

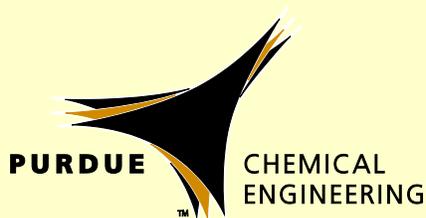
**PURDUE**  
UNIVERSITY

**School of  
Chemical Engineering**



# Professional Activity Report

**2011-12**



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## Purdue University School of Chemical Engineering

### Message from the Head

The 2011-12 academic year was special for us: with the main event on October 7-8, 2011, the School of Chemical Engineering marked 100 years since the Board of Trustees approved the School's founding. We enjoyed having so many of our School's alumni and friends return to celebrate with us. The theme of the Centennial celebration was "A Century of People and Progress." As you will read this report, this has never been truer - it is our people who drive our progress.

On October 21, 2011, I accompanied Professor Rakesh Agrawal to the White House to receive the National Medal of Technology and Innovation from President Obama. It was among my high notes as School Head to witness a faculty member of our School accept the highest honor an engineer can receive in the United States. We are immensely proud of Dr. Agrawal's accomplishments and greatly appreciate the tremendous effort he puts into all his activities: research, teaching and service.

This fall we welcome Professor Zoltan Nagy, who obtained both his BS and PhD degrees at Babes-Bolyai University, Romania, in 1994 and 2001 respectively. Dr. Nagy comes from Loughborough University, UK, where he was a Professor of Chemical Engineering and leader of the Process Control and Pharmaceutical Systems Engineering Research Group. His research interests include: pharmaceutical systems engineering, modeling, monitoring, optimization and control of chemical processes in particular crystallization systems, and process analytical technologies.

The 2012 AIChE annual meeting, to be held in Pittsburgh during October 29 – November 2, is an exceptional opportunity for us to recognize three faculty members who will receive awards: Nicholas Delgass will receive the R.H. Wilhelm Award in Chemical Reaction Engineering, James Litster will receive the Thomas Baron Award in Fluid-Particle Systems, and Gintaras "Rex" Reklaitis will receive the Van Antwerpen Award. In addition, two of our alumni will also be honored with awards: Donald R Miller (PhD '84) will receive the Industrial R&D Award and Terry Papoutsakis (MS '77, PhD '80) will receive the James E. Bailey Award.

In January 2012, David Pershing (BS 1970) was appointed president of the University of Utah. He becomes the third alumnus of our School to hold such an academic leadership position. In February 2012, two of our alumni were elected to join the National Academy of Engineering: Dr. Richard W. Kormeyer (MS 1980, PhD 1983) is currently Global Head of Licensing, Worldwide Pharmaceutical Sciences and Senior Research Fellow with Pfizer. Dr. Antonios G. Mikos (MS 1985, PhD 1988) is the Louis Calder Professor of Bioengineering and Professor of Chemical and Biomolecular Engineering at Rice University and, in addition, he is Director of the Center for Excellence in Tissue Engineering at Rice University. In April 2012, Alec Scranton (PhD 1990) was named Dean of Engineering at the University of Iowa.

With such great alumni and faculty, it is no wonder that our students are also blazing their own trails in Purdue history and beyond. Miranda McCormack, ChE senior, was appointed by the Indiana Governor as the student representative on the Purdue Board of Trustees for the 2011-2013 term – she is one of total 10 Trustees and the only student member. This is an outstanding accomplishment for Miranda but, considering that the previous student trustee was also a Chemical Engineering student, Tyler Teykl, it is a reflection of the extraordinary quality of our students and the effectiveness of the educational programs our School of Chemical Engineering offers.

We currently enrol 485 sophomores-seniors and 120 graduate students, almost all at the PhD level, including 27 who just joined us this August. Our research programs are reaching farther than ever. Just to give one example, advised by Professor Mike Harris, two of our graduate students, Anand Venkatesan and Aniruddha Kelkar, won the top \$20,000 prize in the 2012 Indiana Soybean Alliance Innovation Competition, with their soybean-based substrate that can be used to make computer circuit boards. We are proud of their accomplishment and invite you to visit our School and witness our continued progress.

Sincerely,

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



## 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.

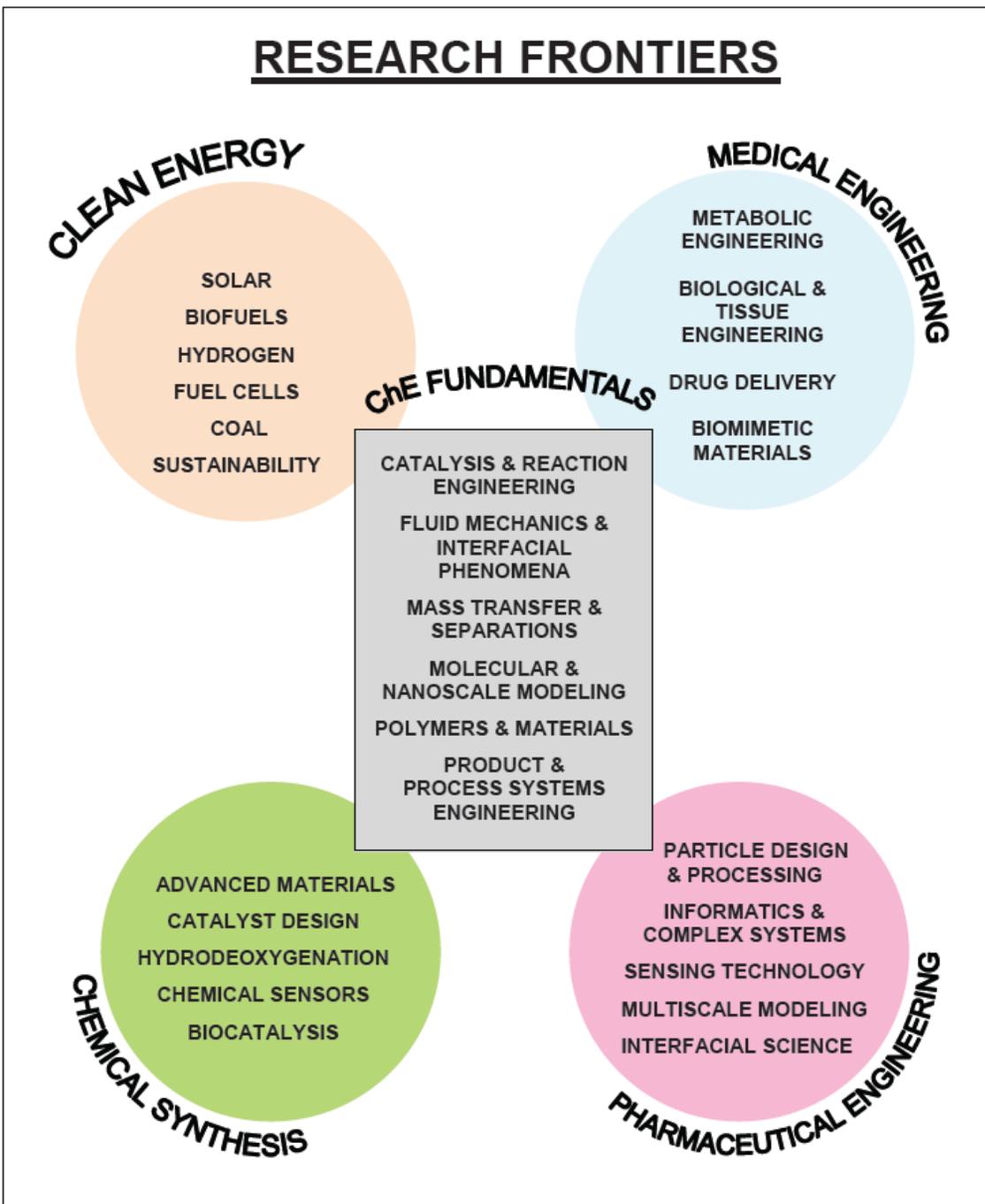
**Development:** Secure and improve the School's financial foundation as a means to continually improve its programs and physical facilities, while balancing short and long term goals.

**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 FRONTIERS



## Fields of Study

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

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

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

**Molecular and Nanoscale Modeling** – Corti, Harris, Thomson, Won

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

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

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

**Energy** - Agrawal, Boudouris, Caruthers, Delgass, Ho, Morgan, Pekny, Ramkrishna, Ribeiro, Varma, Wu

**Medical Engineering** - Franses, Liu, Pekny, Ramkrishna, Won, Yuan

**Pharmaceutical Engineering** - Basaran, Beaudoin, Harris, Kim, Litster, Pekny, Ramkrishna, Reklaitis

# Faculty



## **Rakesh Agrawal**

Sc. D., Massachusetts Institute of Technology, 1980

**Winthrop E. Stone Distinguished Professor**

**Member, National Academy of Engineering  
National Medal of Technology and Innovation, 2011**

### **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  
Editorial Board Member, Current Opinion in ChE  
Consulting Editor, AIChE Journal  
Member, Chem. Eng. Department Advisory Committee, WPI  
Member, Technical Advisory Boards of Dow Chemicals, Genomatica, ATMI  
Member, ChE Advisory Council, University of Delaware

### **Selected Invited Lectures**

“Chemical Engineering in a Solar Energy Driven Sustainable Future,” Hess Lecture, Department of Chemical Engineering, University of Virginia, October (2011)

“Novel Pathways for Biomass-to-Liquid Fuel Production,” Keynote, In session honoring Professor Santosh K. Gupta, AIChE Annual Meeting, Minneapolis, MN, October (2011)

“Chemical Engineering Innovation Needs for a Future Solar Economy,” Plenary Lecture, 61<sup>st</sup> Canadian Chemical Engineering Conference, London, Ontario, Canada, October (2011)

“Novel Pathways for Biomass-to-Liquid Fuel Production,” Plenary Lecture, 6<sup>th</sup> Sino/US Joint Conference, Beijing, China, November (2011)

“Thin Film Solar Cells from nanocrystal Inks of Quaternary Semiconductors,” Keynote Lecture, 6<sup>th</sup> Sino/US Joint Conference, Beijing, China, November (2011)

“Energy Saving in Distillation via Identification of Use Configurations,” Plenary Lecture 6<sup>th</sup> Sino/US Joint Conference, Beijing, China, November (2011)

“Thin Film Solar Cells from Nanocrystal Inks of Quaternary Semiconductors,” National University of Singapore, Singapore, December (2011)

“Energy Savings in Distillation via Identification of Useful Configurations,” National University of Singapore, Singapore, December (2011)

“Synthesis of Quaternary Semiconductor Nanocrystal Inks and Their Use for Fabrication of Solar Cells,” Indo-US Workshop on Photovoltaic Science and Technologies, IIT Bombay, India, January (2012)

“Chemical Engineering in a Solar Driven Sustainable Future,” Ken Nobe Founders Lecture in Chemical and Biomolecular Engineering, UCLA, Los Angeles, CA, February (2012)

“A Systems Approach for the Use of Renewable Energy in Transportation,” Pugwash, Purdue University, West Lafayette, IN,

February (2012)

“Chemical Engineering in a Solar Driven Sustainable Future,” Truth & Beauty Seminar Series, School of Chemical Engineering, Purdue University, West Lafayette, IN, March (2012)

“Solar Economy- Is it Feasible,” Indiana Academy of Science, West Lafayette, IN, March (2012)

### **Selected Publications**

Shenvi, A.A., Herron, D. M. and Agrawal, R., “Energy Efficiency Limitations of the Conventional Heat Integrated Distillation Column (HIDIC) Configuration for Binary Distillation,” *I&EC Res.* **50**, 119 (2011)

Shah, V., Agrawal R., “Are All Thermal Coupling Links between Multicomponent Distillation Columns Useful from an Energy Perspective?” *I&EC Res.*, **50**, 1770 (2011)

Ford, G.M., Guo, Q.J., Agrawal, R., & Hillhouse, H.W., “Earth Abundant Element  $\text{Cu}_2\text{ZnSn}_{1-x}\text{Ge}_x\text{S}_4$  Nanocrystals for Tunable Band Gap Solar Cells: 6.8% Efficient Device Fabrication,” *Chemistry of Materials*, **23**, 2626 (2011)

Kar, M., Agrawal, R. and Hillhouse, H.W., “On the Formation Pathways of  $\text{CuInSe}_2$  Nanocrystals for solar cells,” *Journal of American Chemical Society*, **133**, 17239 (2011)

Ford, G.M., Guo, Q.J., Agrawal, R. and Hillhouse, H.W., “ $\text{CuIn}(\text{S},\text{Se})_2$  Thin Film Solar Cells from Nanocrystal Inks: Effect of Nanocrystal Precursors,” *Thin Solid Films*, **520**, 523 (2011)

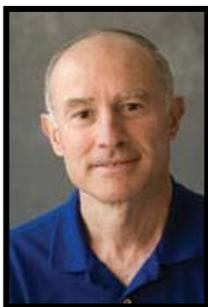
Kar, M., Hillhouse, H.W. and Agrawal, R., “Chemical Liquid Deposition of  $\text{CuInSe}_2$  and  $\text{CuIn}(\text{S},\text{Se})_2$  Films for Solar Cells,” *Thin Solid Films*, **520**, 5431 (2012)

Singh, N. R., Mallapragada, D. S., Agrawal, R. and Tyner, W. E., “Economic Analysis of Novel Synergistic Biofuel ( $\text{H}_2\text{Bioil}$ ) Processes,” *Biomass Conv. Bioref.*, **2**, 141 (2012)

Guo, Q. J., Ford, G. M., Yang, W.-C., Hages, C. J., Hillhouse, H. W. and Agrawal, R., “Optimization of Cation Ratios to Increase the Efficiency of CZTSSe Solar Cells with Ge Alloying,” *Solar Energy Materials and Solar Cells*, **105**, 132 (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 Algorithm,” *AIChE Journal*, in press (2012)

Shenvi, A.A., Shah, V.H., Zeller, J.A. and Agrawal, R., “A Synthesis Method for Multicomponent Distillation Sequences with Fewer Columns,” *AIChE Journal*, in press (2012) <http://onlinelibrary.wiley.com/doi/10.1002/aic.12752/pdf>



## Osman Basaran

Ph. D., University of Minnesota, 1984

**Burton and Kathryn Gedge Professor**

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

### Selected Professional Activities

Fellow, American Physical Society

Chair, National Committee on Membership, American Physical Society

Session Chair, "Bubbles III (Session M3)," 64th Annual Meeting of the Division of Fluid Dynamics (DFD) of the American Physical Society (APS), Baltimore, MD, November (2011)

### Selected Publications

Paulsen, J. D., Burton, J. C., Nagel, S. R., Appathurai, S., Harris, M. T. and Basaran, O. A., "The Inexorable Resistance of Inertia Determines the Initial regime of Drop Coalescence," *PNAS*, **109**, 6857-6861 (2012)

### Selected Conference Presentations

Gao, H., Subramani, H. J., Harris, M. T. and Basaran, O. A., "Wall Effects in Stokes Experiment with a Liquid Foam," 64th Annual Meeting of the Division of Fluid Dynamics (DFD) of the American Physical Society (APS), Baltimore, MD, November (2011)

Pommer, C. A., Harris, M. T. and Basaran, O. A., "Scaling in the Transition from Selective Withdrawal to Viscous Entrainment," 64th Annual Meeting of the Division of Fluid Dynamics (DFD) of the American Physical Society (APS), Baltimore, MD, November (2011)

Sambath, K., Collins, R. T., Harris, M. T. and Basaran, O. A., "Scaling Laws in Electro spraying," 64th Annual Meeting of the Division of Fluid Dynamics (DFD) of the American Physical Society (APS), Baltimore, MD, November (2011)

Appathurai, S., Harris, M. T., Basaran, O. A., Paulsen, J. D., Burton, J. C. and Nagel, S. R., "Coalescence of Liquid Drops," 64th Annual Meeting of the Division of Fluid Dynamics (DFD) of the American Physical Society (APS), Baltimore, MD, November (2011)

McGough, P. T., Gao, H., Appathurai, S. and Basaran, O. A., "Fluid Dynamics of Bottle Filling," 64th Annual Meeting of the Division of Fluid Dynamics (DFD) of the American Physical Society (APS), Baltimore, MD, November (2011)

### Intellectual Property

Xu, X. and Basaran, O. A., "Method for Producing Ultra-Small Drops," U.S. Patent No. 8,186,790, May (2012)



**Chemical Engineering Undergraduate Students**



## Stephen P. Beaudoin

Ph. D., North Carolina State University, 1995

Professor

Purdue University Faculty Scholar (2006-2011)

### Research Areas

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

### Selected Publications

Kishore, V., Paderi, J. E., Akkus, A., Smith, K. M., Balachandran, D., Beaudoin, S., Panitch, A. and Akkus, O., "Incorporation of a Decorin Biomimetic Enhances the Mechanical Properties of Electrochemically Aligned Collagen Threads," *Acta Biomaterialia*, **7**, 2428-2436 (2011)

Jaiswal, R. and Beaudoin, S., "Nanoparticle Adhesion Models: Applications in Particulate Contaminant Removal from Extreme Ultraviolet Lithography Photomasks," *Journal of Adhesion Science and Technology*, **25**, 781-797 (2011)

Kilroy, C., Jaiswal, R. and Beaudoin, S., "Adhesion of Contaminant Particles to Advanced Photomask Materials," *IEEE Transactions on Semiconductor Manufacturing*, **25** (1), 37 - 44 (2012)

Jaiswal, R. and Beaudoin, S., "An Approximate Scheme for Calculating van Der Waals Forces between Finite Cylindrical Volume Elements," *Langmuir*, in press (2012)

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

### Selected Conference Presentations

Smith, K. M., Butterbaugh, J. W. and Beaudoin, S.P., "Effects of Varying Surface Film Thickness on Particle Adhesion in Semiconductor Material-based Systems," AICHE Annual Meeting, Minneapolis, MN, October (2011)

Smith, K. M., Butterbaugh, J. W. and Beaudoin, S.P., "Effects of Varying Surface Film Thickness on Particle Adhesion in Semiconductor Material-based Systems," Annual Meeting of the Electrochemical Society, Boston, MA (2011)

Balachandran, D. and Beaudoin, S., "Particle Shape and Roughness Characterization by Focused Ion Beam Tomography for Adhesion Simulation," AICHE Annual Meeting, Minneapolis, MN, October (2011)



Chemical Engineering Co-Op students



## Bryan W. Boudouris

Ph.D., University of Minnesota, 2009

Assistant Professor

**AFOSR Young Investigator Program Awardee, 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)  
Session Co-Chair, AIChE Meeting, "Nanoscale Structure in Polymers III" (2011)  
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

"Designing Semiconducting Polymers for Advanced Energy Applications," Purdue University, Birck Nanotechnology Center, September (2011)

### Selected Publications

Alarcon-Llado, E., Mayer, M. A., Boudouris, B. W., Segalman, R. A., Miller, N., Yamaguchi, T., Wang, K., Nanishi, Y., Haller, E. E. and Ager, J. W., "PN Junction Rectification in Electrolyte Gated Mg Doped InN," *Applied Physics Letters*, **99**, 102106 (2011)

Boudouris, B. W., Ho, V., Jimison, L. H., Toney, M. F., Salleo, A. and Segalman, R. A., "Real-Time Observation of Polythiophene Crystallization and the Correlation with Transient Optoelectronic Properties," *Macromolecules*, **44**, 6653–6658 (2011)

Ho, V., Boudouris, B. W., McCulloch, B. L., Shuttle, C. G., Burkhardt, M., Chabynyc, M. L. and Segalman, R. A., "Poly(3-alkylthiophene) Diblock Copolymers with Ordered Microstructures and Continuous Semiconducting Pathways," *Journal of the American Chemical Society*, **133**, 9270–9273 (2011)

Chen, C.-F., Park, C.-H., Boudouris, B. W., Horng, J., Geng, B., Girit, C., Zettl, A., Crommie, M. F., Segalman, R. A., Louie, S. G. and Wang, F., "Controlling Inelastic Light Scattering Quantum Pathways in Graphene," *Nature*, **471**, 617–620 (2011)

### Selected Conference Presentations

Boudouris, B. W., Ho, V., McCulloch, B. L. and Segalman, R. A., "Well-Ordered Poly(3-alkylthiophene) Diblock Copolymers for Organic Photovoltaic Applications," AIChE Annual Meeting, Minneapolis, MN, October (2011)

Poster Presentation, "Radical Polymers for Nanostructured, Next Generation Thermoelectric Devices," 2012 DARPA Young Faculty Award Kick-off Meeting, Arlington, VA June (2012)



Graduate Student Ryan Mulvenna with Professor Bryan Boudouris



## James M. Caruthers

Sc. D., Massachusetts Institute of Technology, 1977

### Reilly Professor

### Research Areas

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

### Selected Professional Activities

Board of Directors, Discovery Park Cyber Center  
Director, Center of Impact Science

### Selected Invited Lectures

J.W. Kim, G.A. Medvedev and J.M. Caruthers, "Multiaxial Viscoelastic Characterization of a Glassy Thermoset Resin, Deformation, Yield and Fracture of Polymers," Rolduc Abbey, Kerkarde, Netherlands, April (2012)

### Selected Publications

Maddipati, S.V., Delgass W.N. and Caruthers, J.M., "Determination of the Catalytic Sites for Ziegler Natta Homo-Polymerization from GPC Data," *Macromolecular Theory and Simulation*, **20**, 31-45 (2011)

Bhattacharya, A., Medvedev, G. and Caruthers, J.M., "The Time-Dependent Mechanical Behavior of a Series of Carbon Black Filled Elastomers," *Rubber Chemistry and Technology* **84**, 296 (2011)

Nie, X., Prabhu, R., T. Weerasooriya, W., Chen, W. and Caruthers, J. M., "A Kolsky Torsion Bar Technique for Characterization of Dynamic Shear Response of Soft Materials," *Experimental Mechanics*, **51**(9), 1527-1534 (2011)

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

Switzer, J.M., Travia, N.E., Steelman, D.K., Medvedev, G.A., Thomson, K.T., Delgass W.N., and Caruthers, J.M., "Kinetic Modeling of 1-Hexene Polymerization Catalyzed by  $Zr(tBu-ON^{NMe_2})Bn_2/B(C_6F_5)_3$ ," *Macromolecules*, 4978-4988, DOI: 10.1021/ma300129n (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*, in press (2012)

### Selected Conference Presentations

Prabhu, R. R. Klitkou, Medvedev, G.A., and Caruthers, J.M., "A Critical Analysis of the Viscoelastic Behavior of Elastomers in the Entanglement Region," Rolduc Abbey, Kerkarde, Netherlands, April (2012)

Prabhu, R., Klitkou, R., Medvedev, G.A., and Caruthers, J.M., "Linear Viscoelastic Behavior of Filler Elastomers," Rolduc Abbey, Kerkarde, Netherlands, April (2012)



Professor Caruthers at the  
2012 Purdue Electrical Vehicle Grand Prix



**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,**  
**Colloidal Dispersions, Computer Simulation Techniques**

### Selected Professional Activities

2011 Frontiers of Engineering Education Symposium, National Academy of Engineering  
Chair, Area 1a Programming Committee, AIChE (Term: November 2010 to November 2013)  
Editorial Board, ISRN Computational Mathematics

### Selected Invited Lectures

Corti, D.S. "On the Surface Thermodynamics of Nanoscale Droplets and Bubbles," National Institute of Standards and Technology, Gaithersburg, MD, June (2011)

Dong, J., Kelkar, A., Corti, D.S. and Franses, E.I., "Analytical and Numerical Models of Particle Coagulation in Fluid Dispersions," HP Labs, Palo Alto, CA, January (2012)

Corti, D.S. "On the Interfacial Thermodynamics of Nanoscale Embryos: Can Surface Tension be Negative?" 2012 Midwest Thermodynamics and Statistical Mechanics Conference, University of Minnesota, Minneapolis, MN, May (2012)

### Selected Publications

Siderius D. W. and Corti, D. S., "Extension of Scaled Particle Theory to Inhomogeneous Hard Particle Fluids. IV. Cavity Growth at any Distance Relative to a Planar Hard Wall," *Phys. Rev. E*, **83**, 031126(1-20) (2011)

Corti, D. S., Kerr, K. J. and Torabi, K., "On the Interfacial Thermodynamics of Nanoscale Droplets and Bubbles," *J. Chem. Phys.* **135**, 024701(1-20) (2011)

Dong, J., Chen, S., Corti, D. S., Franses, E. I., Zhao, Y., Ng, H. T. and Hanson, E., "Effect of Triton X-100 on the Stability of Aqueous Dispersions of Copper Phthalocyanine Pigment Nanoparticles," *J. Coll. Int. Sci.* **362**, 33-41 (2011)

Dong, J., Corti, D. S., Franses, E. I., Zhao, Y., Ng, H. T. and Hanson, E., "Adsorption of Myrj 45 on Copper Phthalocyanine Pigment Nanoparticles and Effect on Their Dispersion Stability in Aqueous Solution," *Colloids and Surfaces A: Physicochem. Eng. Aspects* **390**, 74-85 (2011)

Corti, D. S., "Comment on, 'The Gibbs paradox and the distinguishability of identical particles,' by M.A.M. Versteegh and D. Dieks," *Am. J. Phys.* **80**, 170-173 (2012)

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.*, in press (2012)

### Selected Conference Presentations

Torabi, K. and Corti, D. S., "Homogeneous Bubble Nucleation in Superheated Liquids: From the Underlying Free Energy Surface to the Dynamics of Nucleation and Growth," AIChE Annual Meeting, Minneapolis, MN, October (2011)

Corti, D. S., Kerr, G.J. and Torabi, K., "On the Interfacial Thermodynamics of Nanoscale Embryos," AIChE Annual Meeting, Minneapolis, MN, October (2011)

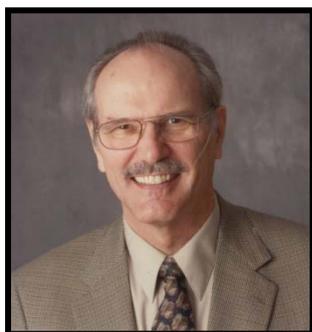
Dong, J., Chen, S., Corti, D. S., Franses, E. I., Zhao, Y., Ng, H.T. and Hanson, E., "Effect of Nonionic Surfactants on the Dispersion Stability of Copper Phthalocyanine Pigment Nanoparticles in Aqueous Solution," AIChE Annual Meeting, Minneapolis, MN, October (2011)

Zhao, Y., Ng, H. T., Hanson, E., Dong, J., Corti, D. S. and Franses, E. I., "Computational and Experimental Study of Colloidal Stability of CuPc Aqueous Dispersions," NIP 27 International Conference on Digital Printing Technologies, Minneapolis, MN, October (2011)

Kelkar, A.V., Dong, J., Franses E.I. and Corti, D.S., "New Theories and Brownian Dynamics Simulations for Rates of Coagulation in Dilute and Concentrated Colloidal Dispersions," 86<sup>th</sup> ACS Colloid & Surface Science Symposium, Baltimore, MD, June (2012)



**Professor Corti with his wife, Michele Brown**



## W. Nicholas Delgass

Ph. D., Stanford, 1969

### Maxine Spencer Nichols Professor

#### Research Areas

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

#### Selected Invited Lectures

Delgass, W. Nicholas "The Chemistry of Catalysis," Purdue University, December (2011)

#### Selected Publications

Maddipati, Sridhar V., Delgass, Nicholas W., Caruthers, James M., "Determination of the Catalytic Sites for Ziegler Natta Homo-Polymerization from GPC Data," *Macromolecular Theory and Simulations*, **20**, 31-45 (2011)

Pazmiño, J. H., Mulla, S. S., Miller, J.T., Delgass, W.N., and Ribeiro, F.H., "Kinetic studies of the stability of Pt for NO oxidation: Effect of sulfur and long term aging," *J. Catal.*, **282**, 13–24 (2011)

Chaugule, S. S., Kispersky, V. F., Ratts, J. L., Yezerets, A., Currier, N. W., Ribeiro, F. H., and Delgass, W. N., "Formation and Removal of Ba-Carbonates or Carboxylates on Pt/BaO/ -Al<sub>2</sub>O<sub>3</sub> Lean NO<sub>x</sub> Traps," *Applied Catalysis B: Environmental*, **107**, 26-33 (2011)

Lee, W-S., Zhang, R., Akatay, M.C., Baertsch, C., Stach, E., Ribeiro, F. H. and Delgass, N. W., "Differences in Catalytic Sites for CO Oxidation and Propylene Epoxidation on Au Nanoparticles," *ACS Catalysis*, **1**, 1327–1330 (2011)

Pazmiño, J.H., Shekhar, M., Williams, W. D., Akatay, M. C., Miller, J. T., Delgass, W. N. and Ribeiro, F. H., "Metallic Pt as Active Sites for the Water-Gas Shift Reaction on Alkali-Promoted Supported Catalysts," *Journal of Catalysis*, **286**, 279–286 (2012)

Dietrich, P. J., Lobo-Lapidus, R. J., Wu, T., Sumer, A., Akatay, M. C., Fingland, B. R., Guo, N., Dumesic, J. A., Marshall, C. L., Stach, E., Jellinek, J., Delgass, W. N., Ribeiro, F. H., and Miller, J. T., "Aqueous Phase Glycerol Reforming by PtMo Bimetallic Nano-particle Catalyst: Product Selectivity and Structural Characterization," *Catalysis Today*, **55**, 53–69 (2012)

Shekhar, M., Wang, J., Lee, W-S., Williams, W. D., Kim, S. M., Stach, E. A., Miller, J. T., Delgass, W. N., and Ribeiro, F. H., "Size and Support Effects for the Water-Gas Shift Catalysis over Gold Nanoparticles Supported on Model Al<sub>2</sub>O<sub>3</sub> and TiO<sub>2</sub>" *Journal of the American Chemical Society*, **134**, 4700-4708 (2012)

McEwen, J.-S., Anggara, T., Schneider, W. F., Kispersky, V. F., Miller, J. T., Delgass, W. N., and Ribeiro, F. H., "Integrated Operando X-ray Absorption and DFT Characterization of Cu-SSZ-13 Exchange Sites During The Selective Catalytic Reduction of NO<sub>x</sub> with NH<sub>3</sub>" *Catalysis Today*, in press (2012)

Wang, J., Kispersky, V. F., Delgass, W. N., and Ribeiro, F. H., "Determination of the Au Active Site and Surface Active Species via Operando Transmission FTIR and Isotopic Transient Experiments on 2.3 wt% Au/TiO<sub>2</sub> for the WGS Reaction," *Journal of Catalysis*, **289**, 171–178 (2012)

Shekhar, M., Wang, J., Lee, W-S., Akatay, M. C., Stach, E. A., Delgass, W. N., and Ribeiro, F. H., "Counting Au Catalytic Sites for the Water-Gas Shift Reaction," *Journal of Catalysis*, **293**, 94–102 (2012)

Lee, W-S., Akatay, M. C., Stach, E. A., Ribeiro, F. H., and Delgass, W. N., "Reproducible Preparation of Au/TS-1 with High Reaction Rate for Gas Phase Epoxidation of Propylene," *Journal of Catalysis*, in press (2012)

#### Selected Conference Presentation

Delgass, W. N., "Model-Based Design of Catalysts," AIChE Annual Meeting, Minneapolis, MN, October (2011)



Hari Nair (PhD 2009). Professor Ribeiro. Ajay Joshi (PhD 2007), Professor Delgass, Saurabh Chaugule (PhD 2010)



**Elias I. Franses**  
Ph. D., Minnesota, 1979

**Professor**

### Research Areas

Adsorption and Tension Equilibria 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. Colloidal Stability of Aqueous Dispersions of Pigment Nanoparticles and of Hydrocarbon Hydrate Particles in Hydrocarbons.

### Selected Invited Lectures

Hewlett-Packard Co, Palo Alto, California, January (2012), "Analytical and Numerical Models of Particle Coagulation in Liquid Dispersions," with J. Dong, A. Kelkar, and D. S. Corti.

### Selected Publications

Dong, J., Chen, S., Corti, D. S., Franses, E. I., Ng, H. T., Zhao, Y. and Hanson, E., "Effect of Triton X-100 on the Dispersion Stability of Aqueous Dispersions of Copper Phthalocyanine Pigment Nanoparticles," *J. Colloid Interf. Sci.*, **362**(1), 33-41 (2011)

Dong, J., Corti, D. S., Franses, E. I., Zhao, Y., Ng, H. T. and Hanson, E., "Adsorption of Myrj 45 on Copper Phthalocyanine Pigment Nanoparticles and Effect on the Dispersion Stability in Aqueous Solution," *Colloids Surf. A*, **390**, 74-85 (2011)

Tsui, H-W., Kasat, R., Willing, J., Wang, N.-H. L., and Franses, E. I., "Infrared Spectroscopy (IR) and Molecular Simulations of a Polymeric Sorbent and Its Enantioselective Interactions with Benzoin Enantiomers," *J. Phys. Chem. B*, **115** (44), 12785-12800 (2011)

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 Series*, **50**, 47-91, (2012) Eli Grushka and Nelu Grinberg, Editors; CRC Press, Taylor and Francis, Boca Raton, FL (2012)

### Selected Conference Presentations

Dong, J., Chen, S., Corti, D.S., Zhao, Y., Ng, H.T., Franses, E.I., and Hanson, E., "Effect of Nonionic Surfactants on the Dispersion Stability of Copper Phthalocyanine Pigment Nanoparticles In Aqueous Solution," AIChE Annual Meeting, Minneapolis, MN, October (2011)

Tsui, H. W., Willing, J., Franses, E.I., and Wang, N-H. L., "Infrared Spectroscopy (IR) and Molecular Simulations of Polymeric Sorbent and Its Enantioselective Interactions with Benzoin Enantiomers," AIChE Annual Meeting, Minneapolis, MN, October (2011)

Zhao, Y., Ng, H. T., Hanson, E., Dong, J., Corti, D. S. and Franses, E. I., "Computational and Experimental Study of Colloidal Stability of CuPc Aqueous Dispersions," NIP 27 International Conference on Digital Printing Technologies, Minneapolis, MN, October (2011)

Tsui, H.-W., Franses, E. I. and Wang, N.-H. L., "Infrared Spectroscopy and Molecular Simulations of Interactions of Chiral Enantiomers with a Polysaccharide Sorbent," 11<sup>th</sup> Csaba Horvath Award Symposium, Hartford, CT, May (2012)

Kelkar, A. V., Dong, J., Franses, E. I. and Corti, D. S., "New Theories and Brownian Dynamics simulations for rates of Coagulation in Dilute and Concentrated Colloidal Dispersions," 86<sup>th</sup> Colloid and Surface Science Symposium, ACS, Baltimore, MD, June (2012)



**Deb Bowman, Graduate Office Administrator,  
Professor Franses, Professor Houze**



**Robert E. Hannemann**

M.D., Indiana University, 1959

**Visiting Professor**

**Research Areas**

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

**Selected Professional Activities**

Executive Committee and Liaison for the 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



**R. Neal Houze**

Ph. D., University of Houston, 1968

**Professor**

**Selected Professional Activities**

Fellow, ASEE  
Purdue University Senate, Superior Student Committee  
Interdisciplinary Engineering Committee, College of Engineering, Purdue University



**Professor Houze**



## Michael T. Harris

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

### Professor

Associate Dean for Undergraduate Education

### Research Areas

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

### Selected Professional Activities

Fellow, AIChE

Engineering Advisory Council, Mississippi State University

Associate Editor, Journal of Nanomaterials, (2005 to present)

Associate Editor, Chemical Engineering Letters, (2007 to present)

Program Chair, Minority Division, ASEE (2011 and 2012 annual meetings)

Trustee of AIChE Foundation (2009 to present)

Member, External Advisor Board for RU (Rutgers University)

FAIR ADVANCE project (2010 – present)

### Selected Publications

Zhao, Y. Y., Hu, F., Evans, J. J., and Harris, M. T., "Study of Sol-Gel Transition in Calcium Alginate System by Population Balance Modeling," *Chemical Engineering Science*, **66** (5), 848-858 (2011)

Sung, P.F., Hsieh, Y.L., Taylor, L.S., and Harris, M. T., "Complex Dielectric Properties Measurements of Microcrystalline Cellulose (MCC) and Anhydrous Lactose Powders Using A Microwave-Based Open Reflection Resonator Sensor," *J. Pharmaceutical Sci.* **100** (7), 2920-2934 (2011)

J.S. Lim, S.M. Kim, S.Y. Lee, E.A. Stach, and J.N. Culver, "Surface Functionalized Silica as a Toolkit for Developing Aqueous Phase Palladium Mineralization on Thiol Moiety in the Absence of External Reducing Agents," *Journal of Colloids and Interface Science*, **356** (1), 31-36 (2011)

Zhu, Q., Harris, M. T., and Taylor, L. S., "Time-resolved SAXS/WAXS Study of the Phase Behavior and Microstructural evolution of drug/PEG blends," *Molecular Pharmaceutics*, **8** (3), 932-939 (2011)

Lee, S.Y., Lim, J.S., and Harris, M. T., "Syntheses and Applications of Virus-Based Hybrid Nanomaterials," *Bioengineering and Biotechnology*, **109** (1), 16-30 (2012)

Zhu, Q., Harris, M.T., and Taylor, L.S., "Modification of Crystallization Behavior in Drug/Polyethylene Glycol Solid Dispersions," *Molecular Pharmaceutics*, **9** (3), 546-553 (2012)

Paulsen, J.D., Burton, J.C., Nagel, S.R., Appathurai, S., Harris, M.T., and Basaran, O.A., "The Initial Regime of Coalescence: The Inexorable Resistance of Inertia." *PNAS*, **109** (18), 6857-6861 (2012)

### Selected Conference Presentations

Gao, H., Subramani, H. J., Harris, M. T. and Basaran, O. A., "Wall Effects in Stokes Experiment with a Liquid Foam," 64th Annual Meeting of the Division of Fluid Dynamics (DFD) of the American Physical Society (APS), Baltimore, MD, November (2011)

Pommer, C. A., Harris, M. T. and Basaran, O. A., "Scaling in the Transition from Selective Withdrawal to Viscous Entrainment," 64th Annual Meeting of the Division of Fluid Dynamics (DFD) of the American Physical Society (APS), Baltimore, MD, November (2011)

Sambath, K., Collins, R. T., Harris, M. T. and Basaran, O. A., "Scaling laws in electrospraying," 64th Annual Meeting of the Division of Fluid Dynamics (DFD) of the American Physical Society (APS), Baltimore, MD, November (2011)

Appathurai, S., Harris, M. T., Basaran, O. A., Paulsen, J. D., Burton, J. C. and Nagel, S. R., "Coalescence of liquid drops," 64th Annual Meeting of the Division of Fluid Dynamics (DFD) of the American Physical Society (APS), Baltimore, MD, November (2011)

Sung, P.F., Harris, M. T., "Modeling of the Particle Deposition from Drying Sessile Droplets," AIChE Annual Meeting, Minneapolis, MN, October (2011)

Austin, J.S., Sang, P.F., Kovacevic, M. and Harris, M.T., "Monitoring of Moisture Content and Bulk Density in Rapidly Flowing Powders Using Microwave Spectroscopy," AIChE Annual Meeting, Minneapolis, MN, October (2011)

Zhu, Q., Taylor, L., Harris M.T. and Hsu, H.Y., "Microstructural Characterization and Dissolution Behavior of Drug/Semicrocrystalline Polymer Systems," AIChE Annual Meeting, Minneapolis, MN, October (2011)

Zhu, Q., Taylor, L., Harris M.T. and Hsu, H.Y., "Effect of Composition and Temperature on the Structural Evolution and Dissolution Behavior of Drug/Polymer Systems," paper 631h, AIChE Annual Meeting, Minneapolis, MN, October (2011)



Professor Harris with undergraduate students



ethanol

## Nancy W. Y. Ho

Ph. D., Purdue University, Molecular Biology

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

### Research Areas

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

### Selected Invited Lectures

San Francisco Biofuel Conference, October (2011)

BBI Conference for Fuel Ethanol, Orlando, FL, February (2012)

ARPA-E, DOE Conference for Advanced Bioenergy, Washington D.C. March (2012)

BBI Intl Biomass Conference, Denver, CO, May (2012)

NCGA - CUTC Corn Growers Conference, Indianapolis, IN, June (2012)

Invited Keynote speaker at the Purdue First Energy Camp for Students and Teachers, West Lafayette, IN, June (2012)

### Selected Publications

Athmanathan, A., Sedlak, M., Ho, N. W. Y. and Mosier, N. S., "Effect of Product Inhibition on Xylose Fermentation to Ethanol in Glucose-Xylose co-fermenting *S. cerevisiae* 424A (LNH-ST)," *Biological Engineering*, **3** (2), 111-124 (2011)

Ho, N. W. Y., Ladisch, M. R., Sedlak, M., Mosier, N.S. and Casey, E., "Biofuels from Cellulosic Feedstocks in Comprehensive Biotechnology," *Industrial Biotechnology and Commodity*, **3** (2), 51-62 (2011)

### Selected Conference Presentations

"Metabolic Engineering the *Saccharomyces* Yeast to Co-ferment Glucose and Xylose for Cost Effective Production of Renewable Fuels and Chemicals," Invited to present at Society For Industrial Microbiology Annual Meeting, New Orleans, LA, July (2011)

Wu, C-L., Mosier, N. S., Kim, J-H., Adamec, J, Ho, N. and Sedlak, M., "Effect of Furfural on Xylose Fermentation using *Saccharomyces Cerevisiae* 424A (LNH-ST)," Abr. No. 421aj, 2011 AIChE Annual Meeting, Minneapolis, MN, October (2011)

Kim, J-H., Adamec, J., Mosier, N. S., Ho, N. and Sedlak, M., "Differential Analysis of Lipids in Xylose Fermenting *S. Cerevisiae* 424A (LNH-ST) and its Ethanol Resistant Variant *S. Cerevisiae* 424A (LNH-ST)-ER," Abr. No. 421ak, 2011 AIChE Annual Meeting, Minneapolis, MN, October (2011)

"Technologies Are Ready For Cost-Effective Production of Cellulosic Ethanol by Yeast-Based Biochemical Conversion," First Symposium on Biomass Conversion, Urbana, IL, October/November (2011)

"Genetically Engineered *Saccharomyces* Yeast Capable of Efficiently converting all C5/C6 Sugars Present in Cellulosic Biomass to Fuels and Chemicals," Keynote, Conferences of BIT World Congress of Bioenergy, Xi'an, China, April (2012)

Casey, E., Mosier, N. S., Adamec, J., Jannasch, A., Ho, N., and Sedlak, M., "Systems Biology Approach to Understanding the Effect of Acetic Acid on the Co-Fermentation of Glucose and Xylose by *S. Cerevisiae* 424A(LNH-ST)," 34<sup>th</sup> Symposium on Biotechnology for Fuels and Chemicals, New Orleans, LA, April/May (2012)

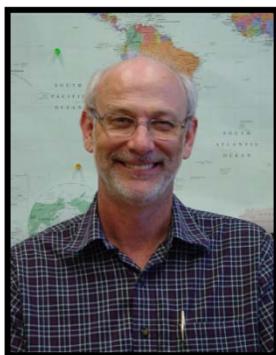
Casey, E., Wu, C-L., Mosier, N. S., Ho, N., Sedlak, M., "Development of Acetic Acid Resistant Derivates of *S. Cerevisiae* 424A (LNH-ST) for Glucose/Xylose co-fermentation," 34<sup>th</sup> Symposium on Biotechnology for Fuels and Chemicals, New Orleans, LA, April/May (2012)

Wu, C-L., Mosier, N. S., Adamec, J., Ho, N. and Sedlak, M., "Systems Biology Comparison Glucose/Xylose Fermentation by *Saccharomyces Cerevisiae* 424A (LNH-ST) and 424A (LNH-ST) -AAR in presence of acetic acid," 34<sup>th</sup> Symposium on Biotechnology for Fuels and Chemicals, New Orleans, LA, April/May (2012)

"Genetic Engineering the *Saccharomyces* Yeast for effective Co-fermentation of the C5/C6 Sugars Present in Cellulosic Biomass and Further Improvement of the Engineered Yeast," invited Keynote, Conferences of Annual World Congress of Molecular & Cell Biology, Beijing, China, May (2012)



Steve Brewer (BScHE 1970) and Professor Ho



## James D. Litster

Ph. D., University of Queensland, 1985

**Professor of Chemical Engineering and Industrial and Physical Pharmacy  
Director of Graduate Studies, Chemical Engineering**

**Fellow, Australian Academy for Technological Sciences  
and Engineering - 2011**

### Research Areas

**Particle Design and Formulation, Granulation and Agglomeration,  
Crystallization of Bioactives, Engineering Education**

### Selected Professional Activities

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 Characterisation (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

"QbD for wet granulation in pharmaceutical processing: Improving models for a priori design and scaling," Genzyme Ltd, Boston, September (2011)

"Compartmental and Multiscale Design Models of Granulation Processes," Vertex Ltd, Boston, September (2011)

### Selected Publications

Rashid, A., White, E. T., Howes, T., Litster, J. D., and Marziano, I., "Crystallization Kinetics of Ibuprofen from Ethanol and Aqueous Ethanol," *Chemical Engineering Transactions*, **24**, 631-636 (2011)

Emady, H, Kayrak-Talay, D, Schwerin, W, and Litster, JD (2011) "Granule Formation Mechanisms and Morphology from Single Drop Impact on Powder Beds," *Powder Technology*, 212(1), 69-79

Kayrak-Talay, D. and Litster, J. D., "A priori Performance Prediction in Pharmaceutical Wet Granulation: Testing the Applicability of the Nucleation Regime Map to a Formulation with a Broad Size Distribution and Dry Binder Addition," *International Journal of Pharmaceutics*, **418**, 254-264 (2011)

Freireich, B., Li, J., Litster, J. D., Wassgren, "A Compartmental Approach to Studying Particle Motion in Mixers Using Discrete Element Modeling," *Chemical Engineering Science*, **66(16)**, 3592-3604 (2011)

Mehta, C. M., White, E. T., and Litster, J. D. "Correlation of Second Virial Coefficient with Solubility for Proteins in Salt Solutions," *Biotechnology Progress*, on line, DOI 10.1002/btpr.724 (2011)

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 (Johanson's model)," *Powder Technology*, on line, DOI: 10.1016/j.powtec.2011.12.001 (2011)

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*, DOI: 10.1002/aic.12678 (2011)

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*, DOI: 10.1016/j.ces.2012.02.036 (2012)

Rashid, A., White, E.T., Howes, T., Litster J.D. and Marziano, I., "Growth Rates of Ibuprofen Crystals Grown From Ethanol and Aqueous Ethanol," *Chemical Engineering R&D*, **90**, 158-161 (2012)

Smith, RM and Litster, JD "Examining the failure modes of wet granular materials using dynamic diametrical compression," *Powder Technology*, in press (2012)

### Selected Conference Presentations

A. Rashid, White, E.T., Howes, T., Litster, J.D. and Marziano, I., "Crystallization Kinetics for Ibuprofen Crystals Grown from Aqueous Ethanol," Chemeca 2011, Sydney, September (2011)

Rashid, A., Liu, L. X., Marziano, I., White, E.T., Howes T. and Litster, J. D., "The Effect of High Shear Wet Milling of Recrystallized Ibuprofen on its Flow Properties for Solid Dosage Pharmaceutical Formulation," Chemeca 2011, Sydney, Australia, September (2011)



**Graduate Student Gautam Yadav and Professor Litster**



**Julie C. Liu**  
Ph. D., Caltech, 2006

**Assistant Professor**  
**3M Non-tenured Faculty Award**

**Research Areas**  
**Biomaterials, Tissue Engineering, Protein Engineering**

### Professional Activities

American Institute of Chemical Engineers

- Women's Initiatives Committee, chair, November 2010 – November 2011
- Women's Initiatives Committee, past chair, November 2011 – November 2012
- Engineering Fundamentals in Life Science (Area 15d/e), 2nd vice chair, November 2010 – November 2011, vice chair (November 2011–November 2012)

Society for Biomaterials

- Elected member of the national membership committee, 2011-2012
- Biomaterials Education special interest group, vice chair, 2011-2013
- Co-organized regional Biomaterials Day, Purdue, Oct 2011

NSF review panel

### Selected Invited Lectures

"Tunable Microenvironments for Stem Cell Differentiation," School of Chemical Engineering, Purdue University, West Lafayette, IN, April (2012)

"Biomimetic Resilin-based Protein Materials," Materials Science and Engineering Seminar, Texas A&M University, College Station, TX, April (2012)

### Selected Publications

Liu, J.C., Lengner, C.J., Gaur, T., Lou, L., Hussain, S., Jones, M.D., Borodic, B., Colby, J., Steinman, H.A., van Wijnen, A.J., Stein, J.L., Jones, S.N., Stein, G.S., and Lian, J.B., "Runx2 Expression Utilizes the Runx2P1 Promoter to Establish Osteoprogenitor Cell Number for Normal Bone Formation," *Journal of Biological Chemistry*, **286**, 30057-30070 (2011)

Renner, J.N., Kim, Y., Cherry, K.M., and Liu, J.C. "Modular Cloning and Protein Expression of Long, Repetitive Resilin-based Proteins," *Protein Expression and Purification*, **82**, 90-96 (2012)

Renner, J.N., Kim, Y., and Liu, J.C. "BMP-derived Peptide Promotes Chondrogenic Differentiation of Human Mesenchymal Stem Cells," *Tissue Eng. Part A*, in press (2012)

### Selected Conference Presentations

Liu, J. C., "Peptide-Based Cues for Mesenchymal Stem Cell Differentiation into Cartilage Graft Applications," Annual Meeting of PIs in the NSF's BRIGE Program, Arlington, VA, August (2011)

Renner, J. N., Kim, Y., and Liu, J. C., "Bioactive Peptides for Mesenchymal Stem Cell Differentiation in Cartilage Tissue Engineering," AICHE Annual Meeting, Minneapolis, MN, October (2011)

Renner, J. N., Kim, Y. and Liu, J. C., "Characterization of Modular Resilin-based Artificial Protein Matrices for Cartilage Tissue Engineering," AICHE Annual Meeting, Minneapolis, MN, October (2011)

Galas, R. J. and Liu, J. C., "Endothelial Differentiation of Mesenchymal Stem Cells Using Surface-Bound Cues," AICHE Annual Meeting, Minneapolis, MN, October (2011)

Renner, J. N., Kim, Y. and Liu, J. C., "Protein-based Matrix for Cartilage Tissue Engineering and Stem Cell Differentiation," Biomaterials Day, Society for Biomaterials and co-organized Purdue University, Case Western Reserve University, and University of Kentucky, West Lafayette, IN, October (2011)

Brennan, M. J., Su, S.-C., Wilker, J. J. and Liu, J. C., "Production of Adhesive Elastin-based Proteins," Biomaterials Day, Society for Biomaterials and co-organized Purdue University, Case Western Reserve University, and University of Kentucky, West Lafayette, IN, Poster session, October (2011)

Cherry, K. M., Renner, J. N., Kim, Y. and Liu, J. C., "Poster: Expression of Resilin-based Proteins and Purification by Selective Precipitation," Biomaterials Day, Society for Biomaterials and co-organized Purdue University, Case Western Reserve University, and University of Kentucky, West Lafayette, IN, Poster session, October (2011)

Su, S.-C. and Liu, J. C., "Modular Protein-based Materials with Tunable Mechanical Properties for Cartilage Engineering," Biomaterials Day, Society for Biomaterials and co-organized Purdue University, Case Western Reserve University, and University of Kentucky, West Lafayette, IN, Poster session, October (2011)

Galas, R.J. and Liu, J.C., "VEGF Peptide Promotes Endothelial Differentiation of Mesenchymal Stem Cells," Biomaterials Day, Society for Biomaterials and co-organized Purdue University, Case Western Reserve University, and University of Kentucky, West Lafayette, IN, Poster session, October (2011)

Kim, Y., Renner, J. N., Cherry, K. M. and Liu, J. C., "Modified Expression Conditions for Resilin-based Proteins," Biomaterials Day, Society for Biomaterials and co-organized Purdue University, Case Western Reserve University, and University of Kentucky, West Lafayette, IN, Poster session, October (2011)

Renner, J. N., Kim, Y., Cherry, K. M. and Liu, J.C., "Characterization of Biomimetic Resilin-based Protein Materials," Spring Meeting of the Materials Research Society, San Francisco, CA, April (2012)



## John A. Morgan

Ph. D., Rice, 1999

Associate Professor

Research Areas: Metabolic Engineering, Biocatalysis

### Selected Professional Activities

Associate Editor, Bioprocess and Biosystems Engineering  
Programming Chair AIChE National Meeting Division 15 (2011)  
Reviewer for the Consortium for Plant Biotechnology Research  
Review Panel, NSF CBET division  
Review Panel, DOE-ARPA-E  
Review Panel, DOE- Young Investigator Program

### Selected Publications

Sengupta, N., Rose, S., and Morgan, J.A., "C Flux Analysis of CHO Cell Metabolism in Non Growth Phase for Recombinant Protein Production," *Biotechnology and Bioengineering*, **108**: 82-92 (2011)

O'Grady, J. and Morgan, J.A., "Heterotrophic Growth and Lipid Production of *Chlorella Protothecoides* on Glycerol," *Bioprocess and Biosystems Engineering*, **34**, 121-125 (2011)

Young, J., Shastri, A., Stephanopoulos, G., and Morgan, J.A. "Isotopically Nonstationary  $^{13}\text{C}$  Flux Analysis Identifies Routes of Carbon Loss and Reveals Suboptimal Photoautotrophic Growth of *Synechocystis*," sp. PCC 6803 *Metabolic Engineering* **13**, 656-665 (2011)

Nesbitt, E. R., Carrier, J., Gao, J., Garcia-Perez, M., Morgan, J., Peterson, J., Shoemaker, S., Thiers, P., Wang, G., Wensel, P. C., and Chen, S., "China's Vision for Renewable Energy: Status of Bioenergy and Bioproduct Research and Commercialization," *Industrial Biotechnology*, **7**, 336-348 (2011)

Boyle, N. and Morgan, J. A., "Computation of Metabolic Fluxes and Efficiencies for Biological Carbon Dioxide Fixation," *Metabolic Engineering*, **13**, 150-158 (2011)

O'Grady, J., Schwender, J., Schahar-Hill, Y., and Morgan, J.A. "Metabolic Cartography: Experimental Quantification of Metabolic Fluxes from Isotopic Labelling Studies," *Journal of Experimental Biology*, in press (2012)

### Selected Conference Presentations

Morgan, J. A., "Probing Subcellular Metabolic Fluxes with Isotopic Labeling and Non-Aqueous Fractionation," Plant Metabolic Engineering: Gordon Research Conference Waterville Valley, NH, July (2011)

Morgan, J. A. "Determination of Metabolic Fluxes in Photoautotrophic Metabolism" Keynote, Society for Experimental Biology, Glasgow, Scotland, UK, July (2011)

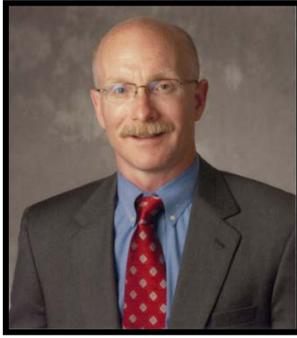
Sengupta, N. and Morgan, J. A., "Proteomic and Metabolic Flux Analysis of Recombinant CHO Cell Cultures," AIChE Annual Meeting, Minneapolis, MN, October (2011)

Morgan, J. A., "Importance of Metabolic Flux Analysis for Microalgae," Global Sustainability Issues in Energy, Climate, Water and Environment; China-US Joint Symposium West Lafayette, IN, September (2011)

Morgan, J. A. "Metabolic Engineering of Algae for Biofuel Production," AIChE Midwest Regional Meeting, November (2011)



Professor Morgan



## 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

Member of the Purdue Global Policy Research Institute Faculty Advisory Board  
Co-Leader of the Systems Engineering Task Force/Systems of Systems Institute Working Group for the College of Engineering  
Technical Advisor – Advanced Process Combinatorics, Inc.  
Advisory Board Member, VA Center of Excellence on Implementing Evidence Based Practice, Roudebush VA Hospital

#### Selected Invited Lectures

Bristol Meyers Squibb, Devens MA, June (2012)

#### Selected Publications

Hodge, B-M., Shukla, A., Huang, S., Reklaitis, G., Venkatasubramanian, V. and Pekny, J., "Multi-Paradigm Modeling of the Effects of PHEV Adoption on Electric Utility Usage Levels and Emissions," *Industrial & Engineering Chemistry Research*, **50**, 5191-5203 (2011)

Huang, S., Hodge, B-M., Taheripour, F., Pekny, J., Reklaitis, G. V., and Tyner, W., "The Effects of Electricity Pricing on PHEV Competitiveness," *Energy Policy*, **39-3**, 1552-1561 (2011)

Shukla, A., Pekny, J. F., and Venkatasubramanian, V., "An Optimization Framework for Cost Effective Design of Refueling Station Infrastructure for Alternative Fuel Vehicles," *Computers & Chemical Engineering*, **35**, 1431-1438 (2011)

Xiao, J., Hodge, B-M., Pekny, J. F., and Reklaitis, G. V., "Operating Reserve Policies with High Wind Power Penetration," *Computers & Chemical Engineering*, **35**, 1876-1885 (2011)

Huang, S., Safiullah, H., Xiao, J., Hodge, B-M., Hoffman, R., Soller, J., Jones, D., Dininger, D., Tyner, W. E., Liu, A., and Pekny, J. F., "The Effects of Electric Vehicles on Residential Households in the City of Indianapolis," *Energy Policy*, **49**, 442-455 (2012)

Doebbeling, B. N., Burton, M. M., Miller, S., Miller, D., Baxter, L., Alvarez, J., Pekny, J. F., and Wiebke, E., "Optimizing Perioperative Decision Making: Improved Information for Clinical Workflow Planning," Proceedings of the American Medical Informatics Association Annual Meeting, in press (2012)



Professor Pipes, Professor Pekny,  
and Dr. George Adams (Birck Nanotechnology Center)



## **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  
Member, NRC Committee Panel on Building and Fire Research  
Session Chair ASC Conference – Dayton, OH  
Member, Army Research Laboratory Technical Assessment Board,  
2011-2013  
Member, NASA Glenn Polymer Branch Review Team, 2011-2012

### **Selected Invited Lectures**

Case Western Reserve University, Macromolecular Science  
Seminar, Cleveland, OH (2012)

“Multi-Scale Analysis – Atoms to Aircraft,” Air Force Research  
Laboratory, Dayton, OH (2011)

### **Book**

Ritchey, A., Dustin, J., Gosse, J. and Pipes, R. B., "Self-Consistent  
Micromechanical Enhancement of Continuous Fiber Composites,"  
*Advances in Composites, INTEC Publications* (2011)

### **Selected Publications**

Mendoza Jasso, A.J., Goodsell, J.E., Ritche, A.J., Pipes, R.B., and  
Koslowski, M., "A Parametric Study of Fiber Volume Fraction  
Distribution on the Failure Initiation Location in Open Hole Off-  
Axis Tensile Specimen," *Composites Science and Technology*, **71**,  
1819–1825 (2011)

Mendoza Jasso, A. J., Goodsell, J. E., Pipes, R. B., and Koslowski,  
M., "Validation of Strain Invariant Failure Analysis in an Open  
Hole Off-Axis Specimen," *Journal of Materials*, **6** (3), 43-48  
(2011)

Siengchin, S. and Pipes, R.B., “Rheological and Dynamic Thermo-  
mechanical Properties of Epoxy Composites Reinforced with  
Single and Multi-Walled Carbon Nanotubes,” *Mechanics of  
Composite Materials*, **47** (6) (2011)

Mendoza Jasso, A. J., Goodsell, J. E., Ritche, A. J., Pipes, R.B.,  
and Koslowski, M., "A Parametric Study of Fiber Volume Fraction  
Distribution on the Failure Initiation Location in Open Hole Off-  
Axis Tensile Specimen," *Composites Science and Technology*, **71**,  
1819–1825 (2011)

Dustin, J. and Pipes, R.B., “Free-Edge Singularities Meet the  
Microstructure: Important Considerations,” *Composites Science  
and Technology*, **72**, 933-937 (2012)

### **Selected Conference Presentations**

“Intrinsic Crack Length Variability in the Open-Hole Off-Axis  
Tensile Specimen,” American Society of Composites, Dayton, OH,  
September (2011)

“The Composites Manufacturing HUB,” 2011 Carbon Fiber  
Conference, Washington, DC, December (2011)

“Multi-scale Analysis in Advanced Composite Materials –  
Continuum Singularities Meet the Microstructure,” Naval  
Research Laboratory, Washington, DC, December (2011)

“Composites Manufacturing HUB,” Composites Manufacturing  
2012 Conference, Las Vegas, NV, February (2012)



**Graduate Student Organization 2012-13 Officers**



## 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

### Selected Invited Lectures

Ramkrishna, D., "The Cybernetic Approach to Metabolic Modeling," Society for Industrial Microbiology, Annual Meeting: New Orleans, July (2011)

Singh, M., Ramkrishna, D., Tung, H-H., Nere, N. and Bordawekar, S., "Towards Control of Crystal Shape. Crystallization and Dissolution," Keynote, International Symposium on Industrial Crystallization 18, Zurich, September (2011)

"Dynamic Modeling of Metabolism. The Cybernetic Approach," Science at the Edge Seminar Series, Department of Physics and Astronomy, Michigan State University, March (2012)

### Selected Publications

Song, H-S. and Ramkrishna, D., "Cybernetic Models Based on Lumped Elementary Modes Accurately Predict Metabolic Function of Multiple Strains," *Biotechnol. & Bioeng.*, **108**, 127-140 (2011)

Franz, A., Song, H-S., Ramkrishna, D., and Kienle, A., "Experimental and Theoretical Analysis of Poly-Hydroxybutyrate Formation and Consumption in *Ralstonia Eutropha*," *Biochem. Eng. J.*, **55**, 49-58 (2011)

Chatterjee, A., Shu, C-C., Johnson, C. M., Kaznessis, Y. N., Ramkrishna, D., Dunny, G. M., and Hu, W-S., "Convergent Transcription Confers a Bistable Switch in *Enterococcus Faecalis* Conjugation," *PNAS*, **108**, 9721-9726 (2011)

Chakraborty, J. and Ramkrishna, D., "Equation Chapter 1 Section 1 Population Balance Modeling of Environment Dependent Breakage: Role of Granular Viscosity, Density and Compaction. Model Formulation and Similarity Analysis," *Ind. Eng. Chem.*, **50**, 13116-13128 (2011)

Shu, C-C., Ramkrishna, D., Chatterjee, A., and Hu, W-S., "Bistability Versus Bimodal Distributions in Gene Regulatory Processes from Population Balance Modeling," *PLoS Computational Biology*: e1002140. doi:10.1371/journal.pcbi.1002140, **7**, August (2011)

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., Morgan J. A., and Ramkrishna, D., "Towards Increasing the Productivity of Lignocellulosic Bioethanol: Rational Strategies Fueled by Modeling," *Bioethanol*, Edited by Marco Aurelio Pinheiro Lima and Alexandra Pardo Policastro Natalense, InTech, 173-190, (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.*, **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," *A.I.Ch.E. J.*, **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 Pentosaceus* Producing Lactic Acid From Lignocellulosic Sugars," *Biotechnol. Progress*, **28**, 623-635 (2012)

Franz, A., Song, H-S., Ramkrishna, D., and Kienle, A., "Modeling and Nonlinear Analysis of *Cupriavidus Necator* Metabolism including Poly (hydroxybutyrate) synthesis and degradation: Incorporation of internal metabolites with slow dynamics into hybrid cybernetic modeling," *Biochemical Journal* **55**, 49-58 (2012)

Singh, Meenesh, Chakraborty, Jayanta; Nandkishor Nere, Hsien-Hsin Tung, Shailendra Bordawekar, and Doraiswami Ramkrishna, "Image-Analysis-Based Method for Measurement of 3D Crystal Morphology and Polymorph Identification Using Confocal Microscopy," *Crystal Growth and Design*, **12**, 3735-3748 (2012)

### Selected Conference Presentations

Ramkrishna, D. and Shu, C-C., "Population Balance Modeling of Particles with Random Behavior. Application to Gene Regulatory Processes," AIChE Annual Meeting, Minneapolis, MN, October (2011)

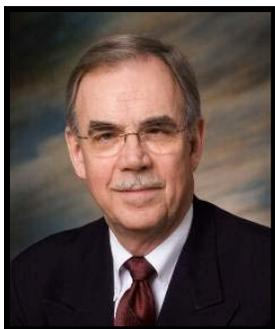
Meenesh R. Singh, Christian Borchert, Kai Sundmacher, Doraiswami Ramkrishna, "Modeling of Morphology Transformations in Crystalline Materials: A Generalized Framework," AIChE Annual Meeting, Minneapolis, MN, October (2011)

Adler, P., Song, H-S., Wiewiora, M., Ramkrishna, D. and Kunz, B., "Modeling of Lactic Acid Production from Lignocellulosic Residues Using a Hybrid Cybernetic Approach," AIChE Annual Meeting, Minneapolis, MN, October (2011)

Shu, C-C., Ramkrishna, D., Chatterjee, A. and Hu, W-S., "How Conjugation Contributes to Antibiotic Resistance of Biofilm-From an Aspect of Population Balance with Stochastic Intracellular Gene Regulation," AIChE Annual Meeting, Minneapolis, MN, October (2011)

Song, H-S., Geng, J., Ramkrishna, D., Pincuk, G., Beliaev, A. S. and Konopka, A., "Comprehensive Network-Based Dynamic Metabolic Model for *Shewanella Oneidensis*," AIChE Annual Meeting, Minneapolis, MN, October (2011)

Song, H-S. and Ramkrishna, D., "Towards Genome-Scale Dynamic Modeling of Cellular Metabolism. The Cybernetic Approach," AIChE Annual Meeting, Minneapolis, MN, October (2011)



## Gintaras V. "Rex" Reklaitis

Ph. D., Stanford University, 1969

### Burton and Kathryn Gedge Distinguished Professor

### Member, National Academy of Engineering

### Deputy Director, NSF ERC on Structured Organic Composites

### 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

US National Academy of Engineering, Section 3 Peer Committee, 2010-2012

AIChE Foundation, Board of Trustees, 2010-2012

Smart Manufacturing Leadership Coalition, 2011- present

National Institute for Pharmaceutical Technology & Education, Purdue representative, 2005- present

Editorial Advisory Boards

- Computers & Chemical Engineering
- Journal of Pharmaceutical Innovation
- Computer Applications in Engineering Education
- Journal of Process Systems Engineering

### Selected Invited Lectures

Progress and Prospects for the ERC on Structured Organic Particulate Systems, Texas Distinguished Lecture, University of Texas at Austin, Austin, TX, May (2012)

### Selected Publications

Huang, S., Hodge, B.-M., Taheripour, F., Reklaitis, G.V., Pekny, J. and Tyner, W., "The Effects of Electricity Pricing Structure on the Competitiveness of Plug-In Hybrid Electric Vehicles in the California Market," *Energy Policy*, **39** 1552-1561 (2011)

Lainez, J.M., Blau, G., Mockus, L., Orcun, S. and Reklaitis, G.V., "Pharmacokinetic Based Design of Individualized Dosage Regimens Using a Bayesian Approach," *I&EC Research* (doi: 10.1021/ie101610r) **50**, 5114-5130 (2011)

Xiao, J., Hodge, B-M, Pekny, J.F. and Reklaitis, G.V., "Operating Reserve Policies with High Wind Power Penetration," *Comput. & Chem Engr*, **35**, 1876-1885 (2011)

Yi, G. and G.V. Reklaitis, "Optimal Design of Multiperiod Batch-Storage Network including Transportation Processes," *AIChE J*, **57**, 2821-2840 (2011)

Hodge, B-M, Huang, S., Sirrola, J.J., Pekny J.F. and Reklaitis, G.V., "A Multi-Paradigm Modeling Framework for Energy Systems Simulation and Analysis," *Comput. & Chem Engr*, **35**, 1725-1737 (2011)

Mockus, L., Lainez, J.M., Reklaitis, G.V. and Kirsch, L., "A Bayesian Approach to Pharmaceutical Product Quality Risk Quantification," *Informatica*, **22**, 1-22 (2011)

Stephanopoulos, G. and Reklaitis, G.V., "Process Systems Engineering: From Solvay to Modern Bio- and Nanotechnology. A History of Development, Successes and Prospects for the Future," *Chem Eng Sci*, **66**, 4272-4306 (2011)

Lainez-Aguirre, J.M., Mockus, L., Blau, G., Orcun, S. and Reklaitis, G.V., "A Variational Bayesian Approach for Dosage Regimen Individualization," *Computer Aided Process Engineering*, **29**, 1563-1567 (2011)

Giridhar, A., Hamdan, I., Joglekar, G., Venkatasubramanian, V., Reklaitis, G.V., "Real-Time Process Management in Particulate and Pharmaceutical Systems," *Computer Aided Process Engineering*, **29**, 1035-1039 (2011)

Chen, Y., L. Mockus, S. Orcun and G.V. Reklaitis, "Simulation-Optimization Approach to Clinical Trial Supply Chain Management with Demand Scenario Forecast," *Comput. & Chem Engr*, **40**, 82-96 (2012)

Huang, S., Xiao, J., Pekny, J.F., Reklaitis, G.V., Liu, A., "Quantifying System Level Benefits from Distributed Solar and Energy Storage", *J. Energy Engr* **138**, 33-42 (2012) DOI:10.1061/(ASCE)EY.1943

Hodge, B-M, Huang, S., Shukla, A., Pekny, J.F., Venkatasubramanian, V., Reklaitis, G.V., "The Effects of Vehicle-to-Grid Systems on Wind Power Integration", *Wind Energy* DOI:10.1002/we.520, in press (2012)

Lainez-Aguirre, J.M., Schaefer, E., and Reklaitis, G. V., "Challenges and Opportunities in Enterprise-wide Optimization in the Pharmaceutical Industry," *Comput. & Chem Engr*, in press (2012)

Chen, Y., Pekny, J. F., and Reklaitis, G.V., "Risk Pooling Strategy in the Pharmaceutical Clinical Trial Supply Chain Management," *I&EC Research*, in press (2012)

### Selected Conference Presentations

"Challenges and Progress in Product and Process Engineering of Solid Dosage Pharmaceuticals," Particulate Processes in the Pharmaceutical Industry III, Keynote, Gold Coast, Australia, July (2011)

"Challenges and Opportunities for Process Systems Engineering Approaches to QbD and Design Space," QbD Plenary, AIChE Annual Meeting, Minneapolis, MN, October (2011)

"Sustainability Implications of Integrating Renewable Power Sources and Electric Vehicles into the Grid," Sustainability Plenary, AIChE Annual Meeting, Minneapolis, MN, October (2011)

"Challenges and Opportunities in Enterprise-wide Optimization in the Pharmaceutical Industry," 6<sup>th</sup> International Conference on Foundations of Computer Aided Process Operations, Plenary Savannah GA, January (2012)



## Fabio H. Ribeiro

Ph. D., Stanford University, 1989

### Professor

Purdue University Faculty Scholar (2006 – 2011)

### Research Areas

Surface Science and Kinetics of Heterogeneous Catalytic Reactions

### Selected Professional Activities

Past-chair, Catalysis and Reaction Engineering Division AIChE (2011)

Editor, Journal of Catalysis

### Selected Invited Lectures

“Direct Catalytic Conversion of Biomass to Biofuels, or C3Bio,” Topsøe Catalysis Forum, Catalysis and Future Energy, Munkerpugaard, Denmark, August (2011)

“Model Catalysts and Dynamic Methods in Catalysis,” 2011 Entretiens Jacques Cartier Colloquium on 21st Century Catalysis Science and Applications, Ottawa Convention Centre, September (2011)

“An overview of the water-gas shift catalysis on metals,” Gordon Research Conference, New London, NH, June (2012)

### Selected Publications

Pazmiño, J. H., Miller, J. T., Mulla, S. S., Delgass, N. W., and Ribeiro, F. H., “Kinetic Studies of the Stability of Pt for NO Oxidation: Effect of Sulfur and Long Term Aging,” *Journal of Catalysis*, **282**, 13–24 (2011)

Chaugule, S. S., Kispersky, V. F., Ratts, J. L., Yezerets, A., Currier, N. W., Ribeiro, F. H., and Delgass, N. W., “Formation and Removal of Ba-Carbonates or Carboxylates on Pt/BaO/ -Al<sub>2</sub>O<sub>3</sub> Lean NOx Traps,” *Applied Catalysis B: Environmental*, **107**, 26-33 (2011)

Lee, W-S., Zhang, R., Akatay, M. C., Baertsch, C., Stach, E., Ribeiro, F. H., and Delgass, N. W., “Differences in Catalytic Sites for CO Oxidation and Propylene Epoxidation on Au Nanoparticles,” *ACS Catalysis*, **1**, 1327–1330 (2011)

Pazmiño, J. H., Shekhar, M., Williams, W. D., Akatay, M. C., Miller, J. T., Delgass, W. N., and Ribeiro, F. H., “Metallic Pt as Active Sites for the Water-Gas Shift Reaction on Alkali-Promoted Supported Catalysts,” *Journal of Catalysis*, **286**, 279–286 (2012)

Kispersky, V. F., Kropf, A. J., Ribeiro, F. H., and Miller, J. T., “Low Absorption Vitreous Carbon Reactors for Operando XAS: A Case Study on Cu/Zeolites for Selective Catalytic Reduction of NOx by NH<sub>3</sub>,” *Physical Chemistry Chemical Physics*, **14** (7), 2229-2238 (2012)

Shekhar, M., Wang, J., Lee, W-S., Williams, W. D., Kim, S. M., Stach, E. A., Miller, J. T., Delgass, W. N., and Ribeiro, F. H., “Size and Support Effects for the Water-Gas Shift Catalysis over Gold Nanoparticles Supported on Model Al<sub>2</sub>O<sub>3</sub> and TiO<sub>2</sub>” *Journal of the American Chemical Society*, **134**, 4700-4708 (2012)

Dietrich, P. J., Lobo-Lapidus, R. J., Wu, T., Sumer, A., Akatay, M. C., Fingland, B. R., Guo, N., Dumesic, J. A., Marshall, C. L.,

Stach, E., Jellinek, J., Delgass, W. N., Ribeiro, F. H., and Miller, J. T., “Aqueous Phase Glycerol Reforming by PtMo Bimetallic Nano-particle Catalyst: Product Selectivity and Structural Characterization” *Catalysis Today*, **55**, 53–69 (2012)

Wang, J., Kispersky, V. F., Delgass, W. N., and Ribeiro, F. H., “Determination of the Au Active Site and Surface Active Species via Operando Transmission FTIR and Isotopic Transient Experiments on 2.3 wt% Au/TiO<sub>2</sub> for the WGS reaction,” *Journal of Catalysis*, **289**, 171-178 (2012)

Williams, W. D., Bollmann, L., Miller, J. T., Delgass, W. N., and Ribeiro, F. H., “Effect of molybdenum addition on supported platinum catalysts for the water-gas shift reaction,” *Applied Catalysis B*, **125**, 206– 214 (2012)

Shekhar, M., Wang, J., Lee, W-S., Akatay, C., Stach, E. A., Delgass, W. N., and Ribeiro, F. H., “Counting Au Catalytic Sites for the Water-Gas Shift Reaction,” *Journal of Catalysis*, **293**, 94–102 (2012)

Lee, W-S., Akatay, M. C., Stach, E. A., Ribeiro, F. H., and Delgass, W. N. “Reproducible Preparation of Au/TS-1 with High Reaction Rate for Gas Phase Epoxidation of Propylene,” *Journal of Catalysis*, **287**, 178-189 (2012)

McEwen, J-S., Anggara, T., Schneider, W. F., Kispersky, V. F., Miller, J. T., Delgass, W. N., and Ribeiro, F. H., “Integrated operando X-ray absorption and DFT characterization of  $\text{CeSSZ} - 13$  exchange sites during the selective catalytic reduction of NOx with NH<sub>3</sub>” *Catalysis Today*, **184**, 129– 144 (2012)

Lobo, R., Marshall, C. L., Dietrich, P., Ribeiro, F.H., Akatay, C., Stach, E. A., Mane, A., Lei, Y., Elam, J., and Miller, J. T., “Understanding the Chemistry of H<sub>2</sub> Production for 1-Propanol Reforming: Pathway and Support Modification Effects,” *ACS Catalysis*, in press (2012)

### Selected Conference Presentations

“Water-gas Shift Catalysis on Supported Au and Pt Nanoparticles” 243rd ACS National Meeting, Gabor A. Somorjai Award for Creative Research in Catalysis and the George A. Olah Award in Hydrocarbon or Petroleum Chemistry: Symposium in Honor of Enrique Iglesia and James A. Dumesic, San Diego, CA, March (2012)

“Experimental and Computational Probing of the Nature of Exchange Sites on Cu/CHA and Cu/MFI for the Selective Catalytic Reduction of NOx by NH<sub>3</sub>,” 243rd ACS National Meeting, ACS Award in Industrial Chemistry: Symposium in Honor of Thomas F. Degnan Jr., San Diego, CA, March (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

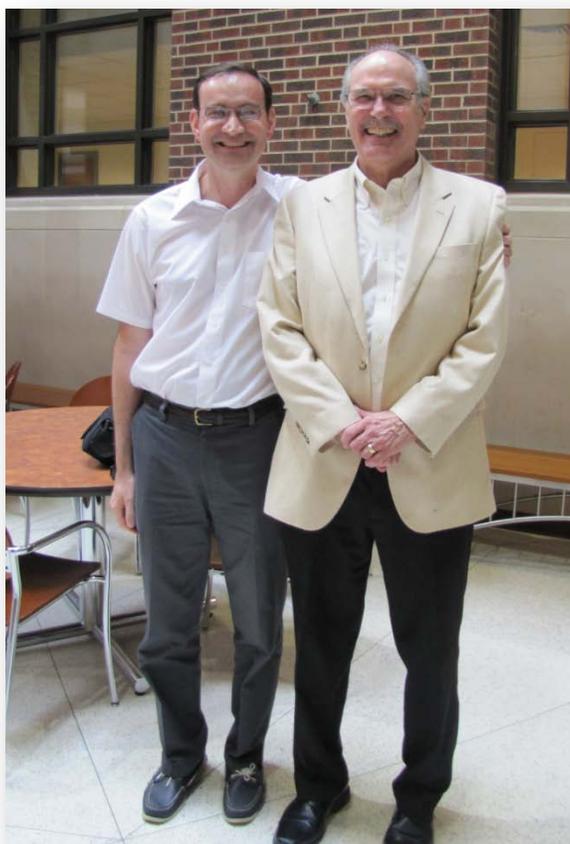
### **Selected Publications**

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** (2), 602–618, (2012)

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  $Zr(tBu-ON^{NMe_2}O)Bn_2/B(C_6F_5)_3$ ," *Macromol.*, in press (2012)

### **Selected Conference Presentations**

Thomson, K. T., Switzer, J., Xiong, S., Delgass, N., Caruthers, J. and Abu-Omar, M., "Structure-Activity Relationships in Group IV Bis (Phenoxide) Amine and Diamine Olefin Polymerization Catalysts: A DFT and Kinetic Analysis," AIChE Annual Meeting, Minneapolis, MN (2011)



**Professor Ribeiro and Professor Delgass**



## Arvind Varma

Ph. D., Minnesota, 1972

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

**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 of Editorial Board, International Journal of Petroleum  
Science and Technology  
Member of Editorial Board, Industrial & Engineering Chemistry  
Research  
Member, AIChE Awards Solicitation Committee  
Member, ISCRE Board of Directors  
B.D. Tilak Visiting Fellow, ICT-Mumbai, March 2012  
Member, Scientific Committee, ISCRE-22, Maastricht, the  
Netherlands, September 2012  
Member, Program Steering Committee, AIChE Midwest Regional  
Conference, January 2013  
Member, International Advisory Committee, 9th World Congress  
of Chemical Engineering, Seoul, Korea, August 2013

### Selected Invited Lectures

Department of Chemical Engineering, Tsinghua University,  
Beijing, China, October (2011)

Department of Chemical Engineering, Universidad de los Andes,  
Bogota, Colombia, November (2011)

Department of Chemical Engineering, Illinois Institute of  
Technology, Chicago, IL, January (2012)

Department of Chemical Engineering, Texas A&M University,  
College Station, TX, February (2012)

Department of Chemical Engineering, Cornell University, Ithaca,  
NY, April (2012)

“Solution Combustion Synthesis of Advanced Materials: Principles  
and Applications,” Gordon Research Conference on Energetic  
Materials, West Dover, VT, June (2012)

### Selected Publications

Hwang, H.T., Al-Kukhun, A., and Varma, A., “High and Rapid  
Hydrogen Release from Thermolysis of Ammonia Borane near  
PEM Fuel Cell Operating Temperatures,” *International Journal of  
Hydrogen Energy*, **37**, 2407-2411 (2012)

Hwang, H.T., Al-Kukhun, A., and Varma, A., “High and Rapid  
Hydrogen Release from Thermolysis of Ammonia Borane near  
PEM Fuel Cell Operating Temperatures: Effect of Quartz Wool,”  
*International Journal of Hydrogen Energy*, **37**, 6764-6770 (2012)

Yadav, G. D, Ajaonkar, N. P., and Varma, A. “Preparation of  
Highly Superacidic Sulfated Zirconia via Combustion Synthesis  
and its Application in Pechmann Condensation of Resorcinol with  
Ethyl Acetoacetate,” *Journal of Catalysis*, **292**, 99-110 (2012)

Al-Kukhun, A., Hwang, H.T., and Varma, A., “NbF<sub>5</sub> Additive  
Improves Hydrogen Release from Magnesium Borohydride,”  
*International Journal of Hydrogen Energy*, in press (2012)

Al-Kukhun, A., Hwang, H.T., and Varma, A., “Mechanistic  
Studies of Ammonia Borane Dehydrogenation,” *International  
Journal of Hydrogen Energy*, in press (2012)

### Selected Conference Presentations

“High and Rapid Hydrogen Release from Thermolysis of  
Ammonia Borane near PEM Fuel Cell Operating Temperatures,”  
AIChE Annual Meeting, Minneapolis, MN, October (2011)

“The Attractiveness of Ammonia Borane to Generate Hydrogen for  
PEM Fuel Cell Vehicles,” AIChE Annual Meeting, Minneapolis,  
MN, October (2011)

“Molecular Reaction Pathways of Ammonia Borane  
Dehydrogenation: Experimental and DFT Elucidations,” AIChE  
Annual Meeting, Minneapolis, MN, October (2011)

“Hydrogen Generation from Ammonia Borane for PEM Fuel Cell  
Applications,” AIChE Annual Meeting, Minneapolis, MN, October  
(2011)

“Trickle-Bed Reactor Studies for Selective Oxidation of Glycerol  
to Dihydroxyacetone Over Pt-Bi/C Catalyst,” AIChE Annual  
Meeting, Minneapolis, MN, October (2011)

“Oxidative Coupling of Methane Using Novel Catalytic  
Materials,” AIChE Annual Meeting, Minneapolis, MN, October  
(2011)

### Intellectual Property

“Ammonia Removal for Hydrogen PEM Fuel Cells,” A. Al-  
Kukhun, H.T. Hwang and A. Varma, Provisional Patent  
Application No. 61/530,420 filed on September 2, 2011.

“High and Rapid Hydrogen Release from Thermolysis of  
Ammonia Borane near PEM Fuel Cell Operating Temperatures,”  
H.T. Hwang, A. Al-Kukhun and A. Varma, Provisional Patent  
Application No. 61/534,913, filed on September 15, 2011.

“High and Rapid Hydrogen Release from Thermolysis of  
Ammonia Borane at PEM Fuel Cell Temperature Using Boric  
Acid as Additive,” H.T. Hwang and A. Varma, Invention  
Disclosure, filed on November 9, 2011.

“Method to Prevent Reprocessing of Ammonium Nitrate Based  
Compounds into Element of Explosives,” H.T. Hwang and A.  
Varma, Invention Disclosure, filed on January 20, 2012.

“Hydrogen Release from Magnesium Borohydride with  
Additives,” A. Al-Kukhun, H.T. Hwang and A. Varma, Invention  
Disclosure, filed on March 30, 2012.



## Nien-Hwa Linda Wang

Ph. D., Minnesota, 1978

Professor

### Research Areas

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

### Selected Professional Activities

Fellow, AIChE

Fellow, American Institute of Medical and Biological Engineering  
Elected chair of Area 2E, Adsorption and Ion Exchange, Separations, AIChE

Elected second vice chair of the Separations Division, AIChE

### Selected Invited Lectures

“Simulated Moving Bed Technologies: Principles and Design Tools for High-Purity and High-Yield Multi-component Separations,” Department of Chemical Engineering, Worcester Polytechnic Institute, Worcester, MA, March (2012)

### Selected Publications

Tsui, H-W., Kasat, R., Willing, J., Wang, N.-H. L., and Franses, E. I., “Infrared Spectroscopy (IR) and Molecular Simulations of a Polymeric Sorbent and Its Enantioselective Interactions with Benzoin Enantiomers,” *J. Phys. Chem. B*, **115** (44), 12785-12800 (2011)

Tsui, H-W., Kasat, R. B., Franses, E. I., and Wang, N.-H. L., “Mechanistic Studies of Chiral Discrimination in Polysaccharide Phases;” A review chapter for the Advances in Chromatography Series, **50**, 47-91, Eli Grushka and Nelu Grinberg, Editors; CRC Press, Taylor and Francis, Boca Raton, FL (2012)

Soepriatna, N., Wang, N.-H. L., and Wankat, P C, “Standing Wave Design 2-Zone Thermal Simulated Moving Bed Concentrator,” *AIChE J*, in press (2012)

Chin, C. and Wang, N.-H. L., “Simulated Moving Bed Technology for Biorefinery Applications, Separation and Purification Technologies in Biorefineries,” book chapter in *Separation and Purification Technologies in Biorefineries*, edited by Shri Ramaswamy, and B. V. Ramarao, John Wiley & Sons, New York, in press (2012)

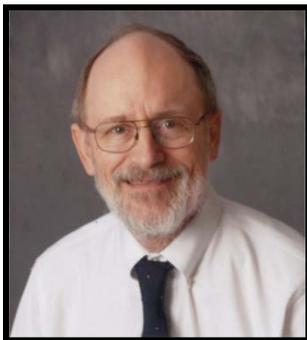
### Selected Conference Presentations

“Rapid Standing Wave Design for the Separation of Three Amino Acids in a Tandem SMB,” Advances of Bioseparations Symposium in Honor of Professor Ed Lightfoot, AIChE Annual Meeting, Minneapolis, MN, October (2011)

11<sup>th</sup> Csaba Horvath Award Symposium, Hartford, Connecticut, May 2-4, 2012, “Infrared Spectroscopy and Molecular Simulations of Interactions with of Chiral Enantiomers with a Polysaccharide Sorbent, “ with H.-W. Tsui and N.-H. L. Wang (invited talk).



Carolyn Blue (ChE Retiree), Professor Linda Wang, Professor Elias Franses, and Professor Christos Takoudis (University of Illinois, Chicago)



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

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

#### **Research Areas**

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

#### **Selected Professional Activities**

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–present  
Editorial board, Separation and Purification Reviews, 1998–present  
AIChE, Member Group 4, Education and Consulting of National Program Committee, 1977-present

#### **Selected Publications**

Lee, J. W. and Wankat, P. C., “Thermal Simulated Moving Bed Concentrator,” *The Chemical Engineering Journal*, **166**, 511-522 (2011)

Venkatesan, A. and Wankat, P. C., “Simulation of Ion Exchange Water Softening Pretreatment for Reverse Osmosis Desalination of Brackish Water,” *Desalination*, **271**, 122-131 (2011)

Kostroski, K. and Wankat, P. C., “Hybrid Membrane-Cryogenic Distillations Air Separation Processes for Oxygen Production,” *Separ. Sci Technol.*, **46**, 1539-1545 (2011)

Wankat, P. C. and Varma, A., “Purdue’s Doraiswami (Ramki) Ramkrishna. A Population of One,” *Chem. Engr. Educ.*, **44** (1), 8-14 (2011)

Wankat, P. C., “Guest Editorial: Cross-Fertilization of Engineering Education R & D,” *Chem. Engr. Educ.*, **45** (4), 230 (2011)

Wankat, P. C., “Guest Editorial: Cross-Fertilization of Engineering Education Research and Development,” *IEEE Trans. Educ.*, **54** (4), 521-522 (2011)

Wankat, P. C., “Guest Editorial: Cross-fertilization of STEM Education Communities,” *J. STEM Ed.*, **12** (5 & 6), 6-11 (2011)

Venkatesan, A. and Wankat, P. C., “Desalination of the Colorado River Water: A Hybrid Approach,” *Desalination*, **286**, 176-186 (2012)

Lindsay, E. and Wankat, P. C., “Going the Way of the Slide Rule: Can Remote Labs Fungibly Replace the In-Person Experience,” *Intl. J. Eng. Educ.*, **28** (1), 192-201 (2012)

Wankat, P. C., “Tips for Busy New Professors,” *Chemical Engineering Education*, **46** (2), 73-79 (2012)

Froyd, J. E., Wankat, P. C. and Smith, K. A., “Five Major Shifts in 100 Years of Engineering Education,” *IEEE Proceedings*, **100**, 1344-1360 (2012) invited paper

Wankat, P. C., “Forum: Cross-Fertilization of Engineering Education Research and Development,” *J. Prof. Issues Engr. Ed. Practice*, **138** (2), 104-106 (2012)

Wankat, P.C. and Oreovicz, F. S., *Teaching Engineering*, McGraw-Hill, NY, 1993. Updated Chinese edition being translated by Tianjin University, published: Higher Education Press, Tianjin, China, in press (2012)

Kostroski, K. and Wankat, P. C., “Potential Hybrid Methods for Oxygen Production,” C. E. Baukal, Jr. (Ed.), *Oxygen-Enhanced Combustion*, 2<sup>nd</sup> ed., Taylor & Francis, in press (2012)

Sharma, P. K. and Wankat, P. C., “Distillation-Adsorption Hybrid Processes to Separate Binary Liquid Mixtures with Homogeneous Azeotrope,” *Separ. Sci. Technol.*, in press (2012)

#### **Selected Conference Presentations**

“Separation Process Development,” 11<sup>th</sup> International Chemical and Biological Engineering Conference, Plenary, Lisbon, Portugal, September (2011)

“Lessons Learned Writing a School History,” AIChE Annual Meeting, Minneapolis, MN, October (2011)

“Effective Teaching for New or Prospective Faculty,” AIChE Annual Meeting, Minneapolis, MN, October (2011)

Venkatesan, A. and Wankat, P. C., “Desalination of Colorado River Water: A hybrid approach,” AIChE Annual Meeting, Minneapolis, MN, October (2011)

#### **Books**

Wankat, P. C. and Nicholas A. Peppas, *100 Years of Chemical Engineering at Purdue University, 1911-2011*, Revised Edition of Nicholas A. Peppas, *History of the School of Chemical Engineering of Purdue University* (1986), Purdue University, West Lafayette, IN (2011)

Wankat, P. C. and Farmus, C. D., *A Pictorial History of the School of Chemical Engineering at Purdue University, 1911-2011*, *Purdue Engineering Impact* magazine, 30-35 (2011), Purdue University, West Lafayette, IN (2011)

Wankat, P. C., *Separation Process Engineering. Includes Mass Transfer Analysis*, 3<sup>rd</sup> edition, Prentice-Hall, Upper Saddle River, NJ (2012) International edition, Pearson Education International, 2012. Spanish translation, *Ingenieria de Procesos de Separacion*, 3<sup>rd</sup> edicion, Pearson Educacion de Mexico (2012)



**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, and biomacromolecules**

### Selected Professional Activities

Organizer/Chair for a Focus Session, "Polymer Brushes," APS Meeting, Dallas, TX March (2011)

### Selected Invited Lectures

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

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

### Selected Publications

Lee, H., Son, S. H., Sharma, R., and Won, Y.-Y., "A Discussion of the pH-Dependent Protonation Behaviors of Poly(2-(dimethylamino)ethyl methacrylate) (PDMAEMA) and Poly(ethylenimine-ran-2-ethyl-2-oxazoline) (P(EI-r-EOz)),  
*Journal of Physical Chemistry B*, **115**(5), 844-860 (2011)

Gary, D. J., Lee, H., Sharma, R., Lee, J.-S., Kim, Y., Cui, Z. Y., Jia, D., Bowman, V. D., Chipman, P. R., Wan, L., Zou, Y., Mao, G., Park, K., Herbert, B.-S., Konieczny, S.F., and Won, Y.-Y., "Influence of Nano-Carrier Architecture on In Vitro siRNA Delivery Performance and In Vivo Biodistribution: Polyplexes vs. Micelleplexes," *ACS Nano*, **5** (5), 3493-3505 (2011)

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)

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

Kim, D. H., Wei, A., and Won, Y.-Y., "Preparation of Super-Stable Gold Nanorods via Encapsulation into Block Copolymer Micelles," *ACS Applied Materials & Interfaces*, **4**(4), 1872-1877 (2012)

Park, H. W., Choi, J., Ohn, K., Lee, H., Kim, J. 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," *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. "Poly(ethylene oxide) Chains Are Not "Hydrophilic" When They Exist as Polymer Brush 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)

Lee, H., Kim, D. H., Park, H.-W., Kim, K., Meron, M., Lin, B. and Won, Y.-Y., "Reduced Water Density in Poly(ethylene oxide) Brushes," *Journal of Physical Chemistry Letters*, **3**, 15891595 (2012)

### Selected Conference Presentations

H. Lee, K. Ohn, K. N. Witte, D. H. Kim, B. Akgun, S. Satija, Y.-Y. Won, "Poly(ethylene oxide) (PEO) Chains Are Not "Hydrophilic" When They Exist as Polymer Brush Chains," AIChE Annual Meeting, Minneapolis, MN, October (2011)

Lee, H., Kim, D. H., Witte, K. N., Ohn, K., Choi, J., Kim, K., Meron, M., Lin, B., Akgun, B., Satija, S. and Won, Y.-Y., "Poly(ethylene oxide) (PEO) Chains Are Not "Hydrophilic" When They Exist as Polymer Brush Chains," APS March Meeting, Boston, MA, February/March (2012)

Kim, D. H. and Won, Y.-Y., "Efficient Encapsulation of Gold Nanorods into Block Copolymer Micelles," APS March Meeting, Boston, MA, February/March (2012)



**Professor Won (third from left) with his research group**



## Yue Wu

Ph. D., Harvard, 2006

### Assistant Professor

#### Research Areas

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

#### Selected Professional Activities

Reviewer for: Nano Letters, Journal of American Chemical Society, Journal of Physical Chemistry C, Environmental Science and Technology, IEEE Electronic Device Letters, Chemistry of Materials, Nanoscale Nano Research, ACS Petroleum Research Fund, National Science Foundation

#### Selected Invited Lectures

“Advanced Nanostructures for Thermoelectric Energy Harvesting,” Wright-Patterson Air Force Research Lab, August (2011)

“Advanced Nanostructures for Thermoelectric Energy Harvesting,” DuPont, September (2011)

Invited talk on AIChE Annual Conference, Minneapolis, MN October (2011)

Invited talk on 2012 AVS 59th Annual International Symposium and Exhibition Program, Nashville, TN October (2011)

#### Selected Publications

Zhang, G., Liang, D., Yadav, G. G., Yang, H., and Wu, Y., “Semiconductor Nanostructure-based Photovoltaic Solar Cells,” Invited Review, *Nanoscale*, **3**, 2430-2443 (2011)

Yadav, G. G., Zhang, G., Qiu, B., Susoreny, J. A., Ruan, X. and Wu, Y., “Self-Templated Synthesis and Thermal Conductivity Investigation for Ultrathin Perovskite Oxide Nanowires,” *Nanoscale*, **3**, 4078-4081 (2011)

Yadav, G. G., Susoreny, J. A., Zhang, G., Yang, H., and Wu, Y. “Nanostructure-Based Thermoelectric Conversion: An Insight into the Feasibility and Sustainability for Large-Scale Deployment,” feature article, *Nanoscale*, **3**, 3555-3562, (2011)

Zhang, G., Kirk, B., Jauregui, L. A., Yang, H., Xu, X., Chen, Y. P. and, Wu, Y., “Rational Synthesis of Ultrathin n-type Bi<sub>2</sub>Te<sub>3</sub> Nanowires with Enhanced Thermoelectric Properties,” *Nano Letters*, **12**, 56-60 (2012)

Qiu, B., Bao, H., Zhang, G., Wu, Y., and Ruan, X., “Molecular Dynamics Simulations of Lattice Thermal Conductivity and Spectral Phonon Mean Free Path of PbTe: Bulk and Nanostructures,” *Computational Materials Science*, **53**, 278-285 (2012)

Yang, H., Jauregui, L. A., Zhang, G., Chen, Y. P., and Wu, Y., “Nontoxic and Abundant Copper Zinc Tin Sulfide Nanocrystals for Potential High-Temperature Thermoelectric Energy Harvesting,” *Nano Letters*, **12**, 540-545 (2012)

Liang, D., Yang, H., Finefrock, S. W., and Wu, Y., “Flexible Nanocrystal-Coated Glass Fibers for High-Performance Thermoelectric Energy Harvesting,” *Nano Letters*, **12**, 2140 (2012)

Zhang, G., Fang, H., Yang, H., Jauregui, L. A., Chen, Y. and Wu, Y., “Design Principle of Telluride-based Nanowire Heterostructures for Potential Thermoelectric Applications,” *Nano Letters*, **12**, 3627 (2012)

Wu, Y., Finefrock, S., and Yang, H. “Nanostructured Thermoelectric: Opportunities and Challenges,” *Nano Energy*, Invited opinion, in press (2012)

#### Selected Conference Presentations

“Advanced Nanostructures for Thermoelectric Energy Harvesting,” AIChE Annual Meeting, Minneapolis, MN, October (2011)

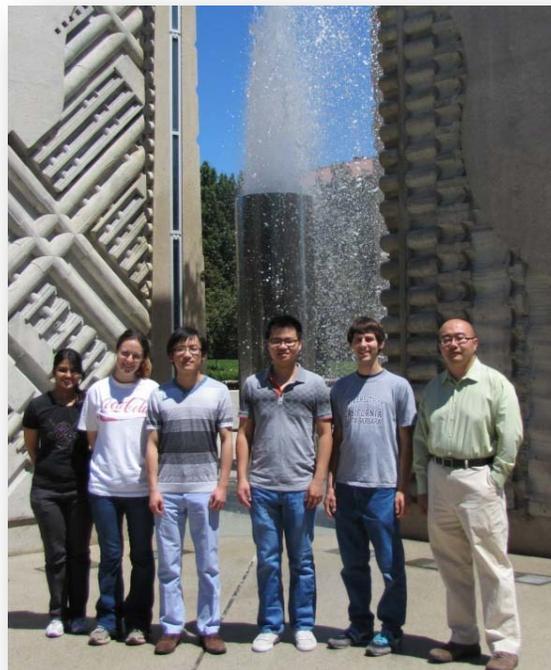
“Hybrid Nanowire/Polymer Composite for Thermoelectric Energy Harvest,” AIChE Annual Meeting, Minneapolis, MN, October (2011)

“Thermoelectric Energy Harvesting from Molecular Scale Nanowires,” 2011 MRS Meeting, Boston, MA, December (2011)

“Advanced Nanostructures for Thermoelectric Energy Harvesting,” 2011 MRS Meeting, Boston, MA, December (2011)

“Advanced Nanostructures for Thermoelectric Energy Harvesting,” Navy Crane Research Center, April (2012)

“Advanced Nanostructures for Thermoelectric Energy Harvesting,” Physical Electronic Conference, June (2012)





## Chongli Yuan

Ph. D., Cornell, 2007

Assistant Professor

### Research Areas

Biomimetic Nanoparticle Systems, Molecular Biophysics

### Selected Professional Activities

Nanoscale Science Session Co-Chair, AIChE, 2011

Peer reviewer of Journal of American Chemical Society, Nucleic Acids Research

### Selected Lectures

Biomedical Engineering, IUPUI, Indianapolis, IN, January (2012)

Biochemistry, Purdue University, West Lafayette, IN, February (2012)

### Selected Publications

Ding, S., Zhu, T., Chen, J. S., Wang, Z., Yuan, C., and Lou, X.W., "Controlled Synthesis of Hierarchical NiO Nanosheet Hollow Spheres with Enhanced Supercapacitive Performance," *J. Material Chemistry*, **21** 6602-6606 (2011)

Andresen, K., Jimenez-Useche, I., Howell, S., Yuan, C., and Qiu, X., "Solution scattering and FRET studies on nucleosomes reveal DNA unwrapping effects of H3 and H4 tails," *Biophysical J.*, submitted

Qiu, X., Howell, S.C., Andresen K., Jimenez-Useche, I., and Yuan, C., "Measuring the interactions between nucleosomes and the roles of histone tails," *Phys. Rev. Lett.*, submitted

Nurse, N., Smith, I.T., Jimenez-Useche, I., Yuan, C., "Histone H3 and H4 tail clipping affects the nucleosome dynamics," *Biophysical J.*, revised

Jimenez-Useche, I. and Yuan, C., "The effect of DNA CpG methylation on the dynamic conformation of a nucleosome," *Biophysical J.*, revised

### Selected Conference Presentations

Yuan, C., Smith, I.T., Jimenez-Useche, I., "The effects of histone tails on the conformational flexibility of a nucleosome" (poster), Biophysical Society Chromatin Meeting, Asilomar, CA, July (2011)

Andresen, K., Yuan, C., Qiu, X., "Electrostatic effects of the ion atmosphere on nucleosome core particle attraction" (poster), Biophysical Society Chromatin Meeting, Asilomar, CA, July (2011)

Yuan, C., Smith, I.T., Structures of polyelectrolytes in differently charged colloidal solutions, AIChE, Minneapolis, October (2011)

Jimenez, I., Yuan, C., Effects of DNA methylation on the self-assembly of a chromatin fiber, AIChE, Minneapolis, MN, October (2011)

Howell, S., Andresen, K., Yuan, C., Qiu, X., "Quantify cation-dependent forces between nucleosomes" (poster), Biophysical Society Meeting, San Diego, CA, February (2012)

Andresen, K., Qiu, X., Howell, S., "Elucidating mechanisms of nucleosome aggregation low resolution structure studies of a variety nucleosome core particle constructs as a function of changing ion conditions" (poster), Biophysical Society Meeting, San Diego, CA, February (2012)



Professor Yuan (right), at the  
Spring 2012 Women in Chemical Engineering Seminar

## Visiting Faculty



**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

Member of Editorial Board, *Enzyme Engineering*

Specialized Reviewer for *Revista Ingeniería Investigación Y Tecnología*, National University of Mexico

### **Teaching Contributions**

CHE 435 - Chem. Engineering Laboratory

CHE 660 - Chemical Reaction Engineering

### **Selected Publications**

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



**Jeffrey Siirola**  
Ph. D., Wisconsin - Madison, 1970

**Professor of Engineering Practice**

**Member, National Academy of Engineering**

### **Professional Activities**

Fellow, AIChE

Conference Chair for two CACHE Trustees meetings

NSF process systems review panel

ABET Secretary

Carbon Capture Simulation Initiative Industrial Advisory Board

University of Delaware - Center for Catalytic Science and Technology Annual Review and Advisory Board, Catalytic Center for Energy Innovation Advisory Board, and Energy Institute Advisory Board

Georgia Institute of Technology Chemical and Biomolecular Engineering External Advisory Board

### **Purdue Activities**

Search committee for process systems engineering faculty position

Purdue Undergraduate Research Symposium Judge

Purdue Discovery Park Advisory Council and Energy Center Advisory Council

### **Teaching Contributions**

ChE 450 - Process Design

### **Selected Conference Presentations**

Presentation on process synthesis and carbon management, Danish Technological University, Denmark (2011)

Presentation on chemical engineering megatrends, East Tennessee, AIChE Local Section (2011)

Presentations on process hazards and ABET update, AIChE Annual Meeting, Minneapolis, MN (2011)

Presentation on process energy systems, FOCAPO and CPC VIII Conferences, Savannah, GA (2012)

Presentation on aniline plant explosion, UCLA, Los Angeles, CA (2012)

Presentation on sustainable engineering and design problem solving, AMIDIQ Meeting, San Jose del Cabo, Mexico (2012)

Presentation on energy and sustainability, PSE Conference, Singapore (2012)

# Graduate Degrees Awarded

(July 1, 2011 to June 30, 2012)

M.S.	4
Ph.D.	<u>14</u>
Total	18

## Ph. D. Degrees - August 2011

### **Huang, Shisheng**

*Policy Portfolio Analysis for Energy Systems Based on a Multi-Paradigm Modeling Framework*, (Pekny/Reklaitis), Singapore University of Technology and Design, Singapore

### **Lee, Eunwoong**

*A Comprehensive Experimental Investigation of the Nonlinear Viscoelastic Properties of PMMA and Other Glassy Polymer*, (Caruthers), Researcher, Samsung-Total Petrochemicals, Seosan, South Korea

### **Pazmino, Jorge H.**

*Fundamental Heterogeneous Catalysis for Environmental and Energy-related Applications*, (Ribeiro/Delgass), Senior Engineer, Dow Chemical Company, Pearland, TX

### **Sengupta, Neelanjan**

*Understanding Cellular Metabolism using Stable Isotopic Labeling, Metabolic Flux Analysis and Kinetic Modeling*, (Morgan), Scientist, Becton Dickinson, Sparks, MD

## M.S. Degrees - August 2011

### **Hill, Cameron L.**

*Compartmental Separation of Chlamydomonas reinhardtii for MFA*, (Morgan), Process Engineer I/II, CalEnergy, Imperial Valley, CA

### **Hoeferkamp, Katherine P.**

(Yuan), MS ChE Non Thesis, Purdue University, West Lafayette, IN, Moved to Boulder Colorado

### **Shekhar, Mayank**

(Ribeiro/Delgass), MS ChE Non-Thesis, Purdue University, West Lafayette, IN, Continuing on for PhD

## Ph.D. Degrees – December 2011

### **Balanchandran, Dave**

*Micro-Particle Adhesion: Measurement and Simulation*, (Beaudoin), Teaching Assistant, Purdue University, West Lafayette, IN

### **Torabi, Korosh**

*Toward a Molecular Theory for Homogeneous Bubble Nucleation*, (Corti), Postdoc, Northwestern University, Evanston, IL

### **Zhu, Qing**

*Crystallization Behavior and Microstructural Characterization of Drug/Polymer Systems*, (Harris), Process Development Engineering, Intel Corporation, Hillsboro, OR

## Ph.D. May 2012

### **Al-Kukhun, Ahmad Y.**

*Hydrogen Generation for Vehicle Applications*, (Varma), Technology Development Engineer, Intel Corporation, Hillsboro, OR

### **Chen, Ye**

*Pharmaceutical Clinical Trial Supply Chain Management*, (Reklaitis/Pekny), R & D Engineer, Air Products & Chemicals, Allentown, PA

### **Emady, Heather**

*Single Drop Granule Formation for Regime Separated Granulation*, (Litster), Postdoc, Procter & Gamble, Cincinnati, OH

### **Gao, Haijing**

*The Impact of Nanoparticle and Support Synergy on Water-Gas Shift Catalyst Design*, (Basaran/Harris), Facility Engineer, Chevron Energy Tech Company, Houston, TX

### **McGough, Patrick**

*Fluid Dynamics of Drips, Filaments and Strings*, (Basaran), Research Chemical Engineer, Dow Chemical Company, Midland, MI

### **Sung, Pei-Fang**

*Deposits Formed from the Evaporation of Sessile Droplets and the Interaction of Particles with a Liquid*, (Harris), R & D Engineer, Intel Corporation, Hillsboro, OR

### **Williams, Wilce Damion**

*The Impact of Nanoparticle and Support Synergy on Water-Gas Shift Catalysis Design*, (Ribeiro/Delgass), Product Development Engineer, Caterpillar Inc., Peoria, IL

## M.S. Degrees – May 2012

### **Vora, Shaunak**

(Litster), MS ChE Non-Thesis, Purdue University, West Lafayette, IN, Internship at Pfizer Animal Health, Kalamazoo, MI

## Graduate Student Enrollment - Fall 2011

	Last Name	First Name	Advisor(s)	UG/M.S. Degree	Enrolled
1	Abbou Oucherif	Kaoutar	Litster	New Mexico Institute of Mining	Spring 2010
2	Al-Kukhun	Ahmad	Varma	Jordan University of Science & Tech	Fall 2008
3	Al-Musleh	Easa	Agrawal	Qatar University	Fall 2008
4	Allsop	Adam	Caruthers/Steuterman	Southern Illinois University	Fall 2011
5	Appathurai	Santosh	Basaran/Harris	Indian Institute of Tech, Madras	Fall 2007
6	Austin	John	Harris	Worcester Polytechnic Institute	Fall 2010
7	Bailey	Joseph	Caruthers/Steuterman	Purdue University/Calumet Campus	Fall 2011
8	Balachandran	Dave	Beaudoin	University of Wisconsin	Fall 2006
9	Baradwaj	Aditya	Boudouris	University of Maryland	Fall 2011
10	Bates	Shane	Baertsch	Pennsylvania State University	Fall 2008
11	Bhat	Anuradha	Reklaitis/Venkatasubramanian	IIT/Madras and IIT/Bombay	Fall 2011
12	Brennan	Mary Jane	Liu	Purdue University	Fall 2010
13	Brew	Kevin	Agrawal	University of Delaware	Fall 2010
14	Brown	Zachary	Caruthers/Steuterman	Purdue University	Fall 2011
15	Carter	Nathan	Agrawal	Missouri University of Science & Tech	Fall 2010
16	Chen	Si	Pipes	Cornell University	Fall 2010
17	Chen	Ye	Reklaitis/Pekny	Zhejiang University, China	Fall 2007
18	Choudhari	Harshavardhan	Agrawal/Delgass/Ribeiro	UICT-Mumbai	Fall 2009
19	Cipich (Chaffee)	Michelle	Beaudoin	Tri-State University	Fall 2006
20	Cui	Yanran	Delgass/Ribeiro	Beihang University, China	Fall 2011
21	Cybulskis	Viktor	Ribeiro/Delgass	Purdue University	Fall 2011
22	David	Anand	Caruthers/Pekny	U. of Minnesota, Twin Cities/Iowa St U.	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	U. of North Dakota	Fall 2011
26	Detwiler	Michael	Ribeiro/Delgass	Youngstown State University	Fall 2010
27	Devaraj	Jayachandran	Ramkrishna	National Univ. of Singapore/Univ. 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, China	Fall 2008
32	Easton	Mckay	Ribeiro	Brigham Young University	Fall 2010
33	Emady	Heather	Litster	University of Arizona, Tucson	Fall 2007
34	Fang	Haiyu	Wu	University of Science & Tech, China	Fall 2010
35	Finefrock	Scott	Wu	Case Western Reserve University	Fall 2010
36	Freer	Alexander	Harris	University of Notre Dame	Fall 2010
37	Gaik	Steven	Agrawal/Hillhouse	Pennsylvania State University	Fall 2007
38	Galas	Richard	Liu	SUNY - Buffalo	Fall 2008
39	Gao	Danni	Varma	Tsinghua University, China	Fall 2009
40	Gao	Haijing	Basaran/Harris	Tsinghua University, China	Fall 2006
41	Gawecki	Piotr	Agrawal/Delgass/Ribeiro	University of California, Riverside	Fall 2008
42	Gencer	Emre	Agrawal/Delgass/Ribeiro	Bogazici University, Turkey	Fall 2011
43	Gharachorlou	Amir	Ribeiro	Amir Kabir University of Tech., Iran	Spring 2010
44	Ghose	Ranjita	Varma	Univ. Inst. of Chem. Tech./U. of Florida	Fall 2009
45	Graeser	Brian	Agrawal	Virginia Poly Inst & State University	Fall 2011

	Last Name	First Name	Advisor(s)	UG/M.S. Degree	Enrolled
46	Gupta	Anshu	Reklaitis/Venkatasubramanian	Indian Institute of Technology, Madras	Fall 2010
47	Hacker	Christopher	Caruthers/Steuterman	Purdue University	Fall 2011
48	Hages	Charles	Agrawal	University of California, Santa Barbara	Fall 2010
49	Haro	Lilia	Caruthers/Steuterman	Purdue University/Calumet Campus	Fall 2011
50	Harrison	Aaron	Beaudoin	Brigham Young University	Fall 2011
51	Hirshfield	Laura	Reklaitis/Venkatasubramanian	University of Michigan/Ann Arbor	Fall 2009
52	Honda	Gregory	Varma	University of Connecticut	Fall 2010
53	Hsu	Hsin-yun	Harris	National Tsing Hua University, Taiwan	Fall 2010
54	Huff	Joshua	Agrawal	Texas A & M University	Spring 2010
55	Icten	Elcin	Reklaitis/Venkatasubramanian	Bogazici University, Turkey	Fall 2011
56	Jimenez-useche	Isabel	Yuan	University De Los Andes, Colombia	Fall 2009
57	Joglekar	Chinmay	Agrawal	ICT, Mumbai	Fall 2011
58	Kelkar	Aniruddha	Franses/Corti	ICT, Mumbai	Fall 2010
59	Kim	Dae Hwan	Won	Seoul National University, Korea	Fall 2007
60	Kim	Jaewoo	Caruthers	Seoul National University, Korea	Fall 2008
61	Kim	Seong-eun	Yuan	Korea University	Fall 2011
62	Kim	Yeji	Liu	Korea University	Fall 2009
63	Kispersky	Vincent	Delgass/Ribeiro	University of California, Santa Barbara	Fall 2007
64	Koswara	Andy	Chakrabarti	University of California, San Diego	Fall 2009
65	Ledden	Michael	Caruthers/Steuterman	Purdue University	Fall 2011
66	Lee	Hoyoung	Won	Korea University	Spring 2009
67	Lee	Shinbeom	Varma	Yonsei Univ./Seoul National Univ., Korea	Fall 2011
68	Lee	Wen-Sheng	Delgass/Ribeiro	National Taiwan University	Fall 2007
69	Li	Jianfeng	Litster	Tsinghua University, China	Fall 2007
70	Ling	Lei	Wang	Tsinghua University, China	Fall 2009
71	Liu	Xiaohui	Pekny/Dietz	Tsinghua University, China	Fall 2011
72	Louvier	Matthew	Venkatasubramanian/Reklaitis	University of California, Los Angeles	Fall 2010
73	Madenoor Ramapriya	Gautam	Agrawal/Tawarmalani	Indian Institute of Technology, Madras	Fall 2011
74	Mallapragada	Dharik	Agrawal/Delgass/Ribeiro	Indian Institute of Technology, Madras	Fall 2008
75	Marimuthu	Kartikeyan	Chakrabarti	Anna University/IIT-Madras	Fall 2009
76	McCarthy	Robert	Agrawal/Hillhouse	Washington University	Fall 2007
77	Mc Gough	Patrick	Basaran	Purdue University/Purdue University	Spring 2007
78	McLeod	Steven	Agrawal	University of Florida	Fall 2011
79	Mehta	Dhairya	Agrawal/Ribeiro/Delgass	UIC- Mumbai	Fall 2009
80	Milah	Steven	Caruthers/Steuterman	Univ. of Akron/Rose-Hulman Inst. of Tech.	Fall 2011
81	Misiego Arpa	C. Rocio	Pipes	U. of Valladolid/Purdue University	Fall 2010
82	Miskin	Caleb	Agrawal	Brigham Young University	Fall 2011
83	Mulvenna	Ryan	Boudouris	Monash University, Australia	Fall 2011
84	Neukam	Joseph	Caruthers/Steuterman	Purdue University	Fall 2011
85	Nieves Remacha	Javier	Wang	U. Complutense de Madrid/Purdue Univ.	Fall 2011
86	Nurse	Nathan	Yuan	North Carolina State University	Fall 2011
87	O'Grady	John	Morgan	Rose-Hulman Institute of Technology	Fall 2008
88	O'Regan	Peter	Caruthers	Tufts University	Fall 2010
89	Ogebule	Oluwaseyi	Caruthers	Alabama Agricultural & ME U.	Fall 2008
90	Oglesby	Patrick	Harris	Purdue University	Fall 2005
91	Parekh	Atish	Ribeiro/Delgass	Indian Institute of Technology, Bombay	Fall 2010
92	Park	Hye Yeon	Agrawal/Hillhouse	Korea University	Fall 2009
93	Pirani	Badruddin(Rudy)	Caruthers/Steuterman	Purdue University/Rose-Hulman Inst. of Tech.	Fall 2011
94	Pohlman	Daniel	Litster	University of Notre Dame	Fall 2011

	Last Name	First Name	Advisor(s)	UG/M.S. Degree	Enrolled
95	Pommer	Chris	Basaran/Harris	Purdue University	Fall 2007
96	Porter	Christopher	Caruthers/Steuterma	Indiana Institute of Technology	Fall 2011
97	Prabhu	Rasika	Caruthers	UICT- Mumbai	Fall 2007
98	Reed	Michael	Caruthers/Steuterma	Indiana Purdue Univ./Indiana Purdue Univ.	Fall 2011
99	Renner	Julie	Liu	University of North Dakota	Fall 2007
100	Ridder	Bradley	Chakrabarti	University of South Florida	Fall 2010
101	Rostro	Lizabeth	Boudouris	University of Arkansas/Fayetteville	Fall 2011
102	Sabnis	Kaiwalya	Ribeiro/Delgass	ICT- Mumbai	Fall 2010
103	Sambath	Krishnaraj	Basaran	Indian Institute of Technology, Madras	Fall 2008
104	Schram	Caitlin	Beaudoin	Johns Hopkins University	Fall 2011
105	Sheets	Erik	Agrawal	Villanova University	Fall 2010
106	Shekhar	Mayank	Delgass/Caruthers/Ribeiro/Thomson	UICT - Mumbai	Fall 2008
107	Shenvi	Anirudh	Agrawal/Reklaitis/Venkat	UICT - Mumbai	Fall 2007
108	Shu	Che-Chi	Ramkrishna	National Taiwan University	Fall 2007
109	Singh	Meenesh	Ramkrishna	Sardar Patel University	Spring 2008
110	Smith	Kathryn	Beaudoin	University of Wisconsin	Fall 2008
111	Soepriatna	Nicholas	Wankat	University of Texas, Austin	Spring 2010
112	Sollberger	Fred	Ribeiro/Delgass	University of Illinois, Urbana-Champaign	Fall 2010
113	Son	Sang Ha	Caruthers	Yonsei University, Korea	Fall 2007
114	Straub	Dean	Wang	Rose-Hulman Institute of Technology	Spring 2011
115	Su	Sheng-chuan	Liu	National Taiwan University	Fall 2009
116	Suchomel	Mark	Caruthers/Pekny	University of Minnesota, Duluth	Fall 2009
117	Sung	Pei-Fang	Harris	National Taiwan University	Fall 2006
118	Sweat (Cook)	Melissa	Beaudoin	Mississippi State University	Fall 2010
119	Switzer	Jeffrey	Caruthers/Thomson	University of California, Davis	Fall 2006
120	Thete	Sumeet	Basaran	Government College of Engineering, India	Fall 2011
121	Thomas	Myles	Beaudoin	Utah State University	Fall 2010
122	Torabi	Korosh	Corti	Irfan University, Iran/IIT-Chicago	Fall 2007
123	Tsouris	Vasilios	Won	University of Pittsburgh	Fall 2011
124	Tsui	Hung-Wei	Franses/Wang	National Taiwan University	Fall 2009
125	Tyler	Wagler	Caruthers/Steuterma	University of Evansville	Fall 2011
126	Venkatakrishnan	Vinod	Agrawal/Delgass/Ribeiro	Indian Institute of Technology, Madras	Fall 2009
127	Venkatesan	Anand	Wankat	Indian Institute of Technology, Madras	Fall 2008
128	Verma	Anuj	Ribeiro/Delgass	Institute of Chemical Technology, Mumbai	Fall 2010
129	Vora	Shaunak	Litster	UICT - Mumbai	Fall 2007
130	Voshol	David	Caruthers/Steuterma	Michigan Technological University	Fall 2011
131	Walker	Bryce	Agrawal	Brigham Young University	Fall 2009
132	Weeden	George	Wang	Purdue University	Fall 2011
133	Williams	W. Damion	Delgass/Ribeiro	University of Oklahoma	Fall 2006
134	Xiong	Silei	Caruthers/Delgass/Thomson	Tsinghua University, China	Fall 2009
135	Yadav	Gautam	Wu	University of Western Ontario, Canada	Fall 2009
136	Yang	Haoran	Wu	Tsinghua University, China	Spring 2010
137	Yang	Yung-jih	Corti/Franses	National Taiwan University	Fall 2011
138	Yohe	Sara	Agrawal/Delgass/Ribeiro	University of Minnesota, Twin Cities	Fall 2008
139	Zarate	Nyah	Beaudoin/Litster	Illinois Institute of Technology, Chicago	Fall 2008
140	Zhu	Qing	Harris/Taylor	Zhejiang University, China	Fall 2006

## Facilities



### Forney Hall of Chemical Engineering

In October 2004, the School of Chemical Engineering dedicated a 100,000 ft<sup>2</sup> expansion (\$20 million) that more than doubled the size of our building. The building was then re-named the Forney Hall of Chemical Engineering. With new lecture facilities and new bioengineering, catalysis, and nanoscience research laboratories, the School has, for the first time in decades, space to grow. The renovation of the original building (\$10.5 million), including associated spaces, was completed in spring 2012.

### Discovery Park

Since 2002, Discovery Park - made up of 10 centers - has grown from an idea to a \$450 million interdisciplinary research, learning and engagement complex. More than 1,000 faculty have been involved in Discovery Park. Nearly 3,000 students have participated in Discovery Park programs, and 250 graduate students have offices there. Our faculty are involved in cutting edge research in the Bindley Bioscience, Birck Nanotechnology, Energy, and Oncological Sciences Centers.



### Bindley Bioscience Center

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



### Birck Nanotechnology Center

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

### Oncology Center

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

## Academic Advisory Board

Formed in 2006 to provide input on academic issues, the Academic Advisory Board had its last meeting on April 11-13, 2011. The current board members are:

- **Kristi Anseth**, Distinguished Professor, University of Colorado, Boulder
- **Alexis T. Bell**, Dow Professor of Sustainable Chemistry, UC-Berkeley
- **Ignacio Grossman**, Rudolph R. and Florence Dean University Professor of Chemical Engineering, Carnegie-Mellon University
- **Michael Ramage**, Executive Vice President, ExxonMobil (Retired)
- **Gregory Stephanopoulos**, Bayer Professor of Chemical Engineering, MIT
- **Frank Bates**, Regents Professor and Head, Chemical Engineering and Materials Science, University of Minnesota

## 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.

3M

Abbott

Air Liquide

Air Products and Chemicals Inc.

Anheuser-Busch, Inc.

BP

ChevronPhillips Chemical

Dow Chemical Company

Du Pont

Eastman Chemical Company

Elanco Animal Health, a division of Eli Lilly

ExxonMobil Chemical Co.

Honeywell Process Solutions

Lubrizol Corporation

LyondellBasell

National Starch & Chemical Corp.

Pfizer Global

Procter & Gamble Co.

Roquette America Inc.

Shell Global Solutions (US) Inc.

UOP LLC

These corporations provide financial support for curriculum innovations, scholarships, experimental facilities enhancements, instructional computing facilities and start-up support for young faculty. The Fall 2011 meeting took place on October 7 in Forney Hall, Purdue; the Spring 2012 meeting was held on February 17, 2012 in Naples, Florida.

## Seminar Speakers - Fall 2011

August 30, 2011

### *Centennial Seminar*

**Dr. Deborah L. Grubbe** (BS 1977/HDR 2010)

Owner

Operations & Safety Solutions, LLC

*"Entrepreneurship Lessons Learned  
from Large Organizations"*

October 31, 2011

**Dr. G.D. Yadav**

Vice Chancellor & R.T. Mody

Distinguished Professor, Inst. of Chemical

Technology, Mumbai, India

*"Challenges in Development of Redox Catalysts for  
Selective Transformations of Organic Compounds  
into Value Added Chemicals"*

September 6, 2011

**Dr. Matthew Neurock**

Alice M. and Guy A. Wilson Professor

Departments of Chemical Engineering & Chemistry

University of Virginia

*"Engineering Molecular Transformations over  
Supported Catalysts for Sustainable Energy  
Conversion"*

November 1, 2011

*GSO Seminar*

**Dr. Alyssa Panitch**

Associate Department Head and

Professor of Biomedical Engineering

Purdue University

*"Tissue Healing and Regeneration: From Invention  
to Translation"*

September 20, 2011

**Dr. Alexander Katz**

Associate Professor of Chemical Engineering

University of California Berkeley

*"Bioinspired Approaches for Enhancing and  
Understanding Heterogeneous Catalysis"*

November 10, 2011

*Centennial Seminar*

**Dr. William D. Young** (BS 1966/HDR 2000)

Venture Partner

Clarus Ventures, LLC

*"History and Promise of Biotechnology"*

September 27, 2011

*Centennial Seminar*

**Mr. Norman L. Gilsdorf** (BS 1977)

President

Honeywell Process Solutions

*"Have Chemical Engineering Degree – Will Travel"*

November 29, 2011

*Centennial Seminar*

**Dr. Kristi S. Anseth** (BS 1992)

Howard Hughes Medical Investigator &

Distinguished Professor of Chemical

& Biological Engineering

University of Colorado at Boulder

*"Goodbye Flat Biology"*

October 4, 2011

*Centennial Seminar*

**Dr. Jennifer Sinclair Curtis** (BS 1983)

Distinguished Professor

School of Chemical Engineering

University of Florida

*"Particle-Laden Flows: Applications, Modeling  
Approaches and Challenges"*

December 6, 2011

**Dr. W. Nicholas Delgass**

Maxine Spencer Nichols Professor

of Chemical Engineering

Purdue University

*"The Science of Catalysis"*

October 13, 2011 (Thursday)

*Centennial Seminar*

**Ms. Emily M. Liggett** (BS 1977)

CEO

Nova Torque, LLC

*"ChE Entrepreneurship: Building on a  
Technical Foundation"*

## Seminar Speakers – Spring 2012

January 24, 2012

**Prof. David Schaffer**

Chemical & Biomolecular Engineering  
University of California, Berkeley

*"Molecular Engineering of Extrinsic and Intrinsic  
Cues to Control Stem Cell Function"*

February 7, 2012

**Prof. Eric Shaqfeh**

Chemical Engr. & Mechanical Engr.  
Stanford University

*"Platelet Margination in the Microcirculation  
or How Capsules Push Particles Around"*

February 28, 2012

**Prof. Mihaela Vorvoreanu**

Dept. of Computer Graphics Technology  
Purdue University

*"Using Social Media Strategically to Manage Your  
Professional Online Identity and Social Network"*

March 6, 2012

**Prof. Michael Bevan**

Dept. of Chemical Engineering  
Johns Hopkins University

*"Colloidal Assembly on Energy Landscapes"*

March 20, 2012

**Mr. Hoyoung Lee**

Chemical Engineering Graduate Student  
Faculty Award Lecture

*"Polymer Nanotechnology towards Improving Gene  
Delivery Vector Design"*

March 27, 2012

**Prof. Michael Strano**

Dept. of Chemical Engineering  
Massachusetts Inst. of Technology

*"New Concepts in Molecular and Energy Transport  
within Carbon Nanotubes: Near Infrared Sensors,  
Resonant Ion Channels, and Thermopower Waves"*

April 3, 2012

**Prof. Warren Seider**

Dept. of Chemical & Biomolecular Engr.  
University of Pennsylvania

*"Risk Analysis Using Large Alarm Databases"*

April 5, 2012

**Prof. Julie Liu**

School of Chemical Engineering  
Purdue University

*"Engineering Cell-Microenvironment Interactions for  
Stem Cell Differentiation and Tissue Regeneration"*

### Kelly Lectures

**Prof. James Dumesic**

Dept. of Chemical and Biological Engineering  
University of Wisconsin – Madison

**April 10, 2012**

*"Strategies for Catalytic Conversion of Biomass to  
Hydrogen and Liquid Hydrocarbon Fuels"*

**April 11, 2012**

*"Catalytic Conversion of Hemi-Cellulose and  
Cellulose to Fuels and Chemicals"*

April 17, 2012

**Prof. Sidney Nagel**

Department of Physics  
James Franck Institute, University of Chicago

*"IMPACT"*

April 24, 2012

**Prof. Gerald Fuller**

Dept. of Chemical Engineering  
Stanford University

*"Interfacial Rheology of Biological Interfaces"*