

# Alumni News



*Celebrating 50 years of Service*

## *TW Fraser Russell* SYMPOSIUM

August 24, 2009  
John M. Clayton Hall

# *Celebrate*

50 Years of Service  
and Accomplishments

[www.che.udel.edu/twfr.html](http://www.che.udel.edu/twfr.html)

A special endowment to support undergraduate

*Continuing Our  
Tradition of  
Excellence*

research has been established to honor TW Fraser Russell's extraordinary service. See inside for more

on the T.W. FRASER RUSSELL ENDOWMENT for undergrad enrichment.

## AICHE DELAWARE ALUMNI RECEPTION

Monday, November 9, 2009

7-9 p.m.

Gaylord Opryland Hotel  
Nashville, TN



[www.aiche.org/annual](http://www.aiche.org/annual)

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2008-09

## LETTER FROM THE CHAIRMAN



Norman Wagner

Universities are among humanities greatest hopes charged with creating a better world. Indeed, Chemical Engineering at UD has a responsibility to respond to challenges such as the energy, health and environmental crises facing all of us. Energy is an everyday topic in Colburn laboratory, whether in discussions over lunch by faculty and students, in the classroom in new courses for both undergraduates and graduate students, or in the laboratories of CCST and the new *UD Energy Institute* (interim director Prof. **Jingguang Chen**), whose headquarters are near completion on the 1st floor of Colburn lab. It is also a topic at solar energy companies that are developing technology licensed from UD faculty (such as Prof. **T.W. Fraser Russell's** work on flexible solar cells) and in conjunction with the world renowned *UD Institute for Energy Conversion*, which has been at the forefront of solar energy research for over three decades.

The faculty are responding to the grand challenge of energy supply and efficiency with many new and novel ideas from nanostructured materials for batteries (Prof. **Thomas Epps III**, who was just awarded the prestigious *Presidential Early Career Award for Scientists and Engineers*) to new catalysts to enhance jet fuel combustion (Prof. **Mark Barteau**). We are especially pleased to welcome the new *Energy Frontier Research Center* on the development of advanced catalysts for bio-fuels, as a new five year 17.5M\$ research effort funded by the *Department of Energy*! This center, to be lead by Prof. **Dion Vlachos**, current director of the *Center for Catalytic Science and Technology* (CCST), involves many CCST faculty as well as some of the best scientists and engineers from other universities. More about this exciting research program follows in the bulletin.

Another critical area is human health and the Department has developed a very strong program in biochemical engineering with emphasis on metabolic and protein engineering. Prof. **Kelvin Lee**, who works on Alzheimer's disease, is the new director of the *Delaware Biotechnology Institute*. We are pleased to announce the hiring of Dr. **David Colby**, who will formally join us in the summer of 2010 after completing his postdoctoral studies in the laboratories of *Nobel laureate Stanley Prusiner*. We can all hope for speedy success for David as he studies the biochemical mechanisms of diseases such as Alzheimer's and Huntington's.

This has been a very productive year for the Department and we are very proud of the 50 BChE, 9 MChE, and 19 PhD's awarded this past year. You will recognize the "Delaware Tradition of Excellence" in the research topics of the highly talented 2009 BChE graduates who pursued senior research and degrees

with distinction that are highlighted herein. Such innovative undergraduate education at Delaware is driven and enabled largely by excellence in graduate research. The numerous national and local awards for research and teaching documented in this bulletin attest to the culture of research excellence and success in melding this success with excellence in teaching. Of the many examples, I must highlight Prof. **Abraham (Bramie) Lenhoff**, who received three major (!) awards this year alone: two from the American Chemical Society for research and one from the College of Engineering for Excellence in Teaching. Undergraduates mentored by Bramie perform cutting edge research as well as develop new experiments on bioseparations, which are now part of senior lab. Undergraduate research is a hallmark of our program that involves nearly all of the faculty as well as many freshmen, sophomores, juniors as well as 57% of the graduating ChE seniors. We are also home to a *National Science Foundation funded Research Experience for Undergraduates* (NSF-REU) that sponsors students from other institutions doing summer research with our faculty.

In closing, let me note that this year's bulletin focuses on undergraduate education and research as well as the retirement of the Professor **T.W. Fraser Russell** – facets that are intimately intertwined at UD. Fraser's impact on this Department and the profession cannot possibly be captured in this short introduction. His national impact on the field was recognized this past June by the *American Society for Engineering Education* (ASEE) with the *Lifetime Achievement in Chemical Engineering Pedagogy Award*! We will honor this lifetime of dedicated achievement at the *Russell Symposium* on August 24<sup>th</sup> and I hope to see many of you there. We have been truly blessed to have Fraser as an educator, author, scholar, advisor, chairperson, administrator, engineer, consultant, mentor, gentleman and friend to over a thousand students, visitors and faculty that have passed through Colburn lab during the past 45 years. Although Fraser will formally retire, we will continue to engage him as he takes on his new responsibilities as the *Allan P. Colburn Emeritus Professor of Chemical Engineering*! We are all looking forward to his continued advice, guidance, service, and friendship. To honor this extraordinary service, we have established a special endowment to support undergraduate research, which I hope you will consider supporting.

Best wishes to you and your families for the upcoming year,

Norman Wagner

*P.S. We, the entire family of Colburn laboratory, sincerely thank you for your support in any and every way you provide it! We are also always welcoming other means of alumni engagement- feel free to make suggestions.*

## ALUMNI COORDINATOR MESSAGE



Jon Olson

My comments this year cover several seemingly disjointed topics. These are alumni awards, alumni seminars, alumni financial support, the 2009 class, job placements, reunions, and Jack Weikart's contributions.

### ALUMNI AWARDS

There are four UD alumni who have earned recognition of particular distinction: **Rakesh Jain, Bruce C. Robertson, E. Alan Uebler**, and **Robert D. Fleck**. A description of their achievements follows:



**Rakesh Jain**, M74, PhD76, was elected in April 2009 into the National Academy of Sciences. Rakesh is the Andrew Werk Cook Professor of Radiation Oncology and Director of the Edwin L. Steele Laboratory for Tumor Biology at the Harvard Division of Medical Sciences and is affiliated with the Harvard-MIT Division of Health Sciences and Technology and the Massachusetts General Hospital.

**Rakesh Jain** was admitted to the Institute of Medicine in 2003 and to the National Academy of Engineers in 2004. Rakesh is only the ninth individual to be elected to all three honor societies, IOM, NAE and NAS.

The NAS announcement simplified the scope of his work to tumor biology, drug delivery, in vivo imaging and bioengineering. He is credited for changing the understanding of how molecularly targeted therapeutics work in tumors and then how this understanding improves cancer patient care. His Steele Lab web site states this as:

"The overall goal of our research is to understand the role of the tumor microenvironment, including the tumor vasculature, in tumor growth and response to therapy, to develop novel strategies to manipulate the tumor microenvironment, and to translate these strategies into improved cancer detection, prevention and treatment in humans."



UD President Patrick Harker (center) presents presidential citations to (from left) the wife and sons of Col. Salman Nodjoman; Wayne Westerman; Deborah Brenner; Bruce Robertson; Chip Eveland; and the parents of Traci Hill Hulse. Photo by Kathy Atkinson

On October 3, 2008, **Bruce C. Robertson**, PhD88, was given the UD Presidential Citation for Outstanding Achievement. The award is to honor graduates of the past 20 years who exhibit great promise in their professional careers and also to recognize their continued engagement with the University. Bruce certainly meets these criteria: he "is the managing director of H.I.G. Ventures, a venture capital fund invested in four life science companies, and he serves on board of directors of all four. ...Robertson has quickly established himself as a leader in identifying investment opportunities in the life sciences." At Delaware he was a Laird Fellow and remains active with this group as historian. He was a major participant at the 30<sup>th</sup> Reunion of the Laird Fellows. He is treasurer of the University of Delaware Research Foundation where he also assists with technology transfer of UD's intellectual property.

Bruce received the College of Engineering Outstanding Alumni Award in 2003.



On May 8, 2009, **E. Alan Uebler**, M64, PhD66, was given the Outstanding Alumni Award by the UD Engineering Alumni Association. Alan did his PhD research with Art Metzner, who encouraged Alan to grind through the difficult task of earning his law degree at Maryland while working at DuPont. Alan quickly became a successful intellectual property attorney, first as an in-house attorney at DuPont and W.L. Gore and then in private practice. His award is to recognize his service to the Department: he has been an adjunct faculty member since 1978 teaching CHEG 595, the patent and intellectual property course. This course has been the gateway for at least 50 students to careers in law. The students who did not become lawyers are much better able to protect and utilize their inventive creativity.



University of Delaware President Patrick Harker, center, welcomes new inductees to the Alumni Wall of Fame. They are, from left, David Plastino, Robert Fleck, Francis "Skip" Gardiner and Spangler "Buzz" Klopp. Photo by Kathy Atkinson

Also on May 8, 2009, **Robert D. Fleck**, B69, was inducted to the UD Wall of Fame, which honors graduates who have achieved unique success. Bob's success comes from his passion and dedication to old books. He founded Oak Knoll Books and Oak Knoll Press, a book store and publishing house of antiquarian books, both located in New Castle, DE. He is the past president of the Antiquarian Booksellers Association of America and the second American to be president of the International League of Antiquarian Booksellers. He serves on the Board of Directors of the UD Library Association. Bob is recognized worldwide as an expert on the history of books and the art of book making.

While an undergraduate, Bob did research with Stan Sandler and upon graduation worked awhile for Sun in Marcus Hook. His passion for books got him to change his occupation. At the induction ceremony he noted that he didn't stay a chemical engineer very long but has made use of the analytical problem solving process he learned in engineering throughout his life.

## ALUMNI SEMINARS

Two alumni appeared in the Department's seminar series. It is inspirational to the Delaware community to have alumni give seminars, and it is always a pleasure to see successful graduates. Seminars also provide strong links to the larger chemical engineering community, and hence only one or two alumni per year are invited to present.

**Sean Palecek**, B93, is now an associate professor at the University of Wisconsin Madison. Sean did his graduate work at MIT and then a post doc appointment at Chicago. His seminar was titled, "Controlling Human Embryonic Stem Cell Differentiation".

While the popular press makes one think the therapeutic use of embryonic stem cells is just around the corner, it is not. The goal of Sean's research is to overcome some significant problems: stem cells cannot be grown at a large scale, when grown stem cells tend to remain undifferentiated, and stem cell differentiation cannot be reliably controlled to desired products. The solution to these issues is to find how stem cells signal. These include: soluble chemical triggers, surface excitation of sensors, and cell-cell interactions. **Sean's** research shows promising pathways in all of these areas.

**Thomas F. Degnan**, PhD76, is the Director of the New Leads and Breakthrough Technologies Laboratory at the ExxonMobil Research and Engineering Center in Clinton, NJ. In 2007 his group won an ACS "Heros of Chemistry" award for their development of the PxMax process which converts toluene to 90% paraxylene through a very clever catalytic system. Hence his group, "New Leads ..." is named aptly.

**Tom's** seminar was titled, "Catalytic Technologies to Meet the World's Needs". Tom reviewed the projected energy needs for the world thru 2050 and then stressed that these will be difficult to meet unless there are some spectacular new catalytic processes to convert unused or underused fuel potentials into usable products. We are also proud to announce that Tom has been appointed to the ChE Advisory Council.

## ALUMNI FINANCIAL SUPPORT

When **Norm Wagner** became department chair, it quickly became apparent that funding for graduate students would be more difficult, particularly in a recession. It is the goal of this and other departments to postpone using research grants to fund graduate students until after the first year. The practical reasons for this are obvious: in the first year graduate students mainly focus on course work and administrative requirements, they need time to review the research choices, and generally do not get very far with their research initially (the choices are made here during the first semester).

The 2009 entering graduate class was near record in size, yet Norm found that the financial cookie jar for graduate student support was nearly empty, and the immediate goal was to fund the first year students through most of the first term. To reach even this target required additional funds. A potential solution was to ask the chemical engineering alumni for help, and while this certainly works at other institutions, it takes time to get this revenue stream going.

**Tom Degnan** offered to send a request letter under Norm's signature to all the UD alums at ExxonMobil. The letter emphasized the three for one match ExxonMobil makes for educational contributions. Since the Delaware list of UD grads at ExxonMobil was out of date, **Rebekah Cooper**, B01, **Brenda Raich**, PhD96, and **Prasanna Joshi**, PhD98, volunteered to identify all the alum each knew and then ask those to identify others. This chain reached about 90 individuals. The appeal was a success and established a method for making contacts in other companies.

Air Products has hired a substantial number of UD chemical engineers, and their ongoing support for graduate education and the help from **Keith Welp**, PhD99, is greatly appreciated. Additionally this year Air Products created a competitive \$18K fellowship/internship that was awarded to **Elizabeth D'Addio**, a third year graduate student working with **Jochen Lauderbach**. The award contributes \$16K to the base scholarship and \$2K above that. It also gives potential internships up to nine months at Air Products expense.

**Annette Orella**, B83, has been the Merck contact to chemical engineering for several years, and through her efforts many UD grads are Merck employees. Merck has also been generous in supporting the department. In response to Norm's request, she persuaded three groups at Merck to pool resources for a total of \$30K. Merck also has supported the AIChE chapter, the RISE program, a merit award for a first-year student, and a scholarship program for sophomores and juniors including an internship. We are grateful for these and other industrial gifts totaling more than \$120,000 to support our graduate program.

## THE 2009 CLASS

The 2009 senior class was spectacular in many ways: outstanding scholars, meaningful participation in campus activities, unusual cohesiveness and a "can do" attitude. **Jeff Bosco** won a Goldwater as a junior, **Zack Ulissi** was a key member of the UD applied math team that placed in the top 1% nationwide, **Lindsay Schmiedel**, a top student in her class, also was on the varsity cross country team. The group that went to Australia in the winter term worked well together and had a wonderful time. There Martha King wowed the group at the farewell dinner by singing opera. Faculty lunchtime conversations consistently complemented this class.

## PLACEMENTS

In this very tight job market the statistics for the 2009 class are surprisingly good.

Of the 48 students in the class, 11 are going to graduate school with 7 of these continuing in chemical engineering. Twenty four of the remaining had secured employment by graduation, and 13 are "looking". These numbers are about the same as good years in the recent past. W.L. Gore and the Aberdeen Proving Ground hired four, three went to Merck, two to Air Products and the remainder were singletons. Years ago a substantial fraction of each class went to the "local French chemical company," DuPont, but this year none did. Graduate student hiring was soft, and students considering academic careers now are expected to have additional post doc experience.

## REUNIONS AND CLASS NOTES

**President Harker** has brought active reunions to Delaware with emphasis on the 5<sup>th</sup>, 15<sup>th</sup>, 25<sup>th</sup> and 50<sup>th</sup> reunion years. Next year the department will make special effort to contact these class members, and then find an appropriate way to distribute the comments. Facebook appears to work with the younger alum, but for the 50<sup>th</sup> snail mail is suggested. We will need your cooperation to make this experiment work.

## WEIKART'S CONTRIBUTIONS TO ALUMNI RELATIONS

For years **Jack Weikart** was the department's alumni coordinator, and after retiring, has been a unique clipping service for these notes. For example about two years ago he read a News Journal article on Robert Fleck's Oak Knoll book store and publishing operation which in passing mentioned that Bob was a UD chemical engineering graduate. Jack sent me the article with the note, "Did you know this fellow?" To be honest, I didn't remember him but thought his career was fascinating. So did those who did know him and promoted his award.

In a letter written to the Development Office, Jack outlined how he did alum relations. He was very careful to follow up any lead on lost alum, and he wrote a personal note to all that made a contribution to the department. He did this with little acknowledgment of his contributions and efforts.

Thank you, Jack!

**You are a very important part of our history and our future. Jon Olson, our Alumni Coordinator, will be glad to answer any questions or concerns you may have. Please feel free to contact him at 302-831-8472, or send an e-mail to**

[alumni-news@che.udel.edu](mailto:alumni-news@che.udel.edu).

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**Chuck Joanedis**, B50, now lives with his wife, Svlvia, in Jenner's Pond, a retirement community nearby in Pennsylvania. Chuck is greatly respected by the Department for his successful efforts in establishing and funding need based scholarships for undergraduates. At 81 he continues his service efforts with the United Way (local chairman) and UD as a board member of the Engineering Alumni Association, and on the Engineering College Advisory Council.

**Marty Wendel**, M54, PhD56: In the middle of May, a charming and distinguished guy walked into my office with **George Whitmyre** and asked, "Do you know who I am?"

Response: "Not yet." (I was thinking about something else, and have always been slow on the social uptake.)

Cutting to the chase: "I'm **Marty Wendel!**" (I knew **Marty** in 1960-1962 when I was working at DuPont. How could I have missed it? He had only the usual changes of being older.) He was at Colburn to see his grandson, senior **Zack Wendel**. I asked **Zack** for a visit report:

"Grandad Marty and I had been trying to get together to tour the UD campus for a while, and finally this semester we found a date for a visit. Since he graduated, much has changed about the University, so the labs he did his PhD research in are long gone. He did remember having classes in Brown Lab.

There were a few names he recognized at Colburn, **Dr. Russell** and **Dr. Olson** to name a couple. Ironically, he also knew **George Whitmyre**, not from Chemical Engineering, but from a band they had played in years back. My Grandad commented a lot on how much the campus had changed over the last 50+ years. He actually had his graduation on the steps of Memorial Hall on the Green!"

**Robert Baillie**, B59, spent his entire professional career with Sun Oil. He started out in the Marcus Hook Refinery, moved multiple times including a tour in the Canadian tar sands. He finished his career as the director of product research. In 1989 he took advantage of the opportunity for early retirement and "hasn't done professional work since." He and Barbara, AS60, are one of the many Double Dels in the class. When asked why he moved to Durango, CO (and fully expecting an answer about the scenery), he answered: "To be near our daughter in Salt Lake City. Sure, we're not really close to Salt Lake here, but we're a lot closer than being on the east coast!" He also said that Barbara has horses and enjoys riding.

**Carl Borrer**, B59, retired in Idaho Falls, ID after spending most of his career in the Snake River Plain working at the Navel Reactor Facility as manager of chemistry section. Admiral Rickover started this prototype and operator training unit with the S1W reactor.

This reactor design was used in submarines, and the purpose of the facility was to develop safe operating procedures, to define the limits of operation, and to train operators. The second facility, the A1W, was two coupled reactors developed to power Enterprise class navel aircraft carriers. The final unit, the S5G was an advanced design of a submarine reactor. Carl got to the far west via his ROTC commission that put him in the Chemical Corp and sent him to Dugway Proving Grounds. Carl learned to ski while in the Army, well enough that for ten years he was a Ski Patrol leader in Jackson Hole. His is still an active skier but no longer as a patrol member. He and Juanita, ED62 have three grown children who remained in the west.

**Robert W. Gore**, B59: His classmates agree that he is the outstanding member of the class. A brief history follows: Bob was born in 1937 in Utah and moved to Delaware in 1950. He decided to become a chemical engineer and chose Delaware on the basis of its outstanding reputation. At Delaware he added to his work load by playing in the marching band and carrying 21 credits one term. As a sophomore in 1957 he discovered a way to use Teflon tape to insulate wires and cables, an invention particularly important to the emerging computer industry. He continued his engineering education with a MS (1962) and a PhD (1963) from Minnesota. Afterwards he returned to W.L. Gore where in 1969 he invented a way to make expanded PTFE, the invention that led to many other products including Gore-Tex. These inventions required considerable fortitude, for it was 15 years before Gore-Tex became profitable.

Bob was president of the company from 1976 to 2000, and Chairman of the Board of Directors 1986-2006. The company has grown to \$1.8 billion sales, 7000 associates, and 40 locations worldwide. The company has been ranked one (~15<sup>th</sup>) of the 100 best companies to work for by Fortune since these listings began.

Bob won numerous awards: election to the National Academy of Engineers, the Perkins Medal from the Society of the Chemical Industry, and induction into the Inventor's Hall of Fame.

His service to Delaware includes membership to the department's Advisory Council, director of the UD Research Foundation, and membership on the Board of Trustees.

His ongoing generosity to Delaware includes endowing the Gore Chair of Engineering, and, along with his mother, Vieve, and his wife, Sally, funding Gore Hall.

**Jim Lawson**, B59, was the oldest at the Engineering reception on reunion weekend. He started out in the 1958 class, but some problems with strength of materials postponed his graduation. He began his career in electronic devices after graduation by working for Bell Labs in Allentown, PA, one of the first "fabs" for transistors. He moved to the west coast where in the last 20 years he has worked for five organizations. Since 2004 he has

been sales manager for Advanced Packing, a company that makes packaging for electronics.

Jim is an extrovert, obviously suited for sales, and enjoys it. For fun he is a docent for the Ronald Reagan library; a form of teaching he enjoys. His memory of UD chemical engineering is that it was a tough grind. He is particularly respectful of **Bob Gore**, who earned top grades seemingly without great effort and who also had time for an active social life.

**Jim Leathrum**, B59, had a full career after UD. He earned an MA62 and then a PhD63 from Princeton, spent two years in the Army, then two more years (1965-67) with Union Carbide, and returned to UD in the Statistics and Computer Science Department. In 1980 he went to Clemson in the Electrical and Computer Engineering Department from which he retired in 2000 as professor emeritus. While at Clemson his research included a major effort in developing the software for controlling the gun turret position of the Abrams tank. He said this was a non trivial problem in tank to tank warfare since the tanks travel at about 45 mph and can change direction and speed very rapidly. A quote from FAS Military Analysis Network states: "The Abrams Tank System synchronizes its high tempo, distributed maneuver via its digitized situational awareness and the fusion of onboard and remote battlefield sensors." Got that?

After Clemson **Jim** became a startup owner in Oakleaf Systems, a software design consultancy. There he developed a system for auditing the billing of truck freight. While the billing principles seem simple, it is difficult to get the needed throughput without carefully considered software and recently developed identification devices.

Jim and Barbara, AS60 (Nursing), have three sons, James, Jr, a EECPE faculty member at Old Dominion; Tom, a math professor at Jacksonville State; and Roger, a 36 year old adult with Down Syndrome, who lives with them and has adjusted well to the community. Barbara has become deeply involved in advocacy programs for persons with disabilities in SC. She has most recently served on the Board of Directors of Protection and Advocacy for Person with Disabilities.

**Jim White**, M62, PhD65, was awarded the ACS Rubber Division Charles Goodyear Medal for his lifetime research, which gave "fundamental understanding of rheology and mathematical modeling of unfilled and filled rubbers and simulations of flow in batch and continuous mixing machines." He currently is working full time as the Morton professor of polymer engineering. He has been a prolific researcher with 500 publications and eight books, including Rubber Processing, a highly regarded reference book in the field.

Jim did his graduate work with Art Metzner resulting in White-Metzner rheological model, a significant advance in

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the fundamental representation of viscoelastic flows. He then spent four years with U.S. Rubber where he found the tire manufacturing division barely spoke to the research department. Jim expressed this in his usual blunt way: "I learned nothing about industrial problems from tire companies. They wouldn't speak about that. I learned everything from machinery companies."

Jim then spent 16 years at U. Tennessee where he built the school's MS and PhD programs in polymer engineering. In 1983 he went to Akron and started the Polymer Engineering Department, serving as chair and center director. He turned his research focus to rubber processing and compounding. He founded and edited the journal, "International Polymer Processing" with the aim of increasing the flow of information between industry and academe.

While Jim was at Delaware he was very active in the civil rights movement, enough so to incur the wrath of UD president John Perkins. Jim was invited to give a seminar at Penn State, and while there found a post card with a picture of the Penn State's administration building. He sent the card unsigned to **Perkins** with the note, "Wish you were here!" **Jim's** career has never lacked for conflict.

**T. W. Fraser Russell**, PhD64, is highlighted in a UDaily article entitled "Getting a new knee? Exercise after surgery is critical to recovery" dated February 4, 2009. A portion of the article by Tracy Bryant reads:



**T. W. Fraser Russell**, the Allan P. Colburn Professor of Chemical Engineering at the University of Delaware and chief engineer at UD's Institute of Energy Conversion, participated in the study in 2003 at the time of his first knee replacement.

In October 2008, he had his other knee replaced and says he sought out and again benefited from the quadriceps strength training program at the University's Physical Therapy Clinic, which is located on the ground floor of McKinly Laboratory.

"The stretching exercises are painful, but it's absolutely critical to do the physical therapy in the clinic and then do a set of exercises at home," Russell says.

His most recent surgery was on Oct. 13, and by Dec. 13, he says, he was well on the way to recovery.

"My knee strength was already up to 1,000 Newtons, which is normal, over the holidays," he says. "I'm an engineer, so I'm interested in that measure," he explains.

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Today, he can walk in a nearby park for a couple of hours at a time and go up and down stairs with ease.

"My knee is essentially restored to normal," Russell says. "I'm really very pleased with what they do at the clinic," he notes. "I'm gratefully in favor of and appreciate what they do."

The announcement for **Steven Kessler's**, B71, elevation to partner read in part:

"Dempsey Partners LLC, a professional services firm providing catastrophic insurance claim recovery assistance and valuation and risk consulting services to Fortune 500 corporations, announced that six members of its leadership team (including Steven Kessler) have been admitted to the partnership.

**Steven M. Kessler** was named partner in charge of the firm's Houston office and MegaLoss Disaster Recovery practice. He is also the national coordinator of the firm's property damage claims consulting practice. Kessler, a 30-year industry veteran, provides technical expertise in the areas of replacement cost quantification, large loss claims strategy, and project management. Formerly the Global Manager of Claims for a major property insurer, Kessler holds a BS degree in Chemical Engineering from The University of Delaware."

**Rick Bockrath**, B75, M76, is now the Director of Process Development for the Applied Biosciences platform of DuPont. In this role he administers the world wide operation of bioscience pilot plants in the intermediate step between laboratory invention and potential commercialization. These processes are principally in biofuels and bio specialty products. He said two of the biofuel pilot plants are in Tennessee and England, while the others are with toll operators he cannot discuss. There also is a laboratory in Canada.

Rick said he has spent much of his career in process development, and his current responsibilities "are a ball". Last year the applied bioscience group developed a large number of potential hits, and DuPont then needed to establish appropriate pilot plant facilities.

Rick is a guest lecturer in Dave Short's senior design course, CHEG 432, where he discusses risk management. At home he and Susan Flint, a Georgia Tech chemical engineer and UD MBA 1996 graduate, have two college-age children, John and William.

**Michael Mackay**, B79, has been named Distinguished Professor of Materials Science and Engineering at UD. Michael earned a bachelor's degree with distinction in chemical engineering at the University of Delaware in 1979, and joined the UD faculty in 2008. He was a member of the faculty at Michigan State University from 2001 to 2008 and previously held appointments at Stevens Institute of Technology and the University of

Queensland in Australia. Mackay's current research focuses on polymer-based solar cells, with an emphasis on controlling and measuring their structure and nanoscale phenomena within polymer nanocomposites to create the next generation of materials. His work has been supported by the National Science Foundation, the Department of Energy, the National Institute of Standards and Technology, several national laboratories, and industry. He earned his Ph.D. at the University of Illinois-Urbana Champaign. The distinguished professorship recognizes deserving senior members of the UD faculty.

**Steven Bloom**, B84 took a different path from UD chemical engineering to his current position, a team leader in the US Nuclear Regulatory Commission. This started in 1982 when he was accepted into the Nuclear Officer Candidate Program, a very selective group given priority to develop highly competent officers. For this he was paid as an enlisted man while at UD. Upon graduation he went to Officer Candidate School followed by a series of nuclear propulsion schools. He then served on two subs; on the second he made a four-month deployment, obviously highly stressful. He mustered out of the active navy in 1989, married his wife, Darlene, and stayed in the reserves until January 2008.

After the Navy he began work for the NRC, initially doing shift work as an operations officer, then in various responsibilities as a project manager, senior project manager, and team member. He is now the team leader in the Planning and Scheduling division. This group is responsible for the timely review of the license applications of some 20 new reactors.

Steve and Darlene have two children, Stacey (1997) and Matthew (2000). Darlene works at the local hospital as an occupational therapist.

**Joy Bramble**, B84, earned a MS and PhD at Penn and then joined Merck where she is now an Executive Director. In responding to a request for a newsletter tidbit, she replied: "Sorry I have not responded sooner, but I am in the middle of working on the merger between Merck and Schering Plough and that's been taking priority right now.

All I can say is that while at Merck, I have had the pleasure to work on developing and manufacturing new vaccines including measles, mumps, rubella, varicella, rotavirus, zoster, and hepatitis A which has been very rewarding. Also, I have had the honor to work with some great scientists, physicians and world class virologists including Maurice Hilleman PhD, Stan Music MD, and David Nalin MD who have dedicated their lives to saving children from deadly diseases. Finally, I have had wonderful opportunities to travel around the world and to interact with many diverse cultures and people."

**Mitchel Cohn**, B84, wrote a short note describing the plight of the chemical industry in this recession: After graduating Delaware, I received an MS and PhD in Chemical Engineering from the University of Illinois. I ran back to New Jersey as fast as I could, where I worked 3 jobs for 2 companies (did you guess it, I returned to the company that laid me off). Then to everyone's surprise, including my own, I went back to the Midwest to work in West Lafayette, Indiana for Great Lakes Chemical Corporation. Even more surprising was that I was spending much of my time in El Dorado, Arkansas running a pilot plant for the Fluorine R&D. That was probably the most fun I have ever had. Then, Great Lakes merged with Crompton in 2005 and became Chemtura. Again, I ran back to the east coast, where I now reside in West Haven, CT. My current position is the Sr. Technology Manager of the Process Development Group in R&D. I have been with the company for about 10 years, had 9 bosses (I think), and in March 09 Chemtura filed for bankruptcy.

**Michael Dalsey**, B84, described his career succinctly: My career in a nutshell: I worked as an engineer up until 2000, for Campbell Soup Company, Fluor Daniel and Lockwood Greene respectively. I changed careers in 2000, jumped on the IT bandwagon and have been working as a software developer since then. I am currently employed by Advance Auto Parts in Roanoke, VA.

**Sherry (Burfeind) Del Giorno**, B84 describes her path to "homemaker" as: After graduation I married, **Mark Del Giorno**, a UD EE grad. We moved to Bethlehem, PA, where I worked for Air Products in their career development program. We then moved to Baltimore, MD where I had my first daughter, Jackie, in 1986. I began teaching several math classes at a local community college. Our second daughter, Laura, arrived in 1987 and our third daughter, Allison, in 1991. At this point I became a full time mom, and my husband started a business with three other partners, called Robotic Systems Technology. It is now General Dynamics Robotic Systems.

The girls and his business have occupied our lives for the past 18 years. Jackie is at Duke getting her doctorate in physical therapy. Laura just graduated from U. Richmond and will join Teach For America in Baltimore City teaching high school Chemistry and Math. Allison graduated this June and will attend Georgia Tech and plans to major in biomedical engineering. We may finally have an engineer!

Our lives have been very full since graduating from Delaware. We are getting ready to enter a new chapter as all our girls are spreading their wings and preparing to fly off.

**Timothy Griffin**, B84, earned a PhD at Yale in 1989 and then became an "ex pat" living in Germany and Switzerland. In preparation for the UD Reunion he wrote that he is now a Professor of Mechanical Engineering at University of Applied

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Sciences in Northwestern Switzerland. He added: "I worked prior to this job for the company ABB (in Heidelberg and in Switzerland) and for Alstom. One main topic was combustion in gas turbines, I also did some work on gasification processes and in gas turbine power concepts with CO2 removal and storage. Although I live in Switzerland I still have good contacts to Delaware, visiting most years at least once." After the UD reunion he attended a conference in Florida on gas turbines.

**Colleen (Kelly) Hanna**, B84, joined Air Products in their career development program after graduation. She also married **Charles Hanna**, a UD 1984 EE. Their double careers required some complex moves, particularly with the arrival of their children, Kelly, Brandon, and Bridget. In 1996 Colleen left Air Products, for to continue would require a second nanny. Kaylynn and Jacquelynn came along subsequently. Kelly graduated from St. Josephs in 2008, and Brandon just finished his first year there. At the Engineering reception Colleen said she thought Jackie might become an engineer, and if so, she will be the only one.

**Charles** and **Colleen** live in Chadds Ford, PA near the Exelon office where he is sales manager. With an email address of "channagang7", you know the family is filled with mirth and wit.

**Andy Lewis**, B84, was the subject of an article in the Cape Gazette on his candidacy for the local school board (which he won). The article traces Andy's career: a Masters at Idaho, doctorate work at U. Maine, followed by four years in California working on air pollution. In 1994 he returned to Lewis, DE and established Lewis Research, a consulting firm for the plastics industry. He is married to Carrie F. Lewis and they have two children, nine and twelve. Andy has always been full of life, and he brings this vigor to his responsibilities on the school board.

**James Scheckser**, B84, described his career as follows (edited): In 1984 I started working with Rogers Corporation as a Product Engineer, doing product development and process improvement on a specialty papermaking operation. Shortly thereafter, I decided to pursue a business career and began an MBA program at U Conn. Next I joined a firm that did precious metal alloy formulations and polymer molding for medical and electronic applications. I moved through marketing, sales, sales management and ultimately ran a start-up division making ultrasonic process equipment.

I then joined General Eastern, where I ran an instrumentation and controls business specializing in humidity measurement. I sold General Eastern to Spirent, PLC, a London based publically traded company. My group embarked on a series of acquisitions of instrumentation companies, which was a ton of fun. We sold this entire portfolio to General Electric in 2001. From 2001 until

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2005 I ran a telecommunications software and hardware division owned by Spirent.

In 2005, I moved over to the CEO Project, a business I own. We perform coaching for CEOs of medium sized companies and provide peer groups that allow them to work through their toughest issues in a case-study environment. While this is the smallest business I have run, I enjoy the materially reduced travel, the great intellectual stimulation and the wonderful people that are our clients.

My family of four lives in Potomac, Maryland where I am active on a number of non-profit boards dealing with youth education, coach soccer and help lead a Boy Scout Troop. My wife and I enjoy international travel (which is a lot more fun when it is not for business).

**Peter Kirlin's**, PhD87, selection as Senior Vice President of Photronics in August 2008 was announced in an August press release that read in part: Photronics, a worldwide leader in supplying innovative photomask-based imaging solutions for the global electronics and display industries, announced today that **Peter S. Kirlin**, Ph.D. has been named Senior Vice President - U.S. & Europe. In this newly created position, Kirlin has assumed responsibility for the mainstream mask business in both the U.S. and Europe. Additionally, he will support both Corporate Business Development and Strategic Planning.

Prior to joining Photronics, Dr. Kirlin, a 24-year veteran of the photomask and semiconductor industries, has held several senior leadership positions of increasing responsibilities: Vice President of Business Development at Entegris, Chairman and Chief Executive Officer of DuPont Photomasks, and Group Vice President of ATMI. Dr. Kirlin recently finished a term as Executive Chairman of the privately-held firm Akron, Inc.

**Bruce C. Robertson**, PhD88, was one of six UD alumni to receive the Presidential Citation for Outstanding Achievement. He was recognized for his professional and public service achievements at an awards ceremony held at the beginning of Homecoming weekend.

**Scott Stark**, PhD92, is one of the authors of "JBoss 4.0 – The Official Guide". Scott started out as a chemical engineer but while he was at Delaware, it became apparent that computers and programming were to be his passion, so he made the study of applying massively parallel computers to difficult chemical engineering problems the subject of his Ph.D. research. It has been all about distributed programming ever since. Scott currently serves as the chief technology officer of JBoss, Inc., an elite services company based out of Atlanta.

**Jennifer (Martin) McNay** B93 responded to a year-old request for information with a summary of her career since graduation: After graduation I worked for Proctor & Gamble for 2 years in Hunt Valley, MD. I then left P&G and went to grad school at Virginia and earned a MS(1997) and a PhD(2000). I then took a job at Regeneron Pharmaceuticals in Tarrytown NY in the Pre-clinical Manufacturing and Process Development group. I stayed in that group for over eight years, and ended up as Senior Director, Purification Process Development. During this time, my husband, Ewin, was at Yale, and had progressed from post-doc to tenure track faculty in the Med School (he has a Ph.D. in neuroscience, also from UVa). Our first son, Aidan Connor McNay, was also born in 2002.

We lived in Danbury, CT and I was making a 50 mile one-way commute down I-95 to New York. Ewan wanted to start his own lab and received an offer from SUNY Albany with a fantastic start-up package. So last summer, in search of both good careers and improved quality of life, we moved to Albany, NY. Regeneron has a manufacturing facility in Rensselaer, NY, which is just across the Hudson River from Albany. I transferred from Process Development to Process Sciences at the Rensselaer site. My new position involves receiving processes from what was my old group and helping ensure a smooth transfer into manufacturing. My group also performs validation studies in support of product licensure. Regeneron is a fantastic company, and I was really happy to be able to make the move without leaving Regeneron.

Our second son, Keiran Rory Liam McNay, was born last October, and we also built a house last year (the idea is to stay put for a good long while!). We moved in the week after Thanksgiving (Keiran was just 7 weeks old), and I've been back at work since early January. There are still a ton of unpacked boxes!

**Linda Broadbelt**, PhD94, will become the chair of Chemical and Biological Engineering at Northwestern on September 1. The announcement of this promotion outlined a very successful career.

**Linda** received her BS in chemical engineering from Ohio State in 1989 and her PhD in 1994 working with **Mike Klein** on the thermal stability of high performance polymers.

While here she was a Du Pont Teaching Fellow, a National Science Foundation Graduate Fellow, and a DuPont PhD Fellow. Her initial appointment at Northwestern was as the Donald and June Brewer Junior Professor (1994-1996). She rose rapidly to professor. Linda is a fellow of AAAS, won a Fullbright Distinguished Scholar Award and a NSF CAREER Award. She received a McCormick Excellence Award in 2006 at Northwestern and was the Ernest W. Thiele Lecturer at the University of Notre Dame and the Allan P. Colburn Lecturer at UD. She is associate editor for Energy and Fuels (2002-present), a journal that has experienced exceptional growth under her leadership. She is currently on the editorial boards of

IEC Research and Chemical Engineering Journal. She serves on numerous committees of the AIChE, served with the science study group of the Institute for Defense Analyses, and on the organizing committee for the 19<sup>th</sup> and the 21<sup>st</sup> International Symposium on Chemical Reaction Engineering.

She has mentored 34 PhD students, 23 of whom have graduated to date and taken leadership positions in industry and academia. (**Ned Haubein** B97 was one of these PhDs, and please see **Korina** B07 for a testimony on Linda's contribution to academic teaching.) Her research and teaching interests are in the areas of multiscale modeling, complex kinetics modeling, environmental catalysis, novel biochemical pathways, and polymerization/depolymerization kinetics.

Linda is married to **James Rekoske** PhD98 and they live in Glenview, Illinois.

**Linda Broadbelt** also received the 2008 Mentorship Excellence Award sponsored by the AIChE Women's Initiatives Committee. She was also named to the editorial board of Industrial & Engineering Chemistry Research and was appointed to both the executive board of the National Program Committee of AIChE and the advisory board for the Department of Chemical and Biomolecular Engineering of The Ohio State University.

**Jim Bushong**, B94 writes of his career: I am Chief Engineer of CarboUA Ltd ([www.carboua.com](http://www.carboua.com)); we are a technology company that manufactures and markets high-performance purification materials (mainly for very large scale food processing plants). We are a small company but with global reach, having achieved sales in 15+ countries and all 6 populated continents. I have travelled to all reaches of the globe many times over; it is a great and rewarding challenge to be in front of companies that are hundreds or even thousands of times bigger than ours. I perform our entire product and process development projects, so my field travel involves testing and implementation of the technology that I developed in "make or break" fashion. It is great pressure but suitable for a UD ChemE.

I am married for 9 years now, and we have a wonderful 5 year old son.

**Ben (Shih Ping) Chen**, B94, also earned a MS ChE (96), Texas A&M and MBA (02), U Texas Dallas. He then wrote very compactly: Worked for Formosa Plastics as Polymer Engineer (2yrs) and Solvay Engineered Polymers as Product Development Engineer (10 yrs) They were bought by Lyondell Basell.

I currently work for Lyondell Basell Advance Polyolefins. We make thermoplastic olefins resins for automotive applications (such as bumpers, instrument panels) and also for electronics and appliances. Many of the parts you see on cars use our resin (such as GM, Ford, Chrysler, Benz, BMW, Nissan, VW, Audi, Honda, etc.)

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I recently moved to China for an overseas assignment as Technical Manager for Asia Pacific. My assignment is for 3-4 years. One of my job responsibilities is to establish a technical center in Suzhou, China to serve Asia Pacific (Mainly China, Thailand, and India). So far this assignment has been very rewarding.

Here is my personal e-mail if anyone is interested in getting in touch with me. [benspchen@hotmail.com](mailto:benspchen@hotmail.com)

**Roseanne (Givler) Ford**, B84, went from UD to U. Penn where she earned her MS (85) and PhD(89). She then joined the faculty at UVa where she currently is Professor of Chemical Engineering and Associate VP for Research and Graduate Studies. She maintains an active research group working in four areas: biofilms, bioremediation, thermophiles and modeling of biological processes. In her role as VP for Research and Graduate Studies she promotes the financial support of research, coordinates the graduate programs, and resolves the regulation of graduate studies.

She is married to **Matthew Ford**, and they have two children, Stephen Luke (B91) and Logan Michael (B95).

**Richard Kim**, B94, earned his MD and MBA from the University of Alabama ('98). He is board certified in Internal Medicine and for the last three years has a private practice in Los Angeles California. Prior to opening his clinic he was an internal medicine specialist with Kaiser Permanente.

In suggesting that I contact alum through Facebook, **Pamela (Leung) Morrison**, B94, submitted this note: I have continued to work for Seagate Technology since my last update in 2003. Since then, I did participate in Eco-Seagate as I was scheduled to do at the time. In 2005, I was promoted into an Engineering Manager role in the HGA<sup>1</sup> organization of Seagate. My primary areas of responsibility were cleaning, ESD<sup>2</sup>, materials qualification & selection, airflows, and particle metrology. I was promoted again to Senior Manager (2008).

Seagate underwent major changes and reductions in force in 2009 (as I'm sure many companies have). I'm glad to say that I am still with Seagate, but am back to being an individual contributor in the cleaning & materials areas. My current role is as a Senior Staff Process Engineer in the HGA Process Development organization.

Personally, I have been married to **Dave Morrison** for 10 years now and have an 8 year old daughter named Abby. My life is spent mainly in the role of chauffeur and cheerleader these days as we head off to running races, horse shows, soccer games, and martial arts.

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**Pamela and Dave** live in Burnsville, MN. The picture shows Pam jumping off a platform at the beginning of a sky-dive.



<sup>1</sup> HGA = head gimbal assembly, the 3rd assembly step (of 5) in making a disc drive.

<sup>2</sup> ESD = electrostatic discharge. We have an entire program to eliminate zapping disk drives as we make them.

**Karen (Blackshaw) Pye**, B94 made an exception to her job title on the spreadsheet I sent to her. Her response is: First, I would like to update my name to **Karen (Blackshaw) Pye** and change my title to Family Management. Homemaker (although correct) seems a little too 1970s for me.

Here's my other update: Following graduation I worked at Hoffman LaRoche in Nutley, NJ for two years in the Leadership Development Program, then moved to Merck in West Point in Process Research Development for 5 years. I specialized in Sterile Filling of pharmaceuticals and vaccines and helped manage the startup of the Biological Pilot Plant.

Although I loved working at Merck, I made the difficult decision to stay home full-time when my daughter was 15 months old. I anticipate I will go back some day, but we now have four children (ages ranging from 2 to 9) and my vocation as a mother has been filling all my time. My project management skills are used often leading playgroups, Girl Scouts, and school fund raisers.

**Doug Robinson**, B94, now a financial advisor, reports: After graduation I worked for Ultrachem, Inc, a small synthetic oil manufacturer in Wilmington. In a group of 12 employees I was the technical sales representative, product troubleshooter, and toward the end, product formulator. The job had me spending half my life on the road, and after four years of this it was time for a career change.

I apprenticed with a financial advisor who actually took the chaos out of client's personal finances by formulating comprehensive financial plans. From this I learned about taxes, estate planning, insurance, investments, etc. I also earned a MS in Financial Planning with honors. While it wasn't easy, I was well prepared for the grind by Delaware. After four years of preparation I went out on my own and started Robinson Financial Advisory in 2001. In 2005 I invited another colleague to join me to form DouglasBradley LLC. The business is doing great despite the economy owing to our unique investment style and focus on client service.

I married **Patty Scheffer**, UD civil engineer in 1995. She was designing roads for Maryland DOT and I was working in Wilmington. We split the travel distances and bought a house in Bel Air, MD. We now have four children - Amelia (98), Christian (00), Gavin (02) and Grace (03). A few years ago as the children grew we moved to a larger home in Bel Air. All in all this is a busy but fun life as a father, husband and small business owner.

When asked why his home address was in Switzerland while his business address was in New Jersey, **Ken Zrebiec**, B94 replied: I actually just returned to the US (in January 2009) from a two-year assignment at my company's headquarters in Zofingen, Switzerland. This was a rewarding opportunity both professionally for me and personally for my family and I. We are now settled back into the "American lifestyle" and reside in Newark, DE. I work for Siegfried (USA), Inc (Pennsville, NJ) as the Director of Supply Chain Management. Siegfried manufactures Active Pharmaceutical Ingredients (API) with a focus on pain management.

Additionally, I received an MBA from UD in 1998. I'm still in contact with **Doug Robinson**, **Chris Fleck**, **Tyson Bower**, **Teresa Bystol** (now **Teresa Miller**), and **Christy Baker** (now **Christy Inverso**, whom I work with at Siegfried).

When asked about the life of a lawyer in Washington, **Sarah Bannister** B95 replied: I am a third year litigation associate at Covington & Burling LLP in Washington, D.C. It has been a difficult year in the law firm services market due to the collapse of the structured finance markets and the slowing of the economy. Clients (rightly so) are pressing their law firms to reduce costs and prove their ability to deliver results on or under budget. In the next five years, we will see a fundamental restructuring in the relationship between clients and their outside counsel, including a move to fixed-price contracts, a greater emphasis on training lawyers in project management, and probably, the demise of the billable hour in certain situations.

Regardless of one's political orientation, this was a remarkable year to live in D.C. Along with several hundred thousand others, I trekked down to the Mall for President Obama's Inauguration in January. I have never seen anything quite like it - a sea of people stretching from the Capitol to the Lincoln Memorial. Despite the bitter cold and the crowd control problems, the mood of the crowd was ebullient.

**Christy Prilutski**, B98, is Product Manager, Cypher Supply Chain, for Cordis Corp., a division of Johnson and Johnson. Cordis Cardiology manufactures diagnostic, interventional products and stents. She answered a request for "newsletter stuff" with the following: The last year has been quite exciting! Will Dorris and I were married on a beautiful 70 degree day in West Chester, PA in March 2009. That's right, we were blessed enough to have

70 degrees and sunny for a March wedding day! We had family members come from Oklahoma, Michigan and even as far as China! While the wedding has occupied most of my personal life the last year, professionally things have remained exciting as well.

I'm still managing the same product (stents) which, due to competitive entrants, has fallen from 50% market share to mid-teens since the beginning of 2008. I've been working on some interesting projects on the side - for example, the end-to-end supply chain strategy for a new plant we're building in Ireland. We're still living right on the ocean in Miami Beach, although I had to give up volleyball to keep up with work demands. I'm trying to get back into running - hopefully I'll have more fun stuff to report on next year!

**Robert S. Parker**, PhD99, associate professor, Chemical and Petroleum Engineering, University of Pittsburgh, was awarded the 2008 Carnegie Science Center Award for Excellence in Higher Education for innovating work with the undergraduate chemical engineering curriculum—the Pillar Curriculum,.

This has been another great year for **Sujata Bhatia**, B99, M99. In October 2008 VDM Verlag published her book, *Selectin-mediated Leukocyte Adhesion During the Immune Response: Experimental and Computational Studies of White Blood Cell Recruitment to the Vascular Wall*. The work is based on her PhD dissertation. While certainly specialized, the book is available at Amazon, ISBN 3639094549. We all know that it is very unusual for a PhD dissertation to be published as a book. The publisher's abstract reads in part, "This book extends current knowledge of leukocyte adhesion by examining selectin-mediated adhesion in both experimental and computational studies." Much to her credit, Sujata completed this work in 18 months.

**Sujata** was also on the seminar circuit this year. On January 19<sup>th</sup> she presented, "Natural Biomaterials for Tissue Repair and Reconstruction" at Delaware. The seminar described work Sujata's group had done at DuPont to develop effective adhesives for medical use, "people glue". The success of this work depended on high-level collaboration of scientists with diverse skills. Her presentation made all of this seem easy.

It sometimes happens that the audio amplifier isn't working as intended at the beginning of a seminar. This was the case at Sujata's presentation. Completely unflustered, she filled the void by telling jokes, standup comedy style, while the equipment was being debugged.

Sujata has also been active with the UD Engineering Alumni Association, and for her efforts she is now President Elect. The purpose of the association is to link engineering alumni more closely with the college both intellectually and socially. She brings incredible energy to this task.

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In a series of emails **Matt Ford**, B00, unfolded his activities since graduation: After UD, I went to the University of Massachusetts Amherst and got my PhD in CHEG. In 2006 I defended my dissertation titled, "Modeling the Growth and Stability of Nanoporous Materials." I also developed some new methods for simulating complex network forming reactions that occur in the growth of zeolites and silica materials. That project was joint with **Raul Lobo** and **Dion Vlachos**.

I then moved to Boston to work for Atmospheric and Environmental Research, Inc. I only stayed there for about 18 months because the work wasn't quite my cup of tea. I moved back to Baltimore and began working at Telvent, an IT company. I work in a small group in Baltimore that is part of their Oil & Gas division. We develop, configure, and deploy real time models of oil and gas pipelines. Our models can detect, and pinpoint a leak within a few minutes of inception with the goal of minimizing (or eliminating) any environmental impact. We also develop simulators to train pipeline operators and optimization software to minimize energy utilization of pipelines.

As a part time job, for fun and supplemental income, I write articles that attempt to bring cutting edge science and engineering research to everyone. I work with/for a website, *Ars Technica* (<http://arstechnica.com>), whose main focus is technology and computer/gadget related news. Nobel Intent is the science section of *Ars Technica*, a giveaway section of *Ars Technica*. The science section focuses on actual science and engineering research going on around the world. A couple of us also do what we can to highlight scientific outreach efforts, since we feel that is very important.

**Matt's** articles for *Ars Technica* are listed at [www.arstechnica.com/authors/matt-ford](http://www.arstechnica.com/authors/matt-ford). This site lists a wide range of short articles, clearly written, that make you think that you know more than you do. For example one article is titled: "Looking inside a black hole with superstring theory" with the addition: "Using a variant of superstring theory, a group of Japanese researchers derive an expression for the underlying thermodynamics of a black hole, all while testing the idea of a gauge-gravity duality".

**Matt's** wife, **Risha Zuckerman**, ED01, recently changed careers and is now working in an administrative position at Johns Hopkins Bloomberg School of Public Health. She was a preschool teacher until a year ago but changed careers as part of her desire to have a family. They are expecting their first child in December.

**Ryan Snyder**, B01, sent a catch up note with the following information: "This fall I will be starting as new faculty member in the department of Chemical Engineering at Bucknell University. I am currently finishing my post-doctoral work at Eli Lilly in

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Indianapolis. My research is on the development of design methods for structured products ranging from pharmaceuticals to inorganic nanomaterials. I earned my Ph. D. from UC Santa Barbara in the summer of 2008 working with **Michael Doherty**. I was first put on to Prof. Doherty by Dr. Short during senior design at UD, which turned out to be a wonderful recommendation. This fall I will now be teaching senior design at Bucknell. Last summer I married Elise DeVere, and we recently purchased a new house for our move to Lewisburg, PA. We're looking forward to being back in the neighborhood."

**Matt Panzer**, B02, finished his post doc work at MIT and became an assistant professor at Tufts in September. In being asked to elaborate on his appointment, he replied: "I was attracted to Tufts primarily due to its size, location, and long-time emphasis on the quality of its undergraduate programs. In fact, I had actually applied to the Tufts ChemE undergrad program back when I was looking at colleges...so I'm glad that I will end up on their campus after all."

I am very pleased indeed to have the opportunity to join the faculty at Tufts, especially in light of the current economic situation. As you know, I hold my time as an undergraduate in ChemE at UD in the highest esteem thanks primarily to the quality of instruction I received. I can only hope to bring some small semblance of that Delaware tradition of excellence to my own endeavors as an educator of tomorrow's chemical engineers."

When asked about his time at MIT, Matt responded: My postdoc research at MIT could roughly be described as "Novel Optoelectronic Devices Incorporating Colloidal Quantum Dots," and my postdoc advisor (Vladimir Bulovic) is in the EECS Department.

Matt's research program at Tufts will focus on sustainable energy, with three main topics: (1) thin film photovoltaics, (2) electrical energy storage, and (3) "green" electronic devices, including recyclable and biodegradable components.



Matt Panzer and Katie Whitehead taken at a bowling alley.

**Katie Whitehead**, B02, married **Eric Deguns** and they are living in the Boston area. She is a post doc at MIT. She writes: "I am working in the Langer lab juggernaut and couldn't be happier. I've been here about a year and a half, and although it took a few months to adjust to the crazy atmosphere, it is precisely that atmosphere that has helped me to be productive and to grow as a researcher. We have a wonderful assortment of amazing scientists here- everything from organic chemists to clinicians to

geneticists- who teach one another and work together to hasten the pace of biomedical research.

My research primarily focuses on siRNA delivery, which enables the silencing of potentially problematic genes for therapeutic purposes. It's been interesting to get my hands into every aspect of the project, from the organic synthesis of the delivery materials (I'm a disaster in the chemistry lab) all the way down to the analysis of subcellular transport processes.

I'm in no hurry to get out of here- I learn something new just about every day. In the meantime, my husband is happy working for a local Harvard start-up, and we just bought our first home in November. We are content, and I am more than happy to give up the nomadic academic lifestyle for a few years. And as an added Boston bonus, I get to spend lots of time with **Matt Panzer**, who is also in the area. We don't talk about thermo anymore (they worked on a thermo project in 2000), but he's still a lot of fun."

**Sam Blacker**, B03 married **Melanie Evans**, AS03. Both are MDs in the residency phase of medical education. In May 2009 Sam wrote: Things are going well for me. Married for two year now. Melanie and I successfully survived our internships and finishing up the first year of our residencies. We've settled into Bethesda and despite the traffic, really love being in the Washington DC area. Melanie is working hard as a neurology resident (at Georgetown), and I'm going strong in anesthesiology (at Walter Reed). It's a great feeling, after four years of medical school and one year of internship, to finally be immersed in the fields we chose to do. It has been a challenge to see the outside world some months, but we have managed and help each other through it.

Anesthesia is really fun and a lot of chemical engineering concepts keep popping up (vapor-liquid equilibrium, heat and mass transfer, diffusion, kinetics) amongst all the medicine, pharmacology, and physiology. Anesthesia can get very scary very quickly (living things do not do well without a constant supply of oxygen). There's another chemical engineer in my residency and also a fellow Delaware grad (small world). It's a grand time to be a Delaware grad now that people know who **Joe Biden** and **Joe Flacco** are. I'm sure it's been good for the prospective student pool.

**Jennifer (Zak) Grey**, B03, expanded on the Alumni Note form with: "Here's a quick update on me. After taking two years off from the working world to obtain my MBA at UD (May 2008), I am now back at Merck working as an engineer in the Global Vaccine Technology and Engineering department. My specific role is providing technical support for all raw materials for Merck vaccine products. I get to use both my engineering background and my MBA as the role involves quite a bit of vendor interaction and working with more commercially-oriented groups at Merck.

And since we support all vaccine products, I learn something new about one of our vaccines every day. I find the work challenging and rewarding since I am a huge proponent of childhood vaccines!

I can't believe it's been six years since I graduated. I still keep in touch with several people from the program. We've had many informal "CHEG" reunions, especially at weddings. **Dean's (Caravoulis)**, **Dana's (Ungerbuehler Herrigel)**, **Trey's (Kunkel)** and my wedding were all great opportunities to get together and catch up. I guess after spending so many years bonding over Thermo problem sets, the friendship that develops remains strong!"

**Sulio Linic**, PhD03, now is an assistant professor at U. Michigan, Ann Arbor, and had a great 2009. He won two major prizes, the ACS Colloid & Surface Chemistry Unilever Award for the "originality and creativity" of his research. He also won a Camille Dreyfus Teacher-Scholar award, which has a rigorous vetting process to identify genuine creativity, impact of research and excellence in teaching. He was one of three chemical engineers in the nation to win this award. These awards join **Sulio's** others including the DuPont Young Professor award and a NSF Career Award for 2006-2011. In the five years that he has been at Michigan he has published extensively, built a research group of 12 spanning a post doc to undergraduates, and has extraordinary teaching evaluations. His teaching skills were honed at UD as a Russell Fellow assisting in CHEG 342, Heat and Mass Transfer, and his research productivity with Mark Barteau also was exceptional.

**Vinnie Verruto**, B03, describes the last six years as follows: In the Summer of 2003, I spent 9 weeks working at Merck Research Labs in West Point, PA. I enjoyed a spectacular internship under the tutelage of two wonderful people: **Craig McKelvey** and **Eleni Dokou**, both of whom had received their PhD degrees from UD in Chemical Engineering.

I then began my 5-year PhD program in the CHE department at North Carolina State University in Raleigh, NC, the "City of Oaks." My project examined the interfacial self-assembly behavior of asphaltenes (the heaviest and most polar constituent of crude oil). My research also allowed me to travel to some wonderful places. Best of all, my 5 years at NCSU provided me with exactly what I had loved about UD's CHEG department: collegiality, community, and all-around good people.

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In August 2008, I joined PetroBeam Inc. as a full-time member of the technology development team, assuming the role of Technical Program Manager. The company, based in Raleigh, NC, is focused on developing and commercializing a process that uses an accelerated electron beam to effect advantageous conversion of heavy petroleum feedstocks. We have been able to capture the attention and interest of many heavy oil and bitumen production and processing companies, and the timing could not be better. The industry is as hungry as ever for a true "breakthrough" technology; we believe e-beam processing could be one such breakthrough.

Most importantly, much to her relief, I finally became a man and proposed on December 23, 2008 to my girlfriend of MANY years, **Samantha Kwan**. Always a Blue Hen, I proposed at the famous "Kissing Arches" between Memorial and Hullahen halls. Much to MY relief, she said "Yes."

**Jeff Cassell**, B04, writes: I am currently working at AstraZeneca in Wilmington, in the formulation development area. I design oral solid dosage formulations for candidate drug compounds starting in early phases of drug development, and maintain such projects through manufacturing process development and technical transfer to commercial manufacturing sites. Prior to my current position at AZ, I spent nearly 5 years at Merck in both API (chemical) manufacturing and pharmaceutical process development.

I was directly affected by such cost-cutting measures a few years ago; a Merck chemical plant in Georgia at which I was employed was shut down, due to the increased costs of manufacturing in the US compared to those overseas. I have not returned to manufacturing since then, choosing instead to stick with R&D. The best technical part of the job is utilizing experimental designs to screen formulations and develop process operating spaces - that said, **Dr. Ogunnaike's** statistics elective continues to be the most utilized material in my career thus far.



## CLASS NOTES

On a personal note, my wife **Erin** (CHEP 03) and I welcomed our daughter, Allison Mariah Cassel, into the world last March!! She is now over 14 months old and keeping us in very, very good shape as we chase her around the house.

After UD **Charles Collins-Chase**, B04, earned a M.Phil. in Engineering for Sustainable Development from Cambridge and then a J.D. at Penn. He writes: "I graduated from law school at the University of Pennsylvania in May, 2008. Since September, I have been working as an attorney at Finnegan, Henderson, Farabow, Garrett & Dunner, LLP, the top intellectual property firm in the country. We represent an expansive array of clients in the chemical, biological, and pharmaceutical industries (to name only those relevant to the CHEG department). Each day, my job requires me to draw on both my engineering knowledge and my legal skills, and I am enjoying it very much. So far, I have been working mostly on a drug patent case that is in district court litigation, through which I have gotten a tremendous amount of experience.

I really like living in DC, which as a city has much to recommend it. I am a quick walk from the Mall and monuments, and enjoy having many friends from UD living nearby. I imagine I'll be here for some time."

When asked at the UD Reunion if "top firm in the country" was a bit immodest, he then quoted from the legal magazine that made this judgment. Footnotes at a cocktail party.

**Laura Stafford**, B04 married **Steven Kestel**, B04 and now is **Laura (Stafford) Kestel**. The two bought a house in Norristown, PA in the summer of 2008. Steve works as systems engineer for Biochem Technology and has become a world traveler with three trips to China. Laura is a project development engineer for Merck in West Point, PA. She wrote that the name change was a chore but worth it.

**Sal(man) Siddiqui**, B04, attended the June 5-6 UD Reunion and reported: I completed my MBA in Finance & Entrepreneurship (summa cum laude) from Fordham as of Dec. 2008. I am currently working with a consulting firm in New York City by the name of LECG (it stands for Law & Economic Consulting Group) in their Petroleum & Chemicals practice area as a consultant. We provide consulting services particularly in litigation matters; however, we also work on bankruptcy cases, contract disputes and valuation studies among others...so long gone are the days of mass & energy balances.

**Amy VanFossen**, B04, describes her progress toward a PhD in biology at NC State as follows: I'm working under Dr. Robert Kelly on an extreme thermophile, *Caldicellulosiruptor saccharolyticus*, which produces hydrogen from biomass material. Specifically, I'm investigating how the bacteria breaks down lignocellulose

extracellularly, and then transports the broken down carbohydrates into the cell for metabolism. My research uses functional genomics along with bioinformatic techniques and biochemical characterization. In 2008, in conjugation with our collaborators, we published a paper on the genome of the organism, and I'm now working on characterizing different proteins found within the genome. I'm coming to the end of my fifth year and hope to defend by the end of 2009. My future plans involve finding a job in the biotech industry.

**James Vennard**, B04, lives in Newark and works for W.L. Gore developing medical products such as a PTFE pad for hernia repair. He and Sarah Kim Vennard have a two year old boy, Sampson. She is a dancer and a UD student in education. When asked how she and Jim met, she replied, "In a bar in Philadelphia, but neither of us are bar people."

**Jessica Penetar** B05 finished her term with the Peace Corp last spring and moved with her boyfriend to Princeton where he is a student in Environmental Engineering. She found employment with ENVIRON, ([www.vironcorp.com](http://www.vironcorp.com)) where she is "...working in the Site Solutions group which deals with remediation of contaminated soil and groundwater. I have designed two sets of pipelines, one for a Soil Vapor Extraction system on a Superfund site and the other for a Landfill Gas to Energy Application. ...the work has been varied due to our large variety of clients so that keeps it interesting. Even though the economy has slumped, we still have plenty of work to do as the EPA and NJ Department of Environmental Protection regulate our work."

Her email also includes, "I am writing from Luxor, Egypt now. One of my friends from the Peace Corps has been here for a year, so I took the opportunity to come visit. Took a cruise down the Nile, saw a lot of temples to the gods and pharaohs, and we will be going to the pyramids tomorrow." Wow!

**Kristie Grammatikos**, B07, is working for Merck and currently is at West Point, PA. She sent **Norm Wagner** this note in October after being at UD interviewing students: "Life has been keeping me busy. I am in Merck's Manufacturing Development Program. Every eight months I rotate to a different position within the company. So far I've been at their Stonewall Site in Elkton, VA. I previously supported the bulk sterilization of Primaxin, and am now involved in the startup of the HPV-Gardasil weigh and dispense facility. My next assignment will begin in December and I will be at West Point, PA in the Viral Vaccine Technology & Engineering group.

In my spare time I am a volunteer firefighter. (I got my national EMT and firefighter certifications over the past year and can now - theoretically - deliver babies in the back of an ambulance and save little children from burning buildings.) It's been a lot of fun and, at times, very taxing!

**Andy Korinda**, B07, wrote (in part) to **Frasier Russell** as follows: I'm hoping you still remember me, I was one of the two Andy's that sat in the back corner of heat and mass transfer class. I'm glad to see your textbook is now published; I am going to have to find a copy for myself.

I'm now studying at Northwestern and working with a new professor here, Justin Notestein, on an oxidation catalysis project. It's been enjoyable working in a real lab for the first time, even if I was the only one for the first seven months. Now that I have begun to focus my research interests, I am going to apply for the NSF fellowship.

One of the best parts of this school is the influence you had through **Linda Broadbelt**. She was instrumental in establishing the Searle Center for Teaching Excellence, a program for graduate students interested in careers in academia. The TA Fellows, TA Apprentice, and Graduate Teaching Certificate programs at Northwestern are very similar to what you started at Delaware. After I have another semester of TAing to support my application, I will begin applying to their training programs.

Last spring **Gina Palladino**, B08, said she would start her career in an unspecified NGO activity. She describes her choice below:

In late December 2008 I came to Rwanda with a program called WorldTeach. It is an NGO that is run out of Harvard's International School of Development. Here in Rwanda WorldTeach entered into a partnership with the Ministry of Education of Rwanda to supply some volunteer teachers. The ministry requested that the teachers be qualified in math and science for secondary schools. Rwanda's school system operated very much like the British system; meaning that the last two years of secondary school are similar to our first or first two years of university.

I'm teaching at a school in Kigali, the capital. The school is called FAWE Girl's school. FAWE itself is a pan-African NGO, Forum for African Women Educationalists. The organization creates (founds?) schools in all different African countries for girls. It is a school that has a focus on math and science. I am teaching Chemistry to the senior 4 and senior 5 levels (there are 6 levels in secondary school here). In the last three years of schooling here the students pick three principle subjects that they want to study. If it is a principle subject they get seven hours of it a week, while for non-principle it is two hours per week.

This year the Rwandan government switched the language of schools all to English. This means that I can be teaching students who for the past 8-10 years have been taught in French. Another interesting difference is that unlike our secondary school system, students here are not provided with text books on the subjects, and instead it falls to the teacher to 'create' one for them through notes given in class. Let's just say I am very happy I brought my organic chemistry notes from **Dr. Taber's** class with me.

## CLASS OF 2009

### Where did they go?

#### INDUSTRY \_\_\_\_\_ 22

Aberdeen P G (3)  
Acrymax Technologies  
Air Products (2)  
Compact Membrane Sys.  
DoD Missile Defense  
English teaching in Brazil  
ExxonMobil  
FritoLay  
Gore (4)  
Hershey Food Products  
Hess  
Merck (3)  
P&G  
Schlumberger

#### CHE GRAD SCHOOL \_\_\_\_\_ 7

Cal Tech (2)  
Wisconsin (2)  
Boulder  
CMU  
Cornell

#### Other GRAD SCHOOL \_\_\_\_\_ 4

MBA, UD (2)  
CISC, Illinois  
LAW, Columbia, Penn

#### UNKNOWN/LOOKING \_\_\_\_\_ 15

#### TOTAL \_\_\_\_\_ 48



HOME COMING IS OCTOBER 30-NOVEMBER 1, 2009

# 2009 Class Reunions

Please see UD's Alumni Relations website,  
[www.udconnection.com/homecoming](http://www.udconnection.com/homecoming),  
for details about Homecoming Weekend.

WE HOPE TO SEE YOU!

## CLASS of 1959:

Mr. Frank G. Andrusko  
Mr. Robert A. Baillie  
Mr. Carl Wayne Borrer  
Mr. William G. Burroughs, Jr.  
Dr. Robert W. Gore  
Mr. Alan A. Graham -  
DECEASED  
Dr. Edward G. Grochowski  
Mr. William F. Jaep -  
DECEASED  
Mr. James C. Lawson  
Dr. James F. Leathrum  
Mr. Thomas L. Lord  
John Matuszeski, Esq.  
Mr. Joseph C. Neel  
Mr. Thomas W. Orlando  
Mr. John W. Packie, Jr.  
Mr. Im K. Park  
Mr. James J. Riley IV  
Mr. E. Douglas Sager, Jr.  
Mr. Harry W. Sherman  
Mr. John A. Skillern, Jr. -  
DECEASED  
Mr. James L. Zawicki

## CLASS of 1984:

Mrs. Barbara W. Angle  
Mr. Mark A. Bennett  
Mrs. Gail L. Blake

Mr. Steven D. Bloom  
Gregory H. Bogush, Ph.D.  
Dr. Joye L. Bramble  
Mrs. Robin L. Brannan  
Mr. David C. Campbell  
Dr. Lorraine Jurman Chalupa  
Mrs. Ann L. Christensen  
Dr. Mitchel Cohn  
Ms. Angela J. Culliton  
Mr. Michael T. Dalsey  
Mrs. Sheryl B. Del Giorno  
Mrs. Jill Emery  
Mr. Richard O. Forchheimer  
Dr. Roseanne M. Ford  
Dr. Martha E. Garske  
Mr. Peter M. Grehlinger  
Dr. Timothy A. Griffin  
Ms. Sandra K. Guggenberger  
Mr. Kirtley B. Haden  
Mr. Kirk R. Hanawalt  
Mrs. Colleen K. Hanna  
Mr. Keith R. Harshey  
Ms. Andrea Hawkins  
Mr. Spencer S. Hirata  
Mr. Harold P. Ho  
Mr. Bruce A. Hoskins  
Dr. Stephen L. Hung  
Dr. Robert J. Karcha  
Mrs. Susan S. Krueger  
Ms. Coreen Younghae Lee  
Mr. Daniel L. Leeser  
Mr. Andrew W. Lewis

Ms. Gwen Perrotti Looby  
Mr. James D. Madric, Jr.  
Dr. Cheinan M. Marks  
Mrs. Patricia J. McKenney  
Mr. John W. McWilliams  
David Meister, Esq.  
Dr. Ronnie Ozer  
Mr. James S. Pawloski  
Mrs. Mary Jo Russell  
Mr. Christopher T. Rutz  
Mr. James H. Schleckser  
John A. Sopp, Esq.  
Dr. Scott K. Starry  
Dr. John D. Stenger-Smith  
Mrs. Lisa Stenger-Smith  
Mr. Larry D. Stewart  
Mr. Gregory H. Tatum  
Mr. Raymond J. Vass  
Mr. Gordon A. Wall

## CLASS of 1994:

Ms. Laurie E. Adkins  
Ms. Jennifer G. Allinson  
Mr. Christopher E. Banschbach  
Mr. Peter J. Blythe  
Mr. Tyson S. Bower  
Dr. Kimberly A. Brown  
Mr. Loyd J. Burcham  
Mr. James H. Bushong, Jr.  
Ms. Teresa L. Bystol  
Mrs. Laura G. Carmichael  
Mr. Patrick E. Champion

Mr. Ben Chen  
Mr. Thomas C. Chiu  
Mr. Daniel C. Cole  
Mr. Wesley D. Costas  
Mr. Thomas S. Doherty  
Mrs. Jennifer R. Dumin  
Neil C. Evans, M.D.  
Mr. Gregg J. Falcone  
Mr. Christopher M. Fleck  
Ms. Kimberly R. Fleming  
Mr. Seth S. Gleiman  
Mr. David W. Goad  
Mrs. Christeen A. Inverso  
Dr. Jeffrey A. Kabin  
Richard S. Kim, M.D., M.B.A.  
Mr. Kenneth S. Laverdure  
Mr. William C. Mangum  
Dr. James G. Mann, Jr.  
Mr. Mark A. Melnychenko  
Mr. Darrin J. Menzo  
Mr. Carl R. Meyer  
Mrs. Dore M. Mobley  
Mr. Ashish G. Modi  
Mrs. Pamela A. Morrison  
Mr. Donald J. Mosemann  
Mr. Andrew D. Pandolfino  
Mr. David R. Power  
Mrs. Karen M. Pye  
Dr. Christopher J. Roberts  
Mrs. Melissa L. Robertson  
Mr. Douglas O. Robinson  
Mr. Aldo A. Romagnoli III  
Mrs. Vera L. Romagnoli  
Mr. Eric S. Rowland  
Mr. Christopher L. Savitz  
Mr. Francis L. Sibilla  
Dr. Andrew P. Sullivan  
Mr. Terry N. Troutman, Jr.  
Dr. Stevan D. Wilson  
Ms. Po T. Wu  
Mr. Ronald Y. Xiang  
Mr. Kenneth S. Zrebiec

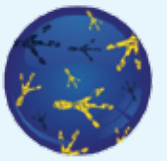
## CLASS of 2004:

Mrs. Amee L. Altenbaugh  
Mr. Ryan E. Altenbaugh  
Mr. Michael S. Angelo  
Mr. Jordan L. Ballard  
Ms. Theresa F. Beinke  
Mr. David J. Bell  
Mr. Joshua W. Brugger  
Mr. Jeffrey T. Cassel  
Charles T. Collins-Chase, Esq.  
Mr. Brian C. Cook  
Mr. Jeffery J. Cucura  
Mr. Joshua C. Dennis  
Mr. Stephen R. M. Ekatan  
Mr. William I. Flanders, Jr.  
Ms. Colleen M. Gendron

Mr. Robert D. Groff  
Mr. Benjamin D. Hankins  
Mr. Randall S. Herbert  
Mr. John J. Holwegner  
Ms. Janine I. Jelks-Seale  
Mr. Nathan L. Jovanelly  
Mr. Steven M. Kestel, Jr.  
Mr. John E. Kirkwood  
Mr. Keith M. Kirkwood  
Mr. Kenneth B. Knudsen  
Mr. Robert C. Limmer  
Mr. Thomas G. Lombardo  
Mr. Michael B. Lowinger  
Mr. Richard R. Lunt III  
Mr. John A. McFadden  
Mr. Ogbazgi T. Mehari  
Mr. Yonnas H. Mengistu  
Mr. Kwame O. Osei  
Mr. Andrew H. Pitoniak  
Mr. Saurabh Raman  
Mr. Joseph J. Robinson, Jr.  
Mr. Paul J. Ruggerio  
Mr. Patrick Schilling  
Mr. Bryan K. Schneider  
Mr. David C. Schwalje  
Mr. Michael T. Schweizer  
Ms. Sharmila N. Shashidhara  
Mr. Salman A. Siddiqui  
Mr. Manvir Singh  
Ms. Sara C. Speser  
Ms. Laura J. Stafford  
Ms. Kristin H. Stoeber  
Mr. Nicholas P. Theodorakos  
Ms. Amy L. VanFossen  
Mr. James Vennard IV  
Mr. Pravine Viswakumar

*We are making special efforts to honor alumni/ae on their 5<sup>th</sup>, 15<sup>th</sup>, 25<sup>th</sup> and 50<sup>th</sup> anniversary years; these are the classes of 1959, 1984, 1994 and 2004. We'd appreciate your help in correcting errors and filling in the blanks.*

Our highlighted reunions: 50 year, 25 year, 15 year and 5 year – come join your former classmates at Homecoming.



UDconnection.com

## AICHE DELAWARE ALUMNI RECEPTION

Monday, November 9, 2009



7-9 p.m.

Gaylord Opryland Hotel  
Nashville, TN

[www.aiche.org/annual](http://www.aiche.org/annual)

FOR CHE ALUMNI NEWS, VISIT  
[www.che.udel.edu/alumni.html](http://www.che.udel.edu/alumni.html)

The Preface written by  
Drs. Mort Denn and Mark Barteau  
for The Fraser Russell special issue  
of I&EC Research

(Ind. Eng. Chem. Res. 2009, 48, 5921–5922) follows:

T. W. Fraser Russell, the Allan P. Colburn Professor of Chemical Engineering at the University of Delaware, is one of those rare individuals who has excelled in all three of the traditional functions of a university professor: teaching, research, and service. Fraser's research, initially on two-phase flow and multi-phase reactors and subsequently on solar cell technology, has always focused on practical applications, leading to honors such as the AIChE Award in Chemical Engineering Practice and the Dupont Engineering Excellence Award. The research was driven by his pre-PhD industrial experience, his thirty years as a weekly consultant to Dupont's Engineering Department as well as other consulting relationships, and his leadership of Delaware's Institute for Energy Conversion as Director and Chief Engineer. Fraser's stature as an educator, developed through his textbooks, journal articles, and personal classroom example, was recognized most recently with the ASCE Award for Lifetime Achievement in Chemical Engineering Pedagogical Scholarship. His service, in addition to the Directorship of the Institute for Energy Conversion, has included terms as Chair of Delaware's Department of Chemical Engineering, acting Dean of Engineering, and Vice-Provost for Research. Fraser was elected to the National Academy of Engineering in 1990.

Fraser was born in Moose Jaw, Saskatchewan and received B.S. and M.S. degrees in Chemical Engineering from the University of Alberta in 1956 and 1968, respectively, the latter while working for the Research Council of Canada on fluid mechanics problems associated with the production of oil from the Alberta tar sands. He then worked for three years as a design engineer for Union Carbide Canada before undertaking PhD studies at the University of Delaware, which he completed in 1964. Fraser was asked to teach the

senior capstone design course during the final year of his PhD program and was subsequently invited to join the faculty, the only time this has happened in Delaware chemical engineering history. He was promoted through the ranks quickly, becoming Professor of Chemical Engineering in 1970 and the Allan P. Colburn Professor in 1981. Fraser's overriding goal as a faculty member has always been to maintain a balance between the art and science of engineering, both in the classroom and in research. This approach is reflected in his textbooks, Introduction to Chemical Engineering Analysis (1972, with M. M. Denn), Structure of the Chemical Process Industries (1978, with J. Wei and M. W. Swartzlander), and Mass and Heat Transfer: Analysis of Mass Contactors and Heat Exchangers (2008, with A. S. Robinson and N. J. Wagner), as well as in several book chapters and in his many technical articles.

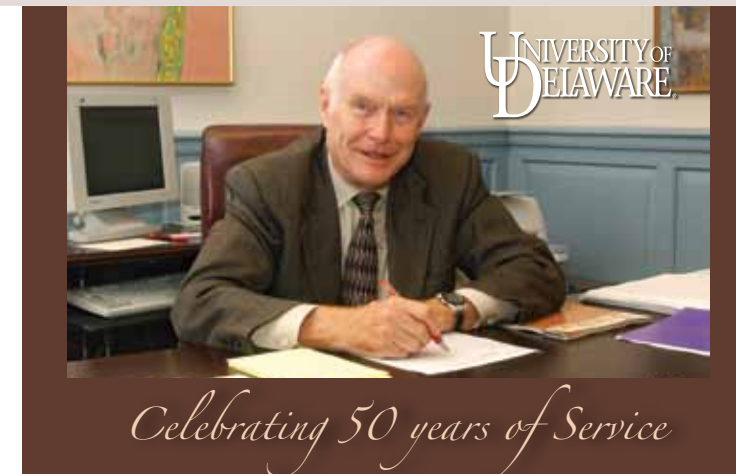
Fraser's teaching style and his dedication to mentoring graduate students interested in careers in education are both legendary. Perhaps the accomplishment most typical of his interest in engineering education was his initiation of a Teaching Fellow program, initially funded by Dupont, in which senior PhD students are given the opportunity to teach an undergraduate course under the close supervision of a faculty mentor who provides continuous feedback and support. Fraser personally worked with ten Teaching Fellows at Delaware. He recently endowed two Teaching Fellowships, one at Delaware and one at Alberta, in memory of his late wife, Shirley.

We have both been privileged to have been friends and colleagues of Fraser for many years. His no-nonsense style of problem solving, whether in education, research, or academic management, has been a model for us and for the many friends and colleagues who have contributed to this special issue in his honor. We join all of the authors in expressing our appreciation for Fraser's profound impact on us and on our profession.

*TW Fraser Russell*  
SYMPOSIUM

August 24, 2009  
John M. Clayton Hall

*Celebrate*  
50 Years of Service  
and Accomplishments



*T. W. Fraser Russell*

Undergraduate Enrichment Endowment

A new academic enrichment fund is being created to commemorate the career of T.W. Fraser Russell, Allan P. Colburn Professor of Chemical Engineering. Dr. Russell completed his BSc and MSc degrees at the University of Alberta and his Ph.D. in 1964 at the University of Delaware. While he may be best known as a teacher and scholar, he has also served in many important leadership roles at the University of Delaware including Vice Provost for Research, Dean of the College of Engineering, Chair of the Department of Chemical Engineering, and Director of the Institute of Energy Conversion. Dr. Russell, a member of the National Academy of Engineering, was recognized with the Lifetime Achievement in Chemical Engineering Pedagogical Scholarship Award from the American Society for Engineering Education. In 2009, he will retire, completing 45 years of distinguished service.

The **T.W. Fraser Russell Undergraduate Enrichment Endowment** will make it possible for selected undergraduate Chemical Engineering students to have valuable learning experiences that complement classroom teaching. This fund is being initiated by the Department of Chemical Engineering and reflects Dr. Russell's greatest interest: the quality and vitality of the overall student experience. Awards will specifically support undergraduate research and internship experiences guided by a Chemical Engineering faculty advisor.

Students will be eligible to receive an award after successful completion of their sophomore year in Chemical Engineering. Initially, awards will be in the amount of \$4,000. A student electing to carry out research with a faculty advisor will be fully funded by the endowment. A student choosing a summer internship with a firm will be funded jointly by the endowment and the employing firm.

The minimum endowment needed to support four students annually is \$240,000. Recipients will be known as **Russell Undergraduate Fellows**. Additional Fellows will be added as the endowment expands in \$60,000 increments.

Your gift to the T.W. Fraser Russell Endowment would be very much appreciated.

You may give by any one of the following methods. Be sure to note that your gift is for this special fund.

- Make a gift on-line: <https://primus.nss.udel.edu/casforms/gift/index.jsp>
- To transfer appreciated securities or for additional information please contact  
**Armand Battisti**  
Director of Development  
College of Engineering  
☎ (302) 831-7273 or [aab@udel.edu](mailto:aab@udel.edu)
- Mail your check to:  
T.W. Fraser Russell Fund  
College of Engineering  
University of Delaware  
102 DuPont Hall  
Newark, DE 19716  
Enclosed is my gift \$ \_\_\_\_\_

Name(s) \_\_\_\_\_

Email \_\_\_\_\_

Day Phone \_\_\_\_\_ Evening \_\_\_\_\_

# Graduating Class of 2009

## Honors Degree with Distinction:

The Honors Degree with Distinction recognizes a student's completion of the research requirements for the Degree with Distinction in addition to the successful completion of 30 credits in Honors courses through the degree program. The Honors Degree with Distinction is listed on each student's University of Delaware official transcript.



### Eric S. Bennung

#### *Structural Transition of Magnetorheological Fluids in Microgravity*

My thesis presents observations and analysis from the NASA experiment, Investigating the Structure of Paramagnetic Aggregates from Colloidal Emulsions (InSPACE), performed on the International Space Station. My research focuses on the long-time two-dimensional aggregation kinetics of magnetorheological fluids in a view parallel to a DC magnetic field. Data gathered from video microscopy experiments is analyzed through the Smoluchowski equation.

Advisor: Dr. Eric M. Furst  
Grad Mentor: Dr. Paula Vasquez



### Jeffrey P. Bosco

#### *Synthesis and Characterization of Three-Dimensionally Ordered Macroporous (3DOM) Tungsten Carbide: Application to Direct Methanol Fuel Cells*

Three-dimensionally ordered macroporous tungsten carbide (3DOM WC) with varying pore size was synthesized using the "inverse-opal" method. Poly[methyl methacrylate] (PMMA) colloidal crystal template with sphere diameters ranging from 180 to 490 nm was used. The material properties were evaluated using surface and bulk characterization techniques, including cyclic voltammetry to investigate the methanol electro-oxidation activity of the 3DOM WC and Pt-modified 3DOM WC in acidic electrochemical environment.

Advisor: Dr. Jinguang G. Chen



### Melissa C. Day

#### *Solar Powered Hydrogen Generation via Carbon-Doped TiO<sub>2</sub> Anodes*

Hydrogen fuel cells may not release emissions on the consumer level but the industrial production of hydrogen still produces CO<sub>2</sub>. Pulsed laser deposition was used to dope TiO<sub>2</sub> films with carbon in an effort to narrow the band gap and improve the visible light activity, thereby increasing the ability to split water into hydrogen and oxygen when incorporated into a photoelectrochemical cell. Based on the density of states placement it was recommended that co-doping of carbon and nitrogen be attempted in future research.

Advisor: Dr. Ismat Shah  
Grad Mentor: Meghan Schulz

### Belinda Gao

#### *Synthesis and Characterization of Rubidium Promoted Catalysts for NH<sub>3</sub> Decomposition (?)*

The objective of the research was to investigate Rubidium-based Hollandite structures as potential ammonia decomposition catalysts for on-board hydrogen generation.

Advisor: Dr. Jochen Lauterbach  
Grad Mentor: Elizabeth D'Addio

### Kyle Hoffmann

#### *Mathematical Modeling of Adverse Reactions*

Several methods of mathematically modeling and predicting adverse reactions were investigated. A physiologically based pharmacokinetic model of the distribution and metabolism of methotrexate was developed.

Advisor: Dr. Prasad Dhurjati

### Jeffrey A. Knopf

#### *Investigation of Linear Electrospinning Jets*

Experiments were performed using high speed imagery in an attempt to validate a recently simplified electrohydrodynamic model of the electrospinning process, a technique that allows for the creation of polymeric nanofibers through the use of an electric charge. While most electrospinning jets have a 'bending' instability; in this case a completely linear electrospinning system was chosen, which has the ability to be collected in the form of highly spatially oriented fibers. Experiments performed on this completely different system were aimed at determination of radius and velocity profiles in the jet to examine the applicability of the model for multiple polymer-solvent systems.

Advisor: Dr. Norman Wagner  
Grad Mentor: Matt Helgeson



### Rebecca K. Pagels

#### *Experimental Method for Rapid Prediction of Protein Aggregation Rates*

My thesis focused on the mechanisms of salt-mediated non-native aggregation of proteins, as it pertains to biopharmaceutical product formulation. The protein was alpha-chymotrypsinogen A, a model globular protein that forms different kinds of aggregates, from disease-like amyloid fibers to amorphous particulates. I focused on the effects of Hofmeister salts on protein unfolding and aggregation, as well how the mechanism and kinetics change when the reaction is "seeded" by pre-existing aggregates from an upstream processing step.

Advisor: Dr. Chris J. Roberts



### Matthew G. Petroff

#### *The effects of secondary polymers on adsorption and transport in ion-exchange chromatography*

One recent approach towards improving an adsorbent's chromatographic performance is the attachment of secondary polymers to a traditional base matrix. We investigated the affects that these secondary polymers had on transport and adsorption, and were able to identify chromatographic conditions that significantly impact adsorbent performance.

Advisor: Dr. Abraham M. Lenhoff  
Grad Mentor: Brian Bowes



### Lindsay Schmiedel

#### *Analyzing Spatial Localization of Proteins of the Endoplasmic Reticulum in Budding Yeast, S. cerevisiae, During Cell Division*

The focus of this research was to study the mechanism of inheritance of the endoplasmic reticulum (ER) during cell division of budding yeast, *S. cerevisiae*. This objective was accomplished through the use of live cell imaging with confocal light microscopy and fluorescent protein tags to track proteins of interest in vivo. Our hypothesis was proven that spatial heterogeneity exists between proteins of the ER membrane and ER lumen during cell division in budding yeast.

Advisor: Dr. Anne S. Robinson  
Grad Mentor: Carissa Young

### Zachary W. Ulissi

#### *Development and Assessment of Catalytic Microkinetic Models for Rational Catalyst Design*

Full catalytic reactor simulations were conducted using several models and multiscale methods, ranging from the reactor scale to quantum mechanical calculations of surface properties. Using the full models, the properties of a catalyst surface leading to optimal reactor conversion were identified. Because of the number of parameters used and available model choices, a detailed uncertainty analysis was conducted.

Advisor: Dr. Dionisios Vlachos  
Grad Mentor: Dr. Prasad



### Scott J. Zero

#### *Investigation of Genetically Modified Soybean Oil for Synthesis of Pressure Sensitive Adhesives*

The purpose of this research was to investigate the use of new starting materials for the synthesis of pressure sensitive adhesives. The most of exciting of these is a genetically modified high oleic soybean oil, which is used to synthesized an adhesive that is 70% bio-based by mass, and performs comparably to petroleum-based adhesives. This investigation focused on the synthesis of the adhesives and the characterization of starting products with mass spectroscopy and gas chromatography.

Advisor: Dr. Richard Wool  
Grad Mentor: Alejandrina Campanella



## SEE YOU THERE AUGUST 24, 2009

John M. Clayton Hall



### FRASER RUSSELL SYMPOSIUM CELEBRATING 50 YEARS OF SERVICE

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## ALUMNI SPOTLIGHT



### Tom Degnan Named to Department's Advisory Council

**Thomas F. Degnan Jr.**, who earned his Ph.D. in chemical engineering at the University of Delaware in 1977, has been appointed to the Department's Advisory Council. Degnan is

currently manager of New Leads and Breakthrough Technologies for ExxonMobil Research and Engineering in Clinton, N.J.

Established in 1984, the Council assists the Department in defining objectives and future directions, assesses its current state and performance, and provides a mechanism for communications and interaction between the Department and those outside the University community. Members are typically appointed for three-year terms. Degnan joins a distinguished group of industry leaders and university faculty members from institutions across the country on the Council.

Degnan joined 3M Company's Central Research in St. Paul, Minn. In 1976, working in the area of radiation polymerization using UV and high-energy electron beams. He received an M.B.A. from the University of Minnesota in 1980 while working at 3M. In late 1980, Degnan joined Mobil's Central Research Laboratory near

Princeton, N.J., where he began a career in exploratory catalyst development, specifically focused on zeolite catalysts.

Degnan was named a "Hero of Chemistry" by the American Chemical Society in 2007. He and six members of his team won the recognition for developing a novel, cost-effective, and environmentally friendly polyester production catalyst and process.

In 2009, Degnan delivered the Jack A. Gerster Memorial Lecture at the University of Delaware, with a talk entitled "Catalytic Technologies to Meet the World's Energy Needs." His presentation provided an overview of global energy growth and the associated opportunities for innovation and development of new catalytic technologies.

Degnan is a member of the Catalyst Club of New York and the North American Catalyst Society, and he is vice-chairman of the Research & Development Council of New Jersey. He also is a member of several other academic advisory councils. He is the named inventor or co-inventor on approximately 100 U.S. patents and has authored or coauthored more than 35 articles and outside presentations including a book and a monograph.

"We're really pleased to have Tom serving on our Advisory Council," said Department Chair Norm Wagner. "He brings a wealth of experience and wisdom to the position, and I know that we will receive valuable insights and advice from him over the next three years."

## DEPARTMENT FEATURES



### Eric Bennung competes in J24 World Championship Regatta--Annapolis, MD

**Eric Bennung** just completed his BChE this spring. Below he tells us about his experience competing in the J24 World

Championship Regatta: I along with members of the Corinthian Yacht Club of Cape May qualified for and recently participated in the J24 World Championship Regatta held in Annapolis, MD from April 30<sup>th</sup>-

May 8<sup>th</sup>. The regatta included 82 entries from eighteen countries and featured several of the world's premiere professional and amateur sailors. Although my team was disappointed with our finish (51 of 82), we took some consolation in that we are amateurs and were racing professionals. Despite the tough competition and the difficult sailing conditions (torrential

downpours and lack of wind), it was one of the most memorial regattas I've ever raced in.

**Marc Birtwistle** completed his PhD in December 2008 and writes below about his postdoc experience in Scotland: Getting the go ahead to finish a PhD is like what one might expect a Jedi master to tell the Jedi-in-training one random day: "He is ready. Set a date for the defense." From the trainee then comes elation and satisfaction, but after that, an uneasy uncertainty about the future. This uncertainty arises from an obvious question: "What's next?" For me, being set on pursuing an academic career, the answer to this question was postdoctoral academic research. But where? Obviously I should go to a place that would allow me to expand my expertise in a directed way that is complementary to my established toolbox, not simply isotropic expansion (joke for the engineers out there). Since my PhD was spent studying mammalian systems biology



under two brilliant theoreticians, Tunde Ogunnaike and Boris Kholodenko, it seemed clear that I needed more experimental training in mammalian biology to make myself competitive for obtaining independent funding in a few years. But given only this constraint, I could go just about anywhere in the world, provided I could convince an experimental biologist to hire a chemical engineer. But there was also my family to consider. However, my children, Rylee and Cian, were the perfect ages (3 and 1) for such a traveling adventure, and my wife Lisa was excited about the opportunity. So after investigating a few options, we settled on Glasgow, in Scotland, part of the United Kingdom. I am right now working in the lab of Walter Kolch, at the Beatson Institute for Cancer Research.

Professionally, the Beatson is a wonderful place to do a postdoc. It is a well-oiled research machine, and is setup especially well to increase scientific productivity, with central services available for many time consuming tasks. My main project entails understanding how spatial gradients of epidermal growth factor (EGF) and the resultant cell signaling induce a mammalian cell's decision to polarize and migrate in the direction of increasing EGF concentration. While much of the core cell migration machinery is quite well understood, how this core machinery is controlled by biochemical signaling networks is not well understood. The results will have obvious implications for cancer research, as deregulation of cell migration leads to metastasis. To address this research topic we are combining several cutting edge technologies. We are using novel microfluidic devices to generate stable and reproducible EGF gradients in a small cell culture chamber. The "microjets" device we are using was developed by the Folch lab at the University of Washington. The central 200 micron wide cell culture chamber is coupled to two reservoirs on either side, one containing EGF and one not. Pressurization of these reservoirs forces fluid into the cell culture chamber through an array of 2.5 micron tubes (microjets). A stable gradient of EGF is formed within minutes, is stable so long as the reservoirs contain fluid, and importantly does not introduce appreciable shear force onto the cells. To monitor EGF-induced cell signaling in real-time in single cells, we transfect cells with genetically-encoded, forster resonance energy transfer (FRET) probes. These probes code for a single protein molecule containing two fluorescent proteins (FP) that can act as a FRET pair, such as cyan FP and yellow FP, coupled by a "sensing unit". The sensing unit responds to cellular changes in the signal of interest (for instance a kinase activity) by inducing a 3D conformational change in the protein. The conformational change increases (or decreases) the distance between the FP's, which results in a change in the FRET between them. We use confocal microscopy to detect such FRET changes in real time and at subcellular resolution. The overall goal is to finally integrate all of these data into 4D reaction-diffusion-convection mathematical models capable of predicting how

various EGF gradient strengths control a cell's decision to migrate.

Living in Glasgow so far has been wonderful. The people here are so nice and friendly. I don't think I've gotten to a staircase where a local hasn't offered to help me carry our baby stroller up or down it. Many think the niceness is overcompensation for the weather, which is ... unique. This is a place where it rarely drops below freezing yet barely gets hot enough to warm your skin, all four seasons can come in one day, and a sunny day without rain is reason to leave work and enjoy the day! This makes it quite laughable that we at first thought that since most flats didn't come with clothes dryers, people must use the clotheslines outside to dry clothes. Ha! After our clothes did not dry for a week we realized just how silly this was. As Americans it is hard to imagine a life where you do not need a car. But here, we walk just about everywhere we need to go, and I cycle to work. If we really need to go far, we take a 10 min. walk to the train station, which has trains that depart every few minutes to just about anywhere we need to go. There is so much history right at our fingertips. We've spent most of our free time so far getting settled and exploring local things here in Glasgow, such as the pictured scenery around Kelvingrove park. However, quite exciting is that with a short flight and a weekend we can go visit a variety of millennia-old attractions in Greece, Italy, Germany, France, Spain, etc. But one certainly shouldn't come to Glasgow because you think there won't be a language barrier since they speak English. This American still says "Excuse me?" after just about every sentence spoken by a native Glaswegian, although now after a few months I'm getting a little better!

### Teaching the Teachers of Tomorrow

The teaching fellow program is designed to give senior level graduate students a closely supervised in-class teaching experience. Since its inception in 1993, we have appointed and supervised approximately 35 fellows. This teaching experience has not only been valuable for the participants but those who participate in the informal discussions with the fellows also gain and contribute to the teaching program. The teaching fellows program is supported by departmental gift funds and an endowed Fraser and Shirley Russell Teaching Fellow gift.



**Peter G. Millili** writes the following about his teaching fellow experience: This spring, I had the opportunity to serve as the Teaching Fellow for CHEG 432: Senior Design, mentored by Professors Norman Wagner and David Short.

Over the past few years, I have heard about the valuable experiences provided through this program from previous Teaching Fellows and Professor Fraser Russell. Despite this, I never seriously considered exploring this opportunity since I really did

## DEPARTMENT FEATURES

not envision myself as someone who would enjoy teaching. However, while discussing career paths with Professor Russell, he rightfully pointed out to me that I could not discount teaching unless I tried it! With the urging and support of my thesis advisor, Professor Millicent Sullivan, I applied for and was awarded a Teaching Fellowship shortly thereafter.

This opportunity provided me a window into the world of a professor's life including the time management issues accompanying the job. Over the course of the semester, I interacted with the students on a daily basis, gave several lectures and mentored design project teams. I can honestly say I was surprised by how much fun I had with this experience. It was particularly rewarding to see concepts I introduced in class be applied successfully to the individual plant design projects. The feedback and "real world" stories provided by Professors Wagner and Short as well as Adjunct Professors Richard Grenville and Bertrum Diemer made the semester very educational, expanding my knowledge of practical chemical engineering. Based on these experiences, I can certainly say Professor Russell was correct – the perspective I gained through this process has been essential in directing my career path.

The most important thing I learned during this semester is that the most effective teacher is the one who is passionate about the subject matter, interested in transferring knowledge, and is not afraid to have some fun along the way. My mentors exemplify these characteristics, and I am truly grateful for having been given this opportunity. Regardless of where my career path leads, I look forward to using the skills learned through this program in mentorship and communication capacities in the future.



**Matt Helgeson** writes the following about his teaching fellow experience: It was a great privilege to receive a teaching fellowship from the Department of Chemical Engineering in 2009. The teaching fellow program is one of the primary reasons I decided to come to the department for graduate study, and I have

looked forward to applying for the fellowship ever since hearing about it from Prof. Lynn Walker, herself a former teaching fellow, while an undergraduate at Carnegie Mellon University.

I had the pleasure of co-teaching Mass and Heat Transfer using the text developed by Profs. Russell, Robinson, and Wagner (to which I was able to contribute as a former teaching assistant). I enjoy the novel approach of the text to use macroscale experiment and equipment design to inspire and motivate microscale descriptions of fluid motions and transport phenomena. However, this posed a challenge in teaching the course, as the resulting breadth of material is intimidating to

many students. I quickly learned that success in the classroom is not measured by how well-prepared the instructor is, but by the engagement and enthusiasm of students to comprehend the material. These challenges allowed me to develop my own teaching style over the course of the semester. I found that grounding fundamental concepts in examples from contemporary processes and products (and even popular culture!) before deriving complicated model equations provides a concrete path for students to assimilate the material presented throughout the course with existing knowledge. Most of all, however, I simply enjoyed being able to interact with students and nurture their understanding and appreciation of chemical engineering principles.

I entered the teaching fellowship intending to pursue a faculty career in chemical engineering, and the experience has only further solidified that goal for me. One of the most challenging aspects of seeking a faculty position is that little if any formal training exists for most academic responsibilities. Nowhere is this truer than for teaching, and as such the teaching fellow program provides a unique opportunity to teach at the most rigorous level. The continued success of the program and its students are a testament to the commitment of Fraser and Shirley Russell, as well as the entire department, to the quality of undergraduate and graduate education at the University of Delaware, and to the professional development of future generations of chemical engineering faculty.



**Gaurab Samanta** writes the following about his experience as the Fraser and Shirley Russell Teaching Fellow: I was honored to be named the Shirley and Fraser Russell Teaching fellow for the academic year 2008-2009. In my opinion this fellowship is an exceptional effort on the part of Dr. Fraser Russell

and the Department of Chemical Engineering to nurture teaching talents among the graduate students of this department. It gives a unique opportunity to a senior graduate student who must have already established a good record of teaching assistantships, and has an aspiration to become an academic faculty member, to explore the world of teaching by taking on the responsibility of co-instructing an undergraduate course.

I was allowed to co-instruct "Introduction to Fluid Mechanics" to the undergraduate junior class with Prof. Eric Furst. Although I had the freedom to prepare my own class material (based on an overall topic assigned to me), and present it in the way that I thought to be most effective, I was always given healthy feedback on my class performance by Dr. Furst and Dr. Russell. I think this methodology worked wonderfully as it not only allowed me to know my shortcomings in teaching, but also highlighted my

strengths. Thus, it provided me the opportunity to make most effective changes to improve my teaching skills. My learning curve of teaching skills was steep, and I am confident that this fellowship has made me a much better teacher.

I will never forget the words of wisdom shared by Dr. Russell about being an effective teacher, specifically for teaching fluid mechanics. Of many things that I learned from him, the one that I found to be most important is the amount of concern that a teacher needs to show while choosing numerical problems for discussion in class. I now know that choosing a problem based on a real-life situation really does make a teacher's (real) life in class easy while trying to get a conceptual point across to the students.

Finally, I would like to thank Dr. Russell and Dr. Furst for their guidance and mentorship throughout the period of my teaching fellowship. I would also like to thank Dr. Norman Wagner for helping me in reviewing the students' appraisal of my performance as a teacher. With this teaching experience, I can only hope to teach better the next time I enter a classroom as a teacher.



**Alan Stottlemeyer** writes the following about his experience as a Teaching Fellow: I was honored to be awarded a teaching fellowship from our department in fall of 2008. Prof. Doug Buttrey and I were to teach CHEG 231 Chemical Engineering Thermodynamics to almost 80 undergraduate students. I

wholeheartedly believe that I learned far more from my students and my mentor than what I was able to return to them and that this opportunity originated uniquely with the teaching fellowship at UD. After our first lecture, it was clear to me that undergraduate education is as much an art as it is a science. Prof. Buttrey taught me how to use simple classroom experiments and to draw upon history to engage students in the course material. I learned that even the most brilliant minds, which set the foundation of modern science, belonged to people whose education had a clear beginning. As our students were also embarking on their own beginnings, I believe these lessons were inspirational to most and engaging to all. The teaching fellowship helped to guide me in my graduate education, too. It both solidified a hesitant desire to remain in academia after graduation and instilled in me an unwavering respect for those who continue to take on the challenge of secondary education. I am grateful to the Chemical Engineering Department, Prof. Buttrey, and most of all to the students of CHEG 231, without whom I might still be waiting at the starting line for my own beginning.

## DEPARTMENT FEATURES

**Jason McMullan**, a grad student who expects to complete his PhD next spring, spent three months in Belgium: In the spring of 2009, I had a wonderful opportunity to live and study in Belgium for three months. I came to the Katholieke Universiteit in Leuven, Belgium for a research



collaboration between Norman Wagner and Eric Furst, University of Delaware, and Jan Vermant, Katholieke Universiteit Leuven. My research was to focus on creating colloidal crystals by placing particles at the interface between two immiscible liquids. Along with learning a lot about a new technique, I also got to explore Belgium and a bit of Europe.

Putting colloids at interfaces is a robust method to create two-dimensional colloidal crystals. Creating an interface with a polar and non-polar liquid creates a favorable spot for particles to hold with high energy. The particles form crystals because of enhanced electrostatic repulsions creating long-range dipolar repulsions. As part of the work added to the interface community we performed crystallization combined with microscopy and light scattering to measure crystal order. We also worked with large amplitude oscillatory shear at the interface to direct particle crystals to higher order structures. Research discussions with Jan helped to direct the project in Leuven as well as adding new insight to work we performed at Delaware.

Leuven itself is a fantastic university town, with plenty of old historic buildings and sidewalk cafes (with tasty libations). When I wasn't in the lab, I especially enjoyed sitting outside and discussing things with friends from around the world over a Trappist beer. I also had the chance to travel to the Netherlands, France and Germany. In each of these countries, I caught up with students who had come to Delaware to study with Norm, as well as see some incredible sights.

I hope to bring many of the lessons I learned in Europe back to the United States with me, from interfacial ordering of crystals to afternoon tea. The opportunity to "study abroad" as a PhD student allowed me to focus my efforts on techniques that enhance our directed self-assembly project, and expand my personal and professional network. I will take what I have learned in Belgium with me back to Delaware and to my life beyond Colburn Lab.

DON'T MAKE ME COME BACK!

## FACULTY HIGHLIGHT



### David Colby joins Chemical Engineering Department's faculty:

We are pleased to announce that **Dr. David Colby** will be joining the University of Delaware's Chemical Engineering Department as an Assistant Professor in July 2010 and as an affiliate of the Delaware Biotechnology Institute. He will establish a laboratory that uses cellular

and molecular engineering approaches to study diseases of the nervous system. Dave's research complements and strengthens the significant expansion of the Department's research and teaching in biochemical and protein engineering, as well as the University's efforts in promoting the Delaware Health Sciences Alliance.

After completing a PhD at the Massachusetts Institute of Technology, Dr. Colby joined the lab of Nobel Laureate Stanley Prusiner at the University of California, San Francisco, where he studied Prions ("Mad Cow" disease). Dr. Colby has won several notable awards including an NSF graduate research fellowship, a postdoctoral fellowship from the Jane Coffin Childs Fund for Medical Research, and a National Institutes of Health Pathway to Independence Award, which will help fund his new lab.

The Colby Lab will use cellular and molecular engineering tools to dissect the causes of neurological diseases. Engineering therapies for such diseases will also be an important focus of the lab. Research projects will combine mathematical analysis and engineering with experimental approaches such as stem cell culture and transplantation, cell and molecular biology, proteomics, and protein engineering. The objective of this work is to make progress in understanding and treating Huntington's and Prion diseases.

## Breaking News



**Thomas H. Epps**, assistant professor, has been selected to receive a Presidential Early Career Award for Scientists and Engineers (PECASE), the highest honor bestowed by the U.S. government on young professionals in the early stages of their independent research careers.

"These extraordinarily gifted young scientists and engineers represent the best in our country," said President Barack Obama in announcing the awards on July 9. "With their talent, creativity, and dedication, I am confident that they will lead their fields in new breakthroughs and discoveries and help us use science and technology to lift up our nation and our world."

Established by President Bill Clinton in 1996, the awards are coordinated by the Office of Science and Technology Policy. Awardees are selected on the basis of two criteria: pursuit of innovative research at the frontiers of science and technology and a commitment to community service as demonstrated through scientific leadership, public education, or community outreach. Winning scientists and engineers receive up to a five-year research grant to further their study in support of critical government missions.

Epps will receive his grant from the Department of Defense, one of nine federal departments and agencies that join to nominate the young researchers for the awards. His research targets materials design and fabrication to create conducting membranes for current and next-generation energy generation and storage devices, such as batteries, fuel cells, and solar cells.

"This work will create new nanostructured soft-material networks for ion-conducting membranes," Epps says, "where our self-assembling networks will overcome many of the limitations found in current membranes, including inadequate internal conducting pathways, poor mechanical integrity, poor temperature stability, non-uniform pore and channel sizes, and poor chemical compatibility."

"These awards embody the high priority placed on producing outstanding scientists and engineers to advance the nation's goals and contribute to all sectors of the economy," says Michael Chajes, dean of the College of Engineering, "and Thomas Epps embodies the attributes we value in our young faculty. He is very deserving of this award, and the grant will support him as he further develops his research and education programs at UD."

Epps, who joined the UD faculty in June 2006, earned his bachelor's and master's degrees at the Massachusetts Institute of Technology and his doctoral degree at the University of Minnesota. He completed postdoctoral work as a National Research Council Postdoctoral Fellow in the Polymers Division at the National Institute of Standards and Technology in Gaithersburg, MD.

Epps has won a number of honors and awards, including a National Science Foundation (NSF) Faculty Early Career Development Award, an Air Force Young Investigator grant, and the Lloyd Ferguson Young Scientist Award from the National Organization for the Professional Advancement of Black Chemists and Chemical Engineers. He is also co-director of an NSF Research Experiences for Undergraduates program at UD focused on energy and sustainability. **Article by Diane Kukich**

## 2009-10 New Grad Students

Chisom Amaechi	Carnegie Mellon University
Peter Beltramo	University of Penn
Matthew Christiansen	Purdue University
Timothy Courtney	University of Maryland
Kyle Doolan	Villanova University
Stephen Edie	University of California Davis
Amanda Gurnon	Worcester Polytechnic Institute
Jai Shriram Kelkar	Johns Hopkins University
Na Young Kim	University of California Berkeley
Yannick Kimmel	University of Virginia
Nicholas Levy	University of Maryland
Leigh Quang	University of Maryland
Nikki Ross	Johns Hopkins University
Vassili Vorotnikov	University of New Hampshire
Jacob Weiner	University of Buffalo
Diane Wuest	Cornell University
Adil Subani Zuber	University of Maryland
Alex Apostolidis	Aristoteleion University
Jinlin Jiang	Zhejiang University
Wei-Fan Kuan	National Taiwan University Tai
Dongcui Li	Zhejiang University
Nima Nikbin	Universitat Dortmund Germany
Jang Ho Yun	Korea University
Anvar Samadzoda	Middle East Technical University
Hao Shen	National Taipei University

## 2009 SEMINAR SERIES

March 6, 2009

Jason F. Weaver - University of Florida

- Growth and Reactivity of Oxide Phases on the (111) Surfaces of Platinum and Palladium

March 13, 2009

Thomas Degnan - ExxonMobil

- Catalytic Technologies to meet the World's Energy Needs

March 27, 2009

Paula Hammond - MIT

- Exploration of Macromolecular Self Assembly in Thin Films: from Electrochemistry to Biomaterials

April 24, 2009

Matt DeLisa (Colburn Lecture) - Cornell

- Manipulating quality control mechanisms in bacteria for preclinical development of protein therapeutics

April 29, 2009

Mark David (Pigford Lecture) - Cal Tech

- Nanoparticle Cancer Therapeutics: From Concept to Clinic

May 15, 2009

Frank Bates (Wohl Lecture) - University of Minnesota

- Block Copolymers: Designer Materials at Commodity Prices

September 18, 2009

Christos Maravelias - University of Wisconsin-Madison

- Integration of Production Planning and Scheduling in the Chemical Industry

October 2, 2009

Ray Gorte - Penn Engineering

- Thermodynamic Properties of Oxidation Catalysts

October 23, 2009

James Separot (Gerster Lecture) - General Motors Research & Development Center

- Materials Challenges in Developing Fuel Cell/Hydrogen Propulsion Systems

October 30, 2009

Shelley Minteer - St. Louis University

- Enzymatic and Organellar Bioelectrocatalysis for Fuel Cell Applications

November 6, 2009

Ken Carter - University of Massachusetts

- Hierarchically Patterned Polymers

December 11, 2009

Cathy Wu - University of Delaware

- Bioinformatics and Systems Biology

## FACULTY NEWS

**Maciek Antoniewicz**, assistant professor, is one of 17 professors worldwide selected to receive the DuPont Young Professor Award. Maciek's research interests include metabolic engineering and systems biology and engineering microbial cells for production of biofuels and biochemicals.

**Maciek Antoniewicz** received the Jay Bailey Young Investigator Best Paper Award in Metabolic Engineering at Metabolic Engineering VII: Health and Sustainability, held this past September in Puerto Vallarta, Mexico.

The award recognizes outstanding research accomplishments by young researchers who "have advanced the frontiers of metabolic engineering through originality and creativity of experimental or computational concept application."

**Antoniewicz's** research is aimed at providing a fundamental understanding of the function and regulation of complex biological processes that emerge through the interaction of genes, proteins and metabolites at multiple metabolic and regulatory levels.

**Maciek Antoniewicz** was selected to represent AIChE in the first Emerging Leaders Alliance training program.

**Mark Barteau**, Robert L. Pigford Chair of Chemical Engineering and senior vice provost for Research and Strategic Initiatives, was selected to receive the 2009 Giuseppe Parravano Award from the Michigan Catalysis Society. The award was presented at the society's 31<sup>st</sup> annual spring symposium in May, where Barteau presented an award address. The Parravano Award is given biennially in odd-numbered years to an individual from North America to formally recognize outstanding contributions to catalytic science and technology. Barteau was cited for "his groundbreaking contributions to catalysis by metal oxides and transition metals, which led to the development of fundamental understanding and design of novel, improved catalytic materials."



**Antony Beris**, Professor, while shopping locally this past January, ran into Vice President Joe Biden! He was thrilled to be able to congratulate the Vice President AND he just happened to have his camera with him! Isn't it great that Antony had on a UD sweatshirt?

**Jingguang Chen** delivered his inaugural lecture titled "Design of Catalysts: From Model Surfaces to Supported Catalysts" as the University of Delaware's Claire D. LeClaire Professor of Chemical Engineering on November 24, 2008.

A group of researchers led by **Jingguang Chen**, Claire D. LeClaire Professor, has received funding from the Department of Energy for catalysis research using facilities at Brookhaven

National Laboratory (BNL). The \$1 million, three-year grant will enable continuation of work initiated with a previous DOE grant to promote the use of synchrotron techniques for research on catalysis under in-situ conditions.

Co-principal investigators on the grant are Anatoly Frenkel, professor of physics at Yeshiva University, and Radoslav Adzic, senior chemist at BNL. In addition, Nebojsa Marinkovic, a research staff member in Chen's research group, will be on location full-time at BNL to work on the project.

Catalysis, which has played a significant role in the chemical and petroleum industries over the past several decades, has recently been applied to a number of new areas, including environmental and bioengineering applications. With the current grant and other DOE and National Science Foundation funding, Chen and colleagues are investigating the use of less-expensive, more stable catalytic materials for applications ranging from fuel cells to biomass utilization.

**Jingguang Chen**, Claire D. LeClaire Professor of Chemical Engineering, addressed participants in a symposium hosted by the University of Delaware Energy Institute.



A half-day symposium held December 12, 2008 at Clayton Hall brought together more than 30 University of Delaware researchers with interests in the field of energy to share highlights of their work and stimulate collaboration. Participants also included faculty from Lincoln University in nearby Pennsylvania who are working with UD research teams. The event was hosted by the University of Delaware Energy Institute (UDEI). In welcoming participants, **Jingguang Chen**, director of UDEI, quoted the late Nobel laureate Richard Smalley in asserting that energy is number one on the list of humanity's top ten problems for the next 50 years. The mission of UDEI is to create the enabling science and advance the development and deployment of new and emerging energy technologies. The roles of the institute include promoting information exchange and collaboration, coordinating large-scale energy proposals with multiple principal investigators, providing seed funding to promote interdisciplinary research, and establishing central facilities to assist research groups on campus.

**Jingguang Chen**, and colleagues at the Dalian Institute of Chemical Physics in China have discovered a novel way to directly convert cellulose to industrially useful chemical compounds using tungsten carbide as a catalyst.

The breakthrough was announced in a press release by *Angewandte Chemie*, where the work was published as the cover story in November. *Angewandte Chemie* is the leading journal in the world on applied chemistry.



**Pamela Cook**, professor of mathematics with a secondary appointment in chemical engineering and associate dean of the College of Engineering, received the E. Arthur Trabant Award for Women's Equity at a luncheon on May 19. The award recognizes both the work of President Emeritus Trabant to foster a climate of gender equity on campus and the work by an individual, department, administrative unit or committee that contributes significantly to equity for women at UD.

**Pamela Cook** is part of the UD team awarded a \$307,936 grant through NSF's ADVANCE program, which is aimed at developing systemic approaches to increase the representation and advancement of women in academic science and engineering careers, thereby contributing to the development of a more diverse workforce in these areas.

**Pamela Cook** has been named fellow of the Society for Industrial and Applied Mathematics (SIAM).

**Thomas H. Epps III**, Assistant Professor, was named the College of Engineering Outstanding Junior Faculty Member.

**Thomas H. Epps III** was highlighted in the April 27<sup>th</sup> C&EN Career & Employment Article entitled *Spectacular Scientific Talks*.

**Thomas H. Epps III** is among just 39 scientists and engineers throughout the country selected to receive three-year research grants from the U.S. Air Force Office of Scientific Research (AFOSR) Young Investigator Research Program (YIP). The 39 awards total \$12.1 million.

YIP is open to scientists and engineers at research institutions across the U.S. who have earned a doctorate within the past five years and show "exceptional ability and promise for conducting basic research."

**Epps's** research will focus on materials design and fabrication to create conducting membranes for current and next-generation energy generation and storage devices, such as batteries, fuel cells and solar cells. The work will produce new nano-structured soft-material networks for ion-conducting membranes, where these self-assembling networks will overcome many of the limitations found in current membranes, including poor mechanical integrity, poor temperature stability, non-uniform pore sizes and poor chemical compatibility.

## FACULTY NEWS

**Thomas H. Epps III** is also the co-principal investigator with **Millie Sullivan** and a team of researchers to receive a five-year, \$10.5 million grant for a multidisciplinary research program on molecular design of advanced biomaterials from the National Institutes of Health's National Center for Research Resources (NIH-NCRR).

A paper co-authored by **Eric M. Furst**, associate professor, has been selected to receive the *Journal of Rheology* 2008 Publications Award. The award was conferred at the XV<sup>th</sup> International Congress on Rheology in Monterey, California, in August. The paper documents work done by Furst and three of his students on the use of laser tweezers to measure the non-linear rheology of colloidal dispersions. Common examples of such complex fluids include coatings and paints, as well as biofluids such as blood, milk and egg whites. These materials appear homogeneous at the macro-level but are microscopically disordered. The work reported by Furst and his students is an important contribution to the growing field of microrheology, which enables manipulation and characterization at the micro-level. Research was initiated in this emerging field in the mid-1990s. Since then, a number of techniques have been developed to study the linear properties of complex fluids. However, the work done by Furst and his students has expanded the microrheology toolkit to enable the study of non-linear material response, which can be critical in the processing of complex fluids.



**Kelvin Lee**, Gore Professor of Chemical Engineering at the University of Delaware and Director of the Delaware Biotechnology Institute, has been selected as the inaugural recipient of the Biochemical Engineering Journal Young Investigator Award. This biennial award recognizes excellence in research and practice contributed to the field of biochemical engineering by a young community member.

**Lee** received the award and delivered the award lecture at the Biochemical Engineering XVI: Past, Present, and Future of Biochemical Engineering conference, held in Burlington, Vermont on July 5. He has also been invited to compose a review article for the journal.

**Kelvin Lee** is one of the researchers at UD who discovered a new reason why the tall, tasseled reed *Phragmites australis* is one of the most invasive plants in the United States. The other researchers are Thimmaraju Rudrappa, a former postdoctoral researcher at UD who is now a research scientist at the DuPont Company; Harsh Bais, assistant professor of plant and soil sciences; Yong Seok



## FACULTY NEWS

Choi, postdoctoral researcher in the Department of Chemical Engineering; Delphis Levia and David R. Legates, both associate professors in the Department of Geography.

This research team found that Phragmites delivers a one-two chemical knock-out punch to snuff out its victims, and the poison becomes even more toxic in the presence of the sun's ultraviolet rays.

The study, which was published in the June issue of *Plant Signaling & Behavior*, is believed to be the first to report the effects of UV-B radiation on plant allelopathy, the production of toxins by a plant to ward off encroachment by neighboring plants.

Please see [www.udel.edu/udaily/2009/jun/superweed060309.html](http://www.udel.edu/udaily/2009/jun/superweed060309.html) for the complete article.

**Bramie Lenhoff**, Gore Professor, received the American Chemical Society Award in Separations Science and Technology. The award recognizes outstanding accomplishments in fundamental or applied research directed to separations science and technology.

"His hallmark is the merger of the experimental and theoretical methods of biophysics and colloidal science into the chemical engineering framework of process analysis and synthesis," says Stanley I. Sandler, H. B. du Pont Chair of Chemical Engineering at Delaware. "The resulting advances have been critical steps toward setting bioseparations on the same rigorous foundation enjoyed by separations in the traditional chemical process industries."



**Lenhoff** was honored for, among other work, his advances in calculating protein-protein interactions by accounting in detail for the three-dimensional structure of proteins. Most prior methods, **Lenhoff** says, had used colloidal models that neglected molecular anisotropy, or the principle that interactions vary when measured along axes in different directions. "Our computations indicated that the interactions are dominated by a small number of pairwise configurations. As a result, the models suggest that even bulk thermodynamic properties that determine separations behavior are controlled by the molecular recognition phenomena characteristic of biological macromolecules.

"An interesting observation is that the complexity of the interactions is a challenge for molecular simulations, even with modern computational capabilities, but it is precisely this complexity that produces the rich range of properties of protein solutions," **Lenhoff** says.

Another challenge brought about by the complexity of calculating the properties of protein solutions is the need for more efficient measurement techniques. **Lenhoff** has made significant contributions to tackling this problem by combining "sophisticated theory with experiment in the application of self-interaction chromatography to measure solution properties," **Sandler** says. "This method is proving to be an enabling technology for efficient protein interaction measurements by investigators in both academic and industrial labs."

Keeping his finger on the pulse of the industrial world is important for **Lenhoff** in marrying theory and application. "From my perspective, my contact with industry is invaluable in providing a reality check as to whether our research, which is fundamental in nature, is relevant to industrial practice," he says.

**Lenhoff** is the director of Delaware's Center of Biomedical Research Excellence on Membrane Protein Production & Characterization, which has support from a five-year, \$10.4 million grant from the National Institutes of Health. He also serves on the editorial board of *Biotechnology & Bioengineering* and is an associate editor of the *AIChE Journal*. Among his many honors, **Lenhoff** became a fellow of both the American Association for the Advancement of Science and the American Institute for Medical & Biological Engineering in 2003. **Lenhoff** will present the award address before the Division of Biochemical Technology.

**Bramie Lenhoff** received the 2009 ACS BIOT Alan S. Michaels Award in the Recovery of Biological Products. The purpose of the award is to recognize outstanding research and practice contributions toward the advancement of science and technology for the recovery of biological products.

**Bramie Lenhoff** received the College of Engineering Excellence in Teaching Award. The nomination comes from the students and the award is for demonstrated "true excellence in teaching"! Those of you who have had the pleasure of either taking a class from Prof. **Lenhoff** or co-teaching with him will agree that this is well deserved!

### EPSCoR seed grants awarded to environmental researchers

With a focus on environmental issues important to the state, the Delaware National Science Foundation Experimental Program to Stimulate Competitive Research (NSF EPSCoR) office has awarded five seed grants to investigators whose projects aim to solve environmental problems in Delaware. Karl Booksh, Professor,

Chemistry & Biochemistry, and **Raul Lobo**, ChE professor, are developing a "lab on a chip" sensor platform to monitor air quality for volatile organic hydrocarbons (VOC) and ammonia vapor. The tool can be used for continuous monitoring outside animal feed lots, power plants and other settings where emissions may impact quality of life for workers or local residents. **Booksh** and **Lobo** hope to eventually expand their collaboration to include people running chicken houses and engineers modeling the fate and distribution of VOC in the environment.

**Babatunde Ogunnaike** has been appointed the William L. Friend Chair of Chemical Engineering in recognition of his distinguished scientific career and his service to the University of Delaware and beyond.

**Tunde Ogunnaike**, William L. Friend Chaired Professor, was selected to give the McFerrin Lecture at Texas A&M. The McFerrin Lectures were established to enable prominent chemical engineering researchers from throughout the world to visit Texas A&M and interact with students and faculty through lectures on their given areas of expertise.

**Christopher J. Roberts** has been promoted to the rank of associate professor with tenure effective September 1, 2009.

The Alumni Spotlight featured **Chris Roberts** in the Spring 2009 issue of *The Quest, The Undergraduate Research Newsletter*.

**Anne Robinson**, Professor, has been appointed the Associate Chair for Biochemical Engineering in the Department of Chemical Engineering. As Associate Chair for Biochemical Engineering, **Anne** will be coordinating and serving as the faculty advisor for students in the Biochemical Engineering minor; coordinating the crafting and submission of training grants in biochemical engineering (such as IGERT); chairing the ad hoc committee on the biochemical engineering curriculum revision; serve as a point of contact for University and College, as well as external, initiatives that relate to biochemical engineering.



**T. W. Fraser Russell**, Allan P. Colburn Professor of Chemical Engineering at the University of Delaware, was selected to receive the Lifetime Achievement in Chemical Engineering Pedagogical Scholarship Award from the American Society for Engineering Education (ASEE). The award recognizes a "sustained career of pedagogical scholarship which not only caused innovative and substantial changes, but also inspired younger educators to new behaviors which benefit students in chemical engineering." **Russell** was cited for "an outstanding career in education that is characterized by a close relationship with industry and a strong belief that one cannot

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effectively teach engineering without understanding the 'art' aspect of the profession."

"Fraser has inspired and taught generations of engineering students as well as engineering educators," says **Norman J. Wagner**. "His legacy includes multiple textbooks, innovative and creative educational methods, and, perhaps most importantly, scores of well-mentored engineering graduate students for academic careers."

"Teaching has its own satisfaction," **Russell** says. "You can see that you're having an impact when you question students and read their body language. But it's still nice to be formally recognized for my contributions with this award."

**Russell** is especially proud of the teaching fellows program he established more than a decade ago. Modeled on a similar program created by the DuPont Company in 1991, the Shirley and Fraser **Russell** Teaching Fellows Program supports two graduate students each year, one at the University of Delaware and another at **Russell's** alma mater, the University of Alberta in Canada.

**Russell** established an endowment to fund the program in memory of his wife, who died in 1998. "She was a teacher herself," **Russell** says, "so this seemed to be a fitting tribute to her. I deeply regret that she's not here to know about it."

The program provides support for graduate students to teach undergraduate classes under the close supervision of a faculty mentor. "We've had about 25 students go through the program," **Russell** says, "and at least ten of them now have faculty appointments."

**Will Medlin**, who earned his Ph.D. in 2001 and is now teaching at the University of Colorado, recently wrote in an e-mail to **Russell**, "What I learned during my teaching fellow experience with you continues to be a big part of the way I teach. I thought you might like to know that I was just nominated by the engineering college at CU for the top teaching award on campus."

"One of the best things about the teaching fellows program," **Russell** says, "is that it has a positive effect not only on the fellows themselves but also on the other grad students who know them—it generates interactions and fosters discussions about teaching."

His 40-plus years of experience have not kept **Russell** from taking advantage of the latest technology to "get students attention" and "liven up the classroom."

With chemical engineering colleagues **Wagner** and **Anne Skaja Robinson**, professor of chemical engineering, he has set up a Web site to be used in conjunction with their textbook, *Mass and Heat Transfer: Analysis of Mass Contactors and Heat Exchangers*.

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The goal of the interactive site is to improve the thought process engineering students employ as they apply engineering principles to real-world problems.

"The pressure on young faculty to raise research funding is intense," Russell says, "but we can't overlook teaching in the face of that pressure."

**Russell** is a member of the National Academy of Engineering and a Fellow of the American Institute of Chemical Engineers (AIChE). He is the recipient of a number of other honors and awards, including UD's Francis Alison Award.

He earned his bachelor's and master's degrees at the University of Alberta and his doctorate at the University of Delaware. Russell joined the UD faculty in 1964.

**T.W. Fraser Russell** has served as director of the Institute of Energy Conversion, chairperson of the Department of Chemical Engineering, associate dean and acting dean of the College of Engineering, and, most recently, vice provost for research.

**Annette D. Shine**, associate professor, has been elected to the governing Council of the Delaware Association of Professional Engineers (DAPE). The Council of the 6500-member DAPE is the state licensing board for professional engineers, and drafts and enforces laws governing the competent and ethical practice of engineering in Delaware.



photo by Kathy Atkinson

**Millicent Sullivan** is part of the research team to receive a five-year, \$10.5 million grant for a multidisciplinary research program on molecular design of advanced biomaterials from the National

Institutes of Health's National Center for Research Resources (NIH-NCRR). The program will be directed by Thomas P. Beebe Jr., professor in the Department of Chemistry and Biochemistry and director of UD's Surface Analysis Facility. The grant is part of NIH's Centers of Biomedical Research Excellence (COBRE) program, which funds projects to strengthen the research infrastructure and further the research careers of junior science and engineering faculty in this area.

The research team also includes Joseph Fox, Sandeep Patel, Tatyana Polenova, Joel Schneider, Zhihao Zhuang and Neal Zondlo, chemistry and biochemistry; Randall Duncan and Cindy Farach-Carson, biological sciences; **Thomas Epps**, chemical engineering; and Xinqiao Jia, Kristi L. Kiick and Darrin Pochan, materials science and engineering.

The new research center will be organized around five themes in biomaterials research, with each led by one of the 11 junior faculty members. Four of the projects will focus on developing new materials, while the fifth will develop methods to characterize them. Biomaterials are not new, as anything that comes into contact with a part of the body for an extended period of time—for example, contact lenses, hip implants and dental fillings—is considered a biomaterial.

Tom Apple, dean of the College of Arts and Sciences, emphasizes that although UD does not have a medical school, the new center is aligned with the University's commitment to build research relationships with neighboring clinical collaborators. The program will capitalize on the strong synergy that has already been established with the A.I. du Pont Hospital for Children and the Helen F. Graham Cancer Center at Christiana Care Health System.



**Dion Vlachos** has been named the Elisabeth Inez Kelley Professor of Chemical Engineering effective March 1, 2009. Vlachos, who earned his doctorate at the University of Minnesota, joined the UD faculty in 2000 and was named director of the Center for Catalytic Science and Technology in 2008. He is an internationally recognized leader in the field of multiscale

modeling of complex processes, including energy conversion, film growth, nucleation, and biological systems.

**Vlachos** has published some 180 refereed journal papers and seven book chapters, and he has delivered more than 130 invited lectures at locations throughout the world. His research has been supported by a number of agencies, including the National Science Foundation (NSF) and the Department of Energy (DOE). Most recently, a research group led by Vlachos was selected to receive a multi-million-dollar grant from DOE to establish an Energy Frontiers Research Center (EFRC) focusing on the development of innovative catalytic technologies for the efficient conversion of biomass such as trees and grasses into chemicals, electricity, and fuels. (For more information on this, please see Department News.) Vlachos also currently heads a major NSF-funded effort to develop a nanoscale materials design framework and a DOE grant to identify low-cost, nano-sized catalysts that can spur the chemical conversion of liquid fuels into hydrogen for applications ranging from powering cars to heating homes. The named professorship honors Elisabeth Inez Kelley, who attended the Delaware Women's College and later graduated from Drexel Institute of Technology. For many years, she served as assistant and private secretary to the president of Merck Chemical Company.

**Dion Vlachos** has been selected as one of the Top 100 Engineers by the International Biographical Centre for 2009. Dion has also

been appointed to the Editorial Advisory Board of Industrial and Engineering Chemistry Research (I&ECR) Journal of ACS from January 1, 2009 – December 31, 2011 and the Editorial Board of Applied Catalysis A: General from April 1, 2009 – March 31, 2012.



A paper authored by Professor **Richard Wool** has been listed as one of the top three accessed of 2008 in *Soft Matter*, one of several journals published by the Royal Society of Chemistry. Wool's paper, "Self-Healing Materials: A Review," explores the ability of materials to self-heal from mechanical and thermally induced damage. In self-healing systems, there are transitions from hard to soft matter in ballistic impact and solvent bonding and, conversely, from soft to hard matter in high rate yielding materials and shear-thickening fluids used in liquid armor. The paper examines these transitions in terms of Wool's new theory of the glass transition, the twinkling fractal theory (TFT), which quantitatively describes the nature and structure of the glass transition -- that is, from a liquid to a "solid" -- in amorphous materials. Wool is also an affiliated faculty member in the Center for Composite Materials.

An article about **Richard Wool's** Twinkling Fractal Theory, *Glass Molecules Twinkle: 'Twinkling Fractal Theory' Helps Explain Behavior Of Glassy Materials*, was in *ScienceNews* March 18, 2009.

**Richard Wool** was selected to be one of the 2009 Xerox Distinguished Lecturers. The Xerox Distinguished Lecture Series (XDLS) is an annual symposium that serves to recognize the work of leading scientists and engineers and to highlight emerging research in new materials chemistry and materials engineering.

The University of Delaware's Affordable Composites from Renewable Sources (ACRES) program was featured on the Discovery Channel on November 20, 2008. The ACRES program, led by **Richard Wool**, professor of chemical engineering at the Center for Composite Materials, taps into a variety of research fields ranging from genetic engineering, food science, composites manufacturing science, and materials synthesis to mechanics, advanced materials characterization, and computer simulation. Under the ACRES project, soyoil is being used to make affordable and renewable fiber-reinforced composites for high-volume applications.

Potential applications of these innovative materials include the automotive industry, farm machinery and vehicles, the construction industry, where soy-based composites reinforced with natural materials like straw could replace wood composites, and defense, where lightweight, inexpensive, disposable materials are needed.

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**Richard Wool** was invited to be a plenary speaker at the green polymers symposium during the eighth World Congress of Chemical Engineering held August 23-27, 2009, in Montreal. The World Congress will bring together the global chemical engineering community to discuss the most pressing issues of the times. Wool received the invitation as one of the pre-eminent researchers in the growing field of bio-based materials. His research centers on the use of soybean oil and chicken feathers in new bio-based composite materials, including computer circuit boards and hurricane-resistant roofs. Wool is using the bio-based materials in support of several renewable energy projects, such as wind, solar, hydrogen storage and energy efficient housing, as practical solutions to global warming. The research was featured on a recent program on the Sundance Channel titled Big Ideas for a Small Planet and the circuit boards were included in a 2006 technology exhibition at the Science Museum in London.

**Richard Wool** was quoted in a February 25 *Scientific American* story about carbon fiber musical instruments, such as strings.

**Richard Wool** was quoted in a May 5, 2009 *ScienceNOW* Daily News article entitled "You Really Can Catch Lightning in a Bottle" by Phil Berardelli.

## DEPARTMENT NEWS

### University of Delaware launches new energy institute

Attendance at the inauguration of the University of Delaware Energy Institute (UDEI) at Clayton Hall on September 19 topped 300, with participants at the event representing not only UD but also state and local government and a broad array of private companies, public transit providers, hospitals, utilities, conservancies and foundations.

The purpose of the new institute is to create and integrate new solutions to challenges in energy sufficiency and sustainability.

The daylong program included discussion of a collaborative approach to global energy challenges by U.S. Secretary of Energy



Photo by Kathy Atkinson

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Samuel Bodman, highlights of an approach to securing our nation's energy future by U.S. Sen. Thomas Carper (D-Del.) and an overview of UD's Initiative for the Planet by University President Patrick Harker. U.S. Rep. Michael Castle (R-Del.) also spoke briefly during an impromptu post-luncheon session.

**Richard Rocheleau**, EG '73 PHD '80, who earned bachelor's and doctoral degrees in chemical engineering at UD, gave a special luncheon presentation on the Hawaii Clean Energy Initiative. Other speakers included Delaware Lt. Gov. John Carney; Richard Swanson, president of SunPower; Peter Mandelstam, president of Bluewater Wind; and Tom Gage, CEO of AC Propulsion.

In opening the program, UDEI Director **Mark Barteau** referred to the institute as "a portal to energy research and education at UD." He emphasized that UDEI will also play an important role in engagement. "We're not just staying in the lab and the classroom," he said, "but getting out there and trying to connect outside the walls of the University."

Barteau, who also serves as senior vice provost for research and holds the Robert L. Pigford Chair of Chemical Engineering at UD, was instrumental in establishing the institute in 2007.

Harker emphasized that UDEI is an action step on UD's Path to Prominence™, which includes, as one of six milestones, the Initiative for the Planet.

In addition, the institute will take a leadership role in major grant proposals and provide seed grants to launch innovative energy projects.

If developing alternative energy sources and mitigating impacts on the environment were the mandates of the day, partnerships were proposed as the means to those ends.

Projects include advanced biofuels such as biobutanol, sustainable building materials, advanced materials for photovoltaic modules and cellulosic ethanol.

Bodman presented a number of government initiatives aimed at improving energy efficiency and developing renewable energy technologies. "The bottom line is that to address this major energy challenge, we need everyone," he said. He referred to UD, with its many contributions to the field of energy research, as a valued partner.

"For this collaboration to continue on the scale that we need," Bodman said, "we must invest in the next generation of leaders, mathematicians, scientists and engineers to steer us through the technological challenges facing us. By providing a forum for fostering collaboration, this university and UDEI will help lead us toward a cleaner, more affordable, more secure energy future."

Both Carper and Castle echoed Bodman's emphasis on the importance of collaboration and on Delaware's potential to play an important role in the nation's energy future.

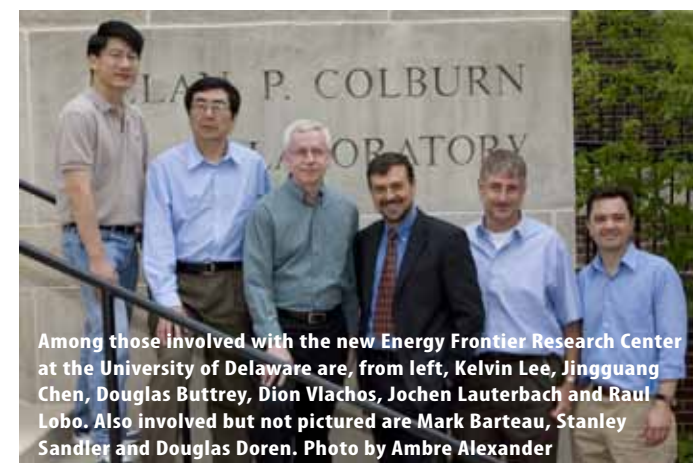
"With the right kind of collaboration across disciplines and with the establishment of meaningful projects," Carper said, "there is much we can do to help meet America's need for national energy security."

"We have an opportunity here to be leaders we have the expertise, we have the corporate background, and we are a small flexible state where people care about making a difference," Castle said.

In closing the program, Barteau pointed to a number of other energy-related centers at UD whose ongoing activities will complement the efforts of UDEI. These include the new Center for Carbon-Free Power Integration, which will be housed within the College of Marine and Earth Studies, as well as the Institute of Energy Conversion, the Center for Energy and Environmental Policy, the Center for Fuel Cell Research, the Center for Catalytic Science and Technology, and the Solar Power Program.

"We need a full range of technologies to meet our energy and environmental needs," Barteau said. "But technology alone is not enough. We also need commitment, and we started the UDEI because we believe that failure is not an option."

### UD Awarded Multi-million Grant to Establish DOE Energy Frontier Research Center



Among those involved with the new Energy Frontier Research Center at the University of Delaware are, from left, Kelvin Lee, Jingguang Chen, Douglas Buttrey, Dion Vlachos, Jochen Lauterbach and Raul Lobo. Also involved but not pictured are Mark Barteau, Stanley Sandler and Douglas Doren. Photo by Ambre Alexander

The University of Delaware will be home to a new Energy Frontier Research Center (EFRC) focusing on the development of innovative catalytic technologies for the efficient conversion of biomass such as trees and grasses into chemicals, electricity, and fuels.

The UD EFRC, which the U.S. Department of Energy (DOE) plans to fund at a level of \$17.5 million over five years, will be led by Dion

Vlachos, Elisabeth Inez Kelley Professor of Chemical Engineering and director of the Center for Catalytic Science & Technology (CCST). The program will also have two co-directors: Jingguang Chen, Claire D. LeClaire Professor of Chemical Engineering and interim director of the University of Delaware Energy Institute (UDEI), and Raul Lobo, professor of chemical engineering.

The Catalysis for Energy Center (CEC) aims at developing innovative, science-based heterogeneous catalytic technologies for transformation of biomass materials into fuels, chemicals, and electricity. Biomass offers a unique opportunity for a sustainable society with unprecedented impact on the US economy, energy security and independence. For this vision to be realized, major scientific hurdles need to be overcome due to the inherent complexity of biomass materials and associated processes. Reactions typically take place in a complex, multiscale environment that renders the rational design of these processes and catalysts very challenging.

The overall objectives of the CEC-EFRC are to develop the enabling science that can eventually lead to viable, economic operation of biorefinery technologies from various biomass feedstocks and to educate the workforce needed for these new positions that can lead to further, sustainable economic growth of the US.

Since biomass feedstocks vary considerably with source, and the number of candidate reactions is huge, the CEC will mainly focus on developing a fundamental science base for controlling the scission and formation of C-H, O-H, C-C and C-O bonds by choosing a select number of reactions from a representative group of processes. Our overarching goal is that the methods and concepts developed herein could form the foundations of modern biorefineries. The cornerstone of the CEC lies in advancing catalysis and electrocatalysis and integrating them with reactors into processes in order to deliver innovative technologies for the conversion of feedstocks of cellulose, sugars, produced, e.g., from the hydrolysis of biomass, and smaller polyols. We have assembled an interdisciplinary team of faculty that brings together the necessary expertise and synergism to tackle this – at first glance – insurmountable problem.

We plan to exploit three complementary catalytic technological platforms anticipated to play key roles in biorefineries and energy/chemical production: Non-aqueous phase processing to produce fuels, aqueous phase processing to selectively produce chemicals, and direct conversion of biomass derivatives to electricity using novel direct carbon fuel cells.

In order to overcome the scientific barriers arising from handling these feedstocks, the CEC will develop three crosscutting research thrusts, namely multiscale modeling to handle the inherent complexity of the environment in which reactions take place, hierarchical multiscale materials that are hydrothermally stable,

possess tunable porosity with bio-inspired functionality grafted, and minimize molecular traffic resistance while allowing shape selectivity, and cutting-edge characterization methods to probe reactions often under in situ environment. Research at the Brookhaven National Laboratories will be central for in situ catalyst characterization of the CEC.

The CEC outcomes will include a fundamental understanding of the reaction mechanisms of representative biomass thermochemical transformations, a rational framework for multiscale hierarchical catalytic materials and process design, science-based innovative technologies for biomass utilization, education of students and postdocs, and effective outreach/dissemination pathways to other scientists and the public.

UD faculty members of the new center include D.G. Vlachos, J.G. Chen and R.F. Lobo, M.A. Barteau, J.A. Lauterbach, D.J. Buttrey, D.J. Doren, S.I. Sandler, and K.H. Lee. The center will also include faculty from the University of Pennsylvania (R.J. Gorte and J.M. Vohs), Lehigh University (M.A. Snyder), University of Massachusetts, Amherst (S.M. Auerbach, G.W. Huber), University of Minnesota (M. Tsapatsis, A. Bhan), California Institute of Technology (M.E. Davis), University of Southern California (H. Wang), and Brookhaven National Laboratories (A. Frenkel).

### Merck Donates 30K Chemical Engineering

The University of Delaware Department of Chemical Engineering has received a gift of \$30,000 from Merck & Co., Inc. to provide support for first-year graduate students. The gift was bestowed by Annette (Murray) Orella, a 1983 CHEG alum who is with Merck's Science and Technology Development group.

Three groups at Merck contributed to provide the support: Science and Technology, Global Pharmaceutical Commercialization, and EMEAC (Europe, Middle East, Africa, and Canada) Operations. "All three [of the people heading these organizations] were very happy that they were able to join together to support the grant so needed by the department," Orella said.

CHEG and Merck have a long-term relationship with many facets, including fellowships, funding to student organizations, scholarships, research grants, gifts to support undergraduate research, student tours of Merck plants and lecture exchanges. The company also has a representative on the department's Advisory Council and employs a large number of UD grads.



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"This funding, provided upon a special request of the faculty, shows Merck's strong commitment to higher education at the University of Delaware" said Norman Wagner, Stiles Professor and Chairperson. "It will be used to help fund the 2008-09 incoming graduate students. Many of our best graduates, both bachelor's and PhDs, now enjoy exciting, rewarding careers world-wide with Merck. We are extremely pleased by the continued tradition of strong support of our Merck alumni for the future of Chemical Engineering."



Prof. Bruce Gates (center), plenary speaker and co-founder of CCST, joins Mark Barteau (left), former CCST director, and Dion Vlachos, current director, at the center's 30th anniversary research review on Oct. 23. Photo by Sheila Boulden

### Center for Catalytic Science and Technology marks 30<sup>th</sup>

A massive change is taking place as America prepares to switch its energy and chemical raw materials needs from dwindling natural gas and oil to coal and other plentiful solid fossil fuels.

While this sentence could easily be the lead to a 2008 news story, it was actually the introduction to a 1977 proposal that resulted in the establishment of the Center

for Catalytic Science and Technology (CCST) at the University of Delaware the following year.

The center celebrated its 30<sup>th</sup> anniversary at the 2008 CCST Research Review, held at UD's Clayton Hall Conference Center October 23. The event brought together close to 100 researchers in catalytic science and technology to share their latest work.

As the center marked this milestone, CCST Director **Dion Vlachos** acknowledged in his welcoming remarks that while much has changed in the past three decades, the issue of energy, which drove the founding of CCST, has come full circle. "Once again, we're focusing on energy, but we're taking it in new directions," he said, "with an emphasis on fuel cells and renewable energy systems."

He also noted that instrumentation has become much more advanced since the 1970s. "We have a lot of computer horsepower now that we didn't have then," he said, "and that has changed how we do research."

The other major change he has observed is in scale: "Initially, our work focused on large systems," he said. "Now, there's a trend toward miniaturization, with growing interest in nanotechnology."

CCST was started with four faculty members--Jim Katzer, Bruce Gates, Al Stiles, and George Schuit--and has since grown to

include 12 faculty from the Department of Chemical Engineering, which houses the center, as well as from the Department of Chemistry and Biochemistry and the Department of Materials Science and Engineering.

Gates, now Distinguished Professor of Chemical Engineering at the University of California Davis, delivered the plenary lecture at the review. His talk, "A Molecular Foundation for Surface Catalysis: Supported Catalysts Synthesized from Organometallic Precursors," focused on the results of recent work that had its roots in CCST.

One constant for CCST over the past three decades has been industrial involvement. The 1977 proposal referred to the most successful researchers in the field as being "those who were closely coupled to industrial colleagues who could translate the academic results into industrial practice."

The center continues to have a strong connection to industrial practice, with ties forged through the Center's Industrial Sponsors Program, industrially supported grant and contract research, collaborative projects with industrial scientists and engineers, and industrial sabbaticals and exchanges of research personnel. "This continues to be an important avenue for funding, research ideas, education enhancement, and collaboration," Vlachos said.

**Mark Barteau**, Robert L. Pigford Chair, former director of CCST and now UD's senior vice provost for research and strategic initiatives, has the longest tenure as a member of the center, including attending 27 previous annual research reviews.

"It has been fascinating to watch the evolution of the field, in many cases led by CCST researchers, over the past quarter-century," Barteau says. "I think the most enduring legacy of the center is its commitment to high-quality, fundamental research, even at times when fundamental catalysis was not in vogue."

Article by **Diane Kukich**

### ExxonMobil Corporation Donates to UD Chemical Engineering Department

The University of Delaware Department of Chemical Engineering has received a donation of \$13,800 from ExxonMobil Corporation. The funds were delivered by CHEG alumni Dr. Tom Degnan (PhD76), Dr. Prasanna Joshi (PhD98), and Rebekah Cooper (B01), who were on campus recruiting for the company. The grant is one of 85 granted to engineering departments throughout the country to support a variety of educational purposes, including scholarships, field trips, visiting speakers, equipment purchases, and student and faculty travel to academic-related activities. The UD Department of Mechanical Engineering also received a grant.

"ExxonMobil has been and continues to be an important corporate sponsor of the Chemical and Mechanical Engineering departments at the University of Delaware," said Norman Wagner,

Stiles Professor and Chairperson. "As importantly, the over 80 CHEG alumni working in ExxonMobil are having a significant impact on our nation's energy future. We are proud of their achievements and really benefit from their continued support for the Department, College and University."

The funds from ExxonMobil will provide partial support for the Chemical Engineering Industrial Sponsors Honors Day Awards.

### Two UD chemical engineers named to AIChE's top 100

The American Institute of Chemical Engineers (AIChE) has named the University of Delaware's **Mark Barteau** and the late **Arthur Metzner** to its list of "100 Chemical Engineers of the Modern Era."

Barteau is the Robert L. Pigford Chair of Chemical Engineering, former director of the University of Delaware Energy Institute, and senior vice provost for Research and Strategic Initiatives at UD. Metzner was H. Fletcher Brown Professor Emeritus of Chemical Engineering at the time of his death in 2006.

The list was compiled by AIChE's Centennial Celebration Committee, and the awards will be conferred at the institute's annual meeting, to be held in Philadelphia from Nov. 16-21. The meeting program includes a series of centennial-related events.

The select group, which is credited with "guiding the profession into the new century," is divided into three categories: achievement, leadership and new frontiers. Both Barteau and Metzner were cited for their achievements.

Barteau was recognized for his work in surface science, metal and metal-oxide catalysis, surfaces and spectroscopic characterization, and computational chemistry techniques. Metzner was cited for his work in turbulent/porous media flows and mixing non-Newtonian fluids. He also was recognized for his service to AIChE.

Barteau and Metzner join an elite group on the list, which includes the inventors of portable dialysis machines and automotive catalytic converters, as well as pioneers in areas ranging from gene modification, controlled drug-release systems, and chemical separations to water resources management, air quality and climate change.

Metzner, who was honored with a memorial symposium in 2007, is remembered as a distinguished educator and researcher. A native of Alberta, Canada, he received his bachelor's degree from the University of Alberta and his doctorate from the Massachusetts Institute of Technology. He joined the University of Delaware faculty in 1953.

Metzner's work is documented not only in some 130 research publications but also in textbooks, where his name appears on the Otto-Metzner correlation for power consumption and the White-

Metzner equation. In addition to AIChE, he won awards from the Society of Rheology, the American Society for Engineering Education, and the American Chemical Society. Metzner was elected to the National Academy of Engineering in 1979 and received UD's highest faculty honor, the Francis Alison Award, in 1981.

Barteau holds a bachelor's degree from Washington University in St. Louis and master's and doctoral degrees from Stanford University. He joined the UD chemical engineering department in 1982. Barteau is a member of the National Academy of Engineering (2006) and a past recipient of the Alison Award (2004). In addition, he has won a number of awards from AIChE, the Catalysis Society, and the American Chemical Society.



### UD wins NSF grant to develop nanoscale materials design framework

Two faculty in the Department of Chemical Engineering have received a grant from the National Science Foundation to develop a computational framework for design and control of materials formed by self-assembly processes. Led by **Dionisios Vlachos**, professor of chemical engineering, the team includes **Babatunde Ogunnaike**, the William F. Friend Chair of Chemical Engineering at UD, as well as Markos Katsoulakis from the University of Massachusetts and Petr Plechac from the University of Tennessee.

The four-year \$860,000 grant was awarded through the agency's Cyber-Enabled Discovery and Innovation (CDI) program. CDI is designed to create revolutionary science and engineering research outcomes through the use of computational concepts, methods, models, algorithms and tools.

According to Vlachos, the development of the proposed framework is driven by a technologically high-impact area: the engineering of materials formed via spontaneous self-assembly. Self-assembly enables "bottom-up" fabrication of nanomaterials from individual building blocks such as atoms, molecules and nanoparticles for applications ranging from solar cells and magnetic storage media to catalysts and membranes.

The work is "cyber-enabled" in that it will involve the use of computers as not only a computational tool but also a means to develop virtual experiments and a way for researchers at multiple locations to work together. In addition, the project will bring a new perspective to the education of students through the exchange of knowledge between applied mathematicians and chemical engineers.

## DEPARTMENT NEWS

### 3 UD connections among 50 'foundation age' chem engineers

Two former University of Delaware faculty members, as well as the first recipient of a doctorate from UD, have been named to the American Institute of Chemical Engineers' list of "50 Chemical Engineers of the Foundation Age." The list was compiled in conjunction with AIChE's centennial celebration.

**Allan Colburn, Robert Pigford** and **James Westwater** are among those who "founded the profession and established the discipline in the first half of the century."

The three not only share this recognition from AIChE but also overlap in an important segment of the history of chemical engineering at UD.

Although the first degree in this field was awarded at UD in 1915, the Department of Chemical Engineering was not officially established until Colburn joined the faculty in 1938. Building on his doctoral experience from the University of Wisconsin and an effective collaboration he had established with Dr. Thomas Chilton of the DuPont Co., Colburn initiated an extensive research program at UD and by the late 1940s had hired enough faculty to start a significant undergraduate program.

In the late 1940s, Colburn became University provost and coordinator of scientific research and turned over the building and operation of the department to Pigford, whom he had recruited from DuPont. Pigford built on Colburn's pioneering work in heat transfer to establish a research effort that integrated experiments and mathematical models.

Westwater received his master's in chemical engineering in the fledgling department in 1943, and in 1948 he became the first student to earn a doctoral degree in this discipline from UD, completing his dissertation research under the direction of Pigford. Westwater then joined the faculty at the University of Illinois, where Pigford had earned his doctorate.

After spending his entire career at Illinois, Westwater was honored by the establishment of a professorship in his name there. He was elected to the National Academy of Engineering in 1974 and recognized as one of 30 distinguished chemical engineers at AIChE's 75<sup>th</sup> anniversary.

Both Colburn and Pigford are members of the National Academy of Engineering and have been honored with professorships in their name at UD. Colburn's name is also associated with the Allan P. Colburn Laboratory, which was completed in 1968 and now houses the Department of Chemical Engineering. In addition, he served as acting president of UD in 1950 and as provost from 1950-55. In 1979, Pigford was the first recipient of the Francis

Alison Award, UD's highest faculty honor, and he served as a member of the UD Board of Trustees from 1982 until his death in 1988.

All three are mentioned in John Munroe's book *The University of Delaware: A History*. In Chapter 10, "The Postwar University: Reorganization and Reorientation," Munroe writes, "Graduation exercises in June 1948 were made memorable by the awarding of the first earned doctorate in the university's history to James Westwater in chemical engineering."

Munroe goes on to write about the increasing emphasis placed on research in the postwar era: "The importance of research was recognized by promotion of Allan Colburn in 1947 to a new position, assistant to the president and adviser on research, with a salary of \$10,000, second only to President Carlson's salary, which was raised to \$15,000 in the same year. His new role allowed Colburn's enthusiasm as a promoter to flow over the bounds of his old department, of which Robert Pigford, another very able recruit from the Du Pont Company, now became chairman."

"These individuals are legendary in the field, and we're extremely proud that they are part of the history of the University of Delaware," says Norman Wagner, Alvin B. and Julia O. Stiles Professor of Chemical Engineering and department chairperson. "In being named to this list, they join 47 others who have become 'household names in chemical engineering labs and industry.'"

The list of 50 includes leaders of key government programs, inventors of products such as Velox photographic paper, the developers of important industrial processes and pioneering educators. **Article by Diane Kukich**

### UD team takes top honors in math modeling contest

For the second year in a row, a team of students from the University of Delaware has placed in the top category of the Mathematical Contest in Modeling (MCM), sponsored by the Consortium for Mathematics and Its Applications (COMAP). **Jeff Bosco** and **Zack Ulissi**, both seniors in chemical engineering, and Bob Liu, also a senior, were members of the UD team receiving an "Outstanding" designation for their solution.

Their finish placed them in the top one percent of the 1,675 teams worldwide that finished the online contest, and their solution paper will be published, along with the eight others that earned outstanding rankings, in *The UMAP Journal*. The publication will include commentary from the authors and other judges.

Ulissi and Liu were also on last year's UD team that received a rank of Outstanding.

Solution reports are scored by a distinguished panel of judges who sort the solutions into four categories: Outstanding (top 1 percent worldwide), Meritorious (next 18 percent worldwide), Honorable

Mention (next 18 percent worldwide), and Successful (remaining 63 percent). Fewer than half of the teams that begin the contest finish successfully.

The contest requires groups of three students to spend four days working on an open question contributed by a panel of experts. Past examples have included analysis of fingerprints, classification of insect species, and evacuation planning. Students can use any inanimate resource to develop and analyze mathematical models to solve the problem.

Contest participants choose from one of two questions. Question A in the 2009 contest asked students to develop a model for traffic circles, while Question B asked them to analyze the impact of a nation switching from land-line telephone usage to cellular telephone usage. UD's winning team answered Question B.

Two other UD teams participated and received "Successful" designations: Brendon McCracken, Camilo Perez and Frank Shen for Problem A; and Soham Gandhi, **Dariusz Murakowski** and Kyle Thomas for Problem B.

### The University of Delaware is ranked one of the nation's top producers of graduates in chemical engineering

The American Chemical Society (ACS) ranked UD's Chemical Engineering Department 7<sup>th</sup> in the nation in the number of chemical engineering doctoral graduates. UD regularly appears in the top ten in these annual rankings. The ACS tabulates graduation data from more than 600 colleges nationwide. The organization lists the top producers of chemical engineering graduates in a report from its Committee on Professional Training. Norman Wagner, Alvin B. and Julia O. Stiles Professor of Chemical Engineering and chairperson of the Department of Chemical Engineering, said he was not surprised to see his department in the ACS's top 10. "This is a top 10 chemical engineering department in terms of faculty, research and funding for research, and that's directly reflected in the funding that this department brings in to itself and to the University," Wagner said. He notes chemical engineering's doctoral students graduate to successful careers in academia and industry. "The kinds of places that come here to recruit, it's a long list of the best companies in the world," he said.

### Society establishes Arthur B. Metzner Early Career Award

The Society of Rheology has established a prestigious award for young rheologists in the name of the late **Arthur B. Metzner**, H. Fletcher Brown Professor Emeritus of Chemical Engineering at the time of his



death in 2006. Metzner is internationally recognized as a pioneer in the field of rheology, the science of deformation and flow of matter.

The award, which will consist of a medal and a \$7,500 honorarium, will be given annually to a member of the society who is younger than 35 and who has distinguished him or herself in rheological research, practice, or service. Recipients will be chosen by an appointed committee.

Establishment of the award was celebrated at the 81<sup>st</sup> annual meeting of the Society of Rheology, Madison, Wis., held October 18-22, 2009.

"This award honors Art's dedicated mentoring of young rheologists here at Delaware as well as internationally," **Norman Wagner** stated. "I can speak from my own experience that Art took a deep, personal interest in the careers of young scientists, serving as a mentor, a friend, and an example of a true scholar to many of us around the globe."

Metzner, who was honored with a memorial symposium in 2007, is remembered as a distinguished educator and researcher. Metzner's work is documented not only in some 130 research publications but also in textbooks, where his name appears on the Otto-Metzner correlation for power consumption and the White-Metzner equation. During his lifetime, Metzner won awards from all of the major professional organizations in his field. Metzner was elected to the National Academy of Engineering in 1979 and received UD's highest faculty honor, the Francis Alison Award, in 1981.

**Beth Cheney, Sarah Mastroianni** and **Michael Mayeda** were three of eight graduate students from UD's IGERT Program in Sustainable Energy from Solar Hydrogen who visited the Independence School in Pike Creek to demonstrate the use of solar power. The solar hydrogen IGERT program is characterized by a commitment to outreach.

**Marc Birtwistle**, PhD09 and **Ryan Snyder**, B01, were two of the students interviewed to provide their take on the future of our discipline in an article entitled "Chemical Engineering in the Next 25 Years" (*Chemical Engineering Progress*, Nov. 08).

UD's graduate program in **chemical engineering** is ranked 9<sup>th</sup> in the nation, tied with the University of California at Santa Barbara, and the College of Engineering is ranked 46<sup>th</sup>, tied with Case Western Reserve University and Washington University in St. Louis according to *U. S. News & World Report*.

## STAFF HIGHLIGHT



### George Whitmyre: Lab Manager and Renaissance Man

George Whitmyre may be listed in the University of Delaware directory as Laboratory Manager for the Department of Chemical Engineering, but that

designation tells little about the man behind the job title.

Whitmyre is not only a skilled machinist but also a competitive ice dancer and a talented musician, as well as an inventor and an entomologist.

Armed with a degree in zoology from Penn State University and four years of experience as a medical entomologist, Whitmyre arrived at the University of Delaware in 1971 to start work on a master's degree in entomology and applied ecology. He completed the degree and worked for several months in the USDA Beneficial Insects Laboratory on the UD campus, but his career took a different turn when he realized that the equipment he had worked on as a graduate student fascinated him more than the insects did.

"I was working on aerial applications of concentrated pesticides," Whitmyre explains, "and I ended up doing a lot of machining in my efforts to control the 'drift' of the tiny droplets we were spraying. I had already received some training as a machinist in a side job I had with a production machine shop in Mechanicsburg, Pa., and it all came together for me when I took a job in the Department of Chemical Engineering as a research machinist and instrument maker."

Whitmyre went on to become Laboratory Manager, a job that suits his love for problem solving and safety management. His work is different every day, but it usually involves troubleshooting equipment problems and conducting hazard reviews of the facilities and the experiments conducted in them.

One of his most significant projects was coordinating the renovation of Colburn Laboratory in the early 1990s. "It was a long process," Whitmyre says, "but it resulted in the department having the needed infrastructure."

Whitmyre has been actively involved with various national safety groups, including the Campus Safety, Health & Environmental Management Association (CSHEMA) and the National Safety Council Research, Development, and Emerging Technologies Section.

"These groups have provided me with access to many agency, academic, and industrial research laboratories that have enabled us to solve problems and upgrade our safety systems," he says. In turn, Whitmyre has taught safety-related short courses, presented papers at conferences, and contributed to newsletters.

Outside work, his two passions are ice dancing and steel drums. Whitmyre learned to skate in the 1970s and has taken 29 semester-long skating classes at UD since then. He also practices at the Skating Club of Wilmington. "Skating is my workout," he admits. "It keeps me in shape."

Whitmyre's interest in steel drums is not only musical but also mechanical. With Harvey Price, Assistant Professor of Music at UD, Whitmyre has patented a method for mass-producing the drums, and he is working on an automated method for tuning them. He also plays just to entertain himself.

And what about his original career choice of entomology? The only vestige of Whitmyre's interest there is a framed set of butterfly specimens hanging on the wall in his office in Colburn Lab. But he has no regrets. "I love what I do here," he says. "My job is all about change and helping people adapt their equipment and experimental setups to the changing needs of the research we're doing."

His help is highly valued by the faculty in the department. "George was instrumental in getting my research laboratory up and running quickly and safely," says Assistant Professor **Thomas Epps**. "In addition to working with the electricians, plumbers, and other service vendors, he provided valuable advice on equipment purchases and laboratory setup. George has continued to be a trusted resource for my research group for matters such as safety, equipment purchases, and vendor information, as well as being available for general 'how to?' questions."

"Hundreds of undergraduates, graduate students, faculty, and visitors have been well served by George's dedicated work in designing, building, and maintaining our undergraduate teaching laboratories as well as our graduate research laboratories," says Department Chairperson **Norm Wagner**. "Besides providing basic infrastructure support for teaching and research, George has been an excellent safety officer, training generations of students in laboratory safety and providing a safe and efficient workplace."

"He is also a key member of the Colburn family," **Wagner** continues, "and he has helped many visitors as well as students and faculty over the years. I'm sure many of the alumni reading this will remember the time that George helped with setting up a laboratory experiment or provided expert guidance on safe laboratory practice or just helped with office furnishings. However, most of George's work is behind the scenes, including daily maintenance of Colburn lab and the undergraduate laboratories, as well as responding to such problems as roof leaks and power outages at all hours of day and night. All of us who have worked or studied in Colburn lab owe George a debt of gratitude for his remarkable dedication to the Department's teaching and research mission, as well as the social, family atmosphere in Chemical Engineering."

Article by Diane Kukich

## Department Renovates Undergraduate Laboratory

A \$280,000 grant from the Unidel Foundation has enabled the Department of Chemical Engineering to upgrade and expand the capabilities of its undergraduate teaching laboratory.

"The lab is one of the key components of undergraduate education," says Professor **Jochen Lauterbach**, "because it enables students to see the connections between the equations they learn in the classroom and the hard data that emerges from experiments."

According to **Lauterbach**, the renovation was needed because some of the equipment in the lab was worn and outdated. In addition, the funds enabled new experimental capabilities to be added, including a fuel-cell testing station and three fundamentals of measurements stations that can be used in the lab course and for classroom demonstration.

"We want to make sure that the physical facility covers the key components of the chemical engineering curriculum," **Lauterbach** says. "Right now, those include bio, energy, and materials."

He emphasizes that flexibility has been built into the experimental setups to enable faculty to vary the required projects from year to year as well as to meet their individual teaching styles and interests.

"We're very grateful for this generous Unidel grant," he says. "This laboratory enables us to provide our students with hands-on instruction that's critical to a well-rounded education in chemical engineering."

The Unidel Foundation was founded in 1939 by Amy Elizabeth du Pont in memory of her father, Eugene du Pont, former head of the DuPont Co. Unidel gifts have been to support a prestigious scholarship program, launch innovative initiatives in undergraduate education, renovate signature buildings on the university campus, establish endowed faculty chairs, and create UD's nationally recognized Honors Program.



The renovated 6-inch glass distillation column in our Unit Operations Lab



Another view of the renovated 6-inch glass distillation column in our Unit Operations Lab

Equipment in the renovated lab includes separate equipment racks for Fundamentals of Temperature, Pressure, and Flow Measurements, along with a Joule-Thompson Effect experiment. A new 3" Distillation Column and Process Control System is under construction, and the Vapor-Liquid Equilibrium rack, 6" Methanol Distillation column, and the Heat Exchanger experiments are all upgraded.

Article by Diane Kukich

## Department Hosts Undergraduate Researchers in Energy Program

A grant from the National Science Foundation's Research Experiences for Undergraduates (REU) Program is enabling 11 students from institutions throughout the country to spend the summer at the University of Delaware investigating energy-related issues.

The program, *Chemical Engineering Research in Energy and Sustainability*, exposes participants to the full spectrum of energy areas, from traditional petroleum to solar power, fuel cells, and biofuels.

"The energy-related issues of the 21<sup>st</sup> century are multi-faceted, and the chemical engineering profession is in an excellent position to tackle many of these problems," says Professor **Jochen Lauterbach**, Co-Director of the program, which is now in its second year.

The summer research program addresses energy and sustainability through two tracks, one focusing on catalytic materials for alternative energy sources and the other on nanostructured materials for energy reduction. Ten ChEG faculty are advising the undergraduate participants, with about half of the students co-advised by two faculty members.

In addition to their work in the labs, the students are provided with a number of enrichment opportunities, including visits to companies working in energy-related areas, communication and presentation skills workshops, and brownbag lunches with the ChEG graduate students.

The students also participate in various activities with several other groups of undergraduate researchers on campus for the summer, in addition to interacting with the students in UD's multidisciplinary solar hydrogen IGERT program.

The 2009 energy REU participants include four women and seven men from schools in ten states, from New Jersey to California. "We received more than 100 applications from well-qualified undergraduates," says **Sharon Anderson**, Program Coordinator. "I think this shows the tremendous interest in the field of energy on the part of young engineers."



2009 NSF-REU Summer Research Students

Recruitment efforts at UD place particular emphasis on Historically Black Colleges and Universities (HBCUs), as well as on predominantly undergraduate institutions. "We're working hard to achieve diversity in the

program," says Assistant Professor Thomas Epps, Program Co-Director. "It's very important that we attract members of groups traditionally underrepresented in engineering to expose them to research and to plant the seed that everyone can achieve success in research."

This year's participants include three African American students, two of whom are from HBCUs. In addition, Derrick Swinton, Associate Professor of Chemistry at Lincoln University (an HBCU), is participating in the program as a visiting faculty member and working in collaboration with Professor Michael Mackay.

NSF's stated goal for the REU program in general is "to expand student participation in all kinds of research—whether disciplinary, interdisciplinary, or educational in focus—encompassing efforts by individual investigators, groups, centers, national facilities, and others. The program seeks to attract a diversified pool of talented students into careers in science and engineering and to help ensure that they receive the best education possible."

The opportunity to "get a feel for what research is like" is what attracted Kathryn Whitaker, a rising senior at Rowan University in New Jersey, to the program. Chris Wolcott, a rising senior at the Illinois Institute of Technology, looked at several REU programs before choosing the one at UD. "I really liked the theme of this program," he says.

Lauterbach and Epps aren't surprised. Their program web site references remarks made by Dr. Raymond L. Orbach, Under Secretary for Science, U.S. Department of Energy: "one...of the biggest challenges we face as Americans today and in the coming decades is that of energy security... Current technologies cannot meet this challenge, and incremental improvements in these technologies will not suffice. We need transformational discoveries, leading to what I call disruptive technologies—technologies that fundamentally change the rules of the game—and that means we need fundamental breakthroughs."

Programs like the ChEG REU program are enhancing diversity while training students who may someday be doing research that helps to meet the challenges cited by Orbach and make the needed breakthroughs.

Article by Diane Kukich

## 2009 NSF-REU Summer Research Students

### Robert Jackson, MIT

Advisor: Dion Vlachos

Project Title: Biomass Conversion to Fuels

### Robert Jones, Lincoln University

Advisors: Michael Mackay/Thomas Epps

Project Title: Characterization of the hole conducting layer in polymer based solar cells

### Thomas Langel, University of Wisconsin

Advisors: Raul Lobo/Eric Furst

Project Title: Modified aqueous gels for conducting devices

### Ryan Niles, University of Florida

Advisors: Norman Wagner/Michael Mackay

Project Title: Directed Self Assembly of Photonic Nanomaterials

### Shannan O'Brien, Manhattan College

Advisor: Dion Vlachos

Project Title: Systems design for distributed energy generation

### Thomas Ronan, University of Notre Dame

Advisor: Michael Mackay/Thomas Epps

Project Title: Nanoparticle self assembly in polymer-based photovoltaic devices

### Jasmine Smith, Delaware State University,

Advisor: Thomas Epps

Project Title: Orienting Block Copolymer Thin Films

### Karen Tschinkel, Manhattan College

Advisor: Jinguang Chen

Project Title: Electrocatalysts for hydrogen PEM fuel cells

### Kathryn Whitaker, Rowan University

Advisor: Jochen Lauterbach

Project Title: High-throughput analysis of NH<sub>3</sub> decomposition catalysts

### Christopher Wolcott, Illinois Institute of Technology

Advisor: Jochen Lauterbach

Project Title: Spectral imaging of soft materials libraries

### Alexander Young, Harvey Mudd College

Advisor: Antony Beris

Project Title: Modeling of drag reducing agents

May 9, 2009

## Department Awards

**Michael Albani** received the American Institute of Chemical Engineers Junior Award.

**Rebecca Pagels** received American Institute of Chemical Engineers Senior Award.

**Stanley Herrmann** received American Institute of Chemical Engineers Sophomore Award.

**Matthew Helgeson** received the Center for Composite Materials R. L. McCullough Scholars Award.

**Alejandrina Campanella** received the Center for Composite Materials Scholarship Award.

**Katherine Danner** and **James McGovern** received the Center for Composite Materials Undergraduate Research Award.

**Anshu Arya**, **Jeffrey Bosco** and **Zachary Ulissi** received the Chemical Engineering Alumni Laboratory Award.

**Marco Bedolla-Pantoja**, **Kevin Brew** and **Daniel Walls** received the Chemical Engineering Class of 1950 Scholarship.

**Timothy Bogart** and **Parag Jalan** received the Chemical Engineering Class of 1952 Scholarship.

**Derek Falcone** received the Chemical Engineering Class of 1953 Scholarship.

**Cara Touretzky** and **Mark Weidman** received the Chemical Engineering Industrial Sponsors Scholarship Award.

**Rebecca Pagels** received the Chemical Engineering Industrial Sponsors Senior Student Award.

**Lindsay Schmiedel** and **Zachary Ulissi** received the Chemical Engineering Industrial Sponsors Undergraduate Research Award.

**Megan Zagrobelny** received the George Fish Scholarship.

**Michael Albani** and **Megan Zagrobelny** received the Hess Corporation Award.

**Amy Chevalier** and **Stanley Herrmann** received the Sylvia and Charles Joanedis Chemical Engineering Scholarship.

**Nicholas Marze** and **Dariusz Murakowski** received the Mr. and Mrs. James F. Kearns Scholarship in Chemical Engineering.

**Sean Hunt** received the Merck Engineering and Technology Scholarship.

**Amy Chevalier** received the Steven R. and Linda Justice Myrick Award.

## HONORS DAY AWARDS

**Elizabeth Hanle**, **Sean Hunt** and **Jason Papandrea** received the National Starch and Chemical Company Undergraduate Scholarship.

**Marco Bedolla-Pantoja** received the Donald F. Othmer Sophomore Academic Excellence Award.

**Russell Burnett**, **Jungik Choi**, **Elizabeth D'Addio**, **Donald Kessler** and **Rachael Lewus** received the Robert L. Pigford Teaching Assistant Award.

**Eitan Barlaz**, **Marco Bedolla-Pantoja**, **Aaron Reinicker**, **Carolyn Slusser** and **Daniel Walls** received the Robert L. Pigford Undergraduate Award.

**Gaurab Samanta** received the Fraser and Shirley Russell Teaching Fellow in Chemical Engineering.

**Christine Smith** received the Stanley Jacob Schechter Award.

**Timothy Bogart** received the Schipper Undergraduate Chemical Engineering Scholarship.

**Eitan Barlaz** received the Walter Silowka Chemical Engineering Scholarship.

**Dariusz Murakowski** received the John Allan Thoroughgood Legacy Scholarship in Chemical Engineering.

## College Awards

**Elizabeth Hanle** and **Kevin Tran** received the Engineering Alumni Association Scholarship.

**Marco Bedolla-Pantoja** received the Bangalore T. Lakshman Scholarship.

**Tracy Powell**, **Glenn Puzio** and **Lindsay Schmiedel** received the Miles Powell, Jr. Scholarship.

**Rebecca Pagels** received the Terry F. Neimeyer Scholarship.

## University Awards

**Jeffrey Bosco** received the AAUP Undergraduate Student Award.

**Marco Bedolla-Pantoja** received the Barry M. Goldwater Scholarship.

**Rebecca Pagels** received the Panel of Distinguished Seniors Award.

## Undergrad Awards/Recognition

**Marco Bedolla**, a junior chemical engineering major in the Honors Program was one of two students awarded 2009-10 academic year scholarships by the Barry M. Goldwater Scholarship and Excellence in Education Foundation.

## HONORS DAY AWARDS

The purpose of the Goldwater Foundation is to provide a continuing source of highly qualified scientists, mathematicians and engineers by awarding scholarships to college students who intend to pursue careers in these fields. The one- and two-year scholarships cover the cost of tuition, fees, books, and room and board up to \$7,500 per year.

Bedolla, of Newark, Del., has been conducting research at UD since his freshman year. Originally a chemistry major, he switched to chemical engineering as a sophomore because he saw it as a perfect merging point for his joint interests in chemistry and physics.

For the past two years, he has been working in the laboratory of Mark Barteau, Robert L. Pigford Chair of Chemical Engineering, whose group focuses on determination of reaction mechanisms in surface catalysis by metals and metal oxides. Specifically, Bedolla is exploring the gas-phase epoxidation of propylene.

Bedolla plans to pursue a Ph.D. in chemical engineering. His career goal is to lead a research group in surface chemistry and catalyst design and possibly teach at the university level.

This year's 278 Goldwater Scholars were selected from a field of almost 1,100 students who were nominated by the faculties of colleges and universities nationwide. Of the 21 UD students nominated in the past six years, 15 have been selected.

**Jeffrey Bosco** received an NSF graduate research fellowship, the Phi Kappa Phi National Award of Excellence, and the Mathematical Contest in Modeling (2009): Outstanding Solution (Awarded to Top 9 out of 1,672 International Teams).

**Kathleen DeWoody**, a junior, was one of several undergrad interns conducting real-world scientific research this past summer. These students were sponsored by Delaware's IDeA Network of Biomedical Research Excellence (INBRE) and Experimental Program to Stimulate Competitive Research (EPSCoR), which are funded by the National Institutes of Health and the National Science Foundation respectively. Kathleen worked with Maciek Antoniewicz culturing HB8 and HB27 cells aerobically to determine the metabolic pathway under which they operate, in order to maximize ethanol production.

**Elizabeth Hanle** received the Engineering Alumni Association Scholarship and was a Howard Hughes Medical Institute Research Scholar.

**Kristy Kassing**, a sophomore from New Holland, Pa., was one of 27 students recognized by The Town & Gown Committee and the city of Newark for her volunteer service to the community during a ceremony held Monday evening, May 4, in the Perkins Student Center. Kristy volunteers with the FISH (Fellowship in Serving the Hungry) Grocery Club, which partners with Lutheran community Services in providing food for people in need in the Newark area.

**Stephanie Myrick**, working with Prof. Millie Sullivan, received a first place in biochemistry and molecular biology for her poster presentation, "Design of a Cell-Responsive De-PEGylation DNA Delivery System" at the 11<sup>th</sup> annual Undergraduate Research Symposium in the Chemical and Biological Sciences.

**Dariusz Murakowski** received the Mathematical Contest in Modeling (2009): Successful designation for Problem B.

### Undergrad wins prestigious DOE fellowship

**Zachary Ulissi**, a senior in the Honors Program with a double major in chemical engineering and physics, already has a resume that runs to almost three pages. He has conducted undergraduate research at UD and the National Institutes of Health, served as a teaching assistant for math and chemistry classes, co-authored three journal papers, and submitted a patent application for a biomedical polarization imaging device.



All of his hard work has paid off. Ulissi was notified that he is the recipient of a Department of Energy (DOE) Computational Science Graduate Fellowship that will total some \$250,000 over the next four years as he works on his Ph.D.

The fellowship covers all tuition and fees as well as providing a stipend of \$32,400 per year and funds for travel and computer equipment. Ulissi will also have the opportunity to gain valuable experience through a summer internship at a DOE lab.

Dion Vlachos served as Ulissi's research adviser for the past two years on a project to develop knowledge-based catalyst discovery methods for the production of chemicals and hydrogen for fuel cells.

**Zachary Ulissi** received the Department of Energy Computational Science Graduate Fellowship, the National Science Foundation GRFP Award, the Mathematical Contest in Modeling (2009): Outstanding Solution (Awarded to Top 9 out of 1,672 International Teams), and the AFCEA General John A. Wickham Scholarship.

## Grad Recognition/Awards

**Monica Branco** received an Excellence in Graduate Polymer Research Award from the American Chemical Society (ACS). She was honored at the 237<sup>th</sup> ACS National Meeting and Exposition held March 22-26 in Salt Lake City, Utah. She invited to present a paper at the conference. Monica is co-advised by Norman Wagner and Joel Schneider, associate professor in the Department of Chemistry and Biochemistry.



Her research uses state-of-the-art methods of interrogation of nanostructured materials to elucidate the relationship between the molecular structure and macroscopic properties of hydrogels composed of novel, self-assembled peptides. Branco, who will finish her degree in 2009, plans to pursue a career in industry, primarily in pharmaceutical research.

Air Products has given the University of Delaware an \$18,000 fellowship gift to support a graduate student in chemical engineering or materials science. **Elizabeth D'Addio**, a third-year grad student, has been selected to receive the fellowship for the 2008-09 academic year. D'Addio is advised by Jochen Lauterbach, professor of chemical engineering. D'Addio, who earned her bachelor's degree in chemical engineering at Villanova University, chose the University of Delaware's doctoral program because of her strong interest in catalysis. D'Addio's interest meshes well with ongoing research at Air Products, and the company selected her out of a pool of highly qualified candidates. In addition to the financial support she is receiving with the fellowship, she will have the opportunity to serve an internship at one of the company's sites in the upcoming year.

The internship will be from three to nine months in duration and will be funded directly by Air Products. "The gift includes a \$2,000 increment above the student's current stipend, with the remaining \$16,000 applied toward the base stipend.

**Robert Leighty** was awarded \$1257 of conference support funds toward his registration fee for the Metabolic Engineering VII Conference to be held in Puerto Vallarta, Mexico this past September.

## HONORS DAY AWARDS

**Rachael Lewus** received a department teaching fellowship award.

**Andrea Naranjo** received an NSF graduate fellowship. The NSF Graduate Student Fellowship Program is aimed at ensuring the vitality of the human resource base of science, technology, engineering, and mathematics in the United States and reinforcing its diversity. The competitive fellowship provides three years of support for graduate study leading to Andrea's research-based doctoral degree.



**Mark Panczyk** received the Outstanding Chemical Engineering Senior Award from AIChE's North Jersey Section.

**Maeva Tureau** won a student travel award in order to take part in the 3rd I2CAM/FAPERJ School with focus in Soft Condensed Matter Physics, which took place in Rio de Janeiro May 17-23.





# GERSTER HISTORY

*There are a number of named lectures held in the department every year. This year we highlight the Jack A. Gerster Memorial Lectureship.*

## Jack A. Gerster

Professor Jack A. Gerster was Chairman of the Chemical Engineering Department at the University of Delaware from 1966 to 1970, was born April 26, 1919, and died on January 17, 1970. His contributions to the University of Delaware during his 24 years as a faculty member and to his profession were extensive.

Jack A. Gerster was born in Pittsburgh and received his education through the Ph.D. program at Ohio State. After teaching briefly at Tulane, he spent the wartime days with the Manhattan Project. He came to the University of Delaware in 1946 to join the small department headed by Allan P. Colburn and rose to the rank of Professor in 1962. This was changed to the Allan P. Colburn Professorship when he assumed the departmental chairmanship in 1966. He was an effective teacher who understood young people, how they learn, and their problems. He gave freely of his time, and many young people benefited from direct personal interaction with Professor Gerster. The University of Delaware recognized his laboratory, classroom and individual teaching talent with an Excellence in Teaching Award; many of his former students show their gratitude by supporting the Jack A. Gerster Fund.

His primary research interests were in areas of distillation, separations processes, and thermodynamics. Prior to his research, it generally was risky to build a distillation tower without testing the system in pilot plant equipment. His work in fluid mechanics and mass transfer, as applied to tray efficiencies, contributed to making the direct construction of commercial scale distillation towers of untried systems routine. The American Institute of Chemical Engineers awarded him the Professional Progress Award in 1962 for his contributions in the field of distillation. His easygoing and relaxed manner resulted in many friendships. He organized the first cooperative research program developed, supported and carried forward by the American Institute of Chemical Engineers. It dealt with bubble-cap tray design for distillation. One example of Jack's modesty is that when this work was eventually published by the American Institute of Chemical Engineers, it carried no mention of his name, only that of the Committee.

Jack A. Gerster exhibited fine talents in teaching, research and administration. He was a warm, friendly human being with a good sense of humor who made a major contribution to this Department, the University, and to his profession. It is for the purpose of remembering his contribution that we honor his memory with this Lectureship each year.

*NOTE: The 2009 Jack Gerster lecturer will be Dr. James Spearot, M70, PhD72.*

# Jack A. Gerster Memorial Lectures

- 1971 James Wei, University of Delaware
- 1972 Robert L. Pigford, University of California, Berkeley
- 1973 Sheldon K. Friedlander, California Institute of Technology
- 1974 William L. Luyben, Lehigh University
- 1975 W. Kenneth Davis, Bechtel Corp., San Francisco
- 1976 Charles R. Wilke, University of California, Berkeley
- 1977 Kenneth B. Bischoff, University of Delaware
- 1978 Hugh D. Guthrie, Department of Energy
- 1979 James Fair, Monsanto, St. Louis
- 1980 Thomas H. Pigford, University of California, Berkeley
- 1981 P. L. Thibaut Brian, Air Products
- 1982 Richard E. Emmert, DuPont, Wilmington
- 1983 Morton Collins, DSV Partners
- 1984 Paul B. Weisz, Mobil Research and Development
- 1985 George Keller, R & D, Union Carbide
- 1986 M. Tribus, Center for Advanced Engineering Study, MIT
- 1987 Keith McHenry, R & D Amoco Oil Corporation
- 1988 Louis L. Hegedus, W. R. Grace & Co.
- 1989 Neal R. Amundson, University of Houston
- 1990 Barry L. Tarmy, Exxon Research & Engineering Co.
- 1991 David Buzzelli, Dow Chemical Company
- 1992 William O. Dalton, HIMONT
- 1994 Ernest J. Henley, University of Houston
- 1995 Thomas L. Gutshall, CV Therapeutics
- 1996 Mary L. Good, U.S. Department of Commerce
- 1998 Joseph A. Miller, Jr., DuPont, Wilmington
- 2000 James M. Meyer, DuPont, Wilmington
- 2001 Sangtae Kim, Eli Lilly
- 2003 Madeleine Jacobs, Editor-in-Chief, Chemical & Engineering News
- 2004 George Stephanopoulos, Massachusetts Institute of Technology
- 2007 Peter Flynn, University of Alberta
- 2008 Brian M. Baynes, Codon Devices, Inc.
- 2008 Alice P. Gast, President, Lehigh University
- 2009 Thomas F. Degnan, Jr., ExxonMobil Research & Engineering Company

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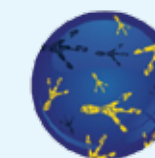
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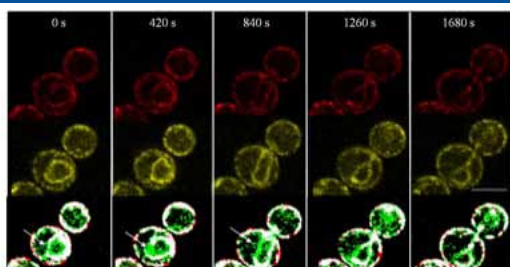
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Some selected images from undergraduate research projects in the Department. Further information about these and other exciting research can be found inside.



This is an image of a live yeast cell dividing over a time course of 1680s. The red image represents the ER lumen protein BiP-mCherry, the yellow represents the ER membrane protein Sec61-Venus, and the merged image represents a quantitative analysis with arrows illustrating the heterogeneity between luminal and membrane ER proteins. Images taken with Zeiss5 DUO confocal microscope, Plan-Apochromat 63x/1.40 Oil DIC M27 objective lens and scale bar is  $\sim 5\mu\text{L}$ .

