The Newsletter of

The Mid-Michigan Section of AIChE

American Institute of Chemical Engineers

Mission: To provide opportunities to continuously develop our members professionally while working with the community to improve the understanding of science and engineering and their impact on society.

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In this issue…

A scene from the Section's Kick-off Meeting held September 15 at Oscar's Cornerstone Pub in downtown Midland. See pages 4 and 5 for additional photos.

Words from the Chair…

Welcome to a new season of events offered by the Mid-Michigan Section of AIChE. Our Program Committee recently announced an impressive schedule of speakers and continuing education classes for this coming year. We recently held our annual Kick-off meeting at Oscar's Restaurant in Midland to promote the season. Alek Gamble was our master of ceremonies. He did an excellent job entertaining the crowd and highlighting the upcoming events. You can view scenes from the evening in photos included later in this issue.

I invite everyone to join us for an exciting programming season. The Section has prepared a full schedule of meetings with noted experts who will be presenting their views on topics of special interest to chemical professionals. Take a minute to reserve these dates on your calendar:

- **Dr. Abhijit Sarkar**, Research Scientist, Michigan Molecular Institute
  Materials for Photonics Applications: Challenges and Future Prospects
  Wednesday evening, **November 17, 2010**
- **Harry White**, Process Safety Technology Leader, Styron Corporation
  Process Safety Challenges and Future Directions
  Wednesday evening, **Dec. 8, 2010**
- **Dr. Dee Strand**, Dow Fellow, Battery Materials R&D, The Dow Chemical Company
  Component Materials for Lithium Ion Batteries
  Wednesday evening, **Jan. 19, 2011**
- **Dr. Laura Dietsche**, Research Scientist, The Dow Chemical Company
  2010 Mid-Michigan Chemical Engineer of the Year
  The Evolving Field of Chemical Engineering Education
  – from the Perspective of an Engineering Accreditation Commissioner and Evaluator
  Wednesday evening, **Feb. 23, 2011**
- **Prof. Steven Gorsich**, Biology Department, Central Michigan University
  Genetic Engineering of Yeast for Enhanced Production of Biofuels from Lignocellulose Waste
  Wednesday evening, **April 13, 2011**

These meetings will be held Wednesday evenings at local Midland restaurants, with dinner starting at 6:00 p.m. and the speaker's presentation beginning at 7:00 p.m. You can read more about our speakers later in this issue. The meeting location will be announced several weeks in advance of the meeting date. Be sure to check our website at http://mmaiche.org for announcements and updates.

The calendar concludes in May with the Annual Spring Banquet. This is an opportunity to recount the year's activities, meet the new officers, and hear about the winners of special awards and scholarships:

- **Annual Spring Banquet**
  Sherrie Fritze-Harris, Operations Manager, Hemlock Semiconductor Corporation
  Keynote Speaker: Leadership During Rapid Growth
  Wednesday evening, **May 25, 2011**

The Section is also offering two continuing education courses:

- **Karl Jacob** (Dow Fellow) and **Dr. Remi Trottier** (Research Scientist)
  Solids Processing Group, The Dow Chemical Co.
  Particle and Bulk Solids Characterization Technology
  Tues. and Wed., **October 12 - 13, 2010**, 8:00 a.m. – 4:30 p.m. each day
- **Prof. David Clough (**Chemical and Biological Engineering Dept., Univ. of Colorado – Boulder) and **Miles Julian** (Consultant, DuPont Scientist and Engineer, retired)
  Spreadsheet Power
  Wed. and Thurs., **March 23 - 24, 2011**, 8:00 a.m. – 4:30 p.m. each day

Descriptions of each course are provided later in this issue. I expect that many of our members will want to take advantage of the opportunity to learn from these nationally recognized experts. Each course will be offered at a substantial discount compared to similar courses given at national conferences. **Note that our first course offering will be held soon (October 12 – 13).** See page 10 for more information, or contact Katherine Nies at knies@dow.com for registration details.

Updates to the Section's Website. Joe Anderson has been doing a great job managing our website as Webmaster for the Section. I encourage everyone to visit our site at http://www.mmaiche.org to keep abreast of the Section's activities. Be sure to review the **Latest News** page.

I am looking forward to another great season. Don't miss the opportunity to participate. Everyone is welcome!

Tim Frank
Chair, Mid-Michigan Section of AIChE

Scenes from the Season Kick-off Meeting

Photos by Joe Anderson, Section Webmaster

The September Kick-off Meeting was held Wednesday, September 15, 2010 at Oscar's Cornerstone Pub in downtown Midland. The meeting was held to introduce the new calendar of events for 2010 - 2011. See pages 6 - 10 for more information about the speakers and continuing education classes scheduled for this year.

Alek Gamble served as Master of Ceremonies. The following is a collection of scenes from the evening.

Alek entertained the crowd with stories of what it is like to be a "nerdy" engineer.

A great start to Mid-Michigan AIChE's programming season for 2010 - 2011.

The Calendar of Events for 2010 – 2011

All meetings will begin at 6:00 p.m. for dinner, followed by the speaker's presentation at 7:00 p.m.. Venues will be announced several weeks in advance of the meeting date. **Be sure to reserve these dates on your calendar!** Read on for more information about each speaker and their presentations.

Schedule

Wednesday, November 17, 2010
Dr. Abhijit Sarkar, Research Scientist, Michigan Molecular Institute
Materials for Photonics Applications: Chanllenges and Future Prospects

Wednesday, Dec. 8, 2010
Harry White, Process Safety Technology Leader, Styron Corporation
Process Safety Challenges and Future Directions

Wednesday, Jan. 19, 2011
Dr. Dee Strand, Dow Fellow, Battery Materials R&D, The Dow Chemical Company
Component Materials for Lithium Ion Batteries

Wednesday, Feb. 23, 2011
Dr. Laura Dietsche, Research Scientist, The Dow Chemical Company
2010 Mid-Michigan Chemical Engineer of the Year
The Evolving Field of Chemical Engineering Education
– from the Perspective of an Engineering Accreditation Commissioner and Evaluator

Wednesday, April 13, 2011
Prof. Steven Gorsich, Biology Department, Central Michigan University
Genetic Engineering of Yeast for Enhanced Production of Biofuels from Lignocellulose Waste

Wednesday, May 25, 2011
Sherrie Fritze-Harris, Operations Manager, Hemlock Semiconductor Corporation
Spring Banquet Keynote Speaker: Leadership During Rapid Growth

Abstracts and Speaker Information

Materials for Photonics Applications – Challenges and Future Prospects

Abhijit Sarkar
Michigan Molecular Institute
Wednesday evening, November 17, 2010

Photonics is the optical equivalent of electronics, and the two technologies often coexist in such innovations as optoelectronic integrated circuits. Just as applications of electronics have expanded dramatically since the first transistor was invented, the unique applications of photonics continue to emerge. Advances in organic and polymeric materials are playing significant role in developing photonics technologies into photonic devices. The range of application of photonics extends from energy generation to detection to communications and information processing. In this presentation, potential and challenges in the development of nonlinear optical materials for photonic applications will be discussed.

Abhijit Sarkar has more than 20 years of experience involving organic and polymer materials with conjugated structures for optoelectronic properties and applications. At MMI, he is leading the programs in photonics materials. More recently, he has been working on U.S. Army and U.S. Air Force laser protection materials and industry sponsored laser protection eyewear development programs. Prior to joining Michigan Molecular Institute, Dr. Sarkar worked at the University of Oregon for two years where he designed and synthesized organic chromophores and studied their second order nonlinear optical properties. Before that, he had been a JSPS fellow and then Assistant Res. Prof. at Tohoku University, Sendai, Japan where he was involved in the preparation of nonlinear optical materials as well as co-supervision of several graduate student research projects on the design and preparation of organic molecules for second order and third order nonlinear optical materials. He has authored over fifty papers in his research area including a review article and has five approved and applied patents. Dr. Abhijit Sarkar was born in India and is a citizen of the U.S. Dr. Sarkar received his Ph.D. in Chemistry from the Indian Institute of Technol. in 1993. He has an M.S. in Chemistry from Ranchi University (1986).

Process Safety Challenges and Future Directions

Harry White
Styron Corporation
Wednesday evening, December 8, 2010

Process safety has been a part of the chemical industry from the beginning. The desire to safely operate chemical processes to protect people and the environment from incidents is the highest priority. The public expects us to operate our plants safely, with no incidents. By implementing regulatory requirements, we can comply with best practices. By examining past incidents, we can identify causes and implement changes. But, how can the industry make a step change to improve upon process safety performance? This presentation will review past incidents and the changes that have occurred or will occur in the industry. The presentation will also look at identifying leading indicators that could be used to direct resources to preventing process safety incidents.

Harry White is a process safety technology leader for Styron, LLC. His current role includes managing process safety performance and developing appropriate tools and procedures. He has over 29 years of experience in the chemical industry with Union Carbide, Rhone Poulenc, and Dow. He has held a variety of roles including supply chain, production, process engineering, hazardous materials emergency response, and process safety. Harry has a bachelor's of science degree in Chemical Engineering from West Virginia Institute of Technology and is a long time member of AICHE.

Component Materials for Lithium Ion Batteries

Dee Strand
The Dow Chemical Company
Wednesday evening, January 19, 2011

Intense research and development is occurring in lithium ion battery materials to enable their use in electrification of the automobile. While the performance of the battery in a vehicle is a function of many variables, the component materials can have a dramatic effect on the energy density, power density, and safety of the cell. This presentation will review the current options for materials in lithium ion batteries and their relative merits. Future trends in material research and development will be discussed. An overview of Dow's participation in this market will also be given.

Dee Strand is a Dow Fellow in the Battery Materials R&D Group at Dow. Prior responsibilities have included R&D on electronic materials, healthcare, diagnostics, as well as new business development. Dr. Strand has a PhD in Polymer Rheology from the University of Wisconsin-Madison, an MS from Caltech in Electrochemistry, and a BS in Polymers and Coatings from North Dakota State University. Dr. Strand and her husband Steve have three teen-age daughters.

The Evolving Field of Chemical Engineering Education – from the Perspective of an Engineering Accreditation Commissioner and Evaluator

Laura Dietsche
The Dow Chemical Company
Wednesday evening, February 23, 2011

The first chemical engineering program was launched at MIT in the late 1800s to bridge the gap between chemistry and industrial engineering. The explosive growth of new chemicals and high competition levels during the industrial revolution spurred the need for optimized chemical operations including continuous reactors, efficient chemical separation and recovery, fluid and solid transport, and recycling. This led to the development of standardized chemical engineering education components focused on the distinguishing concept of "unit operations". AIChE was the leader in pushing for an accreditation process to promote a level of standardization and quality within chemical engineering programs in the U.S., which led to the formation of ABET. However, standardization did not mean stagnation, and the chemical engineering profession and education system has continued to evolve and expand its boundaries, incorporating new technologies and areas such as biotechnology, electronics, material science, and nano-technology. There has also been significant evolution in the tools of the trade going from slide rules and nomographs to large computer clusters and sophisticated software and equipment.

Laura Dietsche received both her B.S. and Ph.D. in Chemical Engineering from the University of California at Berkeley. She is also a Licensed Engineer in California. Her Ph.D. thesis focused on the detection and modeling of "slip-stick" phenomena in polymer flow. In between the two degrees, she spent seven years working for Dow's Agricultural Chemicals Research Group in Pittsburg, California, where she developed new ag processes starting at lab bench scales, shepherding them through scale up activities and into production plant start-ups. She spent one year as a postdoc at Lawrence Livermore National Labs creating Aspen models for mixed waste handling processes before rejoining Dow in Midland, where she is currently a Research Scientist. Her focus for the past 17 years has been in the area of fluid mechanics and mixing, specializing in computational fluid mechanics. She became a Chemical Engineering program evaluator for ABET in 2000 and has been involved in the accreditation process ever since. She is currently a commissioner for the Engineering Accreditation Commission of ABET and leads multiple accreditation visitation teams every year. She is also a member of the AIChE Education and Accreditation Committee where she is able to bring an industrial perspective to the evolving field of Chemical Engineering education. In May of 2010, Dr. Dietsche was named the Mid-Michigan Chemical Engineer of the Year by the local Section of AIChE.

Genetic Engineering of Yeast for Enhanced Production of Biofuels from Lignocellulose Waste

Steven Gorsich
Biology Department, Central Michigan University
Wednesday evening, April 13, 2011

The demand for alternative and renewable fuel sources has increased for economic, security, and environmental reasons. One promising renewable fuel source is bio-ethanol. Cornstarch is the most common fermentative substrate used to produce bio-ethanol. However, cornstarch is not a suitable long-term substrate since there is not enough to produce sufficient quantities of ethanol and using it for ethanol production competes with livestock and human consumption. Using lignocellulosic biomass waste, such as corn stover or wood chips, is an alternative substrate that offers considerable promise. However, lignocellulosic biomass is not commercially used to produce ethanol for three main reasons: 1) releasing glucose from cellulose is not optimized, 2) sugars released from lignocellulosic biomass contain both 5- and 6-carbon sugars, of which yeast cannot metabolize 5-carbon sugars, and 3) the acid pre-treatment step that releases sugars from lignocellulose generates over 100 different fermentation inhibitors. The latter two problems (sugar utilization and inhibitors) are being addressed using genetic engineering strategies. Yeast strains capable of fermenting both 5- and 6-carbon sugars have been successfully engineered by introducing genes from organisms known to metabolize 5-carbon sugars. These strains offer a great deal of promise, but still require optimization for industrial application. Genetic engineering yeast to be tolerant of fermentation inhibitors has received less attention. However, recent strategies from my lab have resulted in engineered strains capable of tolerating high concentrations of three main inhibitors, furfural, hydroxymethylfurfural, and vanillin. These strains were engineered by overexpressing general stress tolerant genes. These studies will not only prove useful in the bio-ethanol industry, but they will also help in understanding the general phenomenon of cellular stress tolerance, which has many applications.

Steven Gorsich is Assistant Professor in the Biology Department at Central Michigan University. He earned BS and MS degrees in Biology from Eastern Kentucky University in 1993 and 1996, respectively, and a Ph.D. in Molecular Biology from the University of Utah, in 2003. Immediately following graduate school, Dr. Gorsich joined the USDA in Peoria, IL as a research molecular biologist where his research interests with biofuels began. In 2006, he joined the biology faculty at Central Michigan University. Dr. Gorsich's general research area is in cellular stress tolerance using yeast as a model system. More specifically, he investigates the problems associated with environmental stresses found during industrial fermentation of ethanol and gamete development. At CMU, Prof. Gorsich teaches introductory biology, genetics, human genetics, advanced cell biology, cell dynamics of disease, alternative energy, art of scientific communication, and eugenics. He is also a board member and Alternate Councilor for Michigan-ASM. Dr. Gorsich is married with 3 young and active boys. He and his family like to travel when not involved in baseball, soccer, or school activities.

Spring Banquet

Sherrie Fritze-Harris, Operations Manager, Hemlock Semiconductor Corporation
Keynote Speaker: *Leadership During Rapid Growth*
Wednesday evening, May 25, 2011
Meeting time and location to be announced

Continuing Education Courses

Contact Katherine Nies at knies@dow.com for registration information and course details.

I. Particle and Bulk Solids Characterization Technology (CH763) – October 12 - 13, 2010
8:00 a.m. – 4:30 p.m. each day. Coffee and Lunch provided.

Registration fee: $650 (for members), $700 (for non-members). The course location will be announced at http://www.mmaiche.org. This course will be of interest to scientists and engineers who want to improve their characterization and data interpretation skills for better control of particulates, particulate formulation, suspensions, and dispersions. Given the wide range of technologies available for powder/ particle characterization, selection of the best technology for a particular application is not a trivial task. You cover the basics of particle and bulk solids (from nanoscale to millimeters) characterization along with the latest commercially available technologies. Participants acquire the knowledge necessary for proper instrument selection, data validation and interpretation.

Instructors:

Karl Jacob is a Dow Fellow/Sr. Technical Leader for solids processing at The Dow Chemical Co. He is a Chemical Engineering graduate of Case Western Reserve Univ. Mr. Jacob is founder of the Solids Processing Lab at Dow and for the last two decades has worked on a vast array of particle technology problems, with particular expertise in silo/hopper design, powder mechanics, pneumatic conveying, particle eng. and drying. He is member of AIChE and past chair of the Particle Technology Forum.

Dr. Remi Trottier is a Reseach Scientist in the solids processing discipline of engineering sciences at The Dow Chemical Company. He has over 20 years of industrial experience in particle characterization, aerosol science, air filtration and solids processing technology. Dr. Trottier has authored some 20 papers and has served as an instructor for several short courses on particle characterization. He received his Ph.D. in Chemical Engineering from Loughborough University of Technology, UK, and his master's and bachelor's degrees in Applied Physics from Laurentian University, Sudbury, Ontario, Canada.

II. Spreadsheet Power (CH201) – March 23 - 24, 2011. 8:00 a.m. – 4:30 p.m. each day. Coffee and lunch provided.

Registration fees and the course location will be announced at http://www.mmaiche.org. This course covers problem solving strategies for spreadsheets, including use of macros and Visual Basic (VBA) in Excel, solving methods for engineering equations, applied statistics in Excel, optimization calculations using spreadsheets, table-based operations and solving algebraic and differential equations.

Instructors:

Prof. David E. Clough, has successfully taught chemical engineers how to apply and use spreadsheets for more than 20 years. He is currently Professor of Chemical Engineering at the University of Colorado, Boulder, where his special areas of expertise are applied computing in chemical engineering, process control, and applied statistics.

Miles Julian spent 41 years with DuPont. Today, he is a widely known consultant throughout the United States and Europe in the areas of engineering evaluations and methanol technology.

Mid-Michigan Section Contact Information

AIChE Mid-Michigan Section 2010-2011 Officers and Committee Chairpersons

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