

Center for Sustainable Energy at Notre Dame

December 2011

In this Issue

- TOP STORIES
- RESEARCH
- EDUCATION
- OUTREACH
- CONTACT US
- SUBSCRIBE

Our Story...

cSEND was formed in 2011 as a University Research Center with the mission to conduct and integrate energy related research, education and outreach programs that address the global challenge of creating a more sustainable energy future.

cSEND is built upon foundations laid by the Notre Dame Energy Center (NDEC - a College of Engineering research center, initiated in 2005), and the Sustainable Energy Initiative (SEI - a Strategic Research Investment, funded by the University from 2010-2013). Both of these have been integrated into cSEND.



sustainability.

Welcome to the Inaugural Issue

Dear Friends and Colleagues,

Welcome to the inaugural issue of the online newsletter from the Center for Sustainable Energy at Notre Dame (cSEND). This monthly communiqué will bring you the latest news in energy related research, education, and outreach at Notre Dame. Faculty will share their insights and expertise on current research programs, technological advancements, and critical topics of global interest that have far-reaching impact on our energy usage, consumption, and long-term

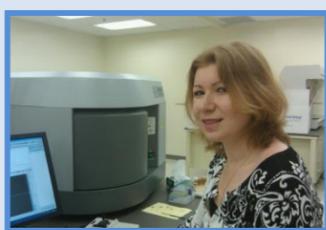
We hope you will enjoy reading the highlights and success stories related to our faculty, students, programs, facilities, and major events. I would welcome your feedback and any comments you might have for improvements in content, distribution, and frequency. I seem to always say this in closing, but I truly do appreciate your support of our research and energy related education programs at Notre Dame. I look forward with great pride and spirit to our continued association and in strengthening our relationships through the sharing of common interests. Together, we are sure to create a more sustainable energy future.



Joan F. Brennecke,
cSEND Director
Keating-Crawford Professor of Chemical and Biomolecular Engineering

MCF Grand Opening

The Materials Characterization Facility (MCF) held its Grand Opening on Thursday, Dec. 15th.



This new facility, located in 132 Nieuwland Science Hall, brings together in one location state-of-the-art instrumentation to aid faculty in characterizing the properties of solid-state materials, combined with molecular structure characterization. The MCF joins the Safer Nuclear Facility (located at 303 Stinson-Remick Hall) in providing cSEND faculty, Notre Dame faculty and external researchers with instrumentation designed to increase and improve research results.

Although she has only been with the Center for Sustainable Energy at Notre Dame for four months, Galyna Krylova has made great strides at getting the Materials Characterization Facility (MCF) up and running.

Born and educated in the Ukraine, Galyna's interest in nanomaterials was sparked in graduate school where her research in analytical syntheses and photo catalysis of nanomaterials began. She completed her post doc studies in France and then immigrated to America to work at Argonne for three years prior to arriving at Notre Dame. Galyna feels invigorated by her work here as she finds American researchers to be enthusiastic and collaborative – particularly younger faculty.

While tasked to get the MCF up and running, Galyna still enjoys being active outside of the lab, citing swimming and yoga as favorite things to do. She is an enthusiastic soccer fan and particularly enjoys watching women's soccer! Galyna shared that girls in the Ukraine were not encouraged to participate in the sport, so she never had the opportunity to play. But she is excited that the European Championships will be held in the Ukraine in 2012, and she hopes to be able to see some of the matches in person.

Until that time, Galyna is eager to get more instruments installed and running at the MCF to keep cSEND at pace with its peers. To learn more about the MCF, please visit the cSEND website: <http://energy.nd.edu/facilities/>. To reserve time to use the equipment, contact Prof. Galyna Krylova at (574) 631-1493 or gkrylova@nd.edu.

ND Energy in the News

Read about cSEND's Prashant Kamat's recent work on simplifying and lowering the cost of quantum dot solar cell materials in the Dec. 14, 2011 edition of *C&EN* online:

Solar Cells From A Paintbrush

<http://cen.acs.org/articles/89/web/2011/12/Solar-Cells-Paintbrush.html>

Special interest in energy studies at the graduate level? Investigate cSEND's programs at the University of Notre Dame's Graduate School website:

<http://graduateschool.nd.edu/departments-and-programs/special-interests/energy/>

RESEARCH

Visiting Faculty

The Center for Sustainable Energy at Notre Dame welcomes visiting faculty member Dr. Jose M. del Valle from the Pontifical Catholic University of Chile (PUC). During his three-month visit, Dr. del Valle will be working in the Brennecke laboratory reviewing the solubility of carbon dioxide in ionic liquids. Dr. del Valle is also interested in expanding PUC's offerings in chemical engineering through his collaborations with Dr. Paul McGinn. Dr. del Valle's research interests are in food engineering and separation processes - particularly supercritical CO₂ extraction in natural products.



Spotlight on a Research Lab

Jim Radich, graduate student – Dr. Prashant Kamat Lab

To say that Jim Radich is interested in energy and the environment is an understatement. His passion for sustainable energy research is evident in his enthusiastic descriptions of his work and in the story he tells of his journey to be a graduate student with Notre Dame's Center for Sustainable Energy.

Jim is a native of Biloxi, Mississippi, steeped in the traditions of this Gulf coast city. A first-generation college student, Jim's interest in chemistry was ignited by his high school chemistry teacher and his participation in Science Olympiad. An undergraduate degree in chemical engineering could have lead Jim to a career in the oil industry, but instead he decided to work for the Mississippi Dept. of Environmental Quality, managing uncontrolled groundwater contamination sites. While this work engaged Jim in his environmental interests, Jim felt his interest in sustainable energy issues would be better utilized in the private sector, and an opportunity at a bioremediation firm allowed Jim to "wear many hats" and learn how a business operates.

Continuing his education, however, was important to Jim's young family, so he earned his Master's degree, and in 2009, followed his passion to Notre Dame where he began his doctoral work with Dr. Prashant Kamat on composite materials with applications to solar energy conversion and electrochemical energy storage. Working in the Kamat Lab has challenged Jim to think differently, and he relishes that opportunity. He feels Dr. Kamat, a chemist, challenges him to think about problems and solutions differently as a chemical engineer. Jim values that in his work.

Challenges and problem solving are not new to Jim as he is the father of a pre-schooler and twins! But Jim finds time to balance his work life and family life, enjoying time with his wife and children, gardening, playing the piano (he learned as a child), and keeping up with family in Biloxi. Following his doctoral degree, Jim plans to pursue a teaching and research faculty career in chemical engineering as he wishes to share his passion of sustainable energy issues with a new generation of college students. It is certain that Jim's passion will be satisfied as he takes on these new challenges.

The Spotlight on a Research Lab is a monthly feature highlighting the persons behind cSEND. Questions? Comments? Suggestions? Please contact us!

Grants Received

Principal Investigator	Primary Department	Awarded Amount	Award Date	Sponsor Name
Huang, Yih-Fang <i>Project Title:</i> Coupling Low-Voltage Microgrids into Mid-Voltage Distribution Systems	Electrical Engineering	\$199,800	5/1/2011	GE Energy
Hartland, Gregory <i>Project Title:</i> Charge Carrier Relaxation and Energy Dissipation in One-Dimensional Nanostructures	Chemistry and Biochemistry	\$758,068	6/7/2011	National Science Foundation
Brown, Seth <i>Project Title:</i> Nonclassical Oxygenation Reactions	Chemistry and Biochemistry	\$411,000	7/14/2011	National Science Foundation
Hicks, Jason <i>Project Title:</i> BRIGE: Novel Bimetallic Catalysts for Advanced Biofuels Production	Chemical and Biomolecular Engr	\$174,944	8/1/2011	National Science Foundation
Brown, Seth <i>Project Title:</i> Catalytic activation of nitrogen dioxide for selective synthesis of nitroorganics	Chemistry and Biochemistry	\$435,000	7/1/2011	AFOSR-AFRL-DOD-US
Brennecke, Joan <i>Project Title:</i> RET in Engineering and Computer Science Site on Engineering a More Sustainable Energy Future	Chemical and Biomolecular Engr	\$494,948	9/1/2011	National Science Foundation
Kuno, Masaru <i>Project Title:</i> Towards spatially resolved, ultrafast imaging of individual reduced graphene oxide sheets	Chemistry and Biochemistry	\$100,000	9/27/2011	American Chemical Society

cSEND Research Areas

Cleaner Fossil



The greatest challenge with fossil fuels is to find environmentally sustainable ways to use them, which in many cases, comes down to effective *separations*. **Cleaner Fossil** research will develop mass separating agents, which take advantage of *materials selectivity* rather than energy, to perform separations. Current research projects can be viewed at: <http://energy.nd.edu/research/cleaner-fossil/sei-projects/>

Safer Nuclear

Notre Dame has world-recognized expertise in synthesizing and characterizing actinide materials. The research emphasis for the **Safer Nuclear** thrust area will be on the creation of novel actinide materials, often at the nano-scale, that have the potential to greatly impact recycling of uranium-based nuclear fuels and the creation of robust waste forms for permanent disposition of unusable radioactive material. Current research projects can be viewed at: <http://energy.nd.edu/research/safer-nuclear/sei-projects/>



Transformative Solar

Transformative Solar research will focus on the development of new *functional materials* that are engineered at the nano-scale to effectively capture solar radiation, interfaced to materials that can use that energy to drive useful chemical reactions. In particular, this research thrust will build on institutional strengths to develop leading technology in two key areas: (1) highly efficient and tailored light-harvesting structures, and (2) highly efficient and selective catalytic processes for converting fuels. Current research projects can be viewed at: <http://energy.nd.edu/research/transformative-solar/sei-projects/>

EDUCATION

Energy Studies Minor

The new Energy Studies Minor is officially up and running and available to all Notre Dame undergraduate students. Over forty students registered this fall for the first required course, Energy and Society (ENER20101), offered through the Physics department. This course gave students a foundation in the basic ideas of energy and power and their applications. Fossil fuels, nuclear, solar, wind, geothermal, and hydropower energy resources together with energy conservation were examined from qualitative and quantitative perspectives. Currently, eighteen students have declared the minor, and we expect this number will continue to grow. As the semester concludes, preparations for the new second required course, the Business of Energy (ENER20202), offered through the Mendoza College of Business, are in full force. This course will include an equal mix of undergraduate and MBA students. This combination should bring interesting perspectives and discussion to the study of the issues and challenges faced by integrated oil and gas producers, power generation and transmission companies, and producers of alternative fuels. For more information about the Energy Studies Minor, please visit energystudiesminor.nd.edu.

cSEND RET: Engineering a More Sustainable Energy Future

At the end of August, the Center for Sustainable Energy at Notre Dame was informed that its Research Experiences for Teachers (RET) proposal to the National Science Foundation was funded!

Engineering a More Sustainable Energy Future is a 3-year project that aims to improve science education for a new generation of students by providing its teachers meaningful lab-based experiences on energy-related topics. These topics will focus on the issues and current approaches surrounding energy use and sustainability.

This project will build research communities consisting of participating Center faculty and teachers, including those from around the U.S. who have been educated by Notre Dame's Alliance for Catholic Education (ACE) programs.

The addition of ACE teachers to this project expands its impact to schools with large minority populations, including many under-resourced Catholic schools across the U.S.

Recruitment of local and ACE teachers for *Engineering a More Sustainable Energy Future* will commence in January 2012 for research projects to begin during the summer.



Undergraduate Research Expo

cSEND is excited to announce the second annual Undergraduate Energy Research Expo. This Expo is an event designed for students to come and learn about opportunities to participate in undergraduate research on energy-related projects for Summer 2012 and/or the 2012-2013 school year. In addition, information will be available regarding the Energy Studies Minor and the Vincent P. Slatt Fellowships for Undergraduate Research in Energy Systems and Processes. Representatives from lab groups will display posters providing descriptions of their groups' research areas as well as new projects that will be available. At the end of the event, students will have the opportunity to fill out an application expressing interest in specific opportunities. The event will take place on 1/30/12 in the Stinson-Remick Atrium from 8-9 pm. If you are a faculty member interested in presenting projects available in your group, please contact Rebecca Hicks at rhicks2@nd.edu

OUTREACH

SAB Board Appointed

New members to the Student Advisory Board (SAB) of the Center for Sustainable Energy at Notre Dame were appointed on Wednesday, Dec. 15th. Comprised of undergraduate and graduate students from all colleges with various majors, the SAB is charged with developing education and outreach programs for the Notre Dame and surrounding communities. These programs are designed for the purpose of raising awareness and promoting action toward creating a more sustainable energy future for all. The next outreach program on the SAB slate will be the Science Alive! event, to be held at the St. Joseph County Public Library on Saturday, Feb. 4th.

The SAB members for 2012 are (* denotes re-appointment):

Rick Bariletto	Lindsay Baxter	Daniel Brach	Kathleen "Kate" Christian
Cathy Chukwulebe*	Patrick Connelly	Ben Cooper	Elizabeth Davis*
Jessica DeLalio*	Peter Diamond	Victoria DiStefano	Brendan Dolan
Megan Dustin*	Lauren Eckert	Whitley Esteban	Tyler Evans*
John-Paul Fontelo	Emily Kalish	Kevin Kastenholz	Brianna Kunycky*
Alex Miram	Estefan Ortiz*	Justin Pellino*	Sofyan Saputra
Jacob Stanton	Rebecca Thomas		

Quad Energy Competition!

Partnering with the Office of Sustainability, the Center for Sustainable Energy at Notre Dame is co-sponsoring the Quad Energy Competition! Dorm quads will face off this Spring Semester to determine which has been most effective in lowering its on-campus energy footprint.

During the competition, quads will be able to track their energy usage on the new campus energy dashboard. Winning quads will receive cash prizes. For more information, visit the Office of Sustainability website at: <http://green.nd.edu/education>

Upcoming Seminars and Events - January through March, 2012

January 30: Undergraduate Energy Research Expo, 8:00 – 9:00 p.m.

Location: Stinson-Remick Atrium

February 20: Alak Bhattacharyya, UOP (a Honeywell Company), 4:00 p.m.

Location: TBA

March 5 - 7: Piedong Yang, University of California-Berkeley, 4:00 p.m.

Location: TBA

March 21, 22: William Banholzer, The Dow Chemical Company,

Time and Location: TBA

March 28: Wes Jackson, founder of The Land Institute in Kansas, 7:00 p.m.

Location: TBA

