In the News:

- For the Record: Julie N. L. Albert
  http://www.udel.edu/udaily/2014/sep/for-the-record-092713.html
- From Methanol to Butanol
  http://www.udel.edu/udaily/2014/sep/arpa-energy-grant-092313.html

Department Events:

- You are cordially invited to Dongui Li’s dissertation defense, which will be held Wednesday, October 9th at 10:15am in 106CCM. The title is "TOWARD RATIONAL DESIGN OF POLYELECTROLYTE-SURFACTANT COMPLEXES: THERMODYNAMICS, MICROSTRUCTURE AND PROPERTY". The abstract is attached. Light refreshments will be provided starting at 9:45am.
- Department Seminar
  Dr. Grant Wilson, University of Texas at Austin
  Friday, October 11, 2013
  10:00am in 102 CLB
  “Block Copolymers for High Resolution Imaging Applications”
- You are cordially invited to a 2-day Thermochemical Upgrading Workshop jointly hosted by Air Liquide, ExxonMobil, Pacific Northwest National Laboratory and the University of Delaware Energy Institute (UDEI) at the Embassy Suites, Newark, DE, on Tuesday and Wednesday, October 8 and 9, 2013. Attached is the Workshop Agenda for your review. Our event will begin at 8:30 am each day (following morning refreshments at 8 am) and will feature presentations discussing the thermochemical conversion of unconventional feedstocks into fuels and chemicals. Along with the affiliated faculty, students and postdocs are an integral part of the UD Energy Institute. Please encourage students and postdocs to join our event and present a poster displaying their research on Tuesday and/or Wednesday at the Embassy Suites. Industrial partners will be represented. Students should complete the online registration and then send a brief bio and an abstract of their poster to Marguerite Mahoney at mahoneym@udel.edu no later than October 1, to be included an abstract booklet.
  The event is FREE.; however, registration is required. Please register at https://www.signup4.net/Public/ap.aspx?EID=ThER155E, so that we have appropriate accommodations. If you have colleagues or student groups who may be interested in participating, please share this invite with them.
  Student posters may be printed through the Smith Hall Computing site (information below).
  If you have any additional questions, please feel free to contact me directly. The deadline for registration is October 5, 2013. We hope you will join us!

Facilities:

- Upgrade campus wireless network software to fix some outstanding issues. Controllers will be upgraded and rebooted, which will then automatically upgrade and reboot all 2000+ access points. Controller upgrade is expected to take 30-40 minutes, followed by 15-20 minutes for access points to upgrade. The upgrade will begin between 6:00-6:30 AM on Wednesday morning, October 2, 2013.

Other Department Events:

- AOE Fundraiser now underway
  My name is Kelsey Smith and I am the fundraising chair for Alpha Omega Epsilon, the technical science and engineering sorority here at UD. We just kicked off our annual Yankee Candle fundraiser and need your help! It is really easy to order! Just click this link to browse the catalog: https://www.yankeecandlefundraising.com/ycfroot/catalog.htm. Then when you’re ready to place your order, go to https://www.yankeecandlefundraising.com/ycfroot/home.htm and enter our Group ID 99048154 and Seller ID
Kelsey86 under the "Get Shopping" Section. You must enter both ID numbers in order for AOE to receive credit. There is a wide variety of Yankee Candle products to choose from and they make great holiday gifts! Orders are due by October 20th and items will be shipped directly to you in time for Thanksgiving! Thank you for your support - we really do appreciate it!

Kelsey Smith
University of Delaware 2016
Mechanical Engineering Major
kesmith@udel.edu

- **Mathematical Sciences Department: Wee of October 1st**
  Please see the attachment that lists all of the seminars given by the Mathematical Sciences Department

- **Remote Sensing Seminar**
  Tuesday, Oct. 1, 2013
  3:30PM-4:30PM
  Robinson 206/Cannon 202
  (Two presenters, all are welcome)

- **Department of Physics and Astronomy**
  Dr. Song Lai, University of Florida
  October 1, 2013
  2:00pm in 215 Sharp Lab
  “Functional magnetic resonance imaging (fMRI) of the human brain: physical principles and applications”

**Jobs/Recruiting:**

- The **Department of Chemical Engineering at Stanford University** is seeking applicants for a tenure-track faculty position at the junior level (Assistant or untenured Associate Professor). Applicants are expected to have earned a Ph.D. degree in chemical engineering or related disciplines. See attachment for more details.

- Roxboro is Certainteed's Newest, Fastest, and most High Profile Gypsum plant. We are looking for a process engineer to join our team. There will be significant opportunity for advancement in this dynamic, fast moving plant. The applicant must be friendly, strong-willed, and have the drive to achieve results through a logical and systematic approach, as well as through persuasion. We are looking for a person who enjoys working with and through people. The job requires actively influencing and motivating a variety of people in changing situations. People skills and the ability to work in an unstructured environment are highly important to the job. See attachment for more details.

  Available positions can be found on the Chemical & Biomolecular Engineering opportunity website ([http://www.che.udel.edu/biz/OppIndex.html](http://www.che.udel.edu/biz/OppIndex.html)), so be sure to check it regularly.
Mixtures of polyelectrolytes (PEs) and oppositely charged surfactants are of significant technological importance and scientific interest. A complex molecular association mechanism in these mixtures leads to the self-assembly of PE-surfactant complexes (PSCs). Such PSCs exhibit a variety of appealing supramolecular structures with useful properties and are found ubiquitously in the food, consumer products, pharmaceutics, and oil industries. Despite their broad use, however, a rational approach to formulation remains challenging because of the complicated association mechanisms that govern the physicochemical properties of PSCs. As such, the goal of this dissertation is to better understand how the thermodynamic and physical properties (e.g., structural, mechanical and adhesion) of PSCs depend on the molecular composition. By identifying the most important molecular interactions and studying their influence, we are able to deduce semi-empirical rules that facilitate the “predictive design” of PSCs with desired properties for use in industrial applications.

Establishing a relationship between molecular-scale interactions and the formulation chemistry is identified as the foundational step towards this goal. A novel methodology of combining visual and isothermal titration calorimetry (ITC) measurements is developed to analyze the equilibrium and metastable formation of PSCs in terms of the strength of surfactant cooperative binding with the polyelectrolyte. An improvement to a two-energy-state adsorption model is derived and the resulting thermodynamic properties, including binding constants and the molar Gibbs free energies, enthalpies, and entropies, identify the relative importance of both hydrophobic and electrostatic interactions in PSC formation. Through a design of experiments with varying surfactant hydrophobicity and PE linear charge density, a power-law connecting the rescaled cooperative binding strength to the PE’s linear charge density is deduced. This correlation is further validated across a broad range of PSC mixtures reported in literature, spanning natural and synthetic PEs including DNA. A semi-empirical model is proposed to enable quantitative prediction of the binding strength parameter from the molecular composition.

A systematic characterization of the microstructures and properties of these model PSCs is then performed via a combination of X-ray scattering, small-angle neutron scattering (SANS), thermal gravimetric analysis (TGA), and the development of a nanoindentation protocol using atomic force microscopy (AFM). More ordered
structures result from stronger surfactant binding and these PSCs have increased elasticity. This research enables correlating the PSC properties with the self-assembled microstructure, which in turn depends on the cooperative binding strength and composition – thus, providing guidance for formulating PSCs for a specific end-use. Further, an industrial end-use of PSC adsorption onto emulsion surfaces is explored and found to follow the solution behavior outlined above. This dissertation provides new insights about and guidance for rationally formulating PSC materials for consumer products and biomedicine as well as a better understanding of the thermodynamics and properties of PSCs, including structure, rheology and interfacial adsorption. The methodologies and techniques developed in this dissertation are of additional value as methods available for more broadly investigating other PSCs and related systems.
MATHEMATICAL SCIENCES DEPARTMENT

Tuesday, October 1, 2013                            2:00 p.m.                             336 Ewing  
Applied Math Seminar  
Speaker:  Jay Newby, Ohio State University  
Title:  Spontaneous neural activity caused by ion channel fluctuations

Tuesday, October 1, 2013                             3:00 p.m.                             336 Ewing  
Discrete Math Seminar  
Speaker:  Sabastian Cioaba, University of Delaware  
Title:  Bipartite Ramanujan Graphs of All Degrees

Thursday, October 3, 2013                            11:00 p.m.                             336 Ewing  
Numerical Analysis & PDE Seminar  
Speaker:  Benjamin Seabold, Temple University  
Title:  Phantom Jams and Jamitons in Second Order Traffic Models

Thursday, October 3, 2013                             2:00 p.m.                             336 Ewing  
Inverse Problems and Analysis Seminar  
Speaker:  Shari Moskow, Drexel University  
Title:  Asymptotic Expansions for Transmission Eigenvalues for Media with Small Inhomogeneities

Thursday, October 3, 2013                             3:00 p.m.                             336 Ewing  
Student Discrete Math / Algebra Seminar  
Speaker:  Paul Hearding, University of Delaware  
Title:  Orthomorphism Polynomials

Friday, October 4, 2013                                3:30 p.m.                             336 Ewing  
Probability Seminar  
Speaker:  Luc Rey-Bellet, University of Massachussets, Amherst
STANFORD UNIVERSITY
Department of Chemical Engineering
Faculty Opening

The Department of Chemical Engineering at Stanford University is seeking applicants for a tenure-track faculty position at the junior level (Assistant or untenured Associate Professor). Applicants are expected to have earned a Ph.D. degree in chemical engineering or related disciplines.

We will consider applicants knowledgeable in the general area of chemical engineering science. There are several broad areas of interest, including hydrocarbon chemistry, surface reactivity and catalysis, fuel cells, environmental or atmospheric studies, molecular transport processes and mechanics, soft materials physics and chemistry, computation and simulation, biochemical and biomolecular engineering, and nanomaterials processing. In general, we give higher priority to the overall originality and promise of the candidate's work rather than to the sub-area of specialization. Researchers with interests in the applied life sciences, energy sciences, and environmental sciences are particularly encouraged to apply.

The successful candidate will be expected to teach at the graduate and undergraduate level, to develop advanced graduate courses in a research specialty, as well as to develop a world-class research program with an emphasis on the fundamental physical, chemical, or biological aspects of chemical engineering science. Applicants should be seeking a stimulating interdisciplinary environment in which to pursue teaching and research. We anticipate that the faculty members will contribute to and develop leadership roles and interactions among faculty not only in Chemical Engineering, but also Electrical, Mechanical, Civil and Environmental, and Material Science and Engineering in the School of Engineering; in Physics, Chemistry, and Biology in the School of Humanities and Sciences; in the departments and programs in the School of Medicine, as well as Bioengineering located in the Schools of Engineering and Medicine, and at the Stanford Synchrotron Radiation Laboratory.

Applicants must submit online their curriculum vitae (including research accomplishments, teaching experience, and publications) a transcript of doctoral graduate study, a detailed research and teaching plan, and three references (name and email address). Applications are due by December 1, 2013, but we will continue to accept applications until the position is filled. Please apply online at http://cheme.stanford.edu/.

Stanford University is an equal opportunity employer and is committed to increasing the diversity of its faculty. It welcomes nominations of and applications from women and members of minority groups, as well as others who would bring additional dimensions to the university's research and teaching missions.
Process Engineer - Manufacturing

Company Description
Saint-Gobain is a global company headquartered in Paris with over 200,000 employees worldwide making a wide variety of products. The Gypsum division is branded as CertainTeed in America. We have over 60 plants making 25% of the dry wall used in the world. Each year we hire 100's of recent college graduates to work at our sites.

POSITION SUMMARY
Roxboro is CertainTeed's newest, fastest, and most high profile Gypsum plant. We are looking for a process engineer to join our team. There will be significant opportunity for advancement in this dynamic, fast moving plant. The applicant must be friendly, strong-willed, and have the drive to achieve results through a logical and systematic approach, as well as through persuasion. We are looking for a person who enjoys working with and through people. The job requires actively influencing and motivating a variety of people in changing situations. People skills and the ability to work in an unstructured environment are highly important to the job.

ESSENTIAL DUTIES
• Ensure we meet our annual cost savings.
• Sets ambitious goals and reaches them efficiently (effectively, without involving extensive resources)
• Ensure safe working conditions are designed and standardized into any changes in working practice.
• Introduce process control parameters and facilitate the operators to carry out on an ongoing basis.
• Train plant staff as required for the improvement of the plant performance.
• Displays great creativity in finding new solutions and having them tried out, assessed and deployed.
• Analyzes reactive operating problems, develops solutions, and implements corrective actions.
• Organizes and initiates trials to evaluate equipment, process and raw material improvement opportunities.
• Analyzes process variations; develops solutions and implements corrective that reduce variation
• Determine equipment performance specifications and established baselines
• Participate and/or may lead a continuous improvement activities

OTHER DUTIES AND RESPONSIBILITIES
• Performs other related duties and responsibilities as needed and / or requested by management.
• May consult with and/or assist other CertainTeed Gypsum North American plants on issues.

MINIMUM KNOWLEDGE AND SKILLS REQUIRED
• Bachelor’s Degree in chemical engineering or similar discipline.
• Flexible, open-minded team player with excellent written and verbal communication skills.
• Excellent interpersonal and problem solving capabilities to work effectively in team environments.
• Willing and capable to work on a wide range of projects in both corporate and manufacturing environments.
• Ability to specify and size process equipment; develop control logic.
• Complete material and energy balances, develop process alternatives
• Proficient in Microsoft Office Suite.

PREFERRED OR DESIRED QUALIFICATIONS
• Experience in gypsum chemistry and manufacturing process.
• Experience leading focused improvement (FI) or TPM projects.
• Experience doing DOE, FMEA, ANOVA, Gauge R&R
• Knowledge and use of SPC tools including use of Mini Tabs
• Previous AutoCAD experience.

**FISCAL RESPONSIBILITY**
• Responsible for capital project budget from planning to execution.
• Prepares capital expenditures and provides technical and budgetary input for the purpose of planning and scheduling projects.

**SUPERVISORY RESPONSIBILITY**
None

**WORKING CONDITIONS**
Works in a manufacturing plant environment with limited HVAC, concrete floors, and exposure to industrial noise, dust, chemicals and temperature changes. Normal plant operation is 24 hours, 7 days a week and work hours may vary depending on business needs. May on occasion require long hours, and weekend and holiday work. May require travel by air and rental cars.

**PHYSICAL DEMANDS**
Must be able to spend a significant amount of time on plant floor. Job includes tasks that require walking, bending, twisting, gripping, stair and ladder climbing, entering confined spaces, navigating rough terrain and occasional lifting of up to 75 lbs. Job may require long periods of sitting, walking, standing, working on a computer or engaging in telephone conversation. Must be capable of wearing personal protective equipment necessary to comply with government and company safety standards whenever engineered methods of reducing hazards or physical requirements cannot be reasonably accommodated.

EOE M/F/D/V