

September 14, 2012

## Recent Grant Award Announcements

**PIs:** Daniel Attinger, Baskar Ganapathysubramanian, Ted Heindel, W. Ross Morrow, Patrick Schnable and Thomas Lübberstedt (Agronomy)

**Title:** Seminar Series on "Computationally Engineered Plants"

**Award Amount:** \$8,400

**Awarding Agency:** Plant Sciences Institute, Iowa State University

The funding will help crystallize a new working group on computationally engineered plants at ISU. Specifically, a 2012-13 seminar series will invite to ISU scientists with expertise in microfluidic, soil physics, optimization, plant physiology and genetics. The working group is an interdisciplinary team of ISU faculty members, who aim at modeling and optimizing transport phenomena in crops, for the purpose to genetically engineer better crops. The seminars will be widely advertised to foster communication among ISU faculty across the colleges of Agriculture and Life Sciences, Liberal Arts and Sciences and Engineering.



**PIs:** Daniel Attinger, W. Ross Morrow and C. Megaridis (University of Chicago)

**Title:** "Collaborative Research: A Micropatterned Wettability Approach for Superior Boiling Heat Transfer Performance"

**Award Amount:** \$294,996

**Awarding Agency:** National Science Foundation, Thermal Transport Processes Program

This collaborative project straddles the areas of materials science, thermofluids and optimization, with main goal to design, fabricate and study novel surfaces that are called "superbiphilic." These micro- and nanostructured surfaces juxtapose superhydrophilic areas (with strong affinities for water) with superhydrophobic areas (with strong affinities for water vapor). As such, they show superior performance in pool boiling by controlling the transport of the vapor and liquid phases in a parallel and optimal manner. The study will develop, characterize and optimize a novel coating-on-metal process, relevant to industrial heat exchangers.



Attinger

Morrow

Attinger will develop the science base for multiphase microfluidic transport on superbiphilic surfaces fabricated by Megaridis. Morrow will construct mathematical strategies to design complex topographies of patterned wettabilities with optimum boiling performance. The three researchers are enthusiastic about contributing to the US industrial competitiveness and to energy sustainability.

## ME 270 project put to test in Uganda



Each semester students from the sophomore engineering design course ME 270 use their engineering skills, coupled with creativity, to produce technologies for the betterment of developing nations. This summer, one project made it beyond the design stage and was put to use in Eastern Africa, where it has potential to make a big difference for farmers.

Last spring, Brent Smith and classmates Anne Alter, Nathan Beougher, Jeffery Grenier, and Xingyuan Ma, who are all now entering their third year in ME, designed a seed cleaner, or fanning mill, that would provide clean grain, in less time, and with better working conditions for soybean farmers in lesser developed countries.

The project stemmed from a grant awarded to the Value Added Agriculture Program (VAAP), which operates through Iowa State Extension and the College of Agriculture and Life Sciences to help farmers establish or expand farmer-initiated, value-added agriculture businesses.

"The best thing we can teach our students is what an engineer can truly do for society by serving people," says **Jim Heise**, a lecturer who teaches ME 270. "Projects like these offer a way for engineers to fight poverty by providing economic opportunity where it already exists."

Projects like this happen each year in ME 270, as Heise continually emphasizes working with organizations like VAAP—groups that are passionate about supporting developing nations as well as advancing the minds of young engineers. ([Full story](#))

## Energy systems minor introduced



A new minor has been developed for students with an interest in the broad area of energy systems. The minor's advisory committee is headed by Bergles Professor of Thermal Science and Interim Department Chair **Ted Heindel**. Joining Heindel on the committee are **Tom Brumm** (Director of Assessment, College of

**Co-PI: Michael Olsen**

**Title:** "Model Validation for Photosynthetically Active Radiation Transport and Multiphase Flow in Algal Photobioreactors"

**Award Amount:** \$349,990

**Awarding Agency:** National Science Foundation



Olsen

Algal culture is an increasingly attractive alternative for producing fuels and chemicals derived from petroleum, but the development of economically viable algal biorefineries requires significant improvements in both the engineering of elite microorganisms and in the design and scaleup of photobioreactors. This project will employ both experimental methods and computer simulations to improve the understanding of how fluid motion and light distribution in algal photobioreactors impacts the production of biomass, and the results will form the basis for constructing a simulation tool for improving the design of production-scale equipment used in algal culture. The research will also provide educational opportunities for graduate and undergraduate students in a research area of strategic national importance.

**PI: Terry Meyer**

**Title:** "Application of Burst-Mode (kHz-MHz) Laser Diagnostics for Combustion"

**Award Amount:** \$240,000

**Awarding Agency:** Air Force Research Laboratory



Meyer

The goal of this project is to apply high-speed laser imaging and spectroscopy to study turbulent combustion processes. The knowledge gained from this research will be used to evaluate the influence of fluid mechanics on chemical reactions and pollutant formation. It will also be used to validate computational fluid dynamics (CFD) models so that scientists and engineers can better predict the performance of alternative fuels for new power and propulsion systems.

**ME Seminar**

**September 18** – [Integration of CFD Simulation with Virtual Reality Visualization](#), Chenn Zhou, Purdue University Calumet, 11 a.m., 2004 Black

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Engineering), **Vik Dalal** (Whitney Professor, Electrical and Computer Engineering), and **Steve Martin** (Distinguished Professor, Materials Science and Engineering).

This minor has been under development for over a year with support from all College of Engineering departments. Although the minor has a home in Mechanical Engineering, it is open to all College of Engineering students, and several classes in all College of Engineering departments satisfy the elective requirements in the minor.

The minor requires two (2) courses, EE 351 – Analysis of Energy Systems and Econ 380 – Energy, Environmental and Resource Economics. The remaining 9 credits can be taken from a variety of electives that are offered in each department.

For more information on the Energy Systems minor, visit <http://www.me.iastate.edu/energy-systems-minor/>.

**Vance named honorary doctorate**

**Judy Vance**, Joseph C. And Elizabeth A. Anderlik Professor of Engineering, has received an Honorary Degree of Doctor of Engineering from Heriot-Watt University in Edinburgh, U.K.



Vance

Vance was honored for her preeminence in, and outstanding innovative contribution to, advancing virtual reality engineering design applications, as well as for her influence as an advocate to promote the participation of women in engineering. ([Full story](#))

**Upcoming Events**

**September 21** – [VRAC Tour](#)

**September 21** – [Engineer's Week Kickoff](#)

**September 21** – [You Can Change the World - Bill Nye "The Science Guy"](#)

**September 22** – [The Amazing Race](#)

Do you have department news you'd like to share?  
Please e-mail news items for InCYde Mechanical Engineering to [Alex Rausch](mailto:Alex.Rausch).