AIChE

The Catalyst

PITTSBURGH CHAPTER
AMERICAN INSTITUTE OF CHEMICAL ENGINEERS

Volume 16 Issue 8 **May 2002**

MAY MEETING NOTICE

Where: Asiago Euro-Cuisine
One Oxford Centre, Downtown

When: Thursday, May 23, 2002

Time: 6:00 PM – Social
6:30 PM – Dinner

Menu: Please select from the following menu items

Chicken Piccata with Lemon Mushroom Sauce

Salmon Mousseline with Dill Beurre Blanc

(Vegetarian available upon request)

All entrees served with salad, Saffron Rice Pilaf, vegetable medley, rolls and butter, Raspberry Sorbet with Fruit Coulis, and choice of beverage.

Cost: $35.00

Parking: Parking stubs from the Oxford Garage will be validated by Asiago any time after 5:00 PM. Please remember to bring your ticket to the restaurant.

FOR APRIL MEETING,
RSVP NO LATER THAN
FRIDAY MAY 17TH, 2002
TO:
Ms. JoAnn Truchan, Vice Chair
Tel 724-695-1945
Email: cricket.jt@att.net
PLEASE PAY AT DOOR

Name _____

Menu Selection _____

Email _____

Phone _____

CANCELLATIONS: If you must cancel your meeting reservation, please do so no later than 24 hours prior to the meeting. If you do not provide a cancellation notice, you will be invoiced for the cost of your meal.

Evening Topics and Presenters:

The following educational topics will be discussed at our May Meeting:

- ***THERMODEPOLYMERIZATION OF CELLULOSE AND CELLULOSE-DERIVED MATERIALS TO PRODUCE A FUEL GAS FOR ENERGY PRODUCTION***
  Sandeepa Sandadi and* Richard Turton*, Dept of Chemical Engineering, West Virginia University

- ***VIDEO IMAGING STUDIES OF TABLET MOVEMENT IN A ROTATING PAN COATING DEVICE***
  Matthew Thomas, Gregory Panuccio, and Douglas Price, Department of Chemical Engineering Youngstown State University

- ***AICHE PITTSBURGH CHAPTER 2001-2002 WRAP UP***
  Mr. Mike Friedrich, Kavaerner

FOR ABSTRACTS SEE PAGES 3 AND 4.

PLAY BALL
AUGUST OUTING

PLEASE JOIN US IN CHEERING ON THE PIRATES
Friday Night, August 16, 2002
"Fireworks Night"

Tickets are $24.00 each and are located in Section 130 (left field boxes) row "A".

Come and celebrate before the game!
Picnic Area in Center Field Food / Beverage Buffet. The cost per person for the food picnic is $26.00 (in addition to baseball ticket) and this is for the all you can eat buffet and soft drinks.

RSVP by May 31, 2002 to
Michael P. Flaherty
412-889-2060
michaelp871@hotmail.com

MEMBERSHIP CORNER

Dear Members,

We are constantly updating our membership database. Please send all change of address notifications to me at

Ashley Smith
Industrial Design Corporation
200 Corporate Center Drive, Suite 200
Moon Township, PA 15108
ashley.smith@idc-ch2m.com

Thanks to all of you for supporting the Pittsburgh local section by volunteering your time to attend meetings and volunteer for the numerous AIChE sponsored activities. I look forward to seeing everyone at this year's activities!

Regards,
Ashley Smith
Membership Chair

Please sign me up for the local Pittsburgh Section of AIChE

Name _____

Company _____

Address _____

City _____ State _____ Zip _____

Business _____

Residence _____

Email _____

Annual Dues are $16.00. Make check payable to "AIChE Pittsburgh Section" and send to our Treasurer:
Leigh Anne M. Wacker, CFX Software & Services , Omega Corporate Center, 1260 Omega Drive, Pittsburgh, Pennsylvania 15205

LETTER FROM THE EDITOR

DEAR MEMBERS:

It has been a pleasure serving the Chapter as Newsletter Editor. It seems like yesterday I published my first letter. Here, it has been four fun packed years.

The years have passed quickly and much has changed in all of our lives. In my case, I started a new position as Direct Account Manager for ITT Industries and I am in the process of planning my wedding that will take place in May of 2003. My fiancé is Michael Flaherty AKA Pittsburgh Chapter Chair. We owe our thanks to the October 1998 Chapter meeting where we met.

With all the changes taking place, I must pass the torch on to someone new. It will be great to have someone with fresh ideas.

I still encourage you to become active in our Pittsburgh Chapter. It has been a wonderful experience for me. The opportunities of networking with your fellow peers are endless.

Have a fun and safe summer!
Peggy Panagopoulos

HUMOR

New Math Keeps Changing (Author Unknown)

Teaching Math in 1950: A logger sells a truckload of lumber for $100. His cost of production is 4/5 of the price. What is his profit?

Teaching Math in 1960: A logger sells a truckload of lumber for $100. His cost of production is 4/5 of the price, or $80. What is his profit?

Teaching Math in 1980: A logger sells a truckload of lumber for $100. His cost of production is $80 and his profit is $20. Your assignment: Underline the number 20.

Teaching Math in 1990: By cutting down beautiful forest trees, the logger makes $20. What do you think of this way of making a living? Topic for class participation after answering the question: How did the forest birds and squirrels feel as the logger cut down the trees? There are no wrong answers.

Teaching Math in 2000: A logger sells a truckload of lumber for $100. His cost of production is $120. How does "A. A." determine that his profit margin is $60?

CHAPTER ANNOUNCEMENTS

AIChE MANAGEMENT CONFERENCE

PREPARE TO BE ENLIGHTENED…
AIChE's 2002 Management Conference, May 19-21 in Scottsdale, Arizona, is the place where senior executives will learn, network, and recharge their strategies to foster growth through innovation. J. Michael Fitzpatrick, President & COO, Rohm and Haas Company will kick-off this focused event. Register by May 3 and save $200. Visit http://www.aiche.org/management or call 1-800-242-4363.

AIChE'S 2002 LEADERSHIP DEVELOPMENT CONFERENCE

AIChE leaders will gather May 31-June 3 for four days of learning, fun, and networking at AIChE's 2002 Leadership Development Conference: The Alchemy of Leadership, in Chicago. Leaders from local sections, divisions, and committees, along with AIChE's Board of Directors, Operating Councils, and staff members, will gather for an inspiring weekend of leadership development. The conference is hosted by AIChE's Chicago Section, Fuels and Petrochemicals Division, and Local Sections Committee. Watch http://www.aiche.org/mag/leadercon/ for details on programming, registration, and travel arrangements. Contact leadershipconf@aiche.org with any questions.

ENERGY RESEARCH

THERMODEPOLYMERIZATION OF CELLULOSE AND CELLULOSE-DERIVED MATERIALS TO PRODUCE A FUEL GAS FOR ENERGY PRODUCTION

Matthew Thomas, Gregory Panuccio, and Douglas Price
Department of Chemical Engineering
Youngstown State University
Youngstown, Ohio

Abstract

Current bioenergy technology has the potential to make renewable farm and forestry resources major sources of electricity and fuel. Advances in these areas can create an expanding array of exciting new business and employment opportunities for farmers and foresters in states with a strong agricultural and forestry base.

The production of electricity from biomass has been demonstrated commercially by co-firing of wood with coal or the gasification of wood by partial oxidation with subsequent buming in a power plant. Thermodepolymerization of wood or other biomass to produce a fuel gas is an attractive alternative to co-firing and gasification in that there is negligible energy spent on drying the biomass. The utilization of biomass-derived fuel for the production of electricity will reduce the dependence on fossil fuels, eliminate the production of greenhouse gases, and reduce the generation of acid rain chemicals, namely sulfur dioxide and nitrogen oxide compounds. The reduction of acid rain chemicals is tantamount in reversing the damage to wilderness areas of the northeastern regions of the United States.

The application of thermodepolymerization to produce a medium energy fuel gas (350 to 500 Btu/standard cubic foot) from biomass and byproducts from the manufacture of pulp and paper is a new technology that has not yet been demonstrated. This technology produces fuel gas under wet conditions, thereby eliminating the energy spent on drying the material. The potential energy savings by this process compared to co-firing or gasification range from 3% for ash to as high as 24% for willow.

Preliminary research at Youngstown State University began in September 2001. The work studied the kinetics of the thermodepolymerization of *salix* (willow) and the qualitative composition of the product gas. The temperature/time dependence on the decomposition of wood solids has been fully determined and the investigation revealed that there is a two-step mechanism in the production of fuel gas. The first step is the solvation of the wood into the aqueous solution. This step is quite rapid. A second, and slower step, involves the breakdown of the dissolved solids into gaseous components. This second step is not well understood at this date and further research is required to determine the proper time/temperature relationship for the production of the fuel gas. A single measurement on the product gas showed that it is primarily hydrogen and carbon dioxide. The presence of hydrogen may expand the potential marketability of the process in that it is the most desirous fuel for fuel cells.

The benefits of this research will provide a technology where electricity can be produced fueled entirely on biomass-derived fuel gas. As little as 1,000 acres of land dedicated to producing willow for fuel gas can provide enough fuel for a 400 to 670 kilowatt electrical generating facility using microturbine generators that can provide power to meet the electrical demands of up to 225 homes. The cost of biomass will range from $0.0085/KWH at a payment to the crop grower of $50/acre/year to $0.028/KWH at a payment to the crop grower of $100/acre/year.

VIDEO IMAGING STUDIES OF TABLET MOVEMENT IN A ROTATING PAN COATING DEVICE

Authors: **Sandeepa Sandadi and Richard Turton**

Affiliation: Department of Chemical Engineering, West Virginia University

Abstract

The uniformity of coating applied to large particles and tablets in rotating-drum coating devices is of significant interest to the Pharmaceutical Industry. This is especially true when the coating contains active material or provides a sustained release barrier for drug transport. As tablets move around the coating drum, they periodically spend time at the surface of the avalanching layer and pass through the spray zone. During their passage through the spray region, they receive amounts of coating solution proportional to the time spent in the spray zone and the area exposed to the spray. The purpose of this research is to quantify parameters that characterize the movement of the tablets through the spray region. The three parameters of greatest interest are

- The circulation time that is defined as the time between successive particle sightings at the surface of the bed.
- The exposure time that is defined as the time that a particle spends within the spray zone during each pass.
- The surface area of the tablet projected toward the spray source (nozzle) during each pass through the spray zone.

In order to measure these parameters, a digital imaging system has been developed and implemented to analyze images of the surface of the tumbling tablet bed. A single black tracer particle is introduced into the bed. The tracer particle location and movement at the surface of the bed are analyzed using machine-vision software (Sherlock 6.0) that processes and analyzes digitized images obtained at a framing rate of 30 Hz. The experimental set-up and preliminary results from this system will be discussed.

For Additional Information Contact:
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Dept of Chemical Engineering,
POBox: 6102, 453 ESB,
West Virginia University,
Morgantown, WV – 26506

NEWSLETTER DEADLINE

THE DEADLINE FOR THE SEPTEMBER NEWSLETTER IS AUGUST 16, 2002.

Please submit information to
Peggy Panagopoulos at
ITT Industries
PO BOX 61, Imperial, PA 15126
Ppanagop@fluids.ittind.com
724-695-7899

CHEMICAL ENGINEERING TODAY & TOMORROW

I found this interesting piece at http://www3.cems.umn.edu/orgs/aiche/archive/history/h_whatis.html. You may find it useful in describing our field to those who are unfamiliar with what a chemical engineer does.

The "Big Four" engineering fields consist of civil, mechanical, electrical, and chemical engineers. Of these, chemical engineers are numerically the smallest group. However, this relatively small group holds a very prominent position in many industries, and chemical engineers are, on average, the highest paid of the "Big Four" (see WAGES). Additionally, many chemical engineers have found their way into upper management. A chemical engineer is either currently, or has previously, occupied the CEO position for: 3M, Du Pont, General Electric, Union Carbide, Dow Chemical, Exxon, BASF, Gulf Oil, Texaco, and B.F. Goodrich. Even a former director of the CIA, John M. Deutch, was a chemical engineer by training.

It was a full house at the Feb. Meeting!

More typically, chemical engineers concern themselves with the chemical processes that turn raw materials into valuable products. The necessary skills encompass all aspects of design, testing, scale-up, operation, control, and optimization, and require a detailed understanding of the various "unit operations", such as distillation, mixing, and biological processes, which make these conversions possible. Chemical engineering science utilizes mass, momentum, and energy transfer along with thermodynamics and chemical kinetics to analyze and improve on these "unit operations."

WVU AIChE Members

Today there are around 70,000 practicing chemical engineers in the United States (57,000 of these are AIChE members) (see AIChE MEMBERSHIP). During the entire history of the profession there have been only about 135,000 American chemical engineers (including those alive today). This means that more than a half of all the chemical engineers who have ever existed are contributing to society right now! Chemical engineering is not a profession that has to dwell on the achievements of the past for comfort, for its greatest accomplishments are yet to come.

So What Exactly Does This "Universal Engineer" Do?

During the past Century, chemical engineers have made tremendous contributions to our standard of living. To celebrate these accomplishments, the American Institute of Chemical Engineers (AIChE) has compiled a list of the "10 Greatest Achievements of Chemical Engineering." These triumphs are summarized below:

The Atom, as Large as Life:

Biology, medicine, metallurgy, and power generation have all been revolutionized by our ability to split the atom and isolate isotopes. Chemical engineers played a prominent role in achieving both of these results. Early on facilities such as DuPont's Hanford Chemical Plant used these techniques to bring an abrupt conclusion to World War II with the production of the atomic bomb. Today these technologies have found uses in more peaceful applications. Medical doctors now use isotopes to monitor

bodily functions; quickly identifying clogged arteries and veins. Similarly biologists gain invaluable insight into the basic mechanisms of life, and archaeologists can accurately date their historical findings.

The Plastic Age:

The 19th Century saw enormous advances in polymer chemistry. However, it required the insights of chemical engineers during the 20th Century to make mass produced polymers a viable economic reality. When a plastic called Bakelite was introduced in 1908 it sparked the dawn of the "Plastic Age" and quickly found uses in electric insulation, plugs & sockets, clock bases, iron cooking handles, and fashionable jewelry (see OIL). Today plastic has become so common that we hardly notice it exists. Yet nearly all aspects of modern life are positively and profoundly impacted by plastic.

The Human Reactor:

Chemical engineers have long studied complex chemical processes by breaking them up into smaller "unit operations." Such operations might consist of heat exchangers, filters, chemical reactors and the like. Fortunately, this concept has also been applied to the human body. The results of such analysis have helped improve clinical care, suggested improvements in diagnostic and therapeutic devices, and led to mechanical wonders such as artificial organs. Medical doctors and chemical engineers continue to work hand in hand to help us live longer fuller lives.

Wonder Drugs for the Masses:

Chemical engineers have been able to take small amounts of antibiotics developed by people such as Sir Arthur Fleming (who discovered penicillin in 1929) and increase their yields several thousand times through mutation and special brewing techniques. Today's low price, high volume, drugs owe their existence to the work of chemical engineers. This ability to bring once scarce materials to all members of society through industrial creativity is a defining characteristic of chemical engineering (see Plastics above, Synthetic Fibers, Food, and Synthetic Rubber below).

Synthetic Fibers, a Sheep's Best Friend:

From blankets and clothes to beds and pillows, synthetic fibers keep us warm, comfortable, and provide a good night's rest. Synthetic fibers also help reduce the strain on natural sources of cotton and wool, and can be tailored to specific applications. For example; nylon stockings make legs look young and attractive while bullet proof vests keep people out of harm's way.

Liquefied Air, Yes it's Cool:

When air is cooled to very low temperatures (about 320 deg F below zero) it condenses into a liquid. Chemical engineers can then separate out the different components. The purified nitrogen can be used to recover petroleum, freeze food, produce semiconductors, or prevent unwanted reactions while oxygen is used to make steel, smelt copper, weld metals together, and support the lives of patients in hospitals.

The Environment, We All Have to Live Here:

Chemical engineers provide economical answers to clean up yesterday's waste and prevent tomorrow's pollution. Catalytic converters, reformulated gasoline, and smoke stack scrubbers all help keep the world clean. Additionally, chemical engineers help reduce the strain on natural materials through synthetic replacements, more efficient processing, and new recycling technologies.

Food, "It's What's For Dinner":

Plants need large amounts of nitrogen, potassium, and phosphorus to grow in abundance. Chemical fertilizers can help provide these nutrients to crops, which in turn provide us with a bountiful and balanced diet. Fertilizers are especially important in certain regions of Asia and Africa where food can sometimes be scarce (See NITROGEN). Advances in biotechnology also offer the potential to further increase worldwide food production. Finally, chemical engineers are at the forefront of food processing where they help create better tasting and most nutritious foods.

Petrochemicals, "Black Gold, Texas Tea":

Chemical engineers have helped develop processes like catalytic cracking to break down the complex organic molecules found in crude oil into much simpler species. These building blocks are then separated and recombined to form many useful products including: gasoline, lubricating oils, plastics, synthetic rubber, and synthetic fibers. Petroleum processing is therefore recognized as an enabling technology, without which, much of modern life would cease to function (see OIL).

Running on Synthetic Rubber:

Chemical engineers played a prominent role in developing today's synthetic rubber industry. During World War II, synthetic rubber capacity suddenly became of paramount importance. This was because modern society runs on rubber. Tires, gaskets, hoses, and conveyor belts (not to mention running shoes) are all made of rubber. Whether you drive, bike, roller-blade, or run; odds are you are running on rubber.

AIChE Pittsburgh Section 2001-2002 Officers

Executive Committee

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724-266-7688

Vice-Chair & Program

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Committee Chairs

Safety & Environmental: Shiaw Tseng
Scholarship Sam Vance

Web Master

Richard Dupree (rrd@telerama.com)
724-775-5122

ELECTIONS!! ELECTIONS!!!

It is time to elect our
2002-2003 Pittsburgh Chapter Officers.
This year, an electronic ballot will be distributed via email.

Please contact
Ed Moretti (emoretti@mbakercorp.com)
Baker Environmental, 412-269-6055
if you are not currently on the email list.

Keep an eye out for this years ballot.

Catalyst
American Institute of Chemical Engineers
337 Fourth Avenue
Pittsburgh, PA 15222-2097

PROUD TO BE AN AMERICAN!