



Professor Yuri Lvov receives Small Times' Innovator of the Year Award



Dr. Yuri Lvov, a chemistry professor at Louisiana Tech's Institute for Micromanufacturing, has been named Small Times' Innovator of the Year. He was selected over candidates from universities and companies from across the nation.

Dr. Lvov received the award based on his work related to important cancer drugs. His research pioneers drug reformulation through polyelectrolyte nanoencapsulation, which has allowed stable

nano and micro colloids of cancer drugs. He has used the same approach to improve cellulose microfibers from recycled paper through polyelectrolyte nanocoating, which has allowed increased recycled fiber usage in paper.

"Each year it gets more and more difficult to judge the best and brightest as the micro and nanotechnology market continues to mature and new products come to market," said Christine Shaw, senior vice president and group publisher of Small Times. "It is an honor to recognize the leading companies, and business and research executives who are driving integration of nanotechnology into the commercial pipeline."

Dr. Lvov's area of specialization is nanotechnology, including nanoassembly of ultra thin organized films, bio/nanocomposites, nanoparticle ensembles, nano/construction of ordered shells on micro-

templates, nanocapsules for drug and enzyme delivery and controlled release. He has also published two books and has had more than 160 peer reviewed papers on these topics.

"This is a well-deserved award, recognizing Dr. Lvov's extensive scientific and technological contributions," said Dr. Kody Varahramyan, Director of the Institute for Micromanufacturing. "He is nationally and internationally known for his pioneering work in the area of nanotechnology, particularly as it relates to the layer-by-layer nanoassembly technique and its applications."

Dr. Lvov, who holds the Tolbert Pipes Eminent Endowed Chair on micro and nanosystems, said "while he felt this achievement was a summation of his work, he expects to continue his research for many years."

"Of course, I hope to do something more," he said.

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IfM Investigators Receive \$1.3 Million in Recent Grant Awards

Recently, IfM investigators have received 3 new grants totaling over \$1.3 million. Specifically, Drs. Yuri Lvov, Mark DeCoster, and Kody Varahramyan have received \$550,000 from the Louisiana Board of Regents for an advanced materials project conducted in collaboration with researchers at the University of New Orleans. Drs. Varah-

ramyan and Lvov, in collaboration with Mr. Ji Fang have also received \$455,000 for a biosensor project in collaboration with researchers at Tulane University and supported by a new NSF EF-SCoR RII grant. Moreover, Dr. Chester Wilson and Mr. Noah Bergeron have recently received a \$335,000 award from the Armament

Research, Development and Engineering Center (ARDEC). The award has been received through Georgia nanoFAB, and will support the IfM investigators to conduct research on the realization of smart projectiles. This work is also laying the foundation for a new start-up company to be located in Louisiana Tech's business incubator.

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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!



Small Times' Innovator of the Year Award *continued from page 1*

"Many, many people were considered. This award means Louisiana researchers are moving forward."

Dr. Dan Reneau, President of Louisiana Tech University, commended Dr. Lvov's research and technological advances.

"Yuri Lvov is an excellent scientist and a very fine individual," President Reneau said. "Louisiana Tech University is fortunate to have him as a professor."

Dr. Stan Napper, Dean of the College of Engineering and Science, said "Dr. Lvov's willingness to collaborate with young faculty members in a variety of

areas has helped boost interdisciplinary research within the university. His technology and scientific contributions have enabled so many of our researchers to develop innovations in a variety of areas. He freely shares his knowledge and has been very supportive of new faculty hires and has helped them become successes early in their careers."

Dr. Les Guice, Vice President for Research and Development, said "Dr. Lvov is a remarkable individual and one of the most prolific scientists in terms of his cited journal publications at Tech. What's really special about Yuri to me

is that he understands the innovative process of taking things he does into things industries are interested in. He provides leadership for us, and this award is an amazing demonstration of his technology. He can take this layer-by-layer assembly method and apply it to cancer drugs and pulp and paper to make it have better properties." Dr. Guice added that "Dr. Lvov is passionate about Louisiana Tech and is a great asset to the university. Great people like him could go anywhere in the country. He has made a difference for us."

"Creating Connections" Program Update

Louisiana Tech's NSF funded "Creating Connections" GK-12 Teaching Fellows program is centered on the theme of molecular science and nanotechnology (MSNT)." The program has developed MSNT Teaching-Learning Labs in three north Louisiana schools including Simsboro, Carroll Jr. High School, and Martin Luther King Jr. Middle School in Monroe, Louisiana. The labs are staffed by NSF teaching fellows, graduate engineering

and science graduate students, and each serves as a focus for creating teaching fellow and teacher generated instructional modules, stimulating fellow, teacher, student, and research mentor interaction, and hands-on student engagement in science and engineering.

Chris Campbell, a science teacher at Simsboro High School, recently presented a workshop on "Hands-On Technology-Driven Science at the 2007

LACUE Conference held in Baton Rouge, LA on November 30th. Mr. Campbell's workshop describes how science can be made very exciting for students with the help of Vernier's LabQuest and other probes, digital scopes, wireless weather stations, and other technological gadgets. A technology-driven lab also works much better when it is wireless!

Smart Paper To Help Diabetics

A group of faculty and students at the Institute for Micromanufacturing (IfM) have developed the technology platform for the making of what they call smart paper. It may look like regular paper, but is being developed for a wide range of applications. A key application is to make smart paper that works as a glucose sensor. Recently, this has been successfully demonstrated by the IfM researchers. "The objective of this project is to ultimately develop a product that serves humanity in assisting those who have diabetes, which is a serious disease and very difficult to deal with", says Dr. Kody Varahramyan, Director of the Institute for Micromanufacturing. He in collaboration with Drs. Yuri Lvov and Mangil Agarwal are leading the efforts in developing smart paper.

Using the Layer-by-Layer (LbL) nanoassembly method, nanocomposites, consisting of polymeric and enzymatic materials, have been used to modify the surface of wood microfibers. The resulting nanocomposite-coated microfibers have been successfully shown to display good response in the presence of glucose. Subsequently, paper made of these fibers has displayed glucose sensing characteristics. The results obtained are very encouraging for the development of this technology for paper-based glucose sensors to aid diabetic patients. These sensors are meant to be very cost effective and easy to use by diabetics to test their glucose levels, by simply exposing the smart paper sensor to their saliva, which contains glucose, and avoiding the need to

puncture the finger tips to test their blood glucose level, as commonly done at the present time.

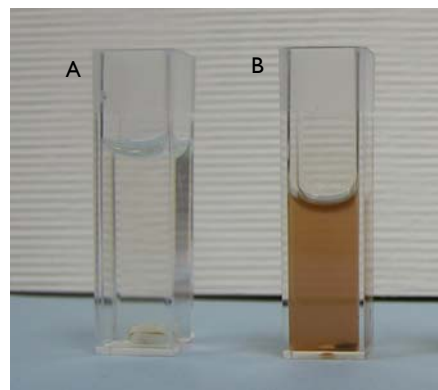


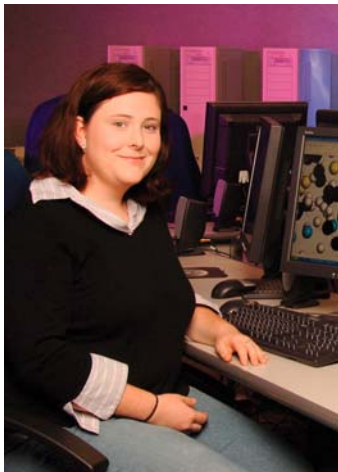
Illustration of Smart Paper Glucose Sensing.

A: Normal Paper Sample in Solution with Glucose
B: Glucose Sensor Paper Sample in Solution with Glucose.



Student Accolades

Vincent A. Forte Graduate School Fellowship Awarded. It is a pleasure to congratulate IfM student Ms. Katherine Keeton as one of two recipients of the Vincent A. Forte Graduate School Fellowship award. The \$2,000 award is given annually by the Louisiana Engineering Foundation to a student enrolled in a graduate education program in engineering who expresses a sincere desire to enter the teaching profession at the university level upon completion of his/her graduate education. The award is named to honor Vincent A. Forte, P.E., a founder and first president of the Louisiana Engineering Foundation.



Ms. Keeton is a second year graduate student working under the direction of Dr. Daniela Mainardi. In the fall she will complete her MS in Biomedical Engineering and will continue to work towards her Ph.D. in Engineering. Her research involves using computational modeling to investigate limitations with electron transport in the enzyme Methanol Dehydrogenase for bio-fuel cell applications. She is also a National Science Foundation GK-

12 Teaching Fellow. She will be recognized at the 12th Louisiana Joint Engineering Societies Meeting in Lafayette on January 24, 2008.

IfM Student Receives LONI Fellowship Award for Louisiana Tech University The LONI Institute, a distributed research collaborative among six Louisiana Optical Network Initiative (LONI) sites, has awarded its first graduate fellowship from each member university.



The graduate fellowship for Louisiana Tech was awarded to Mr. Gopi Dathara, a Ph.D. in Engineering student.

He will work with his advisor Dr. Daniela Mainardi to conduct science and engineering research using LONI's advanced high-performance computing, and high-speed networks and distributed data archives.

Gopi was chosen based on his previous research excellence and the potential to use LONI resources, receive future funding, and meet the LONI Institute's success metrics. He will also receive a one-year stipend of \$20,000. Fellows will seek external funding to continue their research once their initial one-year terms end.

Microfabrication Processes Course Poster Presentations Winners On November 13, 2007, students from Dr. Chester Wilson's MSE 501 Fundamentals of Microfabrication Processes course presented posters for their class projects. This course is one of the core courses for graduate studies in the micro/nanosystems area at Louisiana Tech University. Each student was required to do an independent project, and present the results via a poster and a corresponding written report. Judges, consisting of IfM faculty and staff, were assigned to pick the top 3 posters. The following are the winners: (A) Rebecca Aymond, (B) Joshua Raley, (C) Katherine Keeton.

A



B



C



Winter 2008 Seminars

Functional Nanoassemblies: Fundamentals and Applications

January 31: 2:00 p.m. "Nanotechnology versus Microtechnology in Electrical Devices", *Ville Kaajakari*

February 12: 2:00 p.m. "Alumina Templated Polymeric Nanotubes for Electrical Devices", *Sandra Selmic, Scott Gold, Joey Cannon*

February 25: 11:00 a.m. "Biosensors Based on Piezoelectric Excited Cantilevers", *Raj Mutharasan, Drexel University*



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*