

Spring 2002

BME STATS Spring 2002

Department of Biomedical Engineering, Florida International University

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Biomedical Engineering Advisory Board Convenes

The Biomedical Engineering Advisory Board's third meeting took place on Feb. 26, 2002. During the meeting, several plans were introduced in order to upgrade the BMEI program and its facilities to nationally and internationally recognized levels.

Board members suggested, among other plans, to create a technology transfer office

that will allow technology transfer, knowledge marketing, and licensing. Such an office, according to board members, would attract business enterprises to BMEI-based research.

In order to become a national leader in biomedical education, board members also stressed the importance of improving the marketability of the program. "I think we (the BMEI)

are heading in the right direction with the improvement of our outgoing messages," said Tecnix managing partner, Mario Martinez. "We need to attract more people to FIU and South Florida," he concluded.

For implementation in fall 2002 semester, the advisory board also reviewed the Bachelors Degree in Biomedical Engineering proposal. The proposal has already been accepted by the university and awaits final approval by the university's board of trustees. With the implementation of this program, FIU will be the first Florida public university to offer an undergraduate degree in biomedical engineering.

The university provost, Dr. Mark Rosenberg joined in complementing BMEI for its achievements in its short history and stressed BMEI's importance in following FIU's vision to become a top U.S. public research university.



Advisory Board including Provost Rosenberg and Dean Prasad

Biomedical Engineering Courses

Spring 2002

Course	Title	Credits	Instructor
BME4011	Clinical Rotations for Biomedical Engineering	1	Dr. McGoron
BME4090	Design Project Organization	1	Dr. Schoephoerster/Amit
BME5702	Engineering Analysis of Biomedical Systems	3	Dr. McGoron
BME5994C	Radiological Engineering & Clinical Dosimetry	3	Dr. Franquiz
BME6994	Advanced Cardiovascular Engineering	3	Dr. Schoephoerster
EEL5071	Bioelectrical Models	3	Dr. Heimer
EGM4582	Engineering Hemodynamics	3	Dr. Moore
EGM6586	Fluid Mechanics Applications in Physiological Systems	3	Dr. Moore
EMA5584	Biomaterials Science	3	Dr. Crumpler

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Director of Cardiovascular Engineering Center Receives a U.S. Patent

The invention is shared by Dr. Joel Berry of Wake Forest University, a long time collaborator of Dr. Moore, who proposed the original flow experiments. It is currently undergoing further development in a series of in vivo tests in London, England and Marseille, France.

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Partnership Program Awards Five Grants

The Research Initiation Program is a part of BMEI's Partnership Program with South Florida hospitals and biomedical industry leaders. The program allows its members and FIU faculty to jointly seed pioneering projects, which present potential for discovery, innovation, invention, and future commercialization.

BMEI Faculty Research Grants

The BMEI faculty puts great emphasis on advanced research that will benefit the knowledge pool in the field and is currently involved in numerous projects supported by biomedical industry partners and health agencies.

Tony McGoron, Ph.D.

Cerebral Perfusion and Quantitative Glucose Metabolism Imaging in a Piglet Model of Pediatric Brain Injury using Hybrid SPECT/PET

Source: Initial Investigator Award from American Heart Association
Total Cost: \$225,000

James Moore, Ph.D.

Flow Effects on Platelet Deposition in Stented Arteries

Source: NIH (SCORE program and NHLBI)
Total Cost: \$824,876

Richard Schoephoerster, Ph.D.

In vitro performance characterization of a novel trileaflet synthetic heart valve

Source: Grant-in-Aid from American Heart Association
Total Cost: \$120,000

Juan Franquiz, Ph.D.

Performance Assessment of a New, Hybrid X-Ray CT and SPECT System for Myocardial Perfusion Imaging

Source: DuPont Pharmaceuticals Company
Total Cost: \$12,000

Message from the Director

Having reached a major milestone for the BMEI – our first graduate of the MS program – I thought that this would

be a good time to reflect on the mission of the BMEI in comparison to our recent activities that you will find detailed in this our second newsletter.

The mission of the BMEI is to integrate academia, clinical medicine, and the biomedical industry in the education and training of the next generation of biomedical engineers; and in research and development activities leading to innovations in medical technology.

As you peruse through this edition of STATS, I hope you will notice that our actions are derived from this mission statement. The Advisory Board for the Clinical and Industry Partnership Program continues to guide our research and education programs. You will see two programs in particular that have been implemented (Research Initiation and Internship) that have been designed to serve as vehicles for integrating our research and educational activities with the clinical and industry partners. In addition, our research activities display a strong interaction with industry and clinical medicine, from medical device development (stents and valves) to the prestigious Initial Investigatorship that was awarded to Dr. Anthony McGoron from the American Heart Association. Finally, our spotlight student, Sophia Scipio, is one of the many students who interact with our partners on a daily basis as she works at Miami Children's Hospital.

This mission statement, along with continuous input and guidance from our Partnership Advisory Board, will continue to direct and focus our activities as we look to expand our programs to include more degree offerings (BS and PhD) and value-added skills (such as entrepreneurship). Be on the lookout for announcements on these activities in our next newsletter.

Dr. Richard T. Schoephoerster, Director BMEI



Director of Cardiovascular Engineering Center Receives a U.S. Patent

Dr. James Moore, Director of FIU's CVEC, received a patent for a stent design in March 2001. "It was very satisfying to get a patent number after such a long wait," Moore said of his invention, which was originally conceived in 1995.

The device, which Moore and his team call the "Compliance Matching Stent" aims to reduce problems with previous stent designs that cause the devices to fail in about one third of patients who receive stents. Moore said, "Our design aims to minimize tissue buildup within the stent by minimizing stress in the artery wall."

Stents are tiny metallic tubes that are expanded into diseased arteries. The stent props open the artery, and helps prevent further problems such as heart attacks and strokes. Stents offer a much less invasive and less costly alternative to by-pass surgery.

The idea for the Compliance Matching Stent was born in a series of flow experiments that took place in Moore's lab at CVEC. "We noted that other stents create problems with blood flow patterns and stress in the artery wall due to the abrupt change in mechanical properties at the ends of the stent. Our design minimizes these problems by transitioning the mechanical properties over a small distance."



Dr. James Moore, Jr.

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Partnership Program Awards Five Grants

Living up to its promise to assist and promote research in the biomedical engineering field, the BMEI Partnership Program Research Initiation Awarding Committee announced on December 12, 2001, the five recipients of this year's grants for new research:

Ilker Yaylali, MD, PhD, (BMEI) and Prasanna Jayakar, MD, PhD (MCH), Non Invasive Functional Mapping in the Brain Using Cerebral Oximeter

James Moore, PhD, (BMEI) and Barry Katzen, MD (Miami Cardiac & Vascular Institute), Are Stresses in Abdominal Aortic Aneurysms Reduced with Stent Graft Treatment?

Anthony McGoron, PhD, (BMEI) and William Abraham, PhD, (Mount Sinai), In-Vivo Monitoring of Myocardial Retention of Skeletal Myoblasts

Juan Franquiz, PhD, (BMEI) and Santiago Medina, MD, (MCH), Three-Dimensional Probabilistic Integration of Neuroimaging Modalities for Identification and Surgery of Seizure Focus

Eric Crumpler, PhD, (BMEI) and Howard Leonhardt, (Bioheart), Myoblast Localization via Hydrogel Encapsulation/Delivery

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Biomedical Engineering STATS

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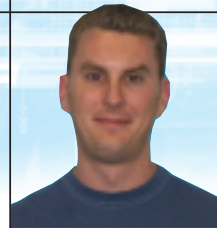


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Biomedical Engineering Society

Message from the President



The Biomedical Engineering Society at Florida International University is well into its second year of existence. This year we have organized and completed several successful events and have conducted general meetings and participated in collegiate society functions organized by the student government.

The BMES sent a delegation of students to last year's Annual Biomedical Engineering Society Meeting. The trip was sponsored by the Biomedical Engineering Institute. The conference was held in the Raleigh-Durham area of North Carolina. The students included seven graduate students and myself, one of who presented a research thesis at the meeting. The 850-mile drive was an adventure and great experience for all involved. The road weary group managed to attend informative talks from researchers around the country and forums with biotechnology industry leaders. We also paid a visit the Duke University campus and enjoyed the nightlife in the Chapel Hill area of Durham.

We have conducted elections this Spring Semester and have a new Executive Staff. Many thanks to the outgoing Executives: Joseph, Siobhain, Hernan, Christian, and Sara; and welcome to the new Executives.

The BMES encourages all students interested in biomedical engineering to join our organization for a richer and more fulfilling college experience. The BMES is dedicated to providing its members with a better understanding of the Biomedical Engineering profession, industry exposure, and social and professional development. I also encourage students to seek leadership positions in the BMES and other organizations to make one more marketable upon graduation.

Thomas E. Claiborne, III,
Founder BMES at FIU
Undergraduate Mechanical/Biomedical
Engineering Senior

BMEI Graduates First Student

The Biomedical Engineering Institute graduated its first student, Mao Xuming, last summer. "I am proud that Xuming is BMEI's first graduate as well as my first graduating student as an advisor," said Xuming's major advisor, Dr. Anthony McGoron.

Xuming joined BMEI from Beijing Union Medical College in China, where he had earned a medical degree in Lab Medicine. Xuming's father and sister still live in Shaxin, a small town in the northeastern province of Zhijiang and hometown of both Prime Minister of China and the president of the University of Beijing.

An internship at Beijing's Union Medical College sparked Xuming's interest in biomedical engineering. "It was important for me to understand what the machine principles were and how those machines worked," he noted. "Medicine did not give me enough information on technology," he concluded.

Xuming joined BMEI in January 2000, and worked under Dr. McGoron in the area of

Tracer Kinetics Modeling using Emission Tomography. After a year at FIU, his wife, Haiying He – a faculty member on sabbatical, joined him in Austin, Texas, where he is currently pursuing a Ph.D. in Pharmacology at the University of Texas.

"I am very happy for Xuming for achieving this important personal goal," said BMEI director, D. Richard Schoepfhoerster. "Mao's graduation – the graduation of our first student, is a milestone in the growth of the institute. It gratifies all of us who were involved in the creation of this unique program," he added.



Mao Xuming

STUDENT SPOTLIGHT

>> Sophia Scipio



Sophia Scipio is an international student in her freshman year in the Biomedical Engineering Institute. "I was born in Scarborough, Tobago, which is in the Caribbean Sea," says Sophia. "I came to FIU in the spring of 2001 because my sister, Patrice, goes to school here and she recommended it to me. I also love the weather in Miami; it is similar to the weather in Trinidad and Tobago and makes me feel right at home," she adds.

Sophia was not a biomedical engineering major when she arrived. "I always wanted to be a neurosurgeon. Naturally, I chose biology as my major," she explains. "During my

first semester, I visited some of my friends who were studying at BMEI and I happened to talk to faculty and staff here. Everybody was very friendly and showed me how biomedical engineering would fit in and benefit me with my premedical preparation; so I decided to change my major."

In her spare time, Sophia enjoys dancing and singing. "My country is very cultural. I started dancing when I was little and I love going to Latin dancing classes here; I go as much as I can."

As far as her experience with the BMEI so far, Sophia has only high praises. "I love BMEI; I have made it my home and, with the devoted support I receive from the faculty, I intend to graduate with honors."

Topics in Student Research

>> Heart Valve Design and Material Testing

The aim of research performed in the Cardiovascular Engineering Center under the supervision of Dr. Richard Schoepfhoerster, is to manufacture and test an innovative polymer-based heart valve prosthesis.

Andres Aguirre, a BMEI graduate student and Mariana Oliva, a Mechanical Engineering undergrad, are the students in charge of the material testing. Dr. Vladimir Kasyanov, a visiting scientist from Latvia and inventor of the valve design, helps them with his close knowledge and expertise in the field.

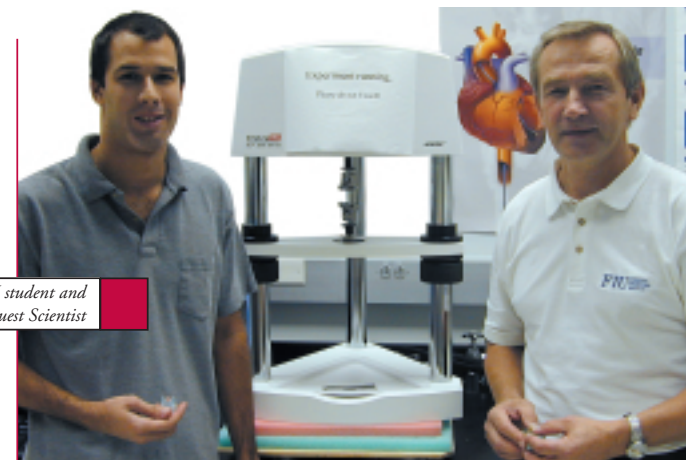
Heart valve prostheses have been used successfully in heart procedures since 1960 and more than often, result in overall improvement in the quality of life of the patients. Currently, there are two kinds of valves used: mechanical and bioprosthetic. Generally, mechanical valves are more durable than bioprosthetic valves. However, they sometimes involve side effects with irregular blood flow and clotting of blood around them. Bioprosthetic valves have better hemodynamic (blood flow) properties, but are more susceptible to wear as a result

of material fatigue. Polymer trileaflet valves offer natural hemodynamics with the potential for better durability.

In order to identify the better material from which to manufacture valves, a certain proprietary polymer is compared to an already implant-approved polyurethane. "We definitely expect the performance of the polymer we have to show better durability," says Aguirre.

During the American Heart Association-sponsored research, the materials are going through two phases of testing. "We are looking at the mechanical properties of the polymers, and testing their static and dynamic properties," he adds. The *static test* validates the ultimate stress of the different materials by stretching them until they fail. The *dynamic test* is designed to provide fatigue properties of the material under tension and bending conditions.

"We don't have conclusive results yet," says Aguirre, "but eventually, we will find the better material from which to make valves. It will improve the quality of living for those who need it."



Andres Aguirre, BMEI student and
Vladimir Kasyanov, Guest Scientist

BMES Elects New Officers

The Biomedical Engineering Society, BMEI's student organization, held elections for chapter officer positions during the society's last meeting in January. **Jon DeDiego** was elected as the new president and will replace Ted Claiborne, founder of BMES, in the position. **Agnieszka Sroka** was elected vice president; **Siobhain Gallocher** remains as secretary; **Ruta Kanitkar** will be the new treasurer; **Qing Hao** will be the webmaster; and **Ruth Llanos** will represent the students in the new board.

FACULTY FOCUS

>> Dr. Anthony McGoron



Most of us know Dr. Anthony McGoron as a professor in the Biomedical Engineering Institute. This interview gives both students and fellow faculty members an opportunity to look at a few different aspects in his life in his own words.

"My wife is Japanese and we have one son," Dr. McGoron states upfront. "I went to Wright State University in Dayton, Ohio. That school was very much like FIU in that it was a commuter school that attracted mostly local students. Later I went to Louisiana Tech University in Ruston. There, I came across an entirely different experience because it was a small college town, and life surrounded the university and its activities. I found it very interesting. It's an experience that is less emphasized here, but FIU is a large and important university in South Florida with a significant impact on both academics and research."

"After I completed my graduate studies at Louisiana Tech University, I went back to Cincinnati. There, while at the University of Cincinnati, I met my wife, Manami. A friend of hers did a fellowship at the university and introduced us."

In his experience, living with someone from a different culture is definitely unique. "It's quite a challenge; I often have to think about what I am about to say – will Manami understand me as intended, due to our culture differences? I guess it is all a matter of the context you put things in," he admits and immediately summarizes: "At the end of the day, despite the few differences, it is very rewarding."

Dr. Anthony McGoron joined the BMEI faculty as an Assistant Professor in Fall 1999.