



\$1.5 Million Grants Awarded To IfM Faculty and Radiance Technologies

Dr. Chester Wilson, Electrical Engineering and Dr. Chad O'Neal, Mechanical Engineering, faculty associated with IfM, in partnership with Radiance Technologies have been awarded two Phase II Small Business Innovation Research Grants, totaling \$1.5 million. The work is on the realization of novel micro/nanosystems for defense and commercial applications.



Dr. Chester Wilson



Dr. Chad O'Neal

\$200,000 DARPA Grants Awarded to Dr. Ville Kaajakari



Dr. Ville Kaajakari

Dr. Ville Kaajakari, Electrical Engineering faculty associated with IfM, has recently received two grants from the Defense Advanced Research Projects (DARPA) Agency. The first grant is the Young Faculty Award. DARPA identified 24 faculty nationwide to receive these prestigious awards. The selected researchers are on the faculty of 19 universities located in 16 different states. Each will receive a grant of approxi-

mately \$150,000 to further develop and validate their research idea during the coming year. Dr. Ville Kaajakari is one of the award recipients for his project on "Porous Silicon for MEMS Vacuum Packages".

DARPA's Young Faculty Award program is designed to seek out ideas from non-tenured faculty in order to identify the next generation of researchers working in microsystems technology.

The funded researchers will focus on concepts that are innovative, speculative, and high-risk. DARPA expects that the innovations researched will assist in identifying new areas of research that are sufficiently important and challenging to warrant additional DARPA programs.

The second DARPA grant that Dr. Kaajakari was awarded is for a project to demonstrate an electrical power generator using MEMS power source embedded inside a shoe. The power generator converts the energy from walking to electrical power that can be used to supply portable electronic equipment such as radios, phones, and GPS positioners.

These devices are currently battery powered and have limited operational time. The \$50,000 phase one grant is for a six month effort to demonstrate a new plastic based power generator that is low cost, does not add weight, and is rugged. Successful proof-of-concept is expected to result in second phase support for prototype development.

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Special points of interest:

- Nanotechnology
- Biotechnology
- Biomedical Nanotechnology
- Environmental Technology
- Information Technology

Newsletter Editor

Mrs. Jeanette Futrell
 jfutrell@latech.edu
 Comments are welcomed!



IfM Student Team Receives High Honors At Nano Nexus 2007

Fifteen student teams from 12 universities were selected to present their new product ideas at the Nano Idea to Product Competition, held April 2 to 4, 2007, as part of Nano Nexus 2007, a nanotechnology research and industry event held at the Oak Ridge National Laboratory.

Nano Nexus 2007 is one of several initiatives begun last year by the Innovation Valley Nano Alliance to translate nanoscience resources into new companies and jobs. In addition to the business competition, the event included a nanotechnology venture showcase and industry forum. The goal of the event was to create a dialogue among participants to spur innovation and more quickly and effectively commercialize nanotechnologies. Major sponsors of Nano Nexus 2007 included the Department of Energy, ORNL, the Kauffman Foundation, Innovation Valley Nano Alliance, Technology 2020, Oak Ridge Associated Universities, BASF Venture Capital America, Stipkala LLC and Research Triangle Institute.

The Nano Idea to Product Competition is the first event of its kind hosted by a national laboratory. The forum was designed to foster innovation and increase collaboration among universities, government, industry and the investment community - all critical players for commercializing new nanotechnology.

The teams for the student competition were chosen based on the innovation of their product ideas combined with the ability of the product to solve a need in the market. Universities selected were Duke University, Emory University, Florida International University, Florida State University, Georgia Tech, Imperial College in the United Kingdom, **Louisiana Tech University**, Tuskegee University, University of Tennessee, University of Texas, University of Virginia and Vanderbilt University. These teams competed for a total of \$30,000 in prizes awarded to the top three finalist teams.



L-R: Joseph Cannon, Fernando Puno Jr., Malcolm Prouty, Jeff Wadsworth (director of Oak Ridge National Laboratory), Joy Fisher (organizer of the Nano Nexus Idea to Product Competition), and Tom Rodgers (President and CEO of Technology 2020, the sponsor of the 2nd place prize).

"We were really impressed with the quality of the submissions from each of these teams," said Joy Fisher, managing director of the event. "Many of the schools involved have not done anything like this before, so it's a great testament to their desire to foster innovation and entrepreneurship."

Advancing to the final round of competition were teams from Georgia Tech, Vanderbilt, the University of Texas, Florida State, and Louisiana Tech University. The Final round culminated with the University of Texas, **Louisiana Tech University**, and Vanderbilt University advancing to the first, second, and third places, respectively.

Louisiana Tech University team consisted of students associated with Better Paper Technologies, LLC, the first all-student start-up company from Louisiana Tech University and stemming from the Institute for Micromanufacturing.

The team members consisted of Malcolm Prouty (Chief Executive Officer), Joseph Cannon (Director of Research & Development), Fernando Puno, Jr. (Director of Finance), and Michael Orum (Director of Marketing). Dr. Yuri Lvov serves as chief consultant for Better Paper Technologies.



The goal of Better Paper Technologies is to create an autonomous, industrial self-assembly system (ISAS) for applying coatings to pulp fibers via layer-by-layer self-assembly, which can be sold and implemented in pulp and paper mills. The coatings will allow the paper industry to use more recycled fiber content without reducing product quality. Because recycled fibers cost 3 to 5 times less than virgin (new) fibers, the paper industry can greatly reduce their manufacturing costs by increasing their recycled content.

IfM Student Bragging Rights

John William Sweeney, a PhD in Engineering student at Louisiana Tech University, has been selected to receive a National Science Foundation Graduate Research Fellowship.

The Graduate Research Fellowship Program awards fellowships for graduate study leading to research-based master's or doctoral degrees in the fields of science, technology, engineering, and mathematics (STEM) relevant to the mission of the National Science Foundation. Approximately 1,000 students are awarded the fellowship each year, providing the recipient with \$10,500 for school-related expenses and \$30,000 in

salary per year for three years.

Mr. Sweeney earned his BS Degree in Electrical Engineering from Louisiana Tech University in 2006. He is currently pursuing his PhD in Engineering at Louisiana Tech University, under the guidance of Dr. Chester Wilson. His research focus is on developing microscale optical and plasma diagnostic devices for homeland security applications.

Teri Williams, a PhD Engineering student at Louisiana Tech University, has been awarded a National Defense Science and Engineering Graduate (NDSEG) Fellowship.

The three-year fellowships are offered by the Department of Defense (DoD) to individuals who have demonstrated ability and special aptitude for advanced training in science and engineering. Applicants are rated based on academics and overall ability in the areas of interest to the DoD. The NDSEG pays full tuition, required fees, and minimal health insurance coverage, as well as a \$30,500 stipend in the first year, \$31,000 in the second year and \$31,500 in the third year.

Ms. Williams has a BS in Engineering Sciences from the United States Air Force Academy and an ME in Space Operations from the University of Colorado. She served 6 years as a Computer-Communications Officer in the

United States Air Force.

She is working towards her PhD in Engineering directed by Drs. Chester Wilson and Ville Kaajakari.

Ms Williams, also had previously applied the NASA Harriett Meyers Fellowship. She will be unable to accept this award, as she has been awarded the DoD fellowship just described.

Fatima Zohra, a Master of Science in Engineering student has received an award as one of the 5 best papers presented at the IEEE International Conference on Networking, Sensing and Control held in London, UK.

The paper was authored by Ms. Zohra and her graduate advisor Dr. Rastko Selmic is on "Fault Aware Wireless Sensor Network"



IfM Semi-Annual Student and Staff Recognition

Semi-annually the IfM hosts an All IfM Meeting, prior to which faculty and staff nominate deserving M.S. and Ph.D. students, as well as a staff person for recognition of his/her achievements. This tradition began in the Spring Quarter of 2002. The criteria established for student nominations take into consideration scholarly activities (e.g. journal publications), demonstrated initiative, and productivity in research efforts.

This Spring quarter those recognized were: IfM staff member Dr. Karen Xu, Ph.D. students Mr. Anirban Chakraborty and Ms. Yanqing Lu, and M.S. student Ms. Ganga Parthasarathi.

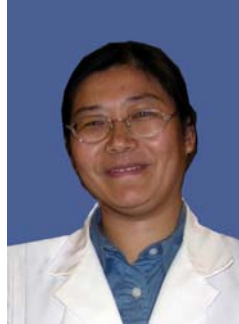
Special guest speaker was Dr. Timothy Ameel,



Dr. Timothy Ameel

a Fulbright Scholar and Associate Professor of Mechanical Engineering at the University of Utah. Dr. Ameel gave an overview about his areas of research and on-going projects.

Dr. Karen Xu, IfM operations staff, was presented with a certificate for Distinctive Professional Performance and Conduct and a monetary award by Mr. Philip Coane, IfM Associate Director of Operations. Dr. Xu is responsible for the daily operations of the Measurements and Characterization Laboratory. She also is responsible for providing electron beam lithography support for various research projects and the diagnostics and maintenance of metrology and select processing equipment.



Dr. Karen Xu

Ms. Lu was presented with a certificate for Excellence in Scholarly Work and Research and a monetary award. She was nominated by her advisor, Dr. Frank Ji, Associate Professor of Chemistry and IfM.

Mr. Chakraborty and Ms. Parthasarathi were presented with a certificate for Excellence in Scholarly work and Research and a monetary award. They were nominated by their advisor, Dr. Cheng Luo, Assistant Professor of Biomedical Engineering and IfM



Anirban Chakraborty Ganga Parthasarathi

IfM Students Receive Top Awards at 2007 Louisiana Academy of Science Conference

On March 16th, the 2007 Conference of the Louisiana Academy of Science was held at Southern University and A&M College campus. As part of the activities, undergraduate and graduate students from Louisiana universities competed with oral and poster presentations. This year the first two places in the graduate students' poster competition were won by Louisiana Tech University students associated with research projects conducted at the Institute for Micro-manufacturing, under the supervision of Dr. Pedro Derosa.

First place was awarded to Indraneel Sanikummu for his poster titled "Modeling Nanoparticle-Doped Radiation Detectors using Monte Carlo Simulations". Mahesh Neupane and Chad Whitney collaborated with Indraneel on the research portion of the poster. The second place was awarded to Bharat Kolan for his poster titled "Proton Diffusion in Porous Materials: A Molecular Dynamics Study". The students also received a certificate and monetary award.

The students have been working diligently on their projects and these recognitions are well deserved. When they joined Dr. Derosa's group, they were given the task to establish computational models for different applications. This is a tedious and sometimes frustrating job that does not produce

immediate outcome. While the tendency is to search for activities that produce instant rewards, Indraneel and Bharat exercised patience and waited for the outcome of their labor to manifest itself at the appropriate time.

The research described in the posters originated from the need for simulation studies in support of ongoing experimental efforts on the design of radiation detection systems (in collaboration with Dr. Chester Wilson), and nanoporous materials for fuel cell applications (in collaboration with Dr. Scott Gold). This fact makes even more valuable the contribution of these students. Currently, both projects have grown beyond the original scope to the point where additional applications are being implemented, all thanks to the dedication of these students.

Indraneel is an MS student in electrical engineering and his first assignment was to search for available codes able to simulate the interaction of radiation with nanoparticles. He confirmed his initial assumption that there were none. By collaborating with Ph.D. student Mahesh Neupane, Indraneel began writing a new code with unique capabilities appropriate for

nanotechnology applications.

Bharat is an MS student in electrical engineering, and was assigned the task to conduct molecular simulations to study the diffusion of species (particularly protons) in nanostructures (nanopores and nanotubes). This is currently a worldwide challenge that was taken on by Bharat and this award is a proof of his success.

Neither Indraneel nor Bharat had previous experience in computer simulation; In Dr. Derosa's opinion "they have come a long way. They are proof that with hard work, patience, and dedication, any task is possible, even if it involves molecular simulations!"



L-R: Bharat Kolan, Mahesh Neupane, Dr. Pedro Derosa, and Indraneel Sanikummu



Louisiana Tech University

Institute for Micromanufacturing
P. O. Box 10137
911 Hergot Avenue
Ruston, LA 71272

Phone: 318-257-5100
Fax: 318-257-5104
Email: ifm-marketing@latech.edu

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Vision and Mission

The vision of the IfM is to be a world-class resource for the realization of commercially-viable micro- and nano-systems, contributing to the economic infrastructure of Louisiana and the nation and benefiting humanity as a whole.

The mission of the IfM is:

- ✧ To research and develop novel micro and nanosystems for biomedical, biological, environmental, chemical, information technology, and other applications
- ✧ To generate and harness commercially viable intellectual property
- ✧ To partner with industry, government, and academia in economic development

- ✧ To transfer new technology and provide technical training to industry and government
- ✧ To develop curricula and educate students in micro/nano scale technologies and systems

The IfM offers a wide range of microtechnology capabilities for the realization of micro electro mechanical systems (MEMS), as well as a complementary array of nanotechnology capabilities for MEMS and other applications.

Nanotechnology, Biotechnology, Biomedical Nanotechnology, Environmental Technology, and Information Technology constitute the five major research and development thrust areas and centers of excellence of the IfM.

Examples of projects include:

BioMEMS efforts aimed at the development of select commercially viable micro and nanosystems for biomedical and biological applications; EnviroMEMS efforts aimed at the development of select commercially viable micro and nanosystems for environmental and chemical applications; Nanotechnology efforts directed at the development of select commercially viable nanotechnologies for BioMEMS, EnviroMEMS, and other applications; Information technology efforts are directly supportive of the State of Louisiana IT Initiative and current efforts include projects for the realization of enabling micro/nanotechnologies for information sensing, storage and processing.



*Institute for Micromanufacturing
Louisiana Tech University
Ruston, LA*