October 2015
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American Institute of Chemical Engineers
Knoxville-Oak Ridge Section

Inside this issue

For additional information see our Web site at: http://www.ornl.gov/sci/aiche/
Or contact: Paula George, georgepm@ornl.gov, (865)576-0603 or
Rita Gray, rgray22@utk.edu, (865)974-5356

October 2015 Meeting

Date: Thursday, October 22, 2015
Cost: $20.00
Location: Rothchild Catering and Conference Center,
8807 Kingston Pike, Knoxville TN

5:30 pm AIChE Executive Committee Meeting
(All members welcome)
6:00 pm Dinner – From menu
7:00 pm Program – Paul Hanson, Corporate Fellow and a Group Leader in the Environmental Sciences Division and the Climate Change Science Institute, Oak Ridge National Laboratory – ***The SPRUCE (Spruce and Peatland Responses Under Climatic and Environmental Change) Project***

Abstract – The SPRUCE experiment is a multi-year cooperative interaction among scientists of the Oak Ridge National Laboratory operated by UT-Battelle, LLC and the U.S. Forest Service, Northern Research Station, Marcell Experimental Forest.

The SPRUCE experiment is the primary component of the Terrestrial Ecosystem Science Scientific Focus Area of ORNL's Climate Change Program, focused on terrestrial ecosystems and the mechanisms that underlie their responses to climatic change. The experimental work is to be conducted in a Picea mariana [black spruce] – Sphagnum spp. bog forest in northern Minnesota, 40 km north of Grand Rapids, in the USDA Forest Service Marcell Experimental Forest (MEF). The site is located at the southern margin of the boreal peatland forest. It is an ecosystem considered especially vulnerable to climate change, and anticipated to be near its tipping point with respect to climate change. Responses to warming and interactions with increased atmospheric CO_2 concentration are anticipated to have important feedbacks on the atmosphere and climate, because of the high carbon stocks harbored by such ecosystems. (Continued on page 2)

Bio – Dr. Hanson is a Corporate Fellow and a Group Leader in the Environmental Sciences Division and the Climate Change Science Institute of Oak Ridge National Laboratory. Dr. Hanson has a B.A. degree in biology from St. Cloud State University, St. Cloud, Minnesota, in 1981, and both M.S. (1983) and Ph.D. (1986) degrees from the University of Minnesota, St. Paul in plant and forest tree physiology. Dr. Hanson's current research focuses on impacts of climatic change on the physiology, growth, and biogeochemical cycles of North American forest ecosystems. He has authored or co-authored over 160 journal articles and book chapters, and has co-edited (and authored) a book titled "North American Temperate Deciduous Forest Responses to Changing Precipitation Regimes". Dr. Hanson is currently an Editor of the journal Global Change Biology. (Continued on page 2)

Please make your reservations by noon, October 21, by contacting
Paula George, georgepm@ornl.gov, (865)576-0603 or
Rita Gray, rgray22@utk.edu, (865)974-5356

The Section will subsidize up to 15 students, including graduate students

October 2015 Meeting (continued)

Abstract (continued) – Experimental work in the 8.1-ha S1 bog will be a climate change manipulation focusing on the combined responses to multiple levels of warming at ambient or elevated CO_2 (eCO2) levels. The experiment provides a platform for testing mechanisms controlling the vulnerability of organisms, biogeochemical processes and ecosystems to climatic change (e.g., thresholds for organism decline or mortality, limitations to regeneration, biogeochemical limitations to productivity, the cycling and release of CO_2 and CH_4 to the atmosphere).

The manipulation will evaluate the response of the existing biological communities to a range of warming levels from ambient to +9°C, provided via large, modified open-top chambers. The ambient and +9°C warming treatments will also be conducted at eCO2 (in the range of 800 to 900 ppm). Both direct and indirect effects of these experimental perturbations will be analyzed to develop and refine models needed for full Earth system analyses.

Bio (continued) – Dr. Paul J. Hanson has over 28 years of experience conducting environmental effects research related to energy technologies and their use. His expertise focuses on the physiological, growth, and biogeochemical cycling responses of woody plant ecosystems, and has encompassed research on acid rain, nitrogen deposition, mercury deposition, ozone effects on woody plants, and environmental and atmospheric change effects associated with precipitation change, elevated CO_2 atmospheres, and warming. Dr. Hanson is known for developing manipulative experimental infrastructures for evaluating plant and whole-ecosystem responses to environmental change.

While Dr. Hanson's career has not involved teaching as a primary activity, since 1986 he has served as a scientific advisor and mentor to more than 25 individuals ranging from students, visiting teachers, postdoctoral researchers, and visiting scientists. In his role as the principal investigator for the DOE-funded SPRUCE warming and CO_2 exposure experiment, he fosters opportunities for collaborative research and development with outside University and other Laboratory colleagues.

Dr. Hanson received the 1995 Distinguished Scientific Achievement Award from the Environmental Sciences Division, Oak Ridge National Laboratory, and was elected a Fellow of the American Association for the Advancement of Science in 2008.

Election of Local Section Officers

In accordance with the Knoxville-Oak Ridge Section of the AIChE By-Laws (http://web.ornl.gov/sci/aiche/bylaws.html), officers and directors are to be elected every year. Officers serve a 1 year term whereas the directors serve for 2 years.

We are looking for members in good standing that may be interested in volunteering for any of the following officer/director positions.

- Chair Elect (the previous Chair Elect automatically assumes the Chair position).
- Secretary
- Treasurer
- Directors (2)

We encourage anyone who would like to become more active in the local Section to run for an office. If you have questions about the level of commitment, job duties, or would like to include your name as a candidate for an office, please contact any Section officer at the email and phone addresses posted in the list of officers on page 5.

Once engaged in the Section meetings I am sure you will agree that we have a great group of people who all work together to provide our Section with fantastic speakers and programs at each meeting. If you are unsure that you can make all the meetings and cannot commit to being on the Board, I encourage you to still come to the Board meetings (typically at 5:30, just before the scheduled Section meeting) and meet the people and share your ideas. Board meetings are open to all members. Attending a board meeting is a good way to get a feel for the workings of the Section and to see firsthand the level of commitment and involvement required (actually very little) of the Section Officers. We routinely have several members participate in the board meetings although not elected to an officer or director position. If nothing else, it is a good way to network with other Chemical Engineers in the area.

(Excerpt from, Michael Aident, *Election of Local Section Officer*s, American Institute of Chemical Engineers, Knoxville-Oak Ridge Section, October 2013, Vol. 66, Issue 7)

2015 AIChE Annual Meeting

November 8-13, 2015
Salt Lake Marriott Downtown at City Creek
Hilton Salt Lake City Center

The AIChE Annual Meeting is the premier educational forum for chemical engineers interested in innovation and professional growth. Academic and industry experts will cover wide range of topics relevant to cutting-edge research, new technologies, and emerging growth areas in chemical engineering. This year's convention includes the following sessions:

2015 Annual Meeting: At-A-Glance

Engineering Sciences and Fundamentals
Separations Division
Particle Technology Forum
Education Division
Management Division
North American Mixing Forum
Transport and Energy Processes
Materials Engineering and Sciences Division
Environmental Division
Computing and Systems Technology Division
Safety and Health Division
Process Development Division
Nuclear Engineering Division - See also ICE
Food, Pharmaceutical & Bioengineering Division
Fuels and Petrochemicals Division
Forest and Plant Bioproducts Division - See also ICE
Liaison Functions
Catalysis and Reaction Engineering Division
Computational Molecular Science and Engineering Forum
Nanoscale Science and Engineering Forum
Sustainable Engineering Forum
Chemical Engineering & the Law Forum
Upstream Engineering and Flow Assurance Forum
Pharmaceutical Discovery, Development and Manufacturing Forum
Annual Meeting Events
Student Poster Sessions
Meet the Faculty Candidate Poster Session – Sponsored by the Education Division
Topical Conference: Entrepreneurial Chemical Engineering - Sponsored by CIEE
2015 Annual Meeting of the AES Electrophoresis Society
2015 International Congress on Energy
Topical Conference: Nanomaterials for Energy Applications
Topical Conference: Sensors
Topical Conference: Emerging Frontiers in Systems and Synthetic Biology
Topical Conference: Environmental Aspects, Applications, and Implications of Nanomaterials and Nanotechnology
Topical Conference: Sustainable Food Production
Topical Conference: Advances in Fossil Energy R&D
Topical Conference: Chemical Engineers in Medicine
Topical Conference: Innovations of Green Process Engineering for Sustainable Energy and Environment

(Source: National AIChE Web-site: https://aiche.confex.com/aiche/2015/webprogram/ataglance.html)

UT Student Poster Presentation at October Meeting

University of Tennessee Chemical and Biomolecular Engineering PhD candidate, Yuanjun Song, will present a poster on her research on the study of selective hydrogenation of an α,β-unsaturated aldehyde to an unsaturated alcohol at the October meeting of the Knoxville-Oak Ridge Section of AIChE. You are invited to either come at 5:30 pm or stay after the regular meeting to talk with Yuanjun about her work.

Abstract: Selective hydrogenation of an α,β-unsaturated aldehyde to an unsaturated alcohol is fundamentally challenging because the molecule contains two highly reactive chemical moieties, both of which are readily hydrogenated under a reducing environment. To produce highly selective catalysts for this reaction, one must tune the surface chemical reactivity such that the carbonyl moiety is selectively activated and the C=C double bond is preserved. To understand the fundamental chemical and physical phenomena that dictate the catalyst selectivity, we have investigated monometallic Au and Ni, nickel intermetallic alloys, and ceramic (Au_2S) catalysts through a combined experimental and quantum chemical modeling approach. This investigation was aimed at identifying the chemical nature of the selective and unselective reaction sites and developing methods to manipulate the sites to control selectivity.

Monometallic Au is an ideal material for investigating the phenomena of interest, as its oxophilicity, carbon affinity, and bulk electronic structure that affect vdW interactions can be tuned by manipulating oxidation state and particle size. Our investigations of Au catalysts indicate that relatively small Au particles have the appropriate oxophilicity and reduced vdW capability to lead to greatly improved selectivity towards the favorable unsaturated alcohol product. Ceramic Au_2S was utilized to verify that reduced vdW interactions likely lead to improved reaction selectivity. DFT calculations over Au_2S further support the idea that oxophilicity of a metal, in this case Au, can be tuned simultaneously with vdW capability. Studies were then extended to nickel intermetallic alloys to investigate the possibility of directly tuning the vdW capability of metal alloys by manipulating the rigidity and directionality of the electronic structure. Indeed, we found that vdW capability can be tuned from a maximum for Ni(111) to a minimum for Ni alloys. These findings indicate that control of vdW activation in reactions that concern either the production or functionalization of olefins can lead to improved control over product selectivity (Fig 1).

Bio: Yuanjun Song attended Yantai University (Yantai, China) in 2007 and received her bachelor degree in 2011. Then she joined the Chemistry and Chemical Engineering Department at Southeast University (Nanjing, China) and received her master degree in 2014. In Spring 2015, she was admitted to the Department of Chemical and Biochemical Engineering at University of Tennessee - Knoxville and began to pursue her Ph.D. Her research, under the supervision of Dr. Laursen, is mainly focused on investigating catalytic activity in selective hydrogenation via a combined computational and experimental approach.

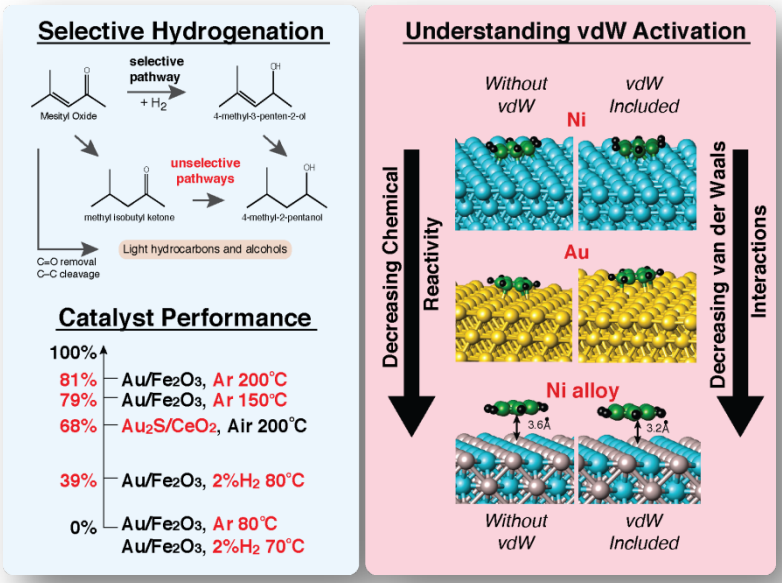
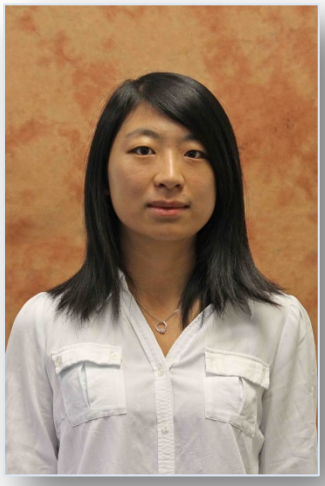


Fig. 1 Selective hydrogenation of an α,β-unsaturated aldehyde to an unsaturated alcohol.



Yuanjun Song

Activities Calendar

Date	Time	Topic	Speaker	Location
Oct 22	6:00 PM	The SPRUCE (Spruce and Peatland Responses Under Climatic and Environmental Change) Project	Paul Hanson	Rothchild's, Knoxville TN
Nov 19	6:00 PM	Biofuels	Brian Davison, ORNL	Rothchild's, Knoxville TN
Dec 10	6:00 PM	Feel the Power of the Dork Side: A Humorous and Educational Look at Science and Engineering and Their Practitioners – Joint with SWE	Pete Ludovice, GA Tech	Rothchild's, Knoxville TN
Jan 21	6:00 PM	Critical Materials Institute – Joint with ASM	Bruce Moyer, ORNL	Rothchild's, Knoxville TN
Feb	6:00 PM	Joint meeting with ANS – Topic TBD	TBD	TBD
Mar 10	6:00 PM	Joint meeting with UT – TBD	TBD	UT Ag Campus
Apr 14	6:00 PM	Energy Choices and Consequences	Harold "Lee" Dobbs, UT	Rothchild's, Knoxville TN
Apr XX		UT Department of Chemical & Biomolecular Engineering Awards Banquet		TBD
May 12	6:00 PM	Super Hydrophobic Coatings	TBD	Rothchild's, Knoxville TN

Sponsoring Opportunities

We continue to accept advertising in the newsletter in order to provide funds to support student participation in the meetings.

Rates per newsletter are:

$80 full-page advertisement

$45 half-page advertisement

$25 quarter-page advertisement

The section will also continue to accept individual or corporate sponsors to provide student meals at section meetings. The sponsor will be recognized at the meeting and in the Newsletter.

The cost to sponsor one meeting is **$200**. It's a great way to encourage students to attend the local meetings and become future members in the Institute!

ORNL Center for Nanophase Materials Sciences
(Image courtesy of DOE Digital Photo Archive, https://www.flickr.com/photos/oakridgelab/with/9068815514/)

"There are painters who transform the sun to a yellow spot, but there are others who with the help of their art and their intelligence transform a yellow spot into the sun."

Pablo Picasso
Artist
1881-1973-

Officers

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About Our Organization…Publications

AIChE keeps you updated as chemical engineering industries change with a diverse and reliable set of publications. CEP is offered as a member benefit, while others—including the AIChE Journal, Process Safety Progress, Environmental Progress & Sustainable Energy, and multiple books—are offered to members at substantial discounts. Browse AIChE publications, along with specific issues and articles.

CEP Magazine

Written and edited by chemical engineering professionals for chemical engineering professionals, each issue of CEP is packed with practical information you can apply to current or future projects. Read about technological advances in the chemical process and related industries. Get business news, advice on how to improve your career, and gain insight on technical issues such as safety, environmental management, fluids and solids handling, and reactions and separations.

Books

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Journals

With its publishing partner John Wiley & Sons, AIChE publishes the AIChE Journal, Biotechnology Progress, Environmental Progress & Sustainable Energy, and Process Safety Progress.

(Source: National AIChE Web-site: http://www.aiche.org/resources/publications)

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