

## SUMMARY OF THE SALT LAKE CITY MEETING

The Salt Lake City Annual Meeting, November 4-9, 2007 was a great success. Fully paid attendance was about 4,000 along with a total of 1100 students.

There were 670 sessions in 16 topical conferences which had as their focus the development of new technologies that will add measurable value to your company's bottom line, also to enable the organization to grow and succeed.

**Annual Business Meeting:** This was held at 7:00 a.m. on Monday, November 5<sup>th</sup> in Ballroom A of the Salt Palace Convention Center. Retiring President, **Larry Evans**, summarized the business affairs of 2007 and yielded the job to successor, **Dale Keairns**, one of our own F&PD members.

Net assets projected to year's end 2007 were \$7.324 million, up from \$3.542 million for 2006. Membership now hovers around 40,000.

Your Editor has attended 20 such meetings since affiliating with F&PD in 1987. It is disparaging to see almost a total lack of F&PD members present at these meetings.

**Institute Lecture: Professor Nichols Peppas** of the University of Texas at Austin spoke on "La Plus Ca Change—Nanotechnology and Bioengineering an Evolving Chemical Engineering World" in the Grand Ballroom of the Salt Palace Convention Center on Wednesday, November 7<sup>th</sup>.

Professor Peppas' talk was pretty much a historical review of Chemical Engineering from the early days to the present. In one sense of the word, this subject seemed to preempt the theme of AIChE's 2008 Hundredths Anniversary coming up in November 2008. He mentioned by name some of a number of early pioneers before moving on to the present where his focus was nanotechnology and bioengineering. He described the development of dialysis, the artificial kidney, and the use of controlled-release medications. In summary, his main point was to emphasize how Chemical Engineering has always shifted to meet the needs of Society. (Summary provided by **Emmett Miller**.)

**Some Observations:** Your Editor took in a pipe organ recital at noon Tuesday in the Tabernacle in Temple Square only two blocks distant. Key selections played were Sousa's "Washington Post March" and the tears-induced hymn "Sweet Hour of Prayer."

If you, the reader, likes pipe organ music we suggest you make plans if you come to Philadelphia next November to hear recitals of the Wanamaker Organ in the well of Lord & Taylor's Store. Recitals are given twice daily, at noon and in the late afternoon. The Wanamaker Organ is one of North America's great musical instruments.

Laptop computers were quite commonplace at this meeting. The Salt Palace Convention Center was wired for wireless reception. Everywhere one looked there were attendants getting their e-mails sitting on benches in the corridors, in stairwells and other places.

## 2008 SPRING NATIONAL MEETING NEW ORLEANS CONVENTION CENTER

### Highlights include:

- The 2008 AIChE Spring National Meeting will feature joint programming with the American Chemical Society (ACS)
- The 4th Global Congress on Process Safety featuring the 23rd CCPS International Conference, the 42nd Loss Prevention Symposium, and the 10th Process Plant Safety Symposium
- The 10th International Conference on Microreaction Technology (IMRET)
- The 20th Annual Ethylene Producers Conference

### Plus

The meeting will also include topical conferences on Distillation, Energy Processes, Natural Gas Symposium, Sustainable Development.

- Fuels and Petrochemicals Keynote Address<sup>a)</sup>  
Monday, April 7, from 11:30 am -12:30 pm.
- Fuels and Petrochemicals Awards Luncheon (following Keynote address)<sup>b)</sup>
- Gas Utilization Keynote Address and Luncheon<sup>a)b)</sup>  
Wednesday, April 9, at noon.
  - a) See page 3 for particulars.
  - b) A ticketed event: location on ticket

## UPCOMING MEETINGS

### 2008 AIChE's CENTENNIAL YEAR

2008 Fall Annual Meeting  
Philadelphia Marriot &  
Pennsylvania Convention Center  
November 16-21, 2008

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2009 Spring National Meeting  
Tampa Convention Center  
Tampa Bay, Florida  
April 26-30, 2009

• • • •

2009 Fall Meeting  
Opryland, Near Nashville, TN  
November 8-13, 2009

# FUELS AND PETROCHEMICALS DIVISION

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## F&PD 2008 DISTINGUISHED SERVICE AWARD TO DENNIS GRIFFITH

Dennis Griffith has been an active member of the AIChE on both the national and local levels. On the national level, he has been Meeting Program Chair or Co

Chair for several Spring National Meetings, and he has been on General Arrangements Committees for many of the Spring National Meetings held in Houston since 1979. Most recently, Dennis was both the Meeting Program Co Chair and General Arrangements Committee Chair for the 2007 Spring National Meeting held in Houston. Dennis has also served in the Chair rotation of the Executive Board of the National Program Committee. In AIChE divisions, Dennis was Treasurer of the Fuels and Petrochemicals Division for two terms, and he has also served in the F&PD Chair rotation. Dennis conceived the idea of and was instrumental in developing the F&PD is Refining Overview CD ROM.

On the local section level, Dennis has served as the Secretary of the Knoxville-Oak Ridge Section, and as Director, Treasurer, and Chair rotation of the South Texas Section. He currently chairs the Government Interaction Committee of the STS AIChE. He has served as a liaison between AIChE and STS AIChE with the Texas Technology Showcase developed by Texas Industries of the Future.

Outside of the AIChE, Dennis is a Vice President of the Engineering, Science, and Technology Council of Houston, and he has served in the past on several air quality committees in the Greater Houston area. He is currently a member of the City Council of Spring Valley Village, one of the six Memorial Villages that are an island surrounded by Houston.

Dennis has served on many committees and boards of Spring Valley Village including the Planning and Zoning Commission and the Impact Fee Committee. Dennis also serves as a volunteer for many other organizations throughout the area.

Dennis received his BS in Chemical Engineering from The University of Texas at Austin in 1970, and his MS in Chemical Engineering from the University of Michigan in 1971. He is a Senior Consultant at Granherne, the front end consultants of Kellogg Brown & Root.

## F&PD KEYNOTE ADDRESS

11:30 AM – 12:30 PM • Monday, April 7

**Topic:** “Refinery Preparation for the Recovery from Major Weather Events --- Post Katrina Events

**Speaker:** Richard Igercich

**Richard Igercich** is the Refinery Manager for Chalmette Refining, L.L.C., a joint venture between ExxonMobil Corporation and PDVSA, the Venezuelan State Oil Company. As Refinery Manager he is responsible for managing the day to day operations of the Chalmette facility located in Chalmette, Louisiana.

Richard has 22 years of service with ExxonMobil and began his career with Mobil Oil Corporation at the Torrance California Refinery in 1981. During his time in Torrance, he worked in a number of refinery positions progressing through technical, supervisory, and management positions. He then moved to the Supply organization where he worked as an Integrated Business Strategic Planner, eventually moved on to California to manage Mobil’s terminal and pipeline facilities on the west coast.



## PURDUE’S AGRAWAL TO RECEIVE F&PD 2008 AWARD

**Rakesh Agrawal** is Winthrop E. Stone Distinguished Professor in School of Chemical Engineering in Purdue University. Previously, he was an Air Products Fellow at Air

Products and Chemicals, Inc., where he worked from 1980 to 2004. A major thrust of his research is related to energy issues and includes novel processes for fabrication of low cost solar cells, biomass and coal to liquid fuel conversion, hydrogen production from renewable sources and energy systems analysis. His research interests further include basic and applied research in gas separations, process development, synthesis of distillation column configurations, adsorption and membrane separation processes, novel separation processes, gas liquefaction processes, cryogenics, and thermodynamics. He holds 116 U.S. and more than 500 foreign patents. These patents are used in over one hundred chemical plants with a capital expenditure in excess of a billion dollars. He has authored 66 technical papers and given many lectures and presentations. He chaired the Separations Division and the Chemical Technology Operating Council of the American Institute of Chemical Engineers (AIChE) and also a Gordon Conference on Separations. He was a member of the NRC Committee on Alternatives and Strategies for Future Hydrogen Production and Use. He is currently a member of the AIChE’s Board of Directors and also it’s Energy Commission. He is also a member of the NRC Board of Directors and also it’s Energy Commission. He is also a member of the NRC Board on Energy and Environmental Systems (BEES). He has received several awards including, J & E Hall Gold Medal from the Institute of Refrigeration (UK). Presidential Citation for Outstanding Achievement from the University of Delaware and from the AIChE: the Gerhold, Excellence in Industrial Gases Technology, Institute Lecture and Chemical Engineering Practice awards. He is a member of the US National Academy of Engineering. Dr. Agrawal received a B. Tech. from the Indian Institute of Technology, in Kanpur, India; a M.Ch.E. from the University of Delaware, and an Sc.D. in chemical engineering from the Massachusetts Institute of Technology.

## GAS UTILIZATION KEYNOTE

Noon • Wednesday, April 9

**Topic:** “LNG – Environmentally Friendly Fuel”

**Speaker:** Takashi Kubota, President and CEO of Chiyoda Corp.

**Mr. Kubota** has been with Chiyoda since 1969. He was Managing Director and Executive Officer before assuming the positions of President and CEO in 2007.



## CHAIR'S CORNER

Service.....

As I complete my term as chair, having worked with so many people during Harry West's and my own term as chair, it has been remarkable how many people give unstintingly of their time to try to make the organization work and provide value for our many colleagues. There is no doubt that I continue to have frustrations with the organization but almost everyone at headquarters has really tried to be helpful and responsive. There remain too many bureaucratic hoops for me, but perhaps most are necessary to make things work. One would hope as new leaders come in, that they will continue to question the necessity of this or that and that will provide a driving force for change to improve what our professional society delivers for us, but also by us.

With Harry's passing I was thrust into fulfilling the chair's role without the usual wind up to the tasks. I think it remarkable that Dennis Griffith has remained so involved in the division, both providing sound advice (not just as the official Division Gourmand) on the needs of the Division. He also continues to help by taking care of such mundane things as producing the invitation letters for our Sunday night Executive Committee dinner and our recognition plaques, giving us a continuing base in Houston with vendors that are familiar. Beyond the Division, he has been helpful as meeting program chair and knowing what is going on all over the Institute.

For these reasons I am pleased to announce that he is the F&P Division Service Award Winner for 2008. I hope we will hear shortly that he is also a candidate for Director of AIChE, please vote for him!

I would also like to mention a few others. Gavin Towler, aside from going great guns with his family, his position at UOP, his teaching at Northwestern and his great new Textbook on Process Design, also knows everyone and how it works in the Institute and has been very helpful with suggestions on what and how to try to get things done. He was elected Director this past year and (hopefully with Dennis) will provide great direction for the Institute over the next few years. He has also continued to work on behalf of the Division, beyond what I have already mentioned, with membership and particularly trying to enhance our outreach to student members.

I would also like to thank Colin Bowen for not only his great job as secretary, but also his willingness to do more and to think of creative ways to get things done. Lastly I will also mention Dennis O'Brien and Bob Dye for continuing to work on getting the Division's message out as we work to transition to more on-line, instant (or near recent!) content delivery.

It is hard to stop as there are a number of others, but I would continue to ask, as I think I have in the past, you to consider becoming involved and make the Institute and Division your own. What you get out will hopefully be more than what you put in, but you will no doubt meet some great people along the way.

**Rick Mallinson**  
*Chair*

## CALL FOR AMBASSADORS TO STUDENT CHAPTERS

Undergraduate chemical engineering students today are seeking information on what to expect upon graduation earlier and earlier in their academic career. They utilize websites full of information and career fairs that give a buffet of options for what exists as a professional. What they often do not get is the personal interaction with an active Chem E. in the field, a problem that AIChE has chosen to address with the Ambassador Program. The Ambassador Program matches vibrant, exciting professional members of the AIChE with a local student chapter. The Ambassador visits the students speaking on a topic of present day interest in the chemical engineering world. In addition, the Ambassador gives general insight into the life of a chemical engineer and discusses how important it is to have a lifelong relationship with AIChE. There is of course ample opportunity for questions and answers, as well as for individual interaction and usually a little food as well. Though this formula typically provides a successful evening, it is the seeds that are planted by this visit that will bear the true fruit. Since the Ambassador is matched with a student chapter close to them, there is the possibility that they can serve as an additional connection to the local professional AIChE section as well as industry in the area. Students who comprehend the value of such an interaction will return after they graduate to also serve as Ambassadors, often for the very school that is their alma mater. Finally, by providing the student members of AIChE with this background, they will emerge into the professional world with a better idea of area they would like to pursue.

**Lowell Aplebaum**

Student & Corporate Relations Professional

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## EUROPE IS SWITCHING CURRENTS

Parts of Europe are considering switching from the standard alternating current (AC) to direct current (DC) distribution. DC has an advantage over AC in voltage loss, which becomes more significant in moving bulk energy over long distances. Scientists and engineers in Europe hope that fact will benefit power developed from wind or solar sources, typically located further from end users than traditional power sources.

The plan would store energy from these sources to be used when skies are too cloudy or the wind is not available at some locations. The energy would be stored by powering pumps to move water up to a reservoir. The water could then be released as needed to power hydroelectric generators.

Several companies in Norway have already begun building high-voltage DC lines between Scandinavia, the Netherlands and Germany.

In the infancy of the electrical distribution system in the U.S. in the 19th century, Thomas Edison and George Westinghouse competed for the rights to build differing types of systems. Edison favored DC but lost the battle thanks to convenience factors for AC that are now largely obsolete.

**Source:** Pollution Engineering, Sept. 2007



## PHOTOVOLTAICS REACH RECORD EFFICIENCY

A new generation of solar cells relies on sophisticated optical designs that collect light and efficiently focus it onto multijunction photovoltaic elements, for applications ranging from portable military power units to rooftop power generators.

At first glance, photovoltaic cells look like nearly ideal energy sources because they can convert sunlight into electricity with no emissions. However, in practice the high cost of making solar cells and their low efficiency limit the range of potential applications. Solar cells have succeeded in a wide range of “off the grid” applications, from powering pocket calculators to satellites and the International Space Station. But at a typical cost of 25 to 50 cents per kwh, photovoltaic power can’t compete with conventional power plants at 1.0 to 5.0 cents per kwh.

However, a new generation of solar cells is emerging that can convert more than 40% of input solar energy into electricity. Late last year, Boeing’s Spectrolab subsidiary demonstrated a multijunction photovoltaic cell with 40.7% efficiency. The development was supported by the U.S. Department of Energy as part of its Solar America Initiative, which targets supplying more than a million American homes with solar energy at 5.0 to 10.0 cents per kwh. In the summer of 2007, a team led by Allen Barnett of the University of Delaware (Newark, DE) announced a new approach to building solar cells that promises 42.9% efficiency. It is part of a Defense Advanced Research Projects Agency (DARPA) project called Very High Efficiency Solar Cells that targets efficiency more than 50%. The initial goal is supplying portable power to soldiers in the field, who now may need up to 20 lb of batteries for a three-day mission, but Barnett says the new approach also can be used in civilian power generation, including rooftop solar cells.

### Limitations of Conventional Solar Cells

Conventional photovoltaic silicon solar cells are a variation on photodiodes. As in a photodiode, incident light excites an electron from the valence band into the conduction band, but no external voltage is applied across the device. Instead, the *p-n* junction itself separates the carriers, generating a voltage across the junction and producing a photocurrent.

The efficiency of the process is inherently limited by the range of energies absorbed by the semiconductor. Photons with energy smaller than the bandgap can’t excite electrons to the conduction band. The semiconductor absorbs photons with energy larger than the bandgap, but the difference between the photon energy and the bandgap energy goes to heating the solar cell, not to producing electricity. These effects combine to limit a semiconductor with a single bandgap to converting at most 31% of the input solar energy into electrical energy.

Silicon photovoltaic technology is the most mature and performs reasonably for existing applications. Silicon solar cells can exceed 20% efficiency and production versions have efficiencies in the 15% to 20% range. That’s good enough to attract support from the German government for rooftop installations feeding into the domestic grid. Arrays of silicon cells are being installed for power generation in areas with abundant sunlight such as northern Africa, southern Italy, and Spain. But silicon is stiff and manufacturing costs remain for large arrays, so a number of alternatives are being investigated.

Low cost per unit is critical for large-scale deployment of solar cells, such as on rooftops, making semiconducting polymers attractive because they can be coated and printed onto flexible substrates. But efficiency remains limited to about 5% for single-element cells and 6% for a solar cell consisting of two voltaics

layers with different bandgaps stacked on top of each other. Other approaches are also being investigated, including dye sensitized solar cells, which have exceeded 10% efficiency in small-scale devices, but have yet to reach 5% over large areas. Although advocates say that lower manufacturing costs would offset lower efficiency to generate power at low cost, questions remain about operating lifetimes, and the area needed to generate large amounts of power. The nature of roll-to-roll processes “does not lead to a tightly controlled reproducible product,” says Henry Brandhurst of Auburn University (Auburn, AL), and performance of the entire array can be limited to that of the weakest element.

### Multilayer Semiconductors Raise Efficiency

Sticking two or more photovoltaic semiconductor compounds with different bandgaps on top of each other can circumvent the 31% efficiency limit. In this way each compound can absorb its own slice of the spectrum as the light passes through the stack. The light passes first through the compound with the largest bandgap, which absorbs light at shorter wavelength and transmits photons with less than the bandgap energy. The second compound has a smaller bandgap, so it absorbs photons with more than the bandgap energy and transmits those with less energy. Successive layers work the same way.

The current record for a multifunctional solar cell is 40.7% efficiency, reported by Spectrolab at the end of last year, using sunlight focused to high intensity. A surface cell of aluminum gallium indium phosphide (AlGaInP) absorbs visible photons to generate electricity. Longer wavelengths pass through to a gallium arsenide (GaAs) layer, which absorbs wavelengths in the 700 to 1000 nm band and transmits long wavelengths to a germanium cell at the bottom of the stack, which converts photons from 1000 to about 1700 nm into electricity. The whole structure is fabricated on a germanium (Ge) substrate.

### Outlook

Solar cell technology has come a long way but big challenges remain to make new applications cost-effective. Low-power off-grid applications are much easier than replacing conventional power plants.

System design is a challenge. Rooftop solar installations sound like a great idea, but batteries or other technologies are needed to store energy generated during the day for nighttime use. For large-scale power generation, the big economic issue is the cost of the generated power.

Photovoltaics alone will not solve our formidable energy problems, but they may be a significant part of the solution.

## WIKIPEDIA

**Wikipedia Won’t Go Away, So Learn to Use It.** The popularity of Wikipedia makes it important that users learn to use the online collaborative encyclopedia as a starting point for their research, rather than as a final word. Introduced in 2001, Wikipedia is a popular online reference tool that allows Internet users to add and edit entries. Professor Sorin A. Matei in the Department of Communication at Purdue University recommends it to be used as a search engine that acts as a springboard to other resources, and that it never be cited as a primary source of information. Suggested guidelines include avoiding entries with poor grammar, paying attention to a “controversial” label as it indicates that the topic generated debate, and checking for missing well-known features of a particular story or concept.

**Source:** Scientific Computing, April 2007.



DATED MATERIAL - DO NOT DELAY!

## TABLE OF CONTENTS

Summary of The Salt Lake City Meeting .....	1
2008 Spring National Meeting .....	1
Upcoming Meetings.....	1
Officer's Page.....	2
F&PS Distinguished Service Award to Dennis Griffith.....	3
Purdue's Agrawal to Receive F&PD 2008 Award .....	3
F&PD Keynote Address.....	3
Gas Utilization Keynote.....	3
Chair's Corner.....	4
Call For Ambassadors to Student Chapters .....	4
Europe is Switching Currents .....	4
Photovoltaics Reach Record Efficiency.....	5
Wikipedia .....	5