InCYde MECHANICAL ENGINEERING
IOWA STATE UNIVERSITY
Department of Mechanical Engineering

August 7, 2013

ME faculty receive PSI Innovative Research Grants program award


Ganapathysubramanian


Heindel

The ISU Plant Sciences Institute gave an Innovative Research Grants (IRG) program award to PI **Baskar Ganapathysubramanian**, assistant professor of mechanical engineering, and **Ted Heindel**, Bergles Professor of Thermal Science, for their project "3D imaging and physics-based modeling for optimized root characteristics." Thomas Lübberstedt, professor of agronomy, is also a researcher on the project. The IRG program provides support to interdisciplinary teams for innovative research projects that involve plant science. Projects were awarded $50,000 to $60,000 per year for up to two years.

Ganapathysubramanian's research featured on NSF homepage

The research about an innovative new way to engineer fluid stream flow done by **Baskar Ganapathysubramanian**, assistant professor of mechanical engineering, and his team of researchers is currently featured on the homepage of the National Science Foundation (NSF) website. The team also published an article about their research in the journal *Nature Communications* earlier this year. The NSF is one of the biggest sources of science-related research funding, accounting for nearly one-fourth of federal support to academic institutions. Read the featured story on the NSF page here.

Summer 2013 research excellence awards

Three mechanical engineering graduate students received research excellence awards for the Fall 2012 semester. PhD students Jingchao Zhang, Dustin Dalluge, and Yajun Wang received research excellence awards.

These awards recognize and encourage outstanding achievement by graduate students in research. The students were nominated by their major professors: Jingchao Zhang's adviser is **Xinwei Wang**; Dustin Dalluge's adviser is **Robert Brown**; and Yajun Wang's adviser is **Song Zhang**.

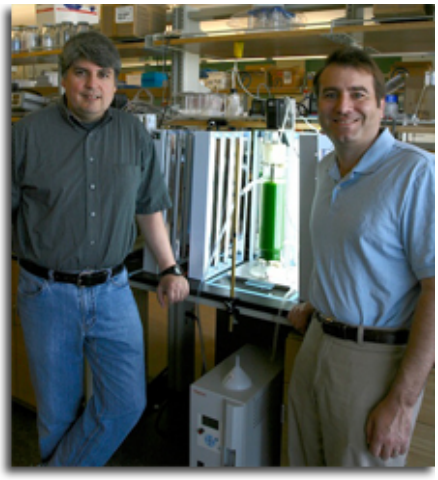
ME postdoc creates networking group

Handan Acar, a postdoc in mechanical engineering, decided to create a networking group for postdocs in the department, to discuss everything from their research to how to get acclimated to life in Ames. Acar is a postdoc working with **Reza Montazami**, assistant professor of mechanical engineering. (Full story)

More ME news

- Iowa State contributes to report on Midwest path to aviation biofuels
- **Mark Mba Wright** featured in Iowa EPSCoR Energy Innovator
- Guest post: Team LunaCY's recipe for success: Dedication

ISU photobioreactor research could speed biofuels development



Photobioreactors, the production systems used to grow algae, seem to operate on a simple concept: place photosynthetic microorganisms in a liquid growth medium and add light. But Dennis Vigil (left), associate professor of chemical and biological engineering, and his research partner **Michael Olsen** (right), professor of mechanical engineering, know that photobioreactors are much more complex systems than they seem, and they are seeking a better understanding that may be valuable in finding alternative fuels. (Full story)

Bryden receives ASME 2013 Melville Medal


Bryden

Mark Bryden, associate professor of mechanical engineering, is one of four authors to receive the American Society of Mechanical Engineers (ASME) 2013 Melville Medal for their journal article "Mixture Preparation Effects on Distributed Combustion for Gas Turbine Applications" from the *Journal of Energy Resources Technology*. The medal is the highest ASME honor for the best original paper in the past two years. Bryden, along with the paper's co-authors, A. E. E. Khalil, A. K. Gupta, and S. C. Lee, will receive a $2000 honorarium, a bronze medal, a certificate and a travel supplement. Formal presentation of the medal will take place at the President's luncheon November 18, 2013, during the ASME International Mechanical Engineering Congress and Exposition in San Diego, CA. First awarded in 1927, the Melville Medal is by the bequest in 1914 of Admiral George W. Melville, Honorary Member and Eighteenth President of the Society.

ME grad student receives ASME Fluids Engineering Division scholarship

Todd Kingston, graduate student in mechanical engineering, received an American Society of Mechanical Engineers (ASME) 2013 Fluids Engineering Division (FED) Graduate Student Scholarship Award. As part of the honor, Kingston will receive a $1000 scholarship, and will be officially invited to become a member of one of the five FED's technical committees for a period of one year, after which time there would be a possibility to become officially appointed to the technical committee. The award was presented during the FED's summer meeting opening reception in Incline Village, NV on July 7.

Team PrISUm launches big comeback; finishes third in close Formula Sun Grand Prix

and fun

- DNR's Pollution Prevention Intern Program profiles ME students' internships
- ISU anatomy expert, CoE professors create digital models to train surgical students

Grant Award Announcements


Kong

PI: Song-Charng Kong
Title: Experiments, Technoeconomics, and Optimization of Bioenergy Systems Based on Bio-Oil Gasification
Award Amount: $177,365
Awarding Agency: Iowa Energy Center

Fast pyrolysis of biomass to produce bio-oil has moved to the forefront of bioenergy research and development. Bio-oil, which is a mixture of complex oxygenated hydrocarbon species, is much easier to transport than bulky solid biomass. A novel approach is to convert biomass to bio-oil at widely distributed small-scale processing plants, transport bio-oil to a centralized location, gasify bio-oil to syngas, and upgrade the syngas to transportation fuels. This research will investigate this approach through a combination of experimental and analytical studies that can potentially lead to the large-scale commercialization of this technology that has the potential to turn agricultural residues (e.g., corn cobs, corn stover, switchgrass, etc) into valued feedstock. This project is sponsored by Iowa Energy Center, and researchers of Bioenergy Systems Analysis Program will conduct experiments, technoeconomic analysis, reactor simulation, and plant optimization of biorefinery based on bio-oil gasification.


Brown

PI: Robert Brown
Title: Production of Activated Carbon from Fast Pyrolysis Biochar
Award Amount: $99,024
Awarding Agency: Iowa Energy Center

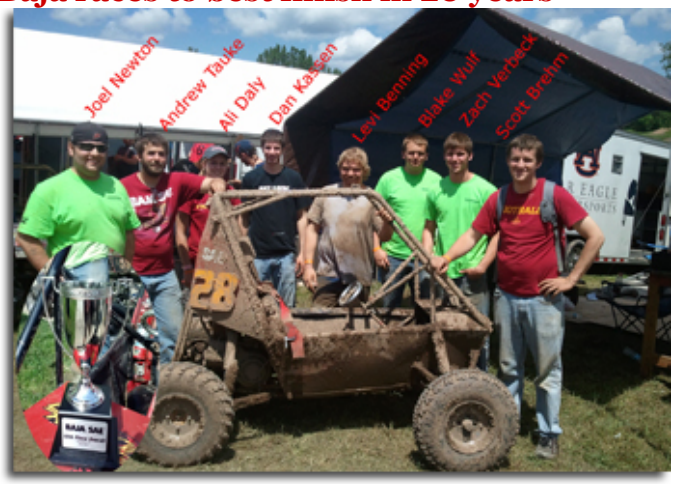
The goal of this project is to produce activated carbon from fast pyrolysis biochar, and use it for cleaning syngas from fast pyrolysis, as well as to detoxify the water soluble fraction of bio-oil for the production of ethanol. With different chemicals and physical treatments, biochar as activated carbon will be enhanced by increasing its surface area and porosity. A techno-economic analysis will be performed to understand the impact of biochar-activated carbon on the IRR of the fast pyrolysis platform.

PI: Robert Brown
Title: Catalytic Processing of Whole Algal Biomass into Aromatics and Ammonia
Award Amount: $119,858
Awarding Agency: Iowa Energy Center

The overall objective of this project is to demonstrate a system for catalytically converting whole algal biomass into the high value benzene, toluene, and xylene (BTX) and other aromatic hydrocarbons suitable for blending with paraffinic molecules for the production of JP-5 and JP-8 aviation fuels or gasoline. Researchers at Iowa State University (ISU) will collaborate to develop a process that pyrolyzes whole algal biomass in the presence of zeolite catalysts. Lipid, carbohydrate, and protein rapidly decompose and volatilize in this high temperature, oxygen-free environment. The product vapors diffuse into the pores of the zeolites where oxygen and nitrogen are removed and the organic compounds are converted into aromatic compounds, especially BTX. These compounds are important in the production of a variety of commercially important compounds, including the aromatic fraction of aviation fuel, which can be as high as 30 wt% of the fuel. Significantly, much of the nitrogen from the protein is

Team PrISUm turned a race-high 78 laps on Saturday, nearly storming back for the Formula Sun Grand Prix title. But the comeback effort fell two laps short. Over three days of racing, Iowa State's solar car team completed 191 laps of the 3.4-mile F1 race track in Austin, Texas. Race-winner Oregon State completed 193 laps and second-place Illinois State completed 192. (Full story) View more pictures on Team Prisum's Flickr photostream.

Baja races to best finish in 20 years



The Baja Team placed 10th at the SAE International Baja Rochester Collegiate Design Series, making its best finish in the last 20 years. The team raced against 87 universities from all over the world in the endurance portion of the competition after passing the safety inspection and all dynamic evens on the first day. The top 10 finish means Iowa State's car has already been assigned a number for next year's competition, which is decided by its finishing place.

Attinger a co-chair of ASME ICNMM conference in Japan

The organizers of the ASME ICNMM 2013 conference (from left to right): Yoav Peles (chair, Rensselaer Polytechnic Institute), Yasuyuki Takata (local co-chair, Kyushu University), Takemi Chikahisa (local chair, Hokkaido University), Daniel Attinger (co-chair, Iowa State University).

Daniel Attinger, associate professor in mechanical engineering, was a co-chair of the American Society of Mechanical Engineers (ASME) 2013 11th International Conference on Nano-, Micro- and Minichannels (ICNMM) held June 16-19 in Sapporo, Japan. Speakers from 26 countries delivered 150 lectures at the conference. Of the experience, Attinger said: "Our Japanese hosts took great care to make us feel comfortable, and to show us their research and their culture. I also met with colleagues at the universities of Hokkaido and Tokyo. Also, American graduate students visiting Japan told me about their joint fellowships from

converted to ammonia, which can be recovered as fertilizer.

Upcoming events

August 9 – Summer term ends
August 26 – Fall semester coursework begins
September 2 – University holiday, offices closed

the US and Japanese National Science Foundation." Attinger will be the chair of the next ICNMM conference, held in Chicago in August 2014.

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Do you have department news you'd like to share?
Please e-mail news items for InCYde Mechanical Engineering to Alex Rausch.