

ENERGY RESEARCH CENTER

As the spring semester and another academic year come to an end, UMERC reflects upon an exciting year in energy.

This year, we had the opportunity to delve into the issue of grid resiliency at the second annual M pact week in October, as well as at the Engineering Sustainability Workshop in April. Look for these events next spring semester.

Since January 2014, ARPA-E awarded over \$32 million to projects involving UMERC faculty, including two recently awarded under the ARID program. With ARPA-E's stream of funding, advanced energy research here at Maryland has reached new heights!

Individual faculty were also recognized for their success and promise in the energy field, including Dr. Radermacher's IIR Gustav Lorentzen Medal for his achievements in the refrigeration field and Dr. Munday's OSA Lomb Medal for his work on solar cells.

Students at UMD have also excelled in the energy field this year, with the Wind TERPines competing in the DOE's Wind Competition and five Clark School students were awarded scholarships from the Achievement Rewards for College Scientists (ARCS) Foundation.

Engineering Students supported by the Wells & Hulka Fellowships

Each year, the Harry K. Wells fellowship supports two graduate students pursuing energy generation or storage research. In addition, The Hulka Energy Research Fellowship supports one graduate student pursuing advanced solar, wind, biofuels, or geothermal energy research.

For the summer '15 - spring '16 academic year, three promising Clark School Engineering graduate students will benefit from these energy fellowships. Department of Chemical and Biomolecular Engineering (ChBE) graduate student, Mann Sakbodin will pursue research in "*Non-Oxidative Dehydroaromatization of Methane via Ceramic Membrane Reactor*". Yiqing Wi, also a ChBE graduate student, will research "*Lignin to Aromatic Fuels/Chemicals: Unilamellar Zeolite Catalysts for Selective Cleavage of Carbon-Oxygen Bonds (C-O) in Aryl Ethers*". Finally, Department of Materials Science & Engineering (MSE) graduate student Thomas Hays will research "*Tunable SOFC Anode Porosity Using Aligned Sacrificial Fibers*".

For more information about the fellowships and this year's winning student researchers, visit the UMERC webpage: www.umerc.umd.edu/students/funding

The Opening of the Center for Research on Extreme Batteries



On Monday, May 4th, UMD, Army Research Laboratory, and NIST hosted the inaugural meeting of the Center for Research on Extreme Batteries (CREB). The event drew over 125 experts from throughout the Mid-Atlantic who discussed their efforts to develop batteries for use in some of the most challenging environments in the world - and beyond.

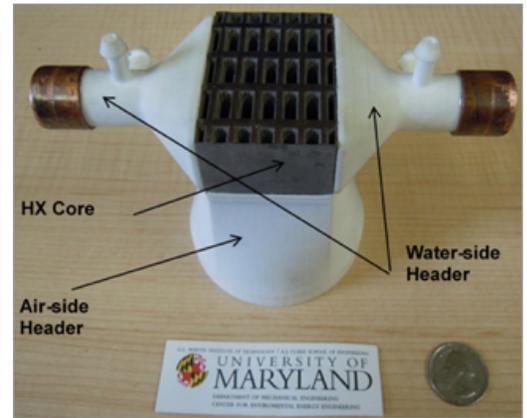
In addition to presenting research, attendees of CREB's first official meeting discussed how to increase awareness of the center in industry, government, and academic institutions; recruit new participants; define membership; and establish a framework for research funding and operational support.

The Center will facilitate new partnerships with government agencies and industry leaders, benefiting UMD, ARL, and NIST researchers

http://www.umerc.umd.edu/news/news_story.php?id=9086

UMD Research Paves the Way for Next-Generation Dry-Cooling Power Plants

University of Maryland Professor Michael Ohadi's research was recently renewed by the ARPA-E ARID program to continue development of enhanced dry air cooling of power plants that will help reduce freshwater for cooling purposes. The research is taking advantage of the latest developments in heat transfer surface design and emerging additive manufacturing technologies (such as 3D printing) to make dry cooling of power plants an economically viable alternative to wet-cooling tower systems. The UMD project team is led by Professor Michael Ohadi and includes Dr. Serguei Dessiatoun and Dr. Amir Shoostari as Co-PIs on the project.



Power plants are responsible for more than 40% of U.S. freshwater withdrawals; over 90% of which is employed for condenser cooling. Air-cooled condensers use significantly less water, and yet only 1% of power plants use air-cooled condensers. This is mainly because for the same cooling capacity, air-cooled condensers are at least three times more costly to install and operate compared to wet cooling. Given the limited supply of water, its increased cost, and increased restrictions on its use, there is a clear need to reduce water consumption for power plant cooling applications.

The UMD-led research team has simulated performance of dry cooled heat exchangers (HXs) built with additive manufacturing, the results of which suggest that for a metallic heat exchanger module, weight could be reduced by 40-50%, while for a polymer-based heat exchanger, weight could be reduced by 80-90%. Based on these results, the team has built subscale modules (pictured above) with metallic and polymer heat exchangers for experimental testing and verification of the computer models. The proposed heat exchangers are fabricated as a single piece and do not require any further processing such as brazing or bonding, thus improving operational reliability aspects. Equally important is the fact that these heat exchangers can be printed/fabricated at the site of their operation, thus greatly reducing transport and installation costs which typically amount to as much as 65% of the cooling system for a power plant.

Transforming Energy Lecture Series

UMERC hosts monthly Transforming Energy Lectures to showcase exciting energy research, news from important industry leaders, and insights from federal agency administrators. All are welcome to come to these lectures and join in discussing the advances that are, or have the potential to change all aspects of the energy field as we know it today.

This Spring 2015 semester, we hosted lecturers from PJM, the DOE Advanced Vehicles Office, the DOE Office of Fossil Fuels, and the DOE Office of Energy Efficiency & Renewable Energy.

For the Fall 2015 semester, we're excited to have lecturers coming from MIT and Chargepoint. More details can be found on the UMEREC website:

www.umerc.umd.edu/transforming-energy-lectures

UMERC Faculty Lunch Seminars

During the Spring and Fall semesters, UMEREC Faculty are invited to the UMEREC Conference room twice monthly to hear about the latest UMEREC Faculty research, publications, projects, and potential energy-related funding opportunities. If you have a topic you would like to present during next Fall semester's UMEREC faculty lunches, please contact UMEREC's Research Coordinator at amccrum@umd.edu.

UMERC Faculty Web Profiles

This summer we plan to make some updates to our website, and it's the perfect opportunity for UMEREC Faculty to make changes to their profile pages. Please send all requests to amccrum@umd.edu

www.umerc.umd.edu/faculty