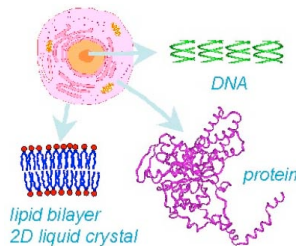
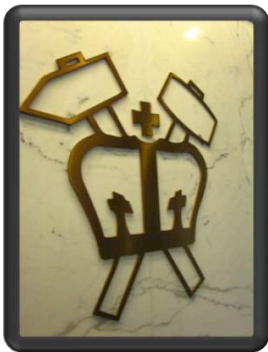




COLUMBIA | ENGINEERING

The Fu Foundation School of Engineering and Applied Science



ChE ALUMNI NEWSLETTER



Faculty Directory (alphabetical order)

FACULTY

Scott Banta, Associate Professor of Chemical Engineering

Christopher James Durning, Professor of Chemical Engineering

George W. Flynn, Thomas Alva Edison Professor of Chemistry; Professor of Chemical Engineering

Jingyue Ju, Professor of Chemical Engineering and Pharmacology; Samuel Ruben-Peter G. Viele
Professor of Engineering

Jeffrey T. Koberstein, Percy K. and Vida L.W. Hudson Professor of Chemical Engineering

Sanat K. Kumar, Professor of Chemical Engineering; Department Chairman

Edward F. Leonard, Professor of Chemical Engineering; Professor of Biomedical Engineering

V. Faye McNeill, Assistant Professor of Chemical Engineering

Ben O'Shaughnessy, Professor of Chemical Engineering

Vanessa Ortiz, Assistant Professor of Chemical Engineering

Ah-Hyung Alissa Park, Lenfest Junior Professor in Applied Climate Science, Associate Director, Lenfest
Center for Sustainable Energy

Nicholas J. Turro, William P. Schweitzer Professor of Chemistry; Professor of Chemical Engineering;
Professor of Earth and Environmental Engineering

Alan C. West, Samuel Ruben-Peter G. Viele Professor of Electrochemistry; Professor of Chemical
Engineering

ADJUNCT FACULTY

Aghavni Bedrossian-Omer, Adjunct Associate Professor of Chemical Engineering

Michael I. Hill, Adjunct Professor of Chemical Engineering

Lynn H. Lander, Adjunct Associate Professor of Chemical Engineering

Stanley A. Leshaw, Adjunct Professor of Chemical Engineering

Elias C. Mattas, Adjunct Assistant Professor of Chemical Engineering

Robert I. Pearlman, Adjunct Professor of Chemical Engineering

David Zudkevitch, Adjunct Professor of Chemical Engineering



Notes from the Chair



First, I want to start by thanking Prof. Alan West for five years of leadership. Alan was Chair from the summer of 2005 through the summer of 2010. When he took over the chairmanship, the

Department was going through rapid changes. Alan provided his great leadership in a calm and gracious manner, which allowed us to navigate the bumps, and at the same time focus on many important issues such as faculty hiring, facilitating research and growing our graduate program. With his efforts and those of his predecessor, Prof. Koberstein, the department is in extraordinary health at this time.

We recently recruited Prof. Vanessa Ortiz (PhD Penn; Post-doc Wisconsin), who works on modeling biologically relevant systems. Our other younger faculty – Profs. McNeill, Park and Banta are all doing extraordinarily well in their research. Prof. Banta received tenure in the Spring of 2011.

The department's research funding is on an excellent trajectory growth. We recently received \$4.5 million in grant funding as a result of the research proposals of our 10 faculty members.

Our graduate student population is at its highest in recent memory (40-45); there are over 10 postdocs and our undergraduate population is “exploding” – our senior class has 40 members, with another 55 in the junior class.

We are in the process of re-evaluating all aspects of the undergraduate and graduate programs to ensure that the students get an experience that is commensurate with their expectations from a Columbia Department. Changes are being put in place, and I will summarize these to you as they are implemented. Given all these facts, I am truly excited about the future of our department.

A word is in order here about on-campus activities outside the department:

Our Dean is very supportive of our department.

We made a joint appointment offer (with Brookhaven National Labs) to a senior faculty member who is a leader in his field, and are currently searching for 1-2 more extraordinary junior colleagues.

Prof. Ju and his group have recently been assigned laboratory space in the new Northwest Corner Science Building. We are all optimistic that we shall see more of Prof. Ju as he moves his research enterprise close to the rest of us.

An advisory committee, comprised primarily of alumni, convenes once a year to provide feedback on how to improve the department. Over time, this advisory committee and I will be reaching out to you with the goal of involving you more with the department, picking your brains for better ways of achieving our on-going goal of raising the department's stature. In this vein, you are invited to our department's annual reception at the AIChE meeting in November 2011. Please do attend, if possible. While we will be reaching out to you, this is an open invitation to each and everyone of you – please call, email or stop by anytime you are in the vicinity. We value your comments, and would like to continue to develop this department into one of which you will be proud.

Special thanks to Edwin Melendez and Mary Ko for providing the photography in this Spring 2011 issue of the newsletter.

Best Regards,

Sanat Kumar
Professor and Chair



Alumni Awards & Achievements

Dr. Andrew Lovinger is Awarded The Egleston Medal



The Egleston Medal, the highest honor bestowed by the Columbia Engineering Alumni Association, is given annually to a SEAS graduate in recognition of distinguished engineering

achievement that has significantly advanced the recipient's branch of the profession or the practice or management of engineering activities in general. Dr. Lovinger received the Egleston Medal at the Engineering Reunion Welcome Dinner and Columbia Engineering School Alumni Association Awards Presentation on 06/02/11. He also delivered a lecture entitled "Morphological Understanding and Technological Innovation from Three Decades of Research on Polymeric Materials."

Dr. Lovinger received his BS degree in 1970, MS in 1971, and PhD in 1976, all in Chemical Engineering and Applied Chemistry from Columbia University. He is currently the Director of the Polymers Program in the Division of Materials Research of the National Science Foundation (NSF). His research has focused on correlation between structure, morphology, and properties of polymeric and organic materials. Dr. Lovinger is a Fellow of the American Physical Society and winner of its Dillon Medal (1985). Other distinctions include the NSF Director's Award for Program Management Excellence (2000), the Bell Laboratories Distinguished Technical Staff Award (1985), Fellowship in the American Association for the Advancement of Science (1988), and the Frazer Price Memorial Award of the University of Massachusetts (1993). He has been an Associate Editor of the ACS journal *Macromolecules* since 1988.

Alumni Events

CAREER NIGHT 2010

The AIChE Student Chapter had a successful *Career Night* panel discussion. This forum was initiated in 2009, where the first panel discussion was met with great enthusiasm by students from Chemical Engineering and Environmental Science.

The panel consisted of distinguished engineers and scientists with a wide variety of experiences and job positions, including SEAS Alumnus Dr. Richard Bowles (Chief Compliance Officer, Merck), Dr. San Kiang (Director of Process Development, Bristol Myers Squibb), Dr. Les Sowul (Technical Manager, Merck, formerly Schering-Plough), Carla Stone (International Development & Technical Assistance, LLC), and Christos Tsiamis (Senior Director, EPA).

Room 826 Mudd was packed. The atmosphere was filled with warmth, encouragement, much needed advice and numerous humorous anecdotes with great educational value. Those in attendance posed excellent questions indicative of a substantial dedication to their chosen fields of interest.

Special thanks to Patrick Han, the AIChE Student Chapter, and to Prof. Vanessa Ortiz in the Department of Chemical Engineering for their hard work. They did an amazing job even with the numerous last minute obstacles.

Based on the success of the event, planning for *Career Night 2011* is currently in progress. Please check the Department webpage for this and other upcoming events:

<http://www.cheme.columbia.edu/directory/recentannouncements.html>





2010 Elmer L. Gaden Lecture Series “Aerosols and Climate”

Prof. John Seinfeld of California Institute of Technology presented the 2010 Elmer L. Gaden Lecture entitled “*Aerosols and Climate*.” That humans are altering the Earth's climate is unequivocal. While greenhouse gases (GHG) act to warm the Earth, particles in the air (aerosols) on the whole exert a cooling influence. The amount of that cooling, expressed as a perturbation of the Earth's energy balance, constitutes the largest uncertainty in predicting future climate.

Aerosols scatter and absorb incoming radiation and also are the condensation nuclei on which clouds form. Particles are injurious to human health and, for that reason, are the subject of mitigation measures worldwide. As aerosols are controlled, the full impact of GHG radiative force

will be unmasked, and the need to reduce GHG emissions becomes even more compelling. In his talk, Prof. Seinfeld reviewed the chemistry and physics of atmospheric aerosols in climate and discussed the major areas of uncertainty.


John H. Seinfeld is the Louis E. Nohl Professor in the Divisions of Chemistry and Chemical Engineering and Engineering and Applied Science at the California Institute of Technology. He has spent his entire professional career at Caltech.

From 1990 to 2000, he served as Chair of the Caltech Engineering and Applied Science Department. He is widely acknowledged for his research on the chemistry and physics of the atmosphere and is the author of numerous scientific papers and books, including *Atmospheric Chemistry and Physics: From Air Pollution to Climate Change* (1998; 2006) and the recipient of numerous honors and awards.

The Department of Chemical Engineering, Columbia University
2010 Gaden Lecture

presented by

John H. Seinfeld
Louis E. Nohl Professor
Divisions of Chemistry and Chemical Engineering
and Engineering and Applied Science
California Institute of Technology





New Faculty Prof. Vanessa Ortiz



The Department of Chemical Engineering is proud to welcome its new faculty member, Vanessa Ortiz. Prof. Ortiz received her Bachelor's degree in

Chemical Engineering from the University of Puerto Rico at Mayagüez in 2002. She then went on to receive a PhD in 2007 from the University of Pennsylvania in the Department of Chemical and Biomolecular Engineering. Before joining the Chemical Engineering Department at Columbia in September of 2010 as a tenure track Assistant Professor, she completed a postdoctoral fellowship from the Program of Computation and Informatics in Biology and Medicine at the University of Wisconsin at Madison.

Prof. Ortiz's main research interests are in the area of multi-scale modeling, with application to biological macromolecules and biomaterials, as well as the stability and dynamics of self assembled supra-molecular structures. As a graduate student, she investigated the stability of cytoskeletal proteins under stress, which provide structure and flexibility to the cells, and are under constant mechanical stress. Mutations on dystrophin, a member of this family of proteins, are associated with muscular dystrophy. By performing computer simulations on these systems, she was able to connect molecular unfolding pathways to macroscopic experimental measurements of force versus extension, and identify sources of mechanical weaknesses in these molecules and effects of mutations in their mechanical strength.

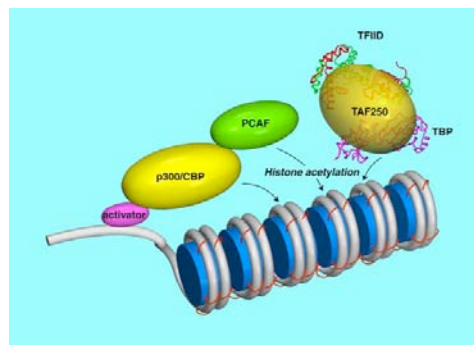
In the area of synthetic materials and self-assembled structures, she examined the stability of diblock copolymer vesicles and worm-like micelles as a function of different design

parameters for the development of efficient drug carriers.

As a post-doctoral fellow, she has focused her efforts on studying the role of DNA sequence on the positioning of nucleosome core particles, which controls expression in cells. By learning how nature controls gene expression in cells, one could use this information to design therapies that could treat a wide range of conditions and diseases such as obesity and cancer. Sequence is thought to affect nucleosome positioning in an indirect manner by controlling the mechanical properties of the DNA, which is required to form tight bends to form the nucleosome. Her studies revealed that DNA does carry sequence information in its structural and mechanical properties by changing the shape of the DNA double helix and its hybridization in a sequence-dependent manner when subjected to tight bending constraints.

At Columbia, Prof. Ortiz plans to continue her epigenetic studies of nucleosome positioning both from the DNA and protein (histone) points of view, and also start a project to use local measurements of protein mechanical strength to predict pathways of allostery and design drugs. In the picture, Vanessa is seen enjoying one of her increasingly rare free moments by reading some literature, an activity for which New York City is the ideal place.

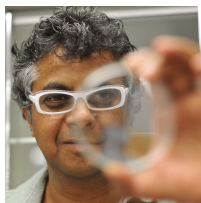
Read more by visiting Prof. Ortiz's homepage: <http://www.cheme.columbia.edu/fac-bios/ortiz/faculty.html>





Faculty Appointments, Awards and Research Updates

Prof. Sanat Kumar Appointed Department Chair



Prof. Sanat Kumar was appointed Chair of Chemical Engineering at Columbia University in the summer of 2010, succeeding Prof. Alan West. Prof. Kumar's research interests are in the area

of synthetic-and bio-polymers, nano composites and nanomaterials. His pioneering research has led to the award of over \$ 2 million in grants during 2010 from the NSF, DOE and the US Navy Multidisciplinary University Research Initiative with the following projects: Cyber-Enabled Design of Functional Nanomaterials and Rational Design of Advanced Polymeric Capacitor Films. The Columbia Chemical Engineering department is moving to a new exciting stage under Sanat's leadership.

Prof. Jeffrey Koberstein Honored by Alumni Association



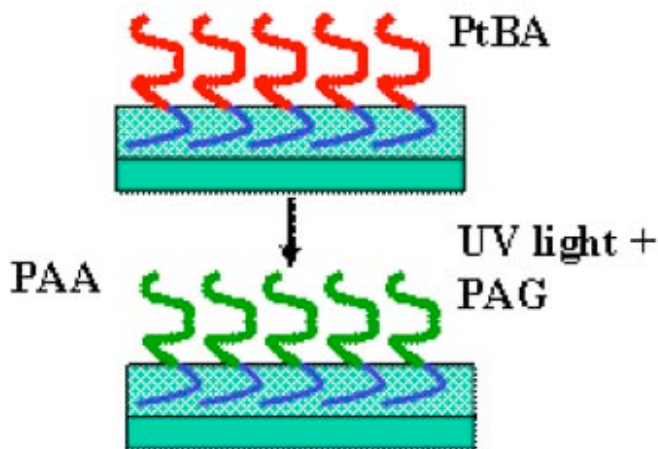
The Faculty Recognition Committee of the Columbia Alumni Association and its Board of Managers have selected Prof. Jeffrey Koberstein as one of the two recipients of the 2011 Distinguished Faculty Teaching

Award. This award is given to honor SEAS faculty for excellence in teaching undergraduates. Prof. Koberstein was nominated by his students and selected as the recipient by a Committee composed of both alumni and students.

The Distinguished Faculty Teaching Award was presented at Class Day ceremonies on 05/16/11.

Professor Vanessa Ortiz is awarded the Rodriguez Family Junior Faculty Development Award

At this year's SEAS Class Day, Professor Ortiz is one of the faculty members honored by Dean Feniosky Peña-Mora. The Rodriguez Family Junior Faculty Development Award is an award established by Marcos Rodriguez and his sister, Anna, in 2008 to help support the professional development of pre-tenured faculty. The award provides a \$10,000 fund to support Professor Ortiz's research in molecular simulations of biological systems.





Prof. Scott Banta Receives Tenure



Prof. Scott Banta has joined the ranks of tenured faculty at Columbia University. He has been promoted to Associate Professor with tenure in the Spring of 2011. Prof. Banta

joined the Department in July 2004 as an Assistant Professor. He received his BS in Chemical and Biochemical Engineering from the University of Maryland, Baltimore County in 1997, then earned his MS (2000) and his PhD (2002) from Rutgers University, in the Department of Chemical and Biochemical Engineering. He completed a postdoctoral fellowship at the Center for Engineering in Medicine, which is affiliated with the Shriner's Hospital for Children, Massachusetts General Hospital, and the Harvard Medical School.

Prof. Banta's research interests lie in the broad area of Protein Engineering. His research has focused on engineering proteins and peptides that exhibit controllable and dynamic conformational behaviors. His group applies these molecules in important applications including bioelectrocatalysis, biomaterials, gene and drug delivery, biosensing, and bioenergy.

One large focus of the Banta group has been bioelectrocatalysis; especially engineering proteins and peptides for biosensors and biofuel cells. This has included research into the engineering of proteins to self-assemble into functional biomaterials that can be used as electrode modifications. His group has also been interested in developing new peptides for biomolecular recognition, including a novel cork-screw shaped peptide that can fold and unfold in response to changes in calcium concentrations.

In the biomedical area, the Banta group has been working to engineer new cell penetrating peptides, which can be used to deliver cargos to

different cell and tissue types. A new line of research in his lab focuses on the development of methods for the production of biofuels from electricity and air using novel microorganisms.

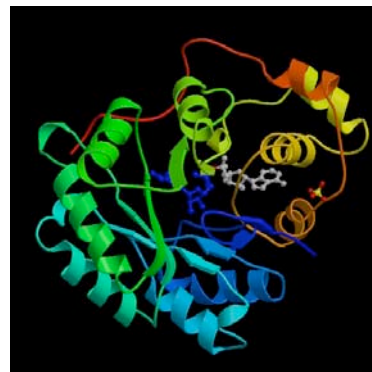
Banta has received funding from all of the major federal agencies including the NSF, NIH, the Dept. of Defense and the Dept. of Energy. So far he has graduated 5 PhD students. His current group of 8 graduate students and postdocs plans to move into new lab space later this year.

Genetic Engineering for Creating Biofuels

Prof. Scott Banta received a 2-year, \$543,394 APRA-E grant from the Dept. of Energy to launch new research on the use of genetic engineering to create less expensive, more efficient biofuels.

On this project, Banta is working with two co-principal investigators: Kartik Chandran, an assistant professor of Earth and Environmental Engineering, and Alan West, Professor of Chemical Engineering.

The project will focus on engineering an ammonia-oxidizing bacteria that is used in wastewater treatment to create isobutanol, which is a biofuel that is already compatible with the existing transportation infrastructure. The cells will fix CO₂ making the process carbon neutral, and the ammonia required by the cells can come from wastewater treatment or it can be generated from electricity that can be obtained from renewable sources.



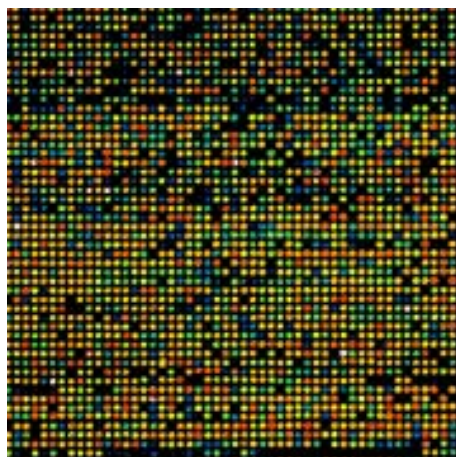


Prof. Jingyue Ju Named Samuel Ruben-Peter G. Viele Professor of Engineering



Prof. Jingyue Ju has been appointed Samuel Ruben-Peter G. Viele Professor of Engineering in recognition of his extraordinary contributions to the scholarly field, the Department,

SEAS, and the University at large. His research interest is in the design and synthesis of novel molecular tags for biological labeling and imaging, and developing new technologies for genomic research. Prof. Ju is the co-inventor of the fluorescent DNA sequencing technology that enabled the rapid completion of the International Human Genome Project. He holds 25 U.S. patents for novel technologies that involve the use of photochemistry, enzyme catalysis, mass spectrometry, and microfabrication for high throughput genetic analyses, laying the foundation for personalized medicine based on genomics. The Samuel Ruben-Peter G. Viele Professorship is a newly established honorary title sponsored and funded by the Proctor & Gamble Company in association with the Samuel Ruben-Peter G. Viele Professorship of Electrochemistry, which is currently held by Prof. Alan West.



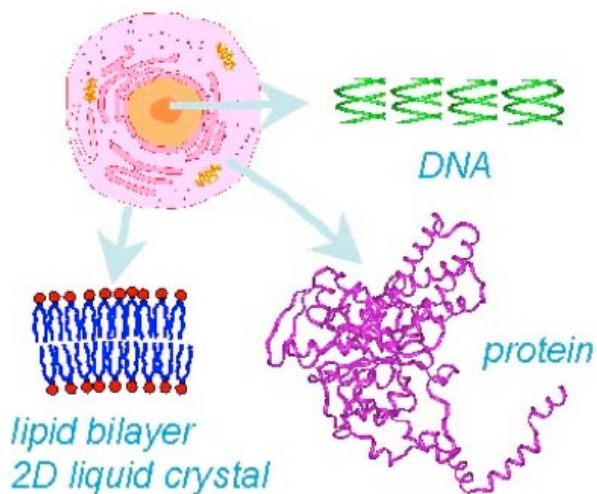
Prof. Ben O'Shaughnessy Awarded Grant by NIH



Prof. Ben O'Shaughnessy was awarded a grant of \$1.5 million by NIH to study the mechanisms of cell division, one of the most basic processes which define life.

Prof. O'Shaughnessy is investigating how cells assemble and then operate the microscopic machinery which physically divides the cell into two pieces.

Read more by visiting the O' Shaughnessy group's homepage: <http://www.columbia.edu/~bo8/>





Featured Research Groups

McNeill Group Featured in ACS



The research of Prof. McNeill's group was featured in an article in the ACS Magazine, C&E News (Volume 88, Page 32 – 34, 07/12/2010), entitled, "Assessing Aerosols in the Air."

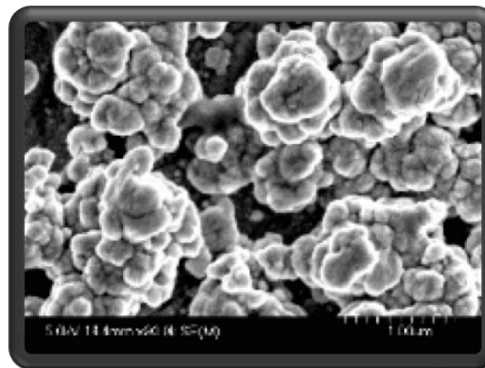
Her research was also published recently by The Journal of the American Chemical Society (JACS) entitled "Ozone Oxidation of Surface-Adsorbed Polycyclic Aromatic Hydrocarbons: Role of PAH-Surface Interaction." The heterogeneous chemistry of surface-adsorbed polycyclic aromatic hydrocarbons (PAHs) plays key roles in nanoscience, environmental science, and public health. Experimental evidence shows that the substrate can influence the heterogeneous oxidation of surface-bound PAHs, however, a mechanistic understanding of the role of the surface is still lacking. The McNeill Group examined the effects of the PAH-substrate interaction on the oxidation of surface-adsorbed anthracene, pyrene, and benzo[a]pyrene by ozone using density functional theory. They found that some ozone oxidation mechanisms for these planar PAH molecules led to nonplanar intermediates or products, the formation of which may necessitate partial desorption or "lift-off" from a solid substrate.

Prof. Alan West: Interfacial Engineering and Electrochemistry



Prof. Alan West's group is investigating significant issues that are often characterized as belonging to "electrochemical engineering" and the emerging field of microfluidics. Applications in electrochemical engineering

include electrochemical metallization processes, corrosion, fuel cells, batteries, and waste-treatment processes. Applications in the area of microfluidics include sensors and "labs on a chip." Research efforts focus on basic issues concerning the design and control of electrochemical systems. A particular application involves studies of both feature and wafer scale phenomena in the copper metallization process that has been recently introduced into the computer industry for advanced, on-chip interconnects.





Memoriam: Prof. Carl Campbell Gryte

(04/02/43-12/31/10)



Carl Campbell Gryte, 67, Professor Emeritus of Chemical Engineering, passed away after a long battle with Parkinson's Disease, having served as a faculty member in the Department since 1972. He was an active advocate for polymer science and gave innumerable

lectures on the subject with engaging enthusiasm.

Prof. Gryte was an internationally renowned expert in polymer science, particularly the formulation of polymers into gels, sorbents, and membranes. He published on many subjects in this area and frequently served as an expert witness in complex litigations involving the manufacture of these materials as well as their roles in major accidents.

Prof. Gryte was an extraordinary teacher and a passionate advocate for his students. He supervised 24 doctoral students many of whom have risen to high positions in industry, academia, and government. He was a positivist who never failed to see merit and a path for advancement in a student. He taught with a passion for the subject matter and the teaching process and mentored his students well beyond graduation.

