

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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A scene from the Section’s Season Kick-off Meeting held September 14 at Oscar’s Cornerstone Pub in downtown Midland. See pages 3 to 5 for additional photos.

Words from the Chair...

We had a great time at the kick-off event at Oscar's on the 14th (see some pictures on later pages), including singing two ChemE songs! It was especially delightful to welcome many newcomers to our area and our section. Mid-Michigan is an exciting place for the development of new science & technology, and through our Section we can share some of that excitement with each other and with the community. One way we do that is through our seminar series (described below). Vishesh Shah led the organization of this program, which covers a wide range of topics from a wide range of speakers – there is something new and interesting to learn about each month. Another way we do that is through our educational outreach, led by Drew Powers. We have the opportunity to demonstrate science with enthusiasm in local schools and science fairs, and to offer job shadows to interested students. Look for more information about these opportunities in your e-mail and feel free to suggest others!

America, and humanity as a whole, has benefited greatly through the work of engineers. This view is not widely held by our society, which has contributed to insufficient interest in engineering by students at all levels compared to students in other countries. The National Academy of Engineering prepared a comprehensive report on this problem and also prepared several ways to “change the conversation” about engineering to be more effective at conveying the importance and excitement about what we do (<http://engineeringmessages.org/>). Key messages for us as engineers to share broadly are:

- Engineers are creative problem-solvers.
- Engineers make a world of difference.
- Engineering is essential to our health, happiness, and safety.
- Engineers help shape the future.

They also present several engineering tag lines; I've used one below – check out the NAE web page for more (<http://engineeringmessages.org/23673/25292.aspx>)!

I hope you are all able to participate in our seminars, committees and outreach, as we **share the excitement** and impact of engineers & engineering!

Rich Helling

Chair, Mid-Michigan Section of AIChE
Engineers – turning ideas into reality



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Scenes from the Season Kick-off Meeting

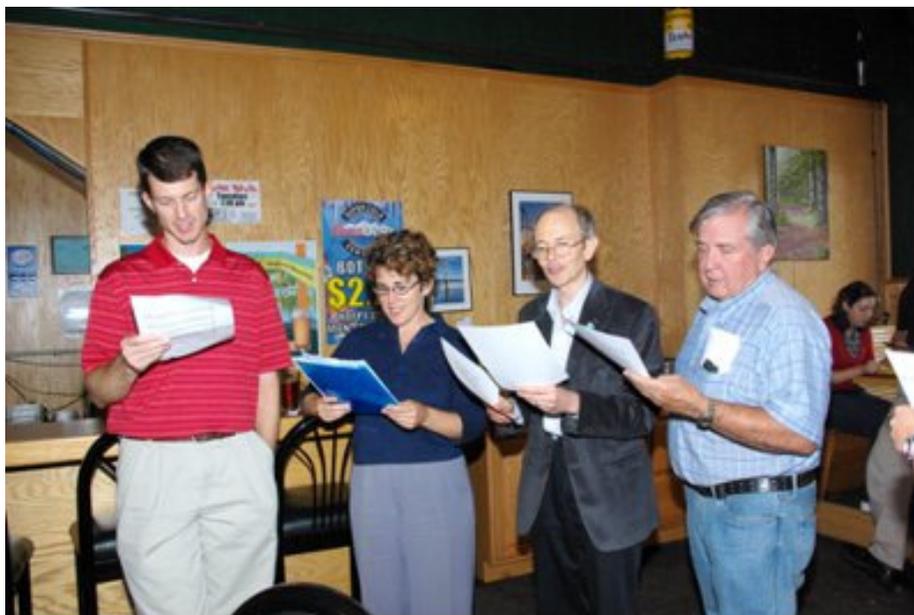
Photos by Joe Anderson, Section Webmaster

The Season Kick-off Meeting was held Wednesday, September 14, 2011 at Oscar's Cornerstone Pub in downtown Midland. The meeting was held to introduce the new calendar of events for 2011 - 2012. See pages 6 to 11 for more information about this year's speakers.

Rich Helling, Section Chair, served as Master of Ceremonies. The following is a collection of scenes from the evening.



John Anderson, well-known chemical engineer and musician, lent his musical talents.



Mike Trippeer, Maxine Cottrell, Rich Helling, and Norm Lake participate in the ChemE sing-along.



Aleksandr Gamble, last year's MC, enjoys the evening.



Paul Kehl (Director) and Kip Mercure (Adviser) give it some serious thought.



Shawn Feist, Chair-Elect joins in the ChemE sing-along.



A great start to Mid-Michigan AIChE's 2011 – 2012 programming year!

The Calendar of Events for 2011 – 2012

All meetings will begin at 6:00 p.m. for dinner, followed by the speaker's presentation at 7:00 p.m. Meetings will be held at the Grand Traverse Pie Company, 2600 N Saginaw Rd., Midland, Michigan. **Be sure to reserve these dates on your calendar!** Read on for more information about each speaker and their presentations.

Schedule

Meetings with Invited Speakers

- **Dr. Tom Cottrell**, Enology Extension Specialist, University of Kentucky
Winemaking from the Perspective of the Small Winery
Wednesday, **October 26, 2011**, 6:00 p.m. dinner (optional), 7:00 p.m. presentation
- **Mr. Brian Vokal, P.E.**, Manager of Engineering, Midland Cogeneration Venture
Evolution of the Midland Cogeneration Venture
Wednesday, **November 9, 2011**, 6:00 p.m. dinner (optional), 7:00 p.m. presentation
- **Professor Ed Cussler**, Distinguished Institute Professor, University of Minnesota
A Different Chemical Industry
Wednesday, **December 14, 2011**, 6:00 p.m. dinner (optional), 7:00 p.m. presentation
- **Dr. Mark Jones**, Research Fellow, The Dow Chemical Company
Chemicals from Biomass: Path to Perdition or the Promised Land?
Wednesday, **January 11, 2012**, 6:00 p.m. dinner (optional), 7:00 p.m. presentation
- **Dr. Melissa Mushrush**, Research Chemist, The Dow Chemical Company
Key Challenges in Manufacturing Building-Integrated Photovoltaics
Wednesday, **February 8, 2012**, 6:00 p.m. dinner (optional), 7:00 p.m. presentation
- **Mr. Mark Loboda**, Chief Scientist, Dow Corning
Semiconductor Silicon Carbide for Power and Energy Applications
Wednesday, **March 7, 2012**, 6:00 p.m. dinner (optional), 7:00 p.m. presentation

Annual Spring Banquet

- **Carol Williams**, Senior Vice President, The Dow Chemical Company
Keynote Speaker
Wednesday, **May 16, 2012**, meeting time and location to be announced

Abstracts and Speaker Information

Contact Vishesh Shah, Programming Chair, at vshah2@dow.com for more information.

Winemaking from the Perspective of the Small Winery

Tom Cottrell

University of Kentucky

Wednesday, October 26, 2011. Dinner at 6:00 p.m. Presentation at 7:00 p.m.

The wine industry in the United States continues to grow rapidly with the expansion of large wineries and the proliferation of small wineries. Kentucky now has 62 small wineries, and Michigan has 80, not all small. The steps in making wine in small wineries follow an established path, but allow many variations in the outcome. Many choices are open along the way: from grape variety, ripeness parameter selection, processing steps, yeast strain, to bottle style and label design. Most winemakers begin their understanding of chemistry part way through their first fermentation. The Laboratory work is simple enough to be fun, and the processing steps are straightforward, but require attention to detail, cleanliness and sanitation. This presentation will review and describe those choices and steps.

Dr. Tom Cottrell founded Cuvaision in 1970 in the Napa Valley. In 1982, Tom became Cornell's first Associate Professor of Enology. Subsequently, he was the Manager/Winemaker for Chalk Hill Winery in Sonoma County, CA, which he grew to 65,000 cases per year, and for Sakonnet Vineyards in Rhode Island, which he grew to 35,000 cases per year. Returning to the Finger Lakes in 1995, Tom consulted for wineries and winery start-ups in the Finger Lakes, on Long Island, Pennsylvania, and other parts of the East, Mid-west, and South. Asked in 2005 to fill a serious need in Kentucky, Tom is now the Extension Enologist for the University of Kentucky in Lexington, primarily assisting the burgeoning wineries of Kentucky in making consistently good wine. Tom continues his consulting for wineries as 'Wine Doc' in winemaking consulting and winery start-ups, doing winery design, equipment specification, and Pro Forma financial projections. He has been a member of the American Society for Enology and Viticulture since 1970.

Evolution of the Midland Cogeneration Venture

Brian Vokal

Midland Cogeneration Venture

Wednesday, November 9, 2011. Dinner at 6:00 p.m. Presentation at 7:00 p.m.

The purpose of this presentation is to introduce the Midland Cogeneration Venture (MCV) facility, its history and its future plans. Originally designed as a nuclear power plant, the MCV facility consists of 12 natural gas fueled, combined cycle combustion turbines, with a net facility electrical output of greater than 1,600 megawatts. The facility provides electricity (up to 1240 megawatts at rated capacity) to Consumers Energy, and steam and electricity for The Dow Chemical Company. When originally built in 1990, MCV was America's largest combined cycle cogeneration facility. The MCV site comprises roughly 1,200 acres, with 880 acres serving as a cooling pond for the condensing steam turbine.

Brian Vokal, P.E., is the Manager of Engineering for the Midland Cogeneration Venture. His responsibilities include providing technical guidance to the Engineering and Chemistry department staff with regard to optimizing energy production and consumption; and ensuring local, state, and federal environmental, health, and safety compliance. Mr. Vokal is a graduate of Michigan State University where he received both his B.S. and M.S. degrees in Mechanical Engineering. He is a licensed Professional Engineer in the State of Michigan and is an active member of The National Society of Professional Engineers. He is also Chairman of the Saginaw Valley Chapter MATHCOUNTS competition held each February at Saginaw Valley State University.

A Different Chemical Industry

Ed Cussler

University of Minnesota

Wednesday, December 14, 2011. Dinner at 6:00 p.m. Presentation at 7:00 p.m.

The chemical industry today is changed from the chemical industry of twenty-five years ago. Clear evidence of this change comes from the jobs taken by graduating chemical professionals in the USA. Twenty-five years ago, eighty percent of these graduating students went to the commodity chemical industry, exemplified by DuPont, Exxon, Shell, and Dow. Now, twenty percent do. Twenty-five years ago, around ten percent went to product-oriented businesses like PPG, Pfizer, and 3M. Now, fifty percent do. The chemical industry now has a product focus. This seminar will discuss whether the skill set of chemists and chemical engineers is appropriate for this altered chemical industry. While the basic skill set remains strong, the applications currently emphasize commodity chemicals. This emphasis includes such classical subjects like reaction kinetics and thermodynamics. In the future, new topics, including those based on psychology, on sustainability, and on product design, may become more central for chemical professionals.

Edward L. Cussler, currently Distinguished Institute Professor at the University of Minnesota, received his B.E. with honors from Yale University in 1961, and his M.S. and Ph.D. in Chemical Engineering from the University of Wisconsin in 1963 and 1965, respectively, working with E. N. Lightfoot. After thirteen years teaching at Carnegie-Mellon University, Cussler joined the University of Minnesota in 1980. He has written over 240 articles and five books, including *Diffusion*, *Bioseparations*, and more recently, *Chemical Product Design*. Cussler has received the Colburn and Lewis Awards from the American Institute of Chemical Engineers (AIChE), for whom he served as Director, Vice President, and President. He has received the Separations Science Award from the American Chemical Society, the Merryfield Design Award from the American Society of Engineering Education, and honorary doctorate degrees from the Universities of Lund and Nancy. Cussler is a Fellow of the American Association for the Advancement of Science and a member of the National Academy of Engineering.

Chemicals from Biomass: Path to Perdition or the Promised Land?

Mark Jones

The Dow Chemical Company

Wednesday, January 11, 2012. Dinner at 6:00 p.m. Presentation at 7:00 p.m.

The U.S. chemical industry is a \$720 B enterprise making essential products that end up in 96% all manufactured goods. The industry uses both fossil and renewable resources to make products today. Bioproducts are receiving active interest due to consumer demand, industry interest in improved materials and interest from the biofuels community in making “high value chemicals”. Several inescapable principles must be dealt with in order to successfully navigate chemical production from biomass. These include: (i) natural gas drives the chemical industry and halcyon days are expected due to shale gas, (ii) biomass and biologically derived materials can be expensive raw materials for chemical production, and (iii) a mixture containing a valuable chemical is not the same as a valuable mixture of chemicals. It is dangerous to assume that chemical production can save an economically challenged biofuels process. Repurposing a fuel for chemical use or garnering more value from co-products both are fraught with peril. Cautious optimism, rather than unbridled optimism, is in order as emphasis shifts towards bioproducts.

Mark Jones is currently Technology Strategy Development Fellow within Performance Plastics, Hydrocarbons, Chemicals, Energy and Licensing R&D in the Dow Chemical Company. In this role, Mark is responsible for developing alternative feedstock initiatives and technology exploration in energy, plastics, chemicals and hydrocarbons areas. Mark left a role leading the Process Scale-up and Implementation Team within the Energy Storage Devices platform to assume his current role. During his foray into batteries, Mark completed preliminary design and equipment selection for a battery materials production facility, worked with business leaders to develop a battery materials strategy, managed intellectual capital, and steered R&D efforts related to electrode and electrolyte materials. Mark’s expertise in energy has resulted in his being asked to participate in and to chair DOE platform reviews for the Office of the Biomass Program. In 2011, Mark is one of the co-chairs of the DOE OBP steering committee. Mark is also currently a member of the National Research Council committee on Sustainable Development of Algal Biofuels. Jones has a Ph.D. in Chemistry from the University of Colorado – Boulder.

Key Challenges in Manufacturing Building-Integrated Photovoltaics

Melissa Mushrush

The Dow Chemical Company

Wednesday, February 8, 2012. Dinner at 6:00 p.m. Presentation at 7:00 p.m.

The solar industry is growing at an astonishing rate, which continues well into the foreseeable future in market projections. As with any relatively new industry, there are unique challenges for each component of a photovoltaic system, from the active cells themselves all the way to the final installation. As a world leader in both energy and materials innovation, Dow has established itself as a significant presence in all aspects of the emerging PV technologies. This overview of photovoltaics will cover the current state of the art for the various PV system components, the particular engineering challenges for these components, and an in-depth look at reliability testing and accelerated aging for PV.

Melissa Mushrush completed a double-major at Wesleyan University in Connecticut in the chemistry and Russian departments. She then pursued an MS and Ph.D. at Northwestern University, working on organic field-effect transistors with Professor Tobin Marks. She came to Dow in 2003 and worked on short projects in Polymer Chemistry, Epoxy R&D, Polyolefins (Catalysis), and Building & Construction before joining the High-Throughput Formulations Group. In the fall of 2006, she was one of the first handful of people to start building Dow Solar Solutions, where she has been ever since.

Semiconductor Silicon Carbide for Power and Energy Applications

Mark Loboda

Dow Corning

Wednesday, March 7, 2012. Dinner at 6:00 p.m. Presentation at 7:00 p.m.

Global focus on electronics technology to control power and reduce energy consumption now drives growth of product markets leveraging semiconductor silicon carbide (SiC) substrates. Sustained growth requires the availability of SiC epitaxial substrates with continually improving quality and a cost reduction roadmap to support broad product adoption by the power semiconductor industry. This presentation will introduce the role and impact SiC power semiconductors can have on energy conservation and quality of life. The challenges, science and methods behind SiC crystal growth, wafer fabrication and epitaxy will be introduced in the context of the semiconductor engineering and manufacturing. The rapid advancement of this technology at Dow Corning will be highlighted by review of the plurality of scientific disciplines practiced in this activity and an engineering/statistics approach to reduce the experience curve.

Mr. Loboda joined Dow Corning in 1989, and is presently Chief Scientist in the Compound Semiconductor Solutions Business. He received B.Sc.(1983) and M.Sc.(1985) degrees in Applied Physics at DePaul University in Chicago, IL. Prior to joining Dow Corning, he was employed at the Raytheon Company's Research Division. Mr. Loboda is an internationally recognized expert in the area of low permittivity dielectric materials science/applications and chemical vapor deposition technology. Mr. Loboda has published over 90 technical papers and has been awarded 18 patents spanning the areas of RF and microwave electronics, integrated circuit and display fabrication, and chemical vapor deposition of Si-based materials. Mr. Loboda is a Senior Member of the IEEE.

Spring Banquet

Carol Williams, Executive Vice President, The Dow Chemical Company

Keynote Speaker

Wednesday, May 16, 2012, meeting time and location to be announced

Carol Williams is Executive Vice President of Dow Manufacturing & Engineering. She is also a member of the Company's Executive Leadership Committee and the Strategy Board. Williams joined Dow in 1980, starting as an engineer in R&D for plastic films and foams in the Granville Research Center. She subsequently held a variety of leadership positions in Dow including director for the Analytical Science Lab in Midland, global R&D director for the Epoxy Products and Intermediates Business, site leader for Oyster Creek in Freeport, business vice president for

Chlor-Alkali Assets, vice president of Global Purchasing, R&D vice president for Hydrocarbons & Energy, Chemicals & Intermediates and Core (Corporate R&D), and vice president of Business Development for Market Facing Businesses. From 2007 to 2008, Williams served as corporate vice president for Dow's Market Facing, Business Development and Licensing Portfolio. Carol was named as Sr. Vice President of Basic Chemicals in January 2009 and President of Chemicals & Energy in 2010, before transition to her current role in 2011. Williams earned a bachelor's degree in chemical engineering from Carnegie Mellon University in Pittsburgh, PA, and received an Executive MBA at Indiana University. Williams is on the board of directors of the Alliance to Save Energy, an advisory board member for the Engineering Department and a member of the Energy Futures Institute Presidential Consultation Committee at Carnegie Mellon University, a member of the Society of Women Engineers and serves on the World Chlorine Council Governing Council.

Mid-Michigan Section Contact Information

AICHe Mid-Michigan Section 2011-2012 Officers and Committee Chairpersons

(all phone numbers are in the 989 area code unless otherwise noted)

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