



Message from the Institute's Director



I have been associated with the Institute for Micromanufacturing for the past 16 years when I joined Louisiana Tech University as a new faculty member, and for the past 8 years, I have also had the privilege of serving as the director of the Institute. I greatly value my years of association with the Institute and the University, and thank everyone who has made my stay so valuable.

There can also be times in one's life, when a new prospect may come along that may take us in a different direction. Recently, I have found myself in such a situation. As a result, I will be leaving my present position at Louisiana Tech University, to join the Indiana University-Purdue Univer-

sity Indianapolis (IUPUI), on July 1, 2008, as its new Vice Chancellor for Research.

While I am looking forward to initiating a new phase in my professional career, I will miss Louisiana Tech University and all my friends and colleagues. Moreover, once I get settled at my new institution, I look forward to the opportunity of establishing collaborative ties with Louisiana Tech, and particularly with the Institute for Micromanufacturing.

The Institute is a unique resource of its kind nationally and internationally. Since its inception over a decade and half ago, the Institute has been in the forefront of integrated multidisciplinary research, education, and technology commercialization. Starting from its original micromanufacturing emphasis, the Institute's research and educational efforts have grown and expanded significantly to its current five thrust areas of emphasis, identified as Nanotechnology, Biotechnology, Biomedical Nanotechnology, Envi-

ronmental Technology, and Information Technology. The activities carried out through these thrust areas, coupled with the Institute's integrated nanomanufacturing and micromanufacturing resources, have led to the realization of a broad range of research, educational and commercialization efforts. These include the development of novel micro/nano scale systems for biomedical, biological, environmental, chemical, information technology, and other applications.

Recently, the university has initiated a nationwide search to find the Institute's next director. The Institute is expected to stay on its current path during the transition period and, with the help of its Leadership Team, consisting of senior faculty and staff who head its thrust areas and operations, the Institute will maintain its high level of productivity, and continue on its path of achieving its vision and mission.

The future is very bright for the Institute for Micromanufacturing, and I wish everyone associated with it all the very best.

Kody Varahramyan
 Director

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Special points of interest:

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

Newsletter Editor

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“Creating Connections” LaTech’s NSF GK-12 Teaching Fellows Program”

“Louisiana Tech Teaching Fellows and Faculty Presented their K-12 Outreach Efforts at the 2008 American Association for the Advancement of Science Meeting in Boston, MA and the 2008 National Science Foundation GK 12 Meeting in Washington, DC”

Dr. David K. Mills and Teaching Fellows from his NSF funded Creating Connections GK12 Teaching Fellows program, presented their outreach efforts at the 2008 American Association for the Advancement of Science (AAAS) meeting held in Boston, Massachusetts. The GK-12 Program at the AAAS was held on Friday, February 15 from 2 to 6:30pm under the larger umbrella of the Forum for School Science. The "Forum" has been a feature at the AAAS Annual Meeting since 1997 and focuses on different topics each year. This year's Forum for School Science focuses on "Programs that Create a New Science Professional: The Ph.D. as Public Educator".

In the program session on Integrating Research into the Classroom, Louisiana Tech GK-12 Teaching Fellows, Skylar Stewart, Melanie Groan and Katie Keeton presented Creating Connections: a Model for Incorporating Scientific Investigation and Research into Louisiana's K-12 Curriculum.

In the session on Structural

Changes at Universities that Support STEM Professionals as Public Educators or University-based Initiatives, Dr. David K. Mills, Project Director, and Ms. Linda Ramsey, CATALYST Director, presented, The CATALYST Summer Research Partnership Program.

Dr. Mills and Ms. Ramsey shared their own outreach experiences, modeled exemplary outreach activities, and provided tools for Louisiana Tech researchers to use in developing their own outreach activities or programs. This program is supported in its efforts by a grant awarded to Dr. Mills, Ms. Ramsey and Dr. Steve Jones and through financial, administrative, and logistical support provided by the Colleges of Applied & Natural Sciences and Engineering and Science, and through a dedicated K-12 Outreach Lab in Louisiana Tech's new Biomedical Engineering building.

Dr. David Mills, principal investigator and project director, has accompanied a Louisiana Tech group of partner teachers, faculty and graduate teaching fellows, to the Na-

tional Science Foundations Graduate Teaching Fellows in K-12 Education (GK-12) Annual Meeting, held in Washington, DC, from February 29th to March 2nd, 2008. Accompanying Dr. Mills from Louisiana Tech were professor Linda Ramsey, co-investigator and a faculty in the School of Biological Sciences, Dr. Steven Jones, co-principal investigator and Program Chair of the Biomedical Engineering Program, and two graduate teaching fellows, Ms. Skylar Stewart-Clark and Ms. Melanie Groan, Ph.D. students in Biomedical Engineering. Also attending was Ms. Norah Burke, a science teacher from Simsboro High School, who serves as a Partner Teacher with Louisiana Tech's Creating Connections GK12 program. The team presented the 2007-2008 accomplishments of Louisiana Tech's Creating Connections program, disseminating program activities and lab modules developed for middle and high school students in northern Louisiana.



Dr. David Mills



Katherine Keeton



Melanie Groan

“This program provides a mechanism for institutionalizing K-16 academic and research activities. Moreover, it provides greater institutional context and support for these efforts.”

Co-Presented “Creating Connections: a Model for Incorporating Scientific Investigation and Research into Louisiana's K-12 Curriculum”

“It was more than just your typical society conference. AAAS incorporated professors, elementary students, teachers, graduate students, and others to learn from one another in developing partnership experiences for all levels of education.”



International Collaboration on Discrete Simulations of Cellular Pathways

IfM faculty Dr. Andrei Paun is collaborating in Spain with the group lead by Dr. Alfonso Rodriguez Paton, from the Univesidad Politecnica de Madrid. This collaboration is in the area of discrete simulations of cellular pathways, with an emphasis on better understanding the cascade of reactions leading to the cellular suicide process (also called apoptosis). The collaboration with the Madrid group has led to a paper recently accepted for publication in the "International Journal of Fundamentals of Computer Science".

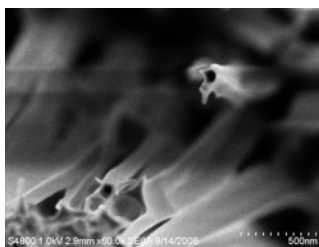
In the same direction, but with an emphasis on experimental validation and augmentation Dr. Paun is also collaborating with his IfM faculty colleague Dr. Mark DeCoster, with whom he has received a Louisiana Biomedical Research Network (LBRN) grant, supporting their activities. In January 2008, Drs. DeCoster and Paun participated in the LBRN's 6th Annual Meeting in New Orleans, where the picture to the right was taken, also showing their IfM faculty colleague Dr. Sidney Sit.



L-R: Dr. Andrei Paun, Dr. Mark DeCoster, and Dr. Sidney Sit.

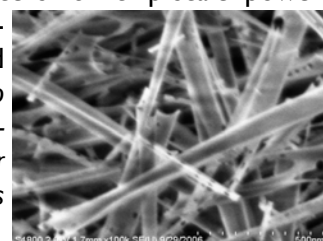
Nanostructured Materials by Template Wetting

Dr. Scott Gold is leading the research efforts at the IfM on the realization of nanostructured materials by the template wetting approach. He is an assistant professor of chemical engineering, who joined Louisiana Tech University in 2004. The process under consideration utilizes wetting phenomena to coat the pore walls of a nanoporous template. The template can then be selectively removed, leaving behind the coating material in the form of nanotubes or nanowires. A key aspect of this process is controlling the wetting behavior of the precursor solution on the nanoporous template. A wide variety of nanostructured materials have been made in Dr. Gold's lab using this technique, including metals, polymers, piezoelec-



trics, and ceramics. Pictured to the left in the previous column are nanotubes of poly(2-methoxy-5-(2'-ethylhexyloxy)-1,4-phenylenevinylene), or MEH-PPV, a widely studied semi-conducting polymer material.

Several applications are being investigated by Dr. Gold and his collaborators. These include development of small chemical fuel cells and enzymatic bio-fuel cells, microreactors for hydrogen production, and polymer electronics. Two areas of particular interest are the development of micro fuel cells for chip-scale power generation, and the fabrication of microchemical and biological sensors. Pictured to the right are platinum nanotubes being investigated for catalytic properties in fuel cells and in other applications.



Spring 2008 Seminars "Functional Nanoassemblies: Fundamentals and Applications"

Each quarter the Institute for Micromanufacturing hosts Nanotechnology Seminars, entitled: "Functional Nanoassemblies: Fundamentals and Applications". Chaired by Drs. Yuri Lvov, Tabbetha Dobbins, and David Mills, the following seminars have been planned for Spring 2008.

#106 - March 11, Tuesday, 2 p.m. Mike Benton, John Flake, James Henry, Louisiana State University, Baton Rouge. 1) J. Flake:

"Electrochemical Processing of Silicon Nanowire Films"; 2) M. Benton: "A Green Approach to DNA Damage Detection"; 3) J. Henry: "Biomimetic Materials for Biomedical Applications".

107 - March 25, Tuesday, 2 p.m. Rahul Krishnan, Tabbatha Dobbins, IfM, "Microwave Irradiation Effects on Reversible Hydrogen Desorption in Sodium Aluminum Hydrides (NaAlH₄)".

108 - April 8, Tuesday, 2 p.m. Mangilal Agarwal, Qi Xing, Yuri Lvov, Kody Varahramyan, IfM, "Smart Paper: Electronic Devices Based on Nanocoated Cellulose Composites".

#109 - April 22, Tuesday, 2 p.m. Shantanu Balkundi, Matthew Eby, Yuri Lvov, Glen Johnson, Tyndall Airforce Base, Research Division, & IfM, "Microbial Spores as Microtemplates for Nano-organized Electrolyte Assembly".

#110 - May 6, Tuesday, 2 p.m. Shraddha Patel, Scott Gold, David Mills, IfM and School of Biology, "Nanoporous Titania Cellular Scaffolds: a Novel Substrate for Enhanced Osseointegration".



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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:

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

- h To transfer new technology and provide technical training to industry and government
- h 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.



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