

# AIChE

## SUSTAINABLE ENGINEERING FORUM NEWSLETTER

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Volume 8, Issue 2



### Message from the Chair

Welcome to the Fall 2014 issue of the SEF Newsletter. With the arrival of Fall, we can begin looking forward to the AIChE Annual Meeting, to be held this year in Atlanta, Georgia. In addition to our usual offerings of excellent programming and our annual awards luncheon, the SEF and IfS will be hosting a joint reception in honor of the 10 year anniversary of the IfS. Be on the lookout for details as we finalize our plans for a great event celebrating 10 years of sustainability with AIChE.

In this issue, you will find the detailed program plan for SEF sponsored and co-sponsored sessions at the Annual Meeting. Also, be sure to check out the announcement of our SEF Award Winners, who will be recognized at our awards luncheon in Atlanta, as well as our usual listing of member announcements, educational briefings and IfS updates. Tickets for the awards luncheon will be available when you register for the Annual Meeting.

Dues paid by SEF members fund our operating expenses and outreach activities. In the last year, your dues have been used to sponsor two sustainability focused conferences - including the Foundations of Computer Aided Process Design Conference, held in Cle Elum, Washington, the 4th Annual International Forum on Sustainable Manufacturing, held in Lexington, Kentucky - as well as the Young professionals mixer at the 2014 AIChE Spring Meeting. Additionally, your dues have provided student research awards at the AIChE Annual Meeting and our annual student paper awards. I hope you will agree that opportunities to recognize the next generation of leaders in

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#### **SEF Website:**

<http://www.aiche.org/sef>

the field of sustainability are important.

In a volunteer based organization like the SEF, volunteers provide all the energy for continued momentum for the forum. If you are interested in getting involved, please e-mail me or any of the other members of the leadership committee listed in the newsletter. On behalf of the leadership committee, we look forward to welcoming many new volunteers to our organization.

Finally, your comments and suggestions on how to improve the SEF or serve our members better are always welcome. Feel free to contact me at Jeffrey.seay@uky.edu.

Jeffrey R. Seay  
Chair, Sustainable  
Engineering Forum



## Announcements

By Ray Smith

### **SEF Luncheon - AICHe Annual Meeting, Wednesday, November 19th, 2014**

The annual SEF luncheon will be held in Sear, located in the Marriott Marquis, Atlanta, on Wednesday, November 19th, 2014, during the AICHe Annual Meeting. Promising a main entrée with starch and vegetables, a salad, soft beverages, and dessert, the lunch will offer a relaxing setting to network with other SEF members while taking a break from the meetings. The SEF awards will be presented during the luncheon. The convenient location will enable the attendees to return to their scheduled meetings on time. The total cost of this SEF-subsidized event including tax and tip is \$35. We encourage you to sign up for the luncheon when you register for the meeting.

### **U.S. NSF - China NSF Workshop on Sustainable Manufacturing Held in China**

Initiated by the U.S. NSF and China NSF, the U.S. NSF - China NSF Workshop on Sustainable Manufacturing was successfully held in Wuhan, China, March 13-15, 2014. Drs. Bruce Hamilton, JoAnn Lighty, and William Chang of the U.S. NSF as well as a number of China NSF officers attended the workshop. The workshop was co-chaired by Prof. Yinlun Huang of Wayne State University and Prof. Xinyu Shao of Huazhong University of Science and Technology of China.

The workshop was targeted to identify high-priority specific research objectives that could be pursued significantly better by collaborative U.S. - China research teams than by U.S. researchers and China researchers working separately without U.S. - China collaboration. In the workshop, U.S. and China researchers defined high-priority sustainable manufacturing research objectives and discussed related collaborative research project areas that were

potentially fundable jointly by the U.S. NSF and China NSF. The workshop was designed for broad and in-depth discussions of challenges, opportunities, and collaborations in critical areas of mechanical/chemical sustainable manufacturing. Participants from each country are leading/active scholars in mechanical, chemical, industrial, material, civil and environmental engineering.

Thematic areas included (i) sustainable products and processes and



(ii) sustainable manufacturing systems. These thematic areas covered most frontier research topics, such as product design innovations for resource efficiency and effectiveness, manufacturing process and equipment design with minimum ecological footprints, smart manufacturing, fast and in-time green production, and sustainable supply chain and industrial ecology. The workshop greatly helped U.S. delegates gain a clear understanding of research on sustainable manufacturing in China, and identify high-level collaboration opportunities with Chinese colleagues. As the workshop was designed for multidisciplinary discussions, it was targeted to lead to identification of cutting-edge areas in sustainable manufacturing and a plan for effective interdisciplinary collaboration.

The U.S. delegation was formed of 14 academic scholars of all ranks, including scholars from underrepresented groups. In specific, the workshop was co-funded by the Global Venture Fund (GVF) of NSF's International Science and Engineering section (ISE), as well as the CMMI and CBET divisions of NSF's Engineering Directorate.

Yinlun Huang  
SEF Technical Advisor

## **SEF 2014 Awards**

By Tom Marrero

### **2014 Sustainable Engineering Forum Student Paper Awards**

Awards are presented to full-time undergraduate or graduate students who prepare the best technical papers that describe results related to engineering and sustainability.

#### **2014 Student Paper Award Winner**

**Shweta Singh, William G. Lowrie Department of Chemical and Biomolecular Engineering, The Ohio State University, Columbus, Ohio**

“Accounting for the Biogeochemical Cycle of Nitrogen in Input-Output Life Cycle Assessment,” published in *Environmental Science and Technology* (2013), 47 (16), pp 9388–9396 (co-authors: Dr. Bhavik R. Bakshi; advisor: Dr. Bhavik R. Bakshi).

#### **2014 Honorable Mentions**

**Sumesh Sukumara**, Department of Chemical and Materials Engineering, University of Kentucky.

**Dajun Yue**, Department of Chemical and Biological Engineering, Northwestern University.

#### **2014 Sustainability Education Award**

The Sustainability Education award recognizes and honor one educator who has made outstanding contributions to sustainability education. Examples of contribution include, but are not limited to, successful incorporation of sustainability in the classroom or engineering community.

**Helen H. Lou, Ph.D., P.E., University Professor and Ann Die Hasselmo Scholar Dan F. Smith Department of Chemical Engineering, Lamar University**

Helen H. Lou is a Professor in the Dan F. Smith Department of Chemical Engineering, Lamar University. Her research focuses on sustainable engineering, process systems engineering, process



safety and combustion. Dr. Lou was the Chair of AIChE Sustainable Engineering Forum (SEF) in 2010-11. She holds a B.S. in Chemical Engineering from Zhejiang University, Hang Zhou, China (1993), then worked four years in SinoPec Luoyang Petrochemical Engineering Corporation (LPEC). She received the following degrees from Wayne State University in Detroit, MI: an M.S. in Chemical Engineering (1998), an M.A. in Computer Science (2001) and a Ph.D. in Chemical Engineering (2001).

#### **2014 Research Excellence in Sustainable Engineering Award**

This award is annually presented for basic or applied research results relative to the sustainability of products, processes, or the environment. The award is to recognize one who has made significant technical contributions to teaching and development activities.

**Prof. Phillip E. Savage, Department of Chemical Engineering, Pennsylvania State University**



Phil Savage is Department Head and Walter L. Robb Family Chair in Chemical Engineering at Pennsylvania State University. He is also Arthur F. Thurnau

Professor Emeritus at the University of Michigan. Phil's research deals with the elucidation of reaction pathways, kinetics, and mechanisms for systems with significance to the environment and environmental sustainability. His current focus is on hydrothermal processes for converting algal biomass into renewable chemicals and fuels. He has also developed and taught a graduate course on environmental sustainability and an undergraduate course on sustainable engineering. He is Editor-in-Chief of *Industrial & Engineering Chemistry Research*.

Phil obtained his B.S. degree at Penn State in 1982, and his M.Ch.E. and Ph.D. degrees from the University of Delaware in 1983 and 1986, respectively. He was at the University of Michigan from 1986 – 2014 and joined Penn State this summer.

**Prof. Vasilios Manousiouthakis, Department of Chemical and Biomolecular Engineering, University of California, Los Angeles**

Dr. Manousiouthakis is a Professor in the University of California, Los Angeles. His research interests include plasma simulation, process design, process optimization and process control.



Dr. Manousiouthakis obtained his Diploma at the National Technical University of Athens in 1981, his M.S. and Ph.D. degrees from Rensselaer Polytechnic Institute in 1985 and 1986, respectively.

## Programming Activities

By Siphon Ndlela

The Sustainable Engineering Forum is thrilled to host 34 sessions gathered by an exceptional group of Chairs and Co-Chairs. The number of sessions is smaller this year as compared to 40 sessions at the 2013 annual conference. I think this gives the SEF team an opportunity to explore how we can bring in more talented faculty members and industrial experts to expand our sessions and increase collaboration.

This year's annual AIChE conference in Atlanta will continue a tradition of enhancing professional development, networking opportunities and information exchange to all participants (faculty, professionals and students). Once again, my sincere thanks to everyone who made this program possible and for your support of the SEF programs. For more information about the upcoming conference, please visit: [www.aiche.org](http://www.aiche.org). Below is a synopsis for the SEF session titles and scheduling.

### Proposed SEF Sessions for the 2014 AIChE Annual Meeting in Atlanta, GA

Monday, November 17, 2014: 12:30 PM - 03:00 PM, Marriott, International C
Session 124 23000 Division Plenary: Sustainability Plenary
Tuesday, November 18, 2014: 03:15 PM - 05:45 PM, Marriott, International B
Session 391 23A00 Nanomaterials and Nanotechnology Sustainability
Monday, November 17, 2014: 08:30 AM - 11:00 AM, Marriott, International B
Session 39 23A01 Area Plenary: Optimizing Health, Safety & Environmental (HSE) Sustainably
Wednesday, November 19, 2014: 08:30 AM - 11:00 AM, Marriott, International B
Session 463 23A02 Process Design: Innovation for Sustainability

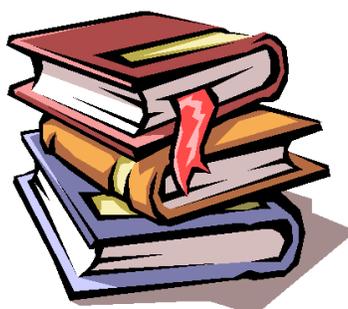
Tuesday, November 18, 2014: 08:30 AM - 11:00 AM, Marriott, International B
Session 287 23A03 Sustainability in Facility Siting
Tuesday, November 18, 2014: 12:30 PM - 03:00 PM, Marriott, International A
Session 324 23A04 Environmental Health & Safety and Sustainability
Wednesday, November 19, 2014: 03:15 PM - 05:45 PM, Marriott, International C
Session 591 23B00 Recovery of Value-Added Co-Products from Biorefinery Residuals and Effluents
Thursday, November 20, 2014: 08:30 AM - 11:00 AM, Marriott, International B
Session 635 23B01 Integrated Thermochemical and Biochemical Processing for Renewable Fuels and Chemicals
Friday, November 21, 2014: 08:30 AM - 11:00 AM, Marriott, International B
Session 752 23B02 Integrating Industrial Waste into Biorefineries
Thursday, November 20, 2014: 08:30 AM - 11:00 AM, Marriott, International C
Session 624 23B03 Developments in Biobased Alternative Fuels I
Wednesday, November 19, 2014: 03:15 PM - 05:45 PM, Marriott, International B
Session 544 23B04 Biological Conversions and Processes for Renewable Feedstocks II
Monday, November 17, 2014: 03:15 PM - 05:45 PM, Marriott, International C
Session 196 23B05 Life Cycle Analysis of Bio-Based Fuels, Energy, and Chemicals
Tuesday, November 18, 2014: 12:30 PM - 03:00 PM, Marriott, International B
Session 298 23B06 Advances in Biofuels: DOE Bioenergy Research Centers
Monday, November 17, 2014: 08:30 AM - 11:00 AM, Marriott, International C
Session 80 23B07 Plenary Session: Sustainable Biorefineries
Tuesday, November 18, 2014: 12:30 PM - 03:00 PM, Marriott, International C
Session 307 23B08 Biofuels Production: Design, Simulation, and Economic Analysis I
Wednesday, November 19, 2014: 08:30 AM - 11:00 AM, Marriott, International C
Session 424 23B09 Advances in Algal Biorefineries I
Monday, November 17, 2014: 03:15 PM - 05:45 PM, Marriott, International B
Session 177 23B10 Conversion of Biomass Based Renewable Resources to Synthesis Gases and Pyrolysis Oils
Wednesday, November 19, 2014: 12:30 PM - 03:00 PM, Marriott, International B
Session 490 23B11 Biological Conversions and Processes for Renewable Feedstocks I
Thursday, November 20, 2014: 03:15 PM - 05:45 PM, Marriott, International A
Session 738 23B12 Reaction Kinetics and Transport Fundamentals for Biomass Conversion
Tuesday, November 18, 2014: 08:30 AM - 11:00 AM, Marriott, International C
Session 266 23B13 Life Cycle Assessment of Advanced Biofuels
Wednesday, November 19, 2014: 06:00 PM - 08:00 PM, Hilton, Galleria Exhibit Hall
Session 604 23B14 Poster Session: Sustainability and Sustainable Biorefineries
Friday, November 21, 2014: 08:30 AM - 11:00 AM, Marriott, International A
Session 757 23B15 Reactor Engineering for Biomass Feedstocks
Thursday, November 20, 2014: 03:15 PM - 05:45 PM, Marriott, International C
Session 718 23B16 Developments in the Pretreatment of Lignocellulosics for Bioconversion
Thursday, November 20, 2014: 12:30 PM - 03:00 PM, Marriott, International A
Session 677 23B17 Chemical and Catalytic Conversions and Processes for Renewable Feedstocks

Thursday, November 20, 2014: 12:30 PM - 03:00 PM, Marriott, International C
Session 683 23B18 Developments in Bio-Based Alternative Fuels II
Tuesday, November 18, 2014: 03:15 PM - 05:45 PM, Marriott, International C
Session 366 23B19 Biofuels Production: Design, Simulation, and Economic Analysis II
Wednesday, November 19, 2014: 12:30 PM - 03:00 PM, Marriott, International C
Session 480 23B20 Advances in Algal Biorefineries II
Thursday, November 20, 2014: 08:30 AM - 11:00 AM, Marriott, International A
Session 626 23C00 Energy Sustainability, Challenges and Solutions
Wednesday, November 19, 2014: 12:30 PM - 03:00 PM, Marriott, International A
Session 532 23C01 Sustainable Electricity: Generation and Storage
Wednesday, November 19, 2014: 08:30 AM - 11:00 AM, Marriott, International A
Session 473 23C02 Sustainable Fuels
Tuesday, November 18, 2014: 03:15 PM - 05:45 PM, Marriott, International A
Session 410 23C03 Sustainability of Fossil Fuels
Wednesday, November 19, 2014: 03:15 PM - 05:45 PM, Marriott, International A
Session 554 23C04 CO2 Capture and Sequestration
Monday, November 17, 2014: 03:15 PM - 05:45 PM, Marriott, International A
Session 176 23C05 Concentrated Solar for Power Generation and Chemical Processing I
Tuesday, November 18, 2014: 08:30 AM - 11:00 AM, Marriott, International A
Session 246 23C06 Concentrated Solar for Power Generation and Chemical Processing II

## Education Column

By Alex Yokochi

### Support the activities of the SEF!



As members of the Institute our work most likely focuses on processes related to the conversion of human activity. Therefore we are responsible for ensuring that we (that's the collective "we" as in all of humanity) have and will continue to have sufficient water, energy, materials, and finished products to support a high quality of life.

Coupling this with the concept of sustainability, essentially the idea of creating conditions that will enable us to maintain conditions under which this

high quality of life can be maintained to an indefinite future, Sustainable Engineering is therefore focused on the creative application of Sustainability Science on the design and improvement of technologies that will enhance our system sustainability by decreasing impacts of present activities or mitigating impacts of past activities. Clearly, sustainability forms a part of the ethical responsibility of engineering in general, and most of our innovation activities include some sustainability component, whether explicit, or implicit. For the upcoming AIChE annual meeting I would like to challenge you to clearly present the manner in which your work addresses sustainability.



For any comments or with ideas on what I can address in upcoming Education Columns, please contact me at [alex.yokochi@orst.edu](mailto:alex.yokochi@orst.edu).

## IfS Updates

By Darlene Schuster and Lucy Alexander

### **Enroll Today for the AIChE Credential for Sustainability Professionals**

The AIChE Credential for Sustainability Professionals (ACSP) is being launched to offer practicing engineers, faculty and graduate students a specialized credential in sustainability. The program comprises an online self-assessment, 2 master level courses, and a capstone case study design project. The ACSP is now open for enrollment to all interested applicants. To register for the first class, take the prescreen assessment at:

<http://www.aiche.org/ifs/resources/sustainability-credentials>.

### **Sustainable Packaging Cosmetics Roundtable (SPCR)**

The Sustainable Packaging Cosmetics Roundtable (SPCR), with members from major cosmetics companies, organized under the [Center for Sustainable Technology Practices \(CSTP\)](#) of AIChE's Institute for Sustainability, enters its third year of operation. SPCR members work with suppliers, retailers and customers to advance sustainable packaging. Their latest effort is the development of the Sustainable Materials Commodity Guide – a comprehensive list of packaging suppliers' sustainability attributes. To browse corporate members of CSTP or to get involved, please visit:

<http://www.aiche.org/ifs/community/overview/corporate-members>

### **DOE Sustainability Metrics**

AIChE's Institute for Sustainability and Center for Energy Initiatives are developing a suite of sustainability metrics for manufacturing systems to be implemented in sensor data technologies being developed by the [Smart Manufacturing Leadership Coalition \(SMLC\)](#) and funded by a DOE grant to achieve energy productivity gains. Efforts are also underway to explore development of education modules with novel

approaches using Cloud data storage and apps for real time engineering and process control for manufacturing. To learn more, please visit:

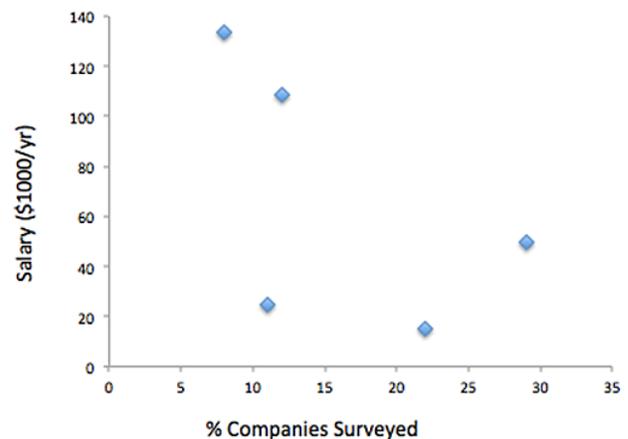
<http://www.aiche.org/cei/news/institute/07-31-2013/industrial-scale-demonstration-smart-manufacturing>

## Members' Column

By Cory Jensen

We are in a period of transformational growth with regard to membership services and community-support-content. Our membership committee has committed to putting a long-term strategic plan into action in order to support your needs as a member. We are also seeking out additional support and, of course, your input to make the SEF a high performing member segment of AIChE. For example, we are looking for education content that supports membership interests via our educational resources. If you think you have an idea to support web content we would like to hear about it!

As I continue to support concepts and applications of sustainable engineering, I wanted to share a tid-bit of information from GreenBiz.com (Figure 1) indicating that companies are spending money on corporate social responsibility activities (current buzz phrase). This trend suggests that employment opportunities exist that requires professionals with



**Figure 1: Equivalent salary vs. % companies surveyed, in response to a poll of how much money companies are spending on corporate social responsibility topics.**

unique soft-hard skill sets. 82% of companies polled spend money on these activities with a remarkable >50% reporting companies spent monies equivalent at least one full time equivalent employee making a decent living wage (>\$40K/yr).

With that, I am leaving you with some sustainable transportation food for thought. Depending on the specifics of your calculation for a MPGe (miles per gallon gasoline equivalent), the Nissan Leaf and Chevy Volt have been reported to obtain MPGe in the mid 90 MPGe. My old Jeep Cherokee would consistently get under 20 (miles per gallon of gasoline) MPG. To help reduce my transportation costs, I rebuilt a two-cycle gas powered bicycle (Figure 2). My initial assessment of online media indicates I could expect to get 150 MPG!

### Become a Member

Not a member of AIChE or the Sustainable Engineering Forum? In order to guarantee that you are on the current email list and will have access to all existing SEF materials, please follow the link and make sure that you join the SEF!

<https://www2.aiche.org/SolutionSite/default.aspx?tabid=168&action=MBRProductDetails&args=35&aicheskin=aiche>

We are an active group of 500+ members ranging from industry to academia. The diverse interests of our members have contributed to the range of activities which we offer through the forum. As a member, you will be placed on our e-mailing list and notified of upcoming meetings and events.

### Three Steps to Membership

Applicant's Request for Membership

1. Complete the SEF Application available online at:

[www.aiche.org/DivisionsForms/ViewAll/SEF.aspx](http://www.aiche.org/DivisionsForms/ViewAll/SEF.aspx)

- REGULAR membership annual fee \$20
- STUDENT membership annual fee \$10

Membership fee waived for full-time undergraduate or graduate students for two years provided that student is a paid AIChE member; otherwise, a \$10 annual fee is required. Mail completed forms to:

AIChE Customer Service,  
100 Mill Plain Rd 3rd Fl  
Danbury, CT 06811

2. Staff Review to ensure completeness of application

3. Membership - Welcome!



Figure 2: Rebuild of a two-cycle

## **SEF Leadership 2014-2015**

### **Chair**

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### **Vice Chair**

Dr. Raymond L. Smith  
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National Risk Management Research  
Laboratory  
Sustainable Technology Division  
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### **Treasurer**

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BASF Corporation  
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### **Secretary**

Dr. Ignasi Palou-Rivera  
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### **Programming Committee Chair**

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### **Awards Committee Chair**

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## **SEF Leadership 2014-2015**

### **Industrial Liaison**

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### **Technical Areas:**

#### **General (Area 23a)**

##### **Area Chair:**

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##### **Area Chair:**

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### **Past Chairs:**

#### **2012-2013:**

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#### **2010-2011:**

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#### **2008-2009:**

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#### **2006-2007:**

Dr. Martin Abraham  
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#### **2003-2005:**

Dr. Subhas K. Sikdar  
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