL, April (2013)

"Stochastic Optimization Approach to Individualized Dosage Regimen," ChE & Bio, Northwestern University, May (2013)

"LTA Award Lecture, Progress in PSE applications within the Pharmaceutical Product Life Cycle," European Symposium on Computer Aided Process Engineering, Lappeenranta, Finland, June (2013)

Selected Publications

Laínez-Aguirre, J. M., Schaefer, E., and Reklaitis, G. V., "Challenges and Opportunities in Enterprise-wide Optimization in the Pharmaceutical Industry," *Computers & Chem. Engr.,* **47**, 19-28 (2012)

Hamdan, I., Reklaitis, G. V., and Venkatasubramanian, V., "Real-time Exceptional Events Management for a partial Continuous Granulation Line," *J.Pharm Innovation,* **7**(3-4), 95-118 (2012)

Hodge, B. M., Huang, S., Shukla, A., Pekny, J. F., Venkatasubramanian, V., and Reklaitis, G. V., "The Effects of Vehicle-to-Grid Systems on Wind Power Integration," *Wind Energy,* **15**, 903-914, doi: 10.1002/we.520 (2013)

Chen, Y., Pekny, J. F., and Reklaitis, G. V., "Risk Pooling Strategy in the Pharmaceutical Clinical Trial Supply Chain Management," *I&EC Research,* **52**, 152-165 doi: 10.1021/ie300823b (2013)

Austin, J., Gupta, A., McDonnell, R., Reklaitis, G. V., Harris, M. T., "The Use of Near Infared and Microwave Sensing to Monitor a Compaction Process," *J. Pharm. Sci.,* **102**(6), 1895-1904 (2013)

Blau, G. E., Orcun, S., Lainez, J. M., Reklaitis, G. V., Suvannasankha, A., Fausel, C., and Anaissie, E. J., "Validation of a Novel Approach for Dose Individualization in Pharmacotherapy Using Gabapentin in a Proof of Principles Study," *Pharmacotherapy,* doi: 10.1002/phar.1267, in press (2013)

Yi, G., and Reklaitis, G. V., "Optimal Design of generalized batch storage network considering storage," *AIChE J.,* doi: 10.1002/aic.14012, in press (2013)

Lainez-Aguirre, J. M. and Reklaitis, G. V., "Using a Stochastic Optimization Approach for the Design of Individualized Dosage Regimens," *AIChE J.,* doi: 10.4002/aic.14100, in press (2013)

Gupta, A., Giridhar, A., Venkatasubramanian, V., and Reklaitis, G. V., "Intelligent Alarm Management applied to continuous pharmaceutical tablet manufacturing: an integrated approach," *I&EC Research,* doi: 10.1021/ie3035042, in press (2013)

Blau, G. E., Orcun, S., Lainez, J. M., Reklaitis, G. V., Suvannasankha, A. Fausel, C., and Anaissie, E. J., "Comparison of an Assumption Free Bayesian Approach with Optimal Sampling Schedule to a Maximum A Posteriori Approach for Personalizing Cyclophosphamide Dosing," *Pharmacotherapy,* in press (2013)

Selected Conference Presentations

"Individualizing the Dosing of Gabapentin with Two Blood Draws," Indiana Clinical and Translational Sciences Institute Annual Meeting, Indianapolis, IN, July (2012)

"Art Westerberg's contributions to process systems engineering," Session in honor of Art Westerberg, AIChE Annual Meeting, Pittsburgh, PA, October (2012) (invited)

"Automation and Control of Drug-On-Demand Technology," AIChE Annual Meeting, Pittsburgh, PA, October-November (2012)

"Use of Workflows in Managing Experimental Data," AIChE Annual Meeting, Pittsburgh, PA, October-November (2012)

"Exceptional Event Management Applied to Continuous Pharmaceutical Manufacturing," AIChE Annual Meeting, Pittsburgh, PA, October-November (2012)

"A Novel QbD Tool for Statistical Data Analysis," AIChE Annual Meeting, Pittsburgh, PA, October-November (2012)

"Application of Multivariate Analysis in Supporting QbD," AIChE Annual Meeting, Pittsburgh, PA, October-November (2012)

"An Optimization Approach to Approximate Bayesian Inference of Complex Systems," INFORMS Annual Meeting, Phoenix, AZ, October (2012)

"Intelligent Alarm System applied to Continuous Pharmaceutical Manufacturin," European Symposium on Computer Aided Process Engineering, Received Best Poster Award (Anshu Gupta), Lappeenranta, Finland, June (2013)

"Developments in Drop on Demand Technology for Dosage Formation," NIPTE Conference on Future of Pharmaceutical Engineering, Rockville, MD, June (2013) (invited)

Fabio H. Ribeiro

Ph. D., Stanford University, 1989

Professor

Research Areas: Surface Science and Kinetics of Heterogeneous Catalytic Reactions

Selected Professional Activities

Editor, Journal of Catalysis, 2013-2015
Directore-at-large, North American Catalysis Society, 2013-2017

Selected Invited Lectures

"An overview of the water-gas shift catalysis on metals," Institut für Oberflochenchemie und Katalyse, Universitat Ulm, Germany, November (2012)

"An overview of the water-gas shift catalysis on metals," Eidgenessische Technische Hochschule (ETH), Zurich, Switzerland, November (2012)

"An overview of the water-gas shift catalysis on metals," Fritz-Haber-Institute of the Max-Planck-Society, Berlin, Germany, November (2012)

"An overview of the water-gas shift catalysis on metals," Inorganic Chemistry Seminar, Chemistry Department, Purdue University, West Lafayette, IN, January (2013)

"General User Catalysis Studies at MR-CAT," Materials Research CAT Review, Advanced Photon Source, Argonne National Laboratory, Argonne, IL, March (2013)

"Overview of the water-gas shift reaction," George A. Olah Award in Hydrocarbon or Petroleum Chemistry: Symposium in Honor of Alexis T. Bell 245th ACS National Meeting, New Orleans, LA, April (2013)

"Ammonia SCR on Cu-zeolites," Cross-Cut Lean Exhaust Emissions Reduction Simmulations (CLEERS) Workshop, University of Michigan, Dearborn, MI, April (2013)

"An overview of Ammonia SCR on Cu-zeolites," Keynote Lecture at the 23rd North American Meeting (NAM) of the Catalysis Society, Louisville, KY, June (2013)

Selected Publications

Lobo, R., Marshall, C. L., Dietrich, P., Ribeiro, F., Akatay, C., Stach, E. A., Mane, A., Lei, Y., Elam, J., and Miller, J. T., "Understanding the Chemistry of H2 Production for 1-Propanol Reforming: Pathway and Support Modification Effects," *ACS Catalysis,* **2**, 2316-2326 (2012)

Lee, W. S., Lai, L. C., Akatay, M. C., Stach, E. A., Ribeiro, F. H., and Delgass, W. N., "Probing the Gold Active Sites in Au/TS-1 for Gas Phase Epoxidation of Propylene in the Presence of Hydrogen and Oxygen," *Journal of Catalysis,* **296**, 31-42 (2012)

Xie, H., Lu, J., Elam, J., Shekhar, M., Delgass, W. N., Ribeiro, F. H., Weitz, E., and Poeppelmeier, K. R., "Preparation of Na-stabilized Non-porous t-ZrO2 Support and Corresponding Pt/t-ZrO2 Catalysts," *ACS Catalysis,* **3**(1), 61-73 (2013)

Parsell, T. H., Owen, B. C., Klein, I., Jarrell, T. M., Marcum, C. L., Haupert, L. J., Amundson, L. M., Kenttamaa, H. I., Ribeiro, F., Miller, J. T., and Abu-Omar, M. M., "Cleavage and hydrodeoxygenation (HDO) of C-O bonds relevant to lignin conversion using Pd/Zn synergistic catalysis," *Chemical Sciences*, **4**, 806-813 (2013)

Dietrich, P. J., Wu, T., Sumer, A., Dumesic, J. A., Jellinek, J., Delgass, W. N., Ribeiro, F. H., and Miller, J. T., "Aqueous Phase Glycerol Reforming with Pt and PtMo Bimetallic Nanoparticle Catalysts: The Role of the Mo Promoter," *Topics in Catalysis,* DOI 10.1007/s11244-013-0115-1 (2013)

Selected Conference Presentations

McEwen, J. S., Anggara, A., Schneider, W. F., Kispersky, V. F., Bates, S. A., Verma, A., Parekh, A., Yezerets, A., Currier, N., Miller, J. T., Delgass, W. N., and Ribeiro, F., "NO Oxidation and Selective Catalytic Reduction of NOx with NH3 On Cu/Zeolites," AIChE Annual Meeting, Pittsburgh, PA, October-November (2012)

Ribeiro, F. H., Delgass, W. N., Stach, E. A., and Miller, J. T., "Methods to Study Catalysts Under Reaction Conditions," AIChE Annual Meeting, Pittsburgh, PA, October-November (2012)

Shekhar, M., Wang, J., Lee, W. S., Akatay, M. C., Tang, W., Neurock, M., Delgass, W. N., and Ribeiro, F. H., "Water-Gas Shift Catalysis Over Supported Gold Nanoparticles," AIChE Annual Meeting, Pittsburgh, PA, October-November (2012)

Sabnis, K., Shekhar, M., Lu, J., Akatay, M. C., Elam, J., Miller, J. T., Delgass, W. N., and Ribeiro, F. H., "Water-Gas Shift Catalysis Over Supported Platinum Nanoparticles," AIChE Annual Meeting, Pittsburgh, PA, October (2012)

Bates, S. A., Kispersky, V. F., Miller, J. T., McEwen, J. S., Anggara, A., Schneider, W., Yezerets, A., Delgass, W. N., and Ribeiro, F. H., "Exploration of the Redox Nature of Cu in Cu/SSZ-13 Catalysts for Selective Catalytic Reduction of NOx by NH3," AIChE Annual Meeting, Pittsburgh, PA, October (2012)

Yohe, S. L., Delgass, W. N., Ribeiro, F. H., and Agrawal, R., "Kinetics of High Pressure Catalytic Reaction Pathways for Dihydroeugenol Over Pt/ZrO2," AIChE Annual Meeting, Pittsburgh, PA, October (2012)

Kendall T. Thomson

Ph. D., University of Minnesota, 1999

Associate Professor
Purdue University Faculty Scholar, 2008-2013

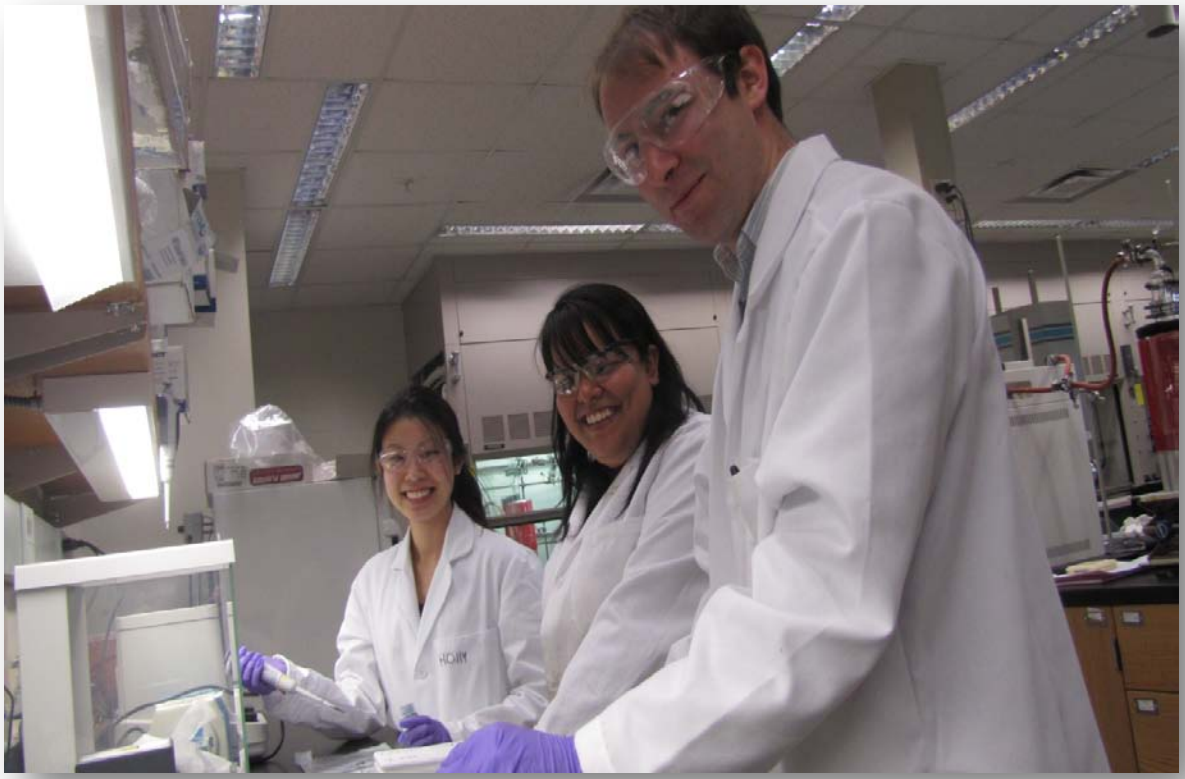
Research Areas: Computational Catalysis Design, Computer-Aided Design of Nanoporous Materials, Ab Initio Molecular Dynamics, Molecular Electronics, Modeling Nano- and Mesoporous Materials

Selected Publications

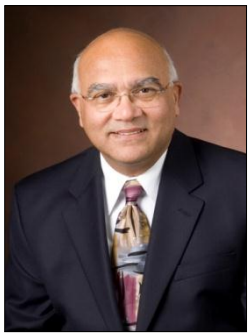
Switzer, J. M., Travia, N. E., Steelman, D. K., Medvedev, G. A., Thomson, K. T., Delgass, W. N., Abu-Omar, M. M., and Caruthers, J. M., "Kinetic Modeling of 1-Hexene Polymerization Catalyzed by Zr(tBu-ON^{NMe2}O)Bn$_2$/B(C$_6$F$_5$)$_3$," *Macromol.,* **45**(12), 4978-4988 (2012)

Selected Conference Presentations

Switzer, J., Xiong, S., Delgass, N., Caruthers, J., Abu-Omar, M., and Thomson, K. T., "Robust Determination of the Kinetic Mechanism and Rate Constants for the Polymerization of 1-Hexene with a Series of Zirconium Phenolate Catalysts," AIChE Annual Meeting, Pittsburgh, PA, October-November (2012)



Graduate Students Holly Chan, Lizbeth Rostro and Edward Tomlinson



Arvind Varma

Ph. D., Minnesota, 1972

R. Games Slayter Distinguished Professor
Jay and Cynthia Ihlenfeld Head of Chemical Engineering

AIChE Warren K. Lewis Award, 2013

Research Areas: Chemical and Catalytic Reaction Engineering, New Energy Sources, Synthesis of Advanced Materials

Selected Professional Activities

Fellow, AIChE; Fellow, AAAS
Fellow, ACS, Industrial and Engineering Chemistry Division
Foreign Member, Academy of Engineering, Mexico
Series Editor, *Cambridge Series in Chemical Engineering*, Cambridge University Press
Member, Editorial Board, International Journal of Petroleum Science and Technology
Member, Editorial Board, Industrial & Engineering Chemistry Research
Member, International Committee, AIChE
Member, ISCRE Board of Directors
Member, Scientific Committee, ISCRE-22, Maastricht, the Netherlands, September 2012
Member, Program Steering Committee, AIChE Midwest Regional Conference, January 2013
Chair, Awards Committee, I&EC Division, ACS
Chair, Engineering Research Council Awards Committee, ASEE
Member, Advisory Committee, Department of Chemical and Biological Engineering, University of Colorado-Boulder
Member, Board of Judges, 2013 Kirkpatrick Award, *Chemical Engineering* Magazine
Member, International Advisory Committee, 9th World Congress of Chemical Engineering, Seoul, Korea, August 2013

Selected Invited Lectures

"New Methods to Generate Hydrogen from Boron-Compounds for Vehicle Applications," Delgass, N. 70th Birthday Session, AIChE Annual Meeting, Pittsburgh, PA, October (2012)

"Glycerol Selective Oxidation: A Reaction Engineering Study," Shinnar, R. Memorial Session, AIChE Annual Meeting, Pittsburgh, PA, October (2012)

"Solution Combustion Synthesis of Advanced Materials: Principles and Applications," Doraiswamy, L. K. Memorial Session, AIChE Annual Meeting, Pittsburgh, PA, October (2012)

"Oxidative Coupling of Methane Using Catalysts Synthesized by the Solution Combustion Method: Technique, Results and Future Directions," ExxonMobil Research & Engineering Co., Annandale, NJ, January (2013)

Selected Publications

Al-Kukhun, A., Hwang, H. T., and Varma, A., "NbF_5 Additive Improves Hydrogen Release from Magnesium Borohydride," *International Journal of Hydrogen Energy,* **37**, 17671-17677 (2012)

Al-Kukhun, A., Hwang, H. T., and Varma, A., "Mechanistic Studies of Ammonia Borane Dehydrogenation," *International Journal of Hydrogen Energy,* **38**, 169-179 (2013)

Ghose, R., Hwang, H. T., and Varma, A., "Oxidative Coupling of Methane Using Catalysts Synthesized by Solution Combustion Method," *Applied Catalysis A: General,* **452**, 147-154 (2013)

Hwang, H. T. and Varma, A., "Effect of Boric Acid on Thermal Dehydrogenation of Ammonia Borane: Mechanistic Studies," *International Journal of Hydrogen Energy*, **38**, 1925-1931 (2013)

Hwang, H. T., Greenan, P., Kim, S. J., and Varma, A., "Effect of Boric Acid on Thermal Dehydrogenation of Amonia Borane: H2 yield and Process Characteristics," *AIChE Journal – Founder's Tribute issue in honor of the late Professor Neal R. Amundson*, **59**, 3359-3364 (2013)

Selected Conference Presentations

"Solution Combustion Synthesized Catalytic Materials for Oxidative Coupling of Methane," ACS National Meeting, Philadelphia, PA, August (2012)

"Hydrogen Generation from Ammonia Borane for Fuel Cell Vehicle Applications," ISCRE-22 Meeting, Maastricht, The Netherlands, September (2012)

"Catalytic Hydrodeoxygenation of Guaiacol," AIChE Annual Meeting, Pittsburgh, PA, October (2012)

"New Methods to Generate Hydrogen from Boron-Compounds for Vehicle Applications," AIChE Annual Meeting, Pittsburgh, PA, October (2012)

"Improved Hydrogen Release from Magnesium Borohydride with Additive," AIChE Annual Meeting, Pittsburgh, PA, October (2012)

"Catalytic Effect of Boric Acid on Thermal Dehydrogenation of Ammonia Borane," AIChE Annual Meeting, Pittsburgh, PA, October (2012)

"Solution Combustion Synthesized Catalytic Materials for Oxidative Coupling of Methane," AIChE Annual Meeting, Pittsburgh, PA, October (2012)

"Pressure Drop and Hydrodynamics of Trickle-Bed Reactors with Particle Size Distributions," AIChE Annual Meeting, Pittsburgh, PA, October (2012)

"Glycerol Selective Oxidation: A Reaction Engineering Study," AIChE Annual Meeting, Pittsburgh, PA, October (2012)

"Pechmann Condensation of Resorcinol with Ethyl Acetoacetate Over a Novel Highly Superacidic Sulfated Zirconia," AIChE Annual Meeting, Pittsburgh, PA, October (2012)

"Solution Combustion Synthesis of Advanced Materials: Principles and Applications," AIChE Annual Meeting, Pittsburgh, PA, October (2012)

Intellectual Property

Ghose, R., Hwang, H. T., and Varma, A., "Oxidative Coupling of Methane using Catalysts Synthesized by Solution Combustion Method," Provisional Patent Application No. 61/684,942, filed on August 20, 2012

Varma, A., Diwan, M., Shafirovich, E., Hwang, H. T., and Al-Kukhun, A., "Method for Releasing Hydrogen from Ammonia Borane," US Patent 8/377,416, issued February 19, 2013

Xiao, Y. and Varma, A., "A Universal Method for Crude Glycerol Purification from Different Feedstock in Biodiesel Production," Invention Disclosure, filed on June 17, 2013

N. H. Linda Wang

Ph. D., University of Minnesota, 1978

Professor

Research Areas: Chemical and Biochemical Separations, Mass Transfer, Adsorption, Ion Exchange, Simulated Moving Bed Chromotography

Selected Professional Activities

Fellow, American Institute for Medical and Biological Engineering
Fellow, American Institute of Chemical Engineers
Chair of the Separations Division, AIChE, 2013

Selected Invited Lectures

"Simulated Moving Bed Chromatography for Insulin Purification: Design Methods and Simulation Tools to Achieve high Product Purity and High Yield," Pipeline 2: Higher Throughput Protein Purification, 12th Annual PEP Talk, Palm Springs, CA, January (2013)

"Simulated Moving Bed Chromatography: Design Methods and Simulations Tools to Achieve High Product Purity and High Yield," ADM, Decatur, IL, April (2013)

Selected Publications

Tsui, H. W., Kasat, R. B., Franses, E. I., and Wang, N. H. L., "Mechanistic Studies of Chiral Discrimination in Polysaccharide Phases," *Advances in Chromatography,* **50**, 47-93 (2012)

Tsui, H. W., Hwang, M. Y., Ling, L., Franses, E. I., and Wang, N. H. L., "Retention Models and Interaction Mechanisms of Acetone and Other Carbonyl-containing Molecules with Amylose tris((S)-α-methylbenzylcarbamate) Sorbent," *J. of Chromatography*, **1279**, 36-48 (2013)

Chin, C. and Wang, N. H. L., "Simulated Moving Bed Technology for Biorefinery Applications," *Separation and Purification Technologies in Biorefineries,* **7**, 167-202 (2013)

Tsui, H. W., Wang, N. H. L., and Franses, E. I., "Chiral Recognition Mechanism of Acyloin-Containing Chiral Solutes by Amylose Tris[(S)- α-methylbenzylcarbamate]," *J. of Physical Chemistry, B,* in press (2013)

Soepriatna, N., Wang, N. H. L., and Wankat, P. C., "Standing wave design of a four-zone thermal SMB fractionators and concentrator (4-zone TSMB-FC) for linear systems," *Adsorption J.,* in press (2013)

Ling, L., Chung, P. L., Youker, A., Stepinski, D. C., Vandegrift, G. F., and Wang, N. H. L., "Capture Chromatography for Mo-99 Recovery from Unranyl Sulfate Solutions: Minimum-Column-Volume Design Method," *J. of Chromatograph A,* in press (2013)

Ling, L. and Wang, N. H. L., "Analysis of Dynamic Phenomena in Liquid Chromatography Systems with Reactions in the Mobile Phase," *Advances in Chromatography,* **52**, in press (2013)

Selected Conference Presentations

Weeden, G., Ling, L., Chin, C., and Wang, N. H. L., "High-Purity and High-Yield Separations of Three Amino Acids in a Tandem SMB: Rapid Standing Wave Design and Column Dynamics," 2012 PREP, Boston, MA, July (2012)

Tsui, H. W., Wang, N. H. L., and Franses, E. I., "Mechanistic Studies of Enantioselective Interactions of a Polysaccharide Sorbent with Benzoin and Ethyl Lactate," PREP 2012, Boston, MA, July (2012)

Ling, L., Chung, P. L., Ziegler, A., Stepinski, D. C., Vandegrift, G. F., and Wang, N. H. L., "Minimum-Column-Volume Design Method for Capture Chromatography for Langmuir Isotherm systems," AIChE Annual Meeting, Plenary Session on Fundamentals and Applications of Adsorption and Ion Exchange, Pittsburgh, PA, October-November (2012)

Tsiu, H. W., Hwang, M., Chen, Y., Ling, L., Franses, E. I., and Wang, N. H. L., "Retention Models and Interaction Mechanisms of Acetone and Related Molecules with Amylose Tris[(S)-α-methylbenzylcarbamate] Sorbent," AIChE Annual Meeting, Pittsburgh, PA, October-November (2012)

Soepriatna, N., Wankat, P. C., and Wang, N. H. L., "Standing Wave Analysis of 4-zone SMB with Thermal Gradients," AIChE Annual Meeting, Poster Session on Fundamentals and Applications of Adsorption and Ion Exchange, Pittsburgh, PA, October-November (2012)

Tsui, H. W., Wang, N. H. L., and Franses, E. I., "Mechanistic Studies of Chiral Recognition of Solutes by Amylose Tris ((S)-α-Mehtylbenzylcarbamate)," AIChE Annual Meeting, Pittsburgh, PA, October-November (2012)

Dr. Varma, William Clark (BSChE '82) and Dr. Wang at the 2012 Outstanding Chemical Engineer Awards

Phillip C. Wankat

Ph. D., Princeton University, 1970

Clifton 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

Fellow, AIChE
Fellow, ASEE
Associate Editor, Chemical Engineering Education, 1995-present
International Editorial Advisory Board, Journal of STEM Education, 2001-present
Contributing Editor, College Teaching, 2006-present
Editorial Board, Separation Science and Technology, 1977-present
Editorial Board, Adsorption, 1993-2013
Editorial Board, Separation and Purification Reviews, 1998-present
AIChE, Member Group 4, Education and Consulting of National Program Committee, 1977-present

Selected Invited Lectures

"Progress in Reforming Engineering Education," Dept. Chemical & Process Engineering (CAPE), CAPE Prestige Seminar Series, University of Canterbury, Christchurch, New Zealand, July (2012)

"Life After Graduation. Good News & Bad News," McKetta-Smith Seminar, Trine University, Angola, IN, April (2013)

Selected Publications

Sharma, P. K. and Wankat, P. C., "Distillation-Adsorption Hybrid Processes to Separate Binary Liquid Mixtures with Homogeneous Azeotrope," *Separ. Sci. Technol.,* **48**(1), 1-14 (2013)

Wankat, P. C., "Teaching Tip: Challenge Problems," *Chem. Engr. Educ.,* **46**(1), Inside Front Cover (2013)

Wankat, P. C., "Progress in Reforming Chemical Engineering Education," *Annual Rev. Chem. Biomol. Eng.,* **4**, 23-43, available free: http://www.anualreviews.org/journal/chembioeng (2013)

Selected Conference Presentations

Best papers from *CEE* and *ASEE Proceedings,* "Role of Chemical Engineering in Engineering Education Research," AIChE Annual Meeting, Pittsburgh, PA, October (2012) (invited)

"Random Thoughts: Inspired by Rich Felder," AIChE Annual Meeting, Pittsburgh, PA, October (2012) (invited)

Venkatesan, A. and Wankat, P. C., "Novel TSA Process for Enhanced Hydrocarbon Recovery from Produced Water," paper 49d, AIChE Meeting, Pittsburgh, PA, October (2012)

Soeprianta, N., Wankat, P. C., and Wang, N. H. L., "Standing Wave Analysis for 4-zone SMB with Thermal Gradients," paper 395k, AIChE Meeting, Pittsburgh, PA, October (2012)

Books

Wankat, P. C. and Oreovicz, F. S., "*Teaching Engineering,"* a slightly updated Chinese edition of the 1993 original translated by Tianjin University, published by Higher Education Press, Tianjin, China, ISBN: 978-7-04-036423-1 (2012)

Book Chapters

Kostroski, K. and Wankat, P. C., "Potential Hybrid Methods for Oxygen Production," in C. E. Baukal, Jr. (Ed.), *Oxygen Enhanced Combustion, 2nd Edition,* Taylor & Francis, Chapter 5 (2013)

Professors (left to right) Wankat, Reklaitis, Siirola and Kim

You-Yeon Won

Ph. D., Minnesota, 2000

Associate Professor

Research Areas: Cancer Drug/Gene Delivery and Theragnosis/Theranosis, Interfacial Phenomena Involving Polymers, Polyelectrolytes, Block Copolymers, Colloids, Biomacromolecules

Selected Invited Lectures

"Polymer Micelle-Based siRNA Carriers "Micelleplexes": Influence of Nanocarrier Architecture on Delivery Properties," KIST Global RANi Carrier Initiative Program Workshop, Jeju, Korea, July (2012)

"Controlling Air-Water and Nanoparticle-Water Interfaces Using Amphiphilic Block Copolymers," Research Seminar, Amore-Pacific Co. R&D Center, Yongin, Korea, July (2012)

"A Photo-Degradable Gene Delivery System for Enhanced Nuclear Transport (Missing Pieces in Understanding the Cell Interaction Behavior of Polyplexes)," Bindley Bioscience Center, Purdue University, West Lafayette, IN, November (2012)

"Self-Assembly of Block Copolymers and Colloids at Aqueous Interfaces," Research Seminar, SK Innovation R&D Center, Daejon, Korea, December (2012)

"A Photo-Degradable Gene Delivery System for Enhanced Nuclear Transport ("Missing Pieces in Understanding the Cell Interaction Behavior of Polyplexes")," Department Seminar, Department of Chemical and Biological Engineering, Korea University, Seoul, Korea, March (2013)

"Formation and Collapse of Single-Monomer-Thick Monolayers of Insoluble Polymers at the Air-Water Interface: Mechanisms and Applications," APS User Seminar/Liquid/Soft-Surface Interest Group Seminar, Advanced Photon Source (APS), Argonne National Laboratory, Argonne, IL, April (2013)

Selected Publications

Park, H. W., Choi, J., Ohn, K., Lee, H., Kim, J. W., and Won, Y. Y., "Study of the Air-Water Interfacial Properties of Biodegradable Polyesters and Their Block Copolymers with Poly(ethylene glycol)," *Langmuir,* **28**(31), 11555-11566 (2012)

Lee, H., Kim, D. H., Witte, K. N., Ohn, K., Choi, J., Akgun, B., Satija, S., and Won, Y. Y., "Water is a Poor Solvent for Densely Grafted Poly(ethylene oxide) Chains: A Conclusion Drawn from a Self-Consistent Field Theory-Based Analysis of Neutron Reflectivity and Surface Pressure-Area Isotherm Data," *Journal of Physical Chemistry B,* **116**(24), 7367-7378 (2012)

Nap, R., Won, Y. Y., and Szleifer, I., "Confinement Induced Lateral Segregation fo Polymer Coated Nanospheres," *Soft Matter,* **8**(5), 1688-1700 (2012)

Kim, D. H. and Won, Y. Y., "In Situ-Polymerized Carbon Nanotube/Polyimide Nanocomposites: Effect of Reaction Stoichiometry on the Glass Transition Properties of the Nanocomposites," *Macromolecular Reaction Engineering,* **6**(1), 45-56 (2012)

Won, Y. Y. and Lee, H., "pH Phoresis: A New Concept That Can Be Used for Improving Drug Delivery to Cancer Cells," *Journal of Controlled Release,* in press (2013)

Gary, D. J., Min, J. B., Kim, Y., Park, K., and Won, Y. Y., "The Effect of N/P Ratio on the *In Vitro* and *In Vitro* Interaction Properties of PEGylated Poly92-(dimethylamino)ethyl methacrylate)-Based siRNA Complexes," *Macromolecular Bioscience,* in press (2013)

Selected Conference Presentations

Park, H. W. and Won, Y. Y., "A Study of the Air-Water Interfacial Properties of Biodegradable Polyesters and Their Block Copolymers with Poly(ethylene glycol): Toward Rational Design of a Polymeric Lung Surfactant," AIChE Annual Meeting, Pittsburgh, PA, October-November (2012)

Lee, H., Park, H. W., Tsouris, V., Choi, J., Mustafa, R., Lim, Y., Meron, M., Lin, B., and Won, Y. Y., "A Laterally-Mobile Mixed Polymer/Polyelectrolyte Brush Undergoes a Macroscopic Phase Separation," APS March Meeting, Baltimore, MD, March (2013)

Dean Leah Jamieson and Dr. Won

Yue Wu

Ph. D., Harvard University, 2006

Assistant Professor
Fellow, Purdue Entrepreneurial Leadership Academy, 2013-2014

Research Areas: Synthesis, Characterization, Assembly of Nanostructured Materials and Their Potential Applications in Nanoscale Devices and Sustainable Energy

Selected Professional Activities

Reviewer, ACS Petroleum Research Fund
Reviewer, National Science Foundation
Reviewer, AFOSR, Qatar National Research Fund
Co-Chair, Nanoscale Science Engineering Forum Poster Session, AIChE
Judge, Nanoscale Science Engineering Forum Poster Session, AIChE
Organizer, Thermal Transport in Electronic Materials & Nanomaterials for Thermal-to-Electric Conversion, AIChE, 2013
Session Chair, Thermal Transport in Electronic Materials & Nanomaterials for Thermal-to-Electric Conversion, AIChE, 2013

Selected Invited Lectures

"Advanced Nanostructured Materials for Thermoelectric Energy Harvesting," Department of Chemistry, Purdue University, West Lafayette, IN, December (2012)

"Advanced Nanostructured Thermoelectric Materials for Waste Heat Recovery," University of Maryland, College Park, MD, March (2013)

"Advanced Nanostructured Thermoelectric Materials for Waste Heat Recovery," Georgia Institute of Technology, Atlanta, GA, March (2013)

"Advanced Nanostructured Thermoelectric Materials for Waste Heat Recovery," University of Delaware, Newark, DE, May (2013)

"Advanced Nanostructured Thermoelectric Materials for Waste Heat Recovery," University of Pennsylvania, Philadelphia, PA, May (2013)

"Advanced Nanostructured Thermoelectric Materials for Waste Heat Recovery," DuPont, May (2013)

"Advanced Nanostructured Thermoelectric Materials for Waste Heat Recovery," University of California at San Diego, San Diego, CA, May (2013)

Selected Publications

Cao, Helin*; Venkatasubramanian, Rama; Liu, Chang; Pierce, Jonathan; Yang, Haoran; Hasan, M. Zahid; Wu, Yue; Chen, Yong P* Topological insulator Bi_2Te_3 films synthesized by metal organic chemical vapor deposition. Applied Physics Letters, 2012, 101,162104

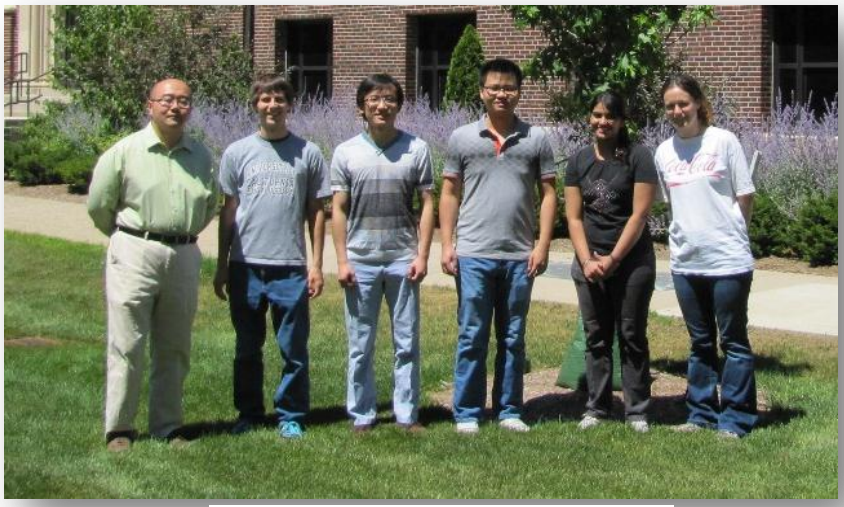
Fang, Haiyu; Feng, Tianli; Yang, Haoran; Ruan, Xiulin; Wu, Yue* Synthesis and Thermoelectric Properties of Compositional-Modulated Telluride Nanowire Heterostructures. *Nano Letters*, **13**, 2058-2063 (2013)

Yadav, Gautam G.; David, Anand; Favaloro, Tela; Yang, Haoran; Shakouri, Ali; Caruthers, James; Wu, Yue* Synthesis and the Investigation of Thermoelectric and Electrochemical Properties of Porous $Ca_0Co_{12}O_{28}$ Nanowires. *Journal of Materials Chemistry*, in press.

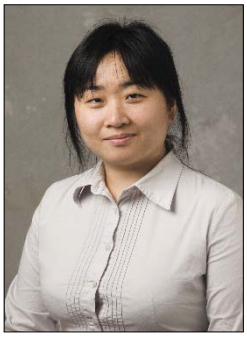
Selected Conference Presentations

Invited: "Advanced Nanostructures for Thermoelectric Energy Harvesting," American Vacuum Society Annual Meeting, Tampa, FL, November (2012)

Invited: "Nanowire and Nanowire Heterostructures for Thermoelectric Energy Harvesting," Japan Nano 2013, Tokyo, Japan, February (2013)



Dr. Wu with his Graduate Students



Chongli Yuan

Ph. D., Cornell University, 2007

Assistant Professor

Research Areas: Effect of Chromosome Structure on Gene Transcription Activity, Effect of a Polyelectrolyte on the Oppositely Charged Colloidal Suspension

Selected Professional Activities

Nanoscale Science Co-Chair, AIChE, 2012

Selected Invited Lectures

"Integrating biological component into chemical engineering education," 2012 ASEE Chemical Engineering Summer School, San Antonio, TX, July (2012)

Selected Publications

Jimenez-Useche, I. and Yuan, C., "The effect of DNA CpG methylation on the dynamic conformation of a nucleosome," *Biophysical J.,* **103**, 1-11 (2012)

Nurse, N., Jimenez-Useche, I., Smith, I. T., and Yuan, C., "Histone H3 and H4 tail clipping affects the nucleosome dynamics," *Biophysical J.,* **104**, 1-8 (2013)

Howell, S. C., Andreson, K., Jimenez-Useche, I., Yuan, C., and Qiu, X., "Measuring the interactions between nucleosomes and the rolees of histone tails," *Biophysical J.,* **105**, 194-199 (2013)

Jimenez-Useche, I., Ke, J., Tian, Y., Shim, D., Howell, S. C., Qiu, X., and Yuan, C., "DNA methylation regulated nucleosome dynamics," *Scientific Reports,* **3**, 2121 (2013)

Selected Conference Presentations

Yuan, C., "Exploring the traits of epigenetic modifications on chromosome structure," Biochemistry, Purdue University, West Lafayette, IN (2012) (invited)

Yuan, C., "Exploring the traits of epigenetic modifications on chromosome structure," Biomedical Engineering, Indiana University-Purdue University Indianapolis, Indianapolis, IN (2012)
Yuan, C. and Nurse, N., "Effects of histone tail modifications on chromosome structure and Activity," AIChE Annual Meeting, Pittsburgh, PA, October (2012) (invited)

Yuan, C. and Kim, S., "Structures of polyelectrolytes in differently charged colloidal solutions," AIChE Annual Meeting, Pittsburgh, PA, October (2012)

Jimenez-Useche, I. and Yuan, C., "Effects of DNA methylation patterns on chromatin compaction," Biophysical Society Meeting, Philadelphia, PA, February (2013)

Professor Chongli Yuan with her research group

Visiting Faculty

Ernesto Marinero

Ph.D., Heriot-Watt University, 1977

Professor of Engineering Practice

Research Areas: Synthesis and Fabrication of Nano-Scale Magnetic Materials and Devices for Future Magnetic Storage Technology, Nanomaterials and Devices for Applications in Bio-Sensing, Energy Generation and Storage for Environmental Needs

Selected Professional Activities

Molecular Foundry (DOE Nanoscience Center) Users Executive Committee Member and Proposal Reviewer

Editorial Board Member, Physical Review X

Symposium Organizer and Chair, Frontiers in Nanomanufacturing, APS March Meeting, Baltimore, MD, 2013

Symposium Organizer and Chair, Strategies for Academy-Industry Relationships, International Materials Research Congress, Cancun, Mexico, 2013

Chair, 41st Electronics Materials Symposium, Santa Clara, CA, 2013

Selected Invited Lectures

"Materials and Device Challenges for Future Information Storage Technology," International Forum on Industrial Applications of Nanotechnology, Monterrey, Mexico, November (2012)

"Nanoscience and Nanotechnology in the Information Storage Industry: Enabling Current and Future Products," Workshop, Nanotechnology in Energy and Medical Applications, Colombia, US, March (2013)

Selected Publications

Marinero, E. E. and Fisher, T., "Carbon Nanotube Thermal Interfaces on Gd Foil," *Int. Journal of Heat and Mass Transfer,* **55**(23-24), 6716 (2012)

Dobisz, E. A., Kercher, D., Grobis, M., Marinero, E. E., Weller, D., and Albrecht, T. R., "Fabrication of CoCrPt Alloy Bit Patterned Media at 1Td/in^2 and Recording Performance Measurement with a Conventional Read/Write Head," *J. Vac. Sc. Tech.,* **B30**, 06FH01 (2012)

Saha, B., Naik, G., Drachev, V. P., Bortasseva, A., Marinero, E. E., and Sands, T. D., "Electronic and Optical Properties of ScN and (Sc,Mn)N Thin Films Deposited by DC-Magnetron," *J. Appl. Phys.,* **114**, 063519 (2013)

Albrecht, T. R., Dobisz, E., Gao, H., Grobis, M., Hellwig, O., Kercher, D., Lille, J., Marinero, E., Patel, K., Ruiz, R., Schabes, M. E., Wan, L., Weller, D., and Wu, T. W., "Bit Patterned Media at 1Td/in^2 and Beyond," *IEEE Trans. Mag.,* **49**, 773 (2013)

Selected Conference Presentations

Hernandez, C., Chavira, E., Rosales, I., Tejada, A., Huerta, L., and Marinero, E. E., "Synthesis, Structural Characterization and Magnetic Properties of YbFe $_{1-x}Mn_xO_3$ Perovskites," APS March Meeting, Baltimore, MD, March (2013)

Olalde-Velasco, P., Yang, W. L., Hernandez, C., Chavira, E., Rosales, I., Tejada, A., Huerta, L., and Marinero, E. E., "Synchrotron Soft X-ray Absorption Studies of YbFe $_{1-x}Mn_xO_3$ Perovskites," APS March Meeting, Baltimore, MD, March (2013)

Tafoya, L., Rendon, L., Santiago, P., Chavira, E., Marinero, E. E., Garibay, V., and Gonzalez, L., "Synthesis and HRTEM Electron Diffraction Characterization of Monocrystalline V_2O_5," APS March Meeting, Baltimore, MD, March (2013)

McCarthy, P. T., Fisher, T. S., and Marinero, E. E., "Magneto Thermolectric Generator with Carbon Nanotube Thermal Interfaces," APS March Meeting, Baltimore, MD, March (2013)

Intellectual Property

Hellwig, O., Marinero, E. E., and Weller, D. K., "Patterned Perpendicular Recording Medium with Ultrathin Oxide Film and Reduced Switching Field Distribution," 8/268,461, filed on September 18, 2012

Gurney, B. A. and Marinero, E. E., "Magnetoresistive sensor having a quantum well structure and a P-doped trapping layer to prevent surface charge carriers from migrating to the quantum well structure," 8/274,763, filed on September 25, 2012

Marinero, E. E., Weller, D. K., and York, B. R., "Patterned Perpendicular Magnetic Recording Medium with Multiple Magnetic Layers and Interlayers," 8/320,232, filed on November 27, 2012

Enrico Martinez

Ph.D., University of Notre Dame, 1972

Visiting Professor
National Researcher, National System of Researchers, Mexico

Selected Professional Activities

Secretary of the Chemical Engineering Division, National Academy of Engineering-Mexico, 2012-2014
Editor in Chief, Journal of Enzyme Engineering, 2012-present
Specialized Reviewer, Revista Ingeniería InvestigaciónY Tecnología, National University of Mexico
Associate Director, Purdue – Mexico Center for Sustainability

Teaching Contributions

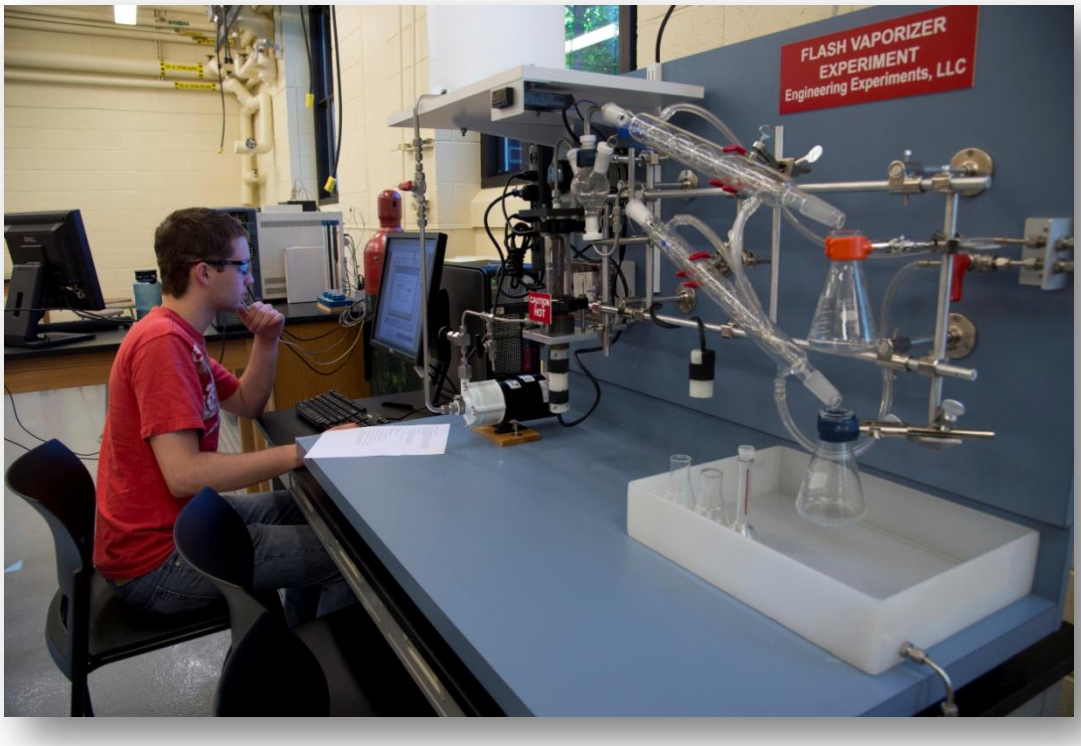
ChE 348 – Chemical Reaction Engineering
ChE 435 – Chemical Engineering Laboratory

Selected Publications

Martinez, E. N., "The Chemical Industry in México: Evolution, Challenges and Perspectives," *Chemical Engineering Progress,* 45-51 (2012)

Selected Conference Presentations

"Jose Uriel Arechiga a Professional Chemical engineer and Teacher," Department of Process and Hydrolic Engineering, Universidad Autonoma Metropolitana-Iztapalapa, Mexico City, Mexico, January (2013)



Undergraduate student in the Unit Operations Laboratory

Jeffrey J. Siirola

Ph. D., University of Wisconsin-Madison, 1970

Professor of Engineering Practice

Member, National Academy of Engineering

Research Areas: Chemical Process Synthesis, Computer-Aided Conceptual Process Engineering, Engineering Design Theory and Methodology, Chemical Process Development and Technology Assessment, Resource Conservation and Recovery, Sustainable Development and Growth, Carbon Management, Chemical Engineering Education

Selected Professional Activities

Fellow, AIChE
Publications Committee, AIChE, 1994-present
Research and New Technology Committee, AIChE, 1993-present
Education and Accreditation Committee, AIChE, 1992-present
Chair and ABET Society Liaison, 2006-present
Chemical Engineering Program Evaluator, 1988-present
Conferences Committee Chair, CACHE Corporation, 1993-present
Industrial Trustee, CACHE Corporation, 1983-present
Secretary, ABET, 2011-present
Board of Directors, ABET, 2006-present
Finance Committee, 2010-present
International Evaluator, ABET, 2002-present
Consulting Editors Board, *AIChE Journal,* 2012-present
Editorial Advisory Board, Academic Process Systems Engineering Series, 1997-present
Editorial Advisory Board, *Computers & Chemical Engineering,* 1996-present
Advisory Board, Lehigh University, Chemical Engineering Department, 2007-present
Advisory Council, University of Delaware, Chemical Engineering, 2006-present
Advisory Board, Energy Institute, 2008-present
Advisory Board, Catalyst Center for Energy Innovation, 2009-present
Advisory Board, University of California-Los Angeles, Chemical and Biomolecular Engineering, 2006-present
Advisory Board, Tennessee Technological University, Chemical Engineering, 2005-present
Advisory Board, City College of the City University of New York, Chemical Engineering, 2004-present
External Advisory Council, Purdue University, Discovery Park, 2003-present
Advisory Board, University of California-Santa Barbara, Chemical Engineering, 2003-present
External Advisory Board, Georgia Institute of Technology, Chemical and Biomolecular Engineering, 2002-present
Advisory Committee, Illinois Institute of Technology, Chemical and Biological Engineering Department, 2000-present
External Advisory Board, University of South Carolina, 2012-present
Industrial Advisory Board, University of Utah, Chemical Engineering, 1999-present
Industrial Advisory Board, Department of Energy Carbon Capture Simulation Initiative, 2010-present
Advisory Board, National Energy Technology Laboratory Modular Framework, 2010-present

Teaching Contributions

ChE 450 – Design and Analysis of Process Systems
ChE 597 – Chemical Process Technology and Industry Structure

Geoffrey Bruening (BSChE 2013) with Dr. Siirola at the Senior Banquet

Graduate Degrees Awarded

July 1, 2012 to June 30, 2013
PhD Degrees - 21
MS Degrees - 6

PhD Degrees Awarded August 4, 2012

Appathurai, Santosh
Breakup and Coalescence of Liquid Drops, (Basaran, Harris), Lead Facilities Engineer, Chevron, Houston, TX

Kispersky, Vincent
Kinetic and Spectroscopic Catalysts for Water-Gas Shift and Nox Removal, (Litster), Process Systems Enterprise Consultant, Naperville, IL

Li, Jianfeng
Multi-Sclae Model Model Approaches for a Spray Coating Process in Paddle Mixers, (Litster), Process Systems Enterprise Consultant, Cedar Knolls, NJ

Pommer, Chris
Scaling in Multi-Phase Flows, (Basaran, Harris), Mechanical Response of Elastomers, Senior Research Engineer, 3M Corporate Research Process Lab, Minneapolis, MN

Prabhu, Rasika
A Critical Investigation of the Viscoelastic Mechanical Response of Elastomers, (Caruthers), Schlumberger, Chemical Engineering, Sugarland, TX

Renner, Julie N.
Modular Protein Matrices for Cartilage Repair, (Liu), Proton OnSite, Postdoc, Wallingford, CT

Shekhar, Mayank
Water-Gas Shift Catalysis over Supported Au and Pt Nanoparticles, (Ribeiro, Delgass), Senior Engineer, The DowChemical Company, Freeport, TX

Shenvi, Arnirudh
Synthesis of Energy Distillation Configurations, (Agrawal), ChE Consultant, DuPong Company, Wilmington, DE

Shu, Che-Chi
Modeling Signal Transduction Process in Cell Population, (Ramkrishna), Posdoc, University of Minnesota, Minneapolis, MN

MS Degrees Awarded August 4, 2012

Straub, Dean
MS ChE Non-Thesis, (Wang), Jacobs Engineering Process Engineer

PhD Degrees Awarded December 15, 2012

Cipich, Michelle N. C.
Contact Between Swabs and Surfaces during Explosives Detection, (Beaudoin)

Dong, Jiannan
Experimental and Modeling Studies of Colloidal Dispersion Stability of CuPc Pigment Nanoparticles in Aqueous Solution, (Franses, Corti), Postdoc, University of Texas at Austin, Austin, TX

Gawecki, Piotr
Fundamental Studies of Biomass Fast Pyrolysis for the Direct Production of Molecules in the Fuel Range, (Agrawal, Delgass, Ribeiro), Technologist, Royal Dutch Shell, Houston, TX

Kim, Dae Hwan
Surface Modification of Nanoparticles by Polymer Grafting, (Won), Researcher, KCC Central Research Institute, Yongin, Korea

Lee, Wen-Sheng
Catalytic Sites in Au/TS-1 and Related, (Delgass, Ribeiro), Postdoc, University of Minnesota, Department of Chemical Engineering, Minneapolis, MN

McCarthy, Robert
The Fabrication and Characterization of Double-Gyroid and Thin Film Photovoltaics, (Hillhouse, Agrawal), St, Louis, MO

Misiego Arpa, Carmen R.
Carbon Nanotube Dispersion and Characteristics: Thermo-Mechanical Properties and Conductivity of Plymide Nanocomposites, (Pipes), SABIC IP Process Technology Engineer, Murcia, Spain

PhD Degrees Awarded May 11, 2013

Galas, Richard
Microenvironmental Cues for Vascular Tissue Engineering, (Liu), Internship, BASF, Ludwigshafen, Germany

O'Grady, John
Metabolic Flux Analysis of Oleaginous Algae, (Morgan), Postdob, Purdue University, West Lafayette, IN

Singh, Meenesh
Towards the Control of Crystal Shape and Morphology Distributions In Crystallizers, (Ramkrishna), Postdoc, Lawrence Berkeley National Lab, Berkeley, CA

Venkatesan, Anand
Low Cost Synergistic Desalination Processes, (Wankat), Associate Engineer, Phillips 66, Bartlesville, OK

Zarate, Nyah
Multi-Scale Modeling of Particulate Systems by Incorporating Particle Roughness, (Litster, Beaudoin), Senior Process Engineer, Intel Corporation, Hillsboro, OR

MS Degrees Awarded May 11, 2013

O'Regan, Peter
Defect Detection for Lithium Ion Battery Manufacturing via Automated Image Processing of Pulse Thermography, (Caruthers)

Hsu, Hsin-Yun
MS ChE Non-Thesis, (Harris) Purdue University, West Lafayette, IN, Continuing for PhD

Jimenez-Useche, Isabel
MS ChE Non-Thesis, (Yuan), Purdue University, West Lafayette, IN, Continuing on for PhD

Mallapragada, Dharik S.
MS ChE Non-Thesis, (Ribeiro), Purdue University, West Lafayette, IN, Continuing on for PhD

Mehta, Dhairya D.
MS ChE Non-Thesis, (Ribeiro, Agrawal), Purdue University, West Lafayette, IN, Continuing on for PhD

Graduate Student Enrollment

	Last Name	First Name	Advisor(s)	UG/MS Institution	Start Date
1	Abbou Oucherif	Kaoutar	Litster	New Mexico Institute of Mining	Spring 2010
2	Acevedo	David	Nagy	University of Puerto Rico	Fall 2012
3	Adigun	Oluwamayowa	Harris	Vanderbilt University	Fall 2012
4	Al-Musleh	Easa	Agrawal/Reklaitis	Qatar University	Fall 2008
5	Anthony	Christopher	Harris/Basaran	University of Arizona, Tucson	Fall 2012
6	Austin	John	Harris	Worcester Polytechnic Institute	Fall 2010
7	Baradwaj	Aditya	Boudouris	University of Maryland	Fall 2011
8	Bates	Shane	Ribeiro	Pennsylvania State University	Fall 2008
9	Bhat	Anuradha	Reklaitis/ Venkatasubramanian	Indian Institute of Technology/Madras and Indian Institute of Technology/Bombay	Fall 2011
10	Brennan	Mary Jane	Liu	Purdue University	Fall 2010
11	Brew	Kevin	Agrawal	University of Delaware	Fall 2010
12	Carter	Nathan	Agrawal	Missouri University of Science & Technology	Fall 2010
13	Chan	Holly	Boudouris	University of Massachusetts	Fall 2012
14	Chen	Si	Pipes	Cornell University	Fall 2010
15	Choksi	Tej Salil	Greeley	Institute of Chemical Technology	Fall 2012
16	Choudhari	Harshavardha	Agrawal/Delgass/Ribeiro	Institute of Chemical Technology	Fall 2009
17	Chun	Hee-joon	Greeley	Ajou University/Seoul National University	Fall 2012
18	Cipich	Michelle	Beaudoin	Tri-State University	Fall 2006
19	Crawford	Morgan	Wang	Rose-Hulman Institute of Technology	Fall 2012
20	Cui	Yanran	Delgass/Ribeiro	Beihang University	Fall 2011
21	Cybulskis	Viktor	Ribeiro/Delgass	Purdue University	Fall 2011
22	David	Anand	Caruthers/Pekny	University of Minnesota, Twin Cities/Iowa State University*	Fall 2009
23	Davis	Nathan B.	Litster	Syracuse University	Fall 2011
24	Davis	Nathan J	Litster	Purdue University	Fall 2011
25	Degenstein	John	Agrawal/Delgass/Ribeiro	University of North Dakota	Fall 2011
26	Detwiler	Michael	Ribeiro/Delgass	Youngstown State University	Fall 2010
27	Devaraj	Jayachandran	Ramkrishna	National University of Singapore/University of Madras	Fall 2009
28	Devilbiss	Frank	Ramkrishna	Purdue University	Fall 2011
29	Devlin	Nicole	Basaran/Harris	Georgia Institute of Technology	Fall 2011
30	Dietrich	Paul	Ribeiro/Baertsch/Delgass	University of Wisconsin/Madison	Fall 2009
31	Dong	Jiannan	Franses/Corti	Zhejiang University	Fall 2008
32	Easton	Mckay	Ribeiro	Brigham Young University	Fall 2010
33	Fang	Haiyu	Wu	University of Science & Technology	Fall 2010
34	Finefrock	Scott	Wu	Case Western Reserve University	Fall 2010
35	Freer	Alexander	Harris	University of Notre Dame	Fall 2010
36	Gaik	Steven	Agrawal/Hillhouse	Pennsylvania State University	Fall 2007
37	Galas	Richard	Liu	State University of New York - Buffalo	Fall 2008
38	Gao	Danni	Varma	Tsinghua University	Fall 2009
39	Gawecki	Piotr	Agrawal/Delgass/Ribeiro	University of California, Riverside	Fall 2008
40	Gencer	Emre	Agrawal/Delgass/Ribeiro	Bogazici University	Fall 2011
41	Gharachorlou	Amir	Ribeiro	Amir Kabir University of Technology	Spring 2010
42	Ghose	Ranjita	Varma	University Institute of Chemical Technology/University of Florida	Fall 2009
43	Graeser	Brian	Agrawal	Virginia Polytechnic Institute & State University	Fall 2011
44	Gupta	Anshu	Reklaitis/Venkatasubrama	Indian Institute of Technology, Madras	Fall 2010
45	Hages	Charles	Agrawal	University of California, Santa Barbara	Fall 2010
46	Hagmann	Christopher	Kong/Pekny/Reklaitis	Brigham Young University	Fall 2012
47	Harris	James	Ribeiro/Delgass	University of Virginia	Fall 2012
48	Harrison	Aaron	Beaudoin	Brigham Young University	Fall 2011
49	Hirshfield	Laura	Reklaitis/ Venkatasubramanian	University of Michigan/Ann Arbor	Fall 2009
50	Honda	Gregory	Varma	University of Connecticut	Fall 2010
51	Hsu	Hsin-yun	Harris	National Tsing Hua University	Fall 2010
52	Huff	Joshua	Agrawal	Texas A & M University	Spring 2010
53	Icten	Elcin	Reklaitis/ Venkatasubramanian	Bogazici University	Fall 2011
54	Jaini	Rohit	Morgan	Indian Institute of Technology/Kharagpur	Fall 2012
55	Jimenez-	Isabel	Yuan	University De Los Andes*	Fall 2009
56	Joglekar	Chinmay	Agrawal	Institute of Chemical Technology	Fall 2011
57	Kamat	Pritish	Basaran	Institute of Chemical Technology	Fall 2012
58	Kelkar	Aniruddha	Franses/Corti	Institute of Chemical Technology	Fall 2010
59	Kim	Dae Hwan	Won	Seoul National University	Fall 2007
60	Kim	Jaewoo	Caruthers	Seoul National University	Fall 2008
61	Kim	Seong-eun	Yuan	Korea University	Fall 2011
62	Kim	Yeji	Liu	Korea University	Fall 2009
63	Koeper	Mark	Agrawal	University of Missouri/Columbia	Fall 2012
64	Koswara	Andy	Chakrabarti	University of California, San Diego	Fall 2009
65	Lee	Hoyoung	Won	Korea University	Spring 2009

	Last Name	First Name	Advisor(s)	UG/MS Institution	Start Date
66	Lee	Jaewon	Wu	Yonsei University/Hanyang University	Fall 2012
67	Lee	Shinbeom	Varma	Yonsei University/Seoul National University	Fall 2011
68	Lee	Wen-Sheng	Delgass/Ribeiro	National Taiwan University	Fall 2007
69	Ling	Lei	Wang	Tsinghua University	Fall 2009
70	Liu	Xiaohui	Pekny/Dietz	Tsinghua University	Fall 2011
71	Louvier	Matthew	Venkatasubramanian/ Reklaitis	University of California, Los Angeles	Fall 2010
72	Lu	Jennifer	Litster	National Taiwan University	Fall 2012
73	Madenoor	Gautham	Agrawal/Tawarmalani	Indian Institute of Technology/Madras	Fall 2011
74	Mallapragada	Dharik	Agrawal/Delgass/Ribeiro	Indian Institute of Technology, Madras	Fall 2008
75	McCarthy	Robert	Agrawal/Hillhouse	Washington University	Fall 2007
76	McLeod	Steven	Agrawal	University of Florida	Fall 2011
77	Mehta	Dhairya	Agrawal/Ribeiro/Delgass	University Institute of Chemical Technology	Fall 2009
78	Mendonca	Agnes	Yuan	Visvesvarya National Institute of Technology/University of Florida	Fall 2012
79	Misiego Arpa	C. Rocio	Pipes	Universidad de Valladolid/Purdue University	Fall 2010
80	Miskin	Caleb	Agrawal	Brigham Young University	Fall 2011
81	Mulvenna	Ryan	Boudouris	Monash University	Fall 2011
82	Negash	Bethlehem	Agrawal	Jackson State University	Fall 2012
83	Nurse	Nathan	Yuan	North Carolina State University	Fall 2011
84	O'Grady	John	Morgan	Rose-Hulman Institute of Technology	Fall 2008
85	O'Regan	Peter	Caruthers	Tufts University	Fall 2010
86	Ogebule	Oluwaseyi	Caruthers	Alabama Agricultural & Mechanical University	Fall 2008
87	Oglesby	Patrick	Harris	Purdue University	Fall 2005
88	Parekh	Atish	Ribeiro/Delgass	Indian Institute of Technology, Bombay	Fall 2010
89	Park	Hye Yeon	Agrawal/Hillhouse	Korea University	Fall 2009
90	Parks	Conor	Ramkrishna	University of Michigan/Ann Arbor	Fall 2012
91	Pohlman	Daniel	Litster	University of Notre Dame	Fall 2011
92	Pradhan	Shankali	Delgass/Ribeiro	Institute of Chemical Technology	Fall 2012
93	Ridder	Bradley	Chakrabarti	University of South Florida	Fall 2010
94	Rostro	Lizbeth	Boudouris	University of Arkansas/Fayetteville	Fall 2011
95	Sabnis	Kaiwalya	Ribeiro/Delgass	Institute of Chemical Technology	Fall 2010
96	Sambath	Krishnaraj	Basaran	Indian Institute of Technology, Madras	Fall 2008
97	Sanchez,Medin	Oscar	Yuan	Universidad Nacional de Colombia	Fall 2012
98	Sayin	Ridade	Litster	Bogazici University	Fall 2012
99	Schram	Caitlin	Beaudoin	Johns Hopkins University	Fall 2011
100	Sheets	Erik	Agrawal	Villanova University	Fall 2010
101	Singh	Meenesh	Ramkrishna	Sardar Patel University	Spring 2008
102	Smith	Ian	Ribeiro/Delgass	Purdue University	Fall 2012
103	Smith	Kathryn	Beaudoin	University of Wisconsin	Fall 2008
104	Soepriatna	Nicholas	Wankat/Wang	University of Texas, Austin	Spring 2010
105	Sollberger	Fred	Ribeiro/Delgass	University of Illinois, Urbana-Champaign	Fall 2010
106	Son	Sang Ha	Caruthers	Yonsei University	Fall 2007
107	Su	Sheng-chuan	Liu	National Taiwan University	Fall 2009
108	Suchomel	Mark	Caruthers/Pekny	University of Minnesota, Duluth	Fall 2009
109	Sung	Seung-Hyun	Boudouris	Seoul National University	Fall 2012
110	Sweat (Cook)	Melissa	Beaudoin	Mississippi State University	Fall 2010
111	Switzer	Jeffrey	Caruthers/Thomson	University of California, Davis	Fall 2006
112	Thete	Sumeet	Basaran	Government College of Engineering	Fall 2011
113	Thomas	Myles	Beaudoin	Utah State University	Fall 2010
114	Tomlinson	Edward	Boudouris	North Carolina State University	Fall 2012
115	Tran	Vu Thien	Ramkrishna	Texas A & M University	Fall 2012
116	Tsouris	Vasilios	Won	University of Pittsburgh	Fall 2011
117	Tsui	Hung-Wei	Franses/Wang	National Taiwan University	Fall 2009
118	Venkatakrishna	Vinod	Agrawal/Delgass/Ribeiro	Indian Institute of Technology, Madras	Fall 2009
119	Venkatesan	Anand	Wankat	Indian Institute of Technology, Madras	Fall 2008
120	Verma	Anuj	Ribeiro/Delgass	Institute of Chemical Technology	Fall 2010
121	Walker	Bryce	Agrawal	Brigham Young University	Fall 2009
122	Weeden	George	Wang	Purdue University	Fall 2011
123	Xiong	Silei	Caruthers/Delgass/ Thomson	Tsinghua University	Fall 2009
124	Yadav	Gautam	Wu	University of Western Ontario	Fall 2009
125	Yang	Haoran	Wu	Tsinghua University	Spring 2010
126	Yang	Yang	Nagy	Peking University	Fall 2012
127	Yang	Yung-jih	Corti/Franses	National Taiwan University	Fall 2011
128	Yohe	Sara	Agrawal/Delgass/Ribeiro	University of Minnesota,Twin Cities	Fall 2008
129	Zarate	Nyah	Beaudoin/Litster	Illinois Institute of Technology, Chicago	Fall 2008
130	Zhao	Xin	Agrawal	Sun Yat-Sen University/Tsinghua University	Fall 2012

Facilities

Forney Hall of Chemical Engineering

In October 2004, the School of Chemical Engineering dedicated a 100,000 ft^2 expansion ($20 million) that more than doubled the size of our building. The building was then renamed 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 renovation of the original building ($10.5 million), including associated spaces, was completed in Spring 2012.

Discovery Park

Since 2001, Discovery Park, made up of 10 – soon to be 12 – centers, has over thousands of square feet space to have an economic impact of $750 million in buildings, equipment and grants. Discovery Park is highly collaborative while its facilities attract researchers and students from all over to participate in research in the Birck Nanotechnology Center, Bindley Bioscience Center, Burton D. Morgan Center for Entrepreneurship, Gerald D. and Edna E. Mann Hall, Hall for Discovery and Learning Research, and the Oncological Sciences Center.

Bindley Bioscience Center

The Bindley Bioscience Center, a $15 million building, consists of 48,000 ft^2, including 20,000 ft^2 of lab space to facilitate research activity of multiple life sciences teams in parallel. Research core activity in metabolomics, proteomics and cytomics supports dozens of academic and corporate projects. The facility's equipment, technology, state-of-the-art labs and research expertise have sparked life science and bioscience research collaborations with state, regional, national and international industry partners.

Birck Nanotechnology Center

The Birck Nanotechnology Center is a 207,000 ft^2, $58 million home for a class 1-10-100 nanofabrication cleanroom, the Scifres Nanofabrication Laboratory. Analytical services to support a wide variety of research. Surface analysis facility includes nanotech labs to support and facilitate technology transfer and entrepreneurship. High collaborative atmosphere is supported by functionally designated labs, including lab space for industry partners and companies.

Oncological Sciences Center

The Oncological Sciences Center is housed at the Burton D. Morgan Center for Entrepreneurship. The Oncological Sciences Center is seeking to discover new opportunities, forge new partnerships, and nurture new relationships to advance cancer research beyond the laboratory. The $7 million, 26,000 ft^2 building offers central meeting places for workshops, seminars and classes, and works in conjunction with all Discovery Park centers and the Purdue Research Park.

Multidisciplinary Cancer Research

The Multidisciplinary Cancer Research Facility will enhance existing capabilities of Birck Nanotechnology, Center for Cancer Research, Biomedical Engineering and Structural Biology to integrate scientific expertise from the molecular level through animal disease modeling. This $15.9 million facility is expected to be completed in Spring 2014

Drug Discovery Facility

The Drug Discovery Facility will provide state-of-the-art drug discovery research space that is modular and capable of strict environmental control. This $28.7 million facility is expected to be completed in Spring 2014.

Industrial Advisory Council

The Chemical Engineering Industrial Advisory Council (IAC) was initiated in 1988 through the leadership support of senior executives from Abbott Laboratories, Air Products and Chemicals, Amoco, Dow Chemical and Quantum Chemical. Today the ChE IAC remains a partnership of leading corporations with the School of Chemical Engineering to advance and improve the education and professional preparation of chemical engineers who will meet the needs of industry in the 21st century.

The current IAC members are listed below:

AbbVie
Air Liquide
Air Products and Chemicals
Anheuser-Busch
BP
ChevronPhillips Chemical
CountryMark
Dow Chemical Company
Du Pont
Eastman Chemical Company
Elanco Animal Health / Eli Lilly
ExxonMobil
Honeywell
Lubrizol
Pfizer
Phillips 66
Procter & Gamble
Shell
UOP

These corporations provide financial support for curriculum innovations, scholarships, experimental facilities enhancements, instructional computing facilities and start-up support for young faculty. The Fall 2012 meeting took place on October 5, 2012 in Forney Hall, Purdue University; the Spring 2013 meeting was held on March 1, 2013 in Houston, TX, hosted by Shell.

Fall 2012 IAC Meeting

Seminar Speakers
Fall 2012

September 4, 2012
Prof. Sohail Murad, Head
Dept. of Chemical Engineering
University of Illinois at Chicago
"Fluid and Nanoparticle Transport in Lipid Bilayer Membranes Using Coarse Grained Molecular Dynamics Simulations"

September 11, 2012
Prof. Mahdi Abu-Omar
Dept. of Chemistry
Purdue University
"Chemical Catalysis for Sustainable Energy and the Environment"

September 18, 2012
Prof. Shekhar Garde, Head
Dept. of Chemical & Biological Engr.
Rensselaer Polytechnic Institute, NY
"Water at Interfaces of Physical and Biological Systems: A New Molecular Perspective"

September 25, 2012
Prof. Lance Lobban
School of Chemical, Biological & Materials Engr.
Oklahoma State University
"Biomass conversion to fuels and chemicals via initial thermal treatment: process options and catalytic reactions"

October 2, 2012
Prof. Dehua Liu
Dept. of Chemical Engineering
Tsinghua University, Beijing, China
"A commercial Demonstration on Biorefinery of Lipids: Co-production of Biodiesel and 1,3-propanediol"

October 16, 2012
Prof. Eray Aydil
Dept. of Chemical Engr. & Materials Science
University of Minnesota
"*CIGS and CZTS Solar Cells*"

November 6, 2012
Prof. Giorgio Carta
Dept. of Chemical Engineering
University of Virginia
"*Transport Phenomena in New and Improved Stationary Phases for Downstream Processing of Biopharmaceuticals"*

November 13, 2012
Dr. Jim Michaels
Senior Scientific Director
Merck & Company
"Development of Material Attribute Design Spaces for Particulate Dosage Forms"

November 27, 2012
Dr. Steven Visco, CEO
PolyPlus Battery Company
"*The Road to Next Generation Battery Technology: Challenges and Opportunities*"

December 4, 2012
Prof. G.V. Rex Reklaitis
School of Chemical Engineering
Purdue University
"Progress and Prospects for the ERC on Structured Organic Particulate Systems"

Seminar Speakers
Spring 2013

January 15, 2013
Prof. Yue Wu
School of Chemical Engineering
Purdue University
"*Advanced Nanostructures for Thermoelectric Applications*"

January 29, 2013
Prof. Bradley Olsen
Department of Chemical Engineering
Massachusetts Inst. of Technology
"Nanomaterials From the Self-Assembly of Globular Proteins"

February 5, 2013
Prof. Robert Kelly
Dept. of Chemical & Biomolecular Engineering
North Carolina State University
"More Heat than Light: How Extremely Thermophilic Microorganisms and Enzymes Fit into the Energy Picture"

February 12, 2013
Prof. Ali Khademhosseini
Harvard Medical School
"*Microengineered Hydrogels for Stem Cell Bioengineering and Tissue Regeneration*"

February 26, 2013
Prof. Mahmoud El-Halwagi
Department of Chemical Engineering
Texas A&M University
"*Sustainable Process Design Through Mass and Property Integration*"

March 5, 2013
Prof. Song Li
Department of Bioengineering
University of California, Berkeley
"Stem Cells in Vascular Regeneration and Remodeling"

March 19, 2013
Prof. Konstantinos Konstantopoulos
Dept. of Chemical & Biomolecular Engr.
Johns Hopkins University
"Integrating Engineering and Biology in Cancer Research"

April 2, 2013
Prof. Paul Nealey
Institute of Molecular Engineering
University of Chicago
"Directed Assembly of Block Copolymers on Lithographically Defined Chemically Nanopatterned Substrates"

April 9, 2013
Prof. Shankar Subramaniam, Chair
Bioengineering Department
University of California at San Diego
"Engineering: the sine qua non for Systems Biology and Medicine"

Kelly Lectures
April 16, 2013
Prof. Michael F. Doherty
Department of Chemical Engineering
University of California, Santa Barbara
"Rapid Process Design: Sorting the Wheat from the Chaff"

and

April 17, 2013
11:30 a.m.-12:30 p.m.
FRNY 3059
"*Crystals are Like People: Growth and Defects are What Make Them Interesting*"

April 23, 2013
Dr. Julie Renner
"Modular Protein Matrices for Cartilage Repair"
(Faculty Lecture Award)