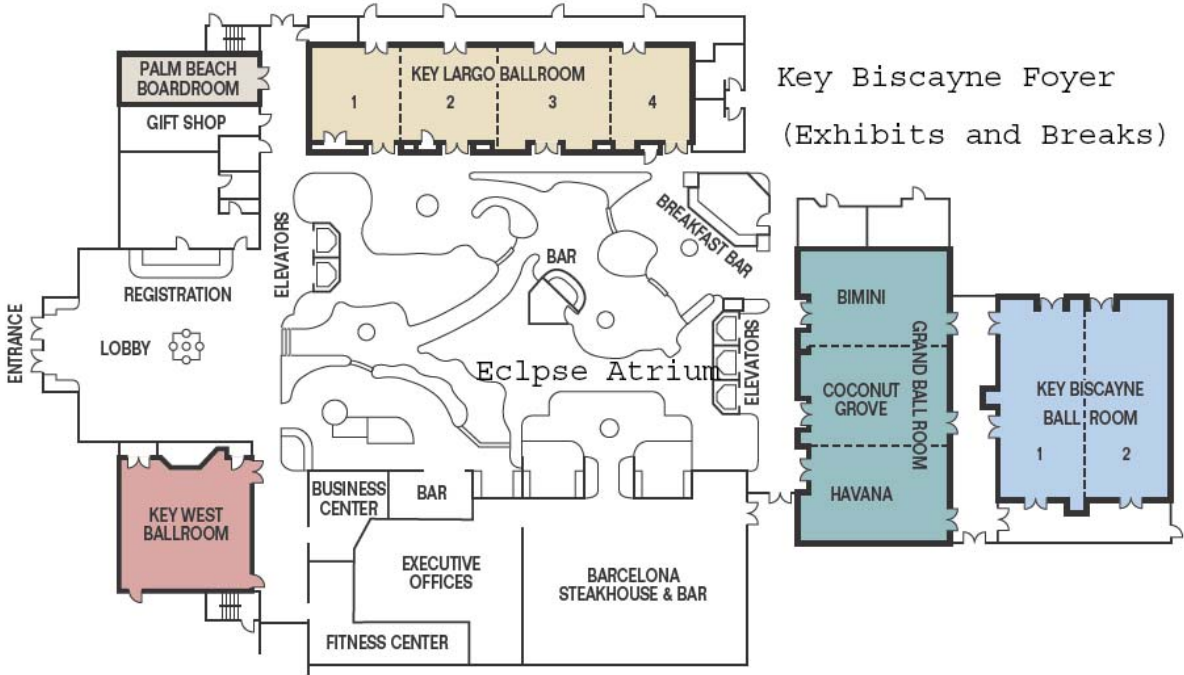




### Conference Program



## **Forward**

On behalf of the steering and organizing committees I would like to welcome you to sunny Miami Florida for the 25<sup>th</sup> Southern Biomedical Engineering Conference. This year we are excited to have visitors from all over North America, South American, Europe and Asia to share exciting developments in all areas of Biomedical Engineering. The main objective of this conference is to bring together students, researchers and clinicians in Biomedical Engineering to disseminate technical information in this rapidly growing field, and provide a forum consisting of established as well as new and future researchers in this exciting engineering field.

This year's meeting features more than 140 high quality papers, many by students, for oral presentations and publication in the conference proceedings. The conference owes its success to the dedicated work of the keynote speakers, conference chairs, authors, participants, students, organizers, and the College of Engineering and Computing webmaster. We wish to especially acknowledge the work of the peer reviewers, program committee, staff of the BME Department, and the student organizing committee.

We also wish to acknowledge the sponsorship of the National Science Foundation and the International Federation of Medical and Biological Engineering (IFMBE), our exhibitors Simpleware, Ltd and World Precision Instruments, Inc (WPI), and Springer for providing the conference proceedings CDs.

We hope that you enjoy your experience, make new collaborations and lasting friendships.

**Anthony J. McGoron, PhD**  
*SBEC 2009 Chair*

## Conference Details

### Organized by

Florida International University, Department of Biomedical Engineering, College of Engineering and Computing  
<http://www.BME.fiu.edu>

### Conference Chairs

Anthony J. McGoron  
Chen-Zhong Li  
Wei-Chiang Lin

### Scientific Program Committee

Anuradha Godavarty, Biomedical Engineering  
Armando Barreto, Biomedical Engineering and Electrical and Computer Engineering  
Arvind Agarwal, Mechanical and Materials Engineering  
Malek Adjouadi, Biomedical Engineering and Electrical and Computer Engineering  
Michael Christie, Biomedical Engineering  
Nikolaos Tsoukias, Biomedical Engineering  
Roberto Panepucci, Electrical and Computer Engineering  
Wei-Chiang Lin, Biomedical Engineering  
Yen-Chih Huang, Biomedical Engineering

### With special assistance from the student committee

Alicia Fernandez  
Andres Ramos  
Carolina Bautista  
Denny Carvajal  
Zenith Acosta

### Conference Steering Committee

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## **About IFMBE**

The International Federation for Medical and Biological Engineering (IFMBE) was established in 1959 to provide medical and biological engineering with a vehicle for international collaboration in research and practice of the profession. The Federation has a long history of encouraging and promoting international cooperation and collaboration in the use of science and engineering for improving health and quality of life.

The IFMBE is an organization with membership of national and transnational societies and an International Academy. At present there are 52 national members and 5 transnational members representing a total membership in excess of 120000 worldwide. An observer category is provided to groups or organizations considering formal affiliation. Personal membership is possible for individuals living in countries without a member society. The International Academy includes individuals who have been recognized by the IFMBE for their outstanding contributions to biomedical engineering.

### *Objectives*

The objectives of the International Federation for Medical and Biological Engineering are scientific, technological, literary, and educational. Within the field of medical, clinical and biological engineering its aims are to encourage research and the application of knowledge, and to disseminate information and promote collaboration.

In pursuit of these aims the Federation engages in the following activities: sponsorship of national and international meetings, publication of official journals, cooperation with other societies and organizations, appointment of commissions on special problems, awarding of prizes and distinctions, establishment of professional standards and ethics within the field, as well as other activities which in the opinion of the General Assembly or the Administrative Council would further the cause of medical, clinical or biological engineering. It promotes the formation of regional, national, international or specialized societies, groups or boards, the coordination of bibliographic or informational services and the improvement of standards in terminology, equipment, methods and safety practices, and the delivery of health care.

The Federation works to promote improved communication and understanding in the world community of engineering, medicine and biology.

### *Activities*

Publications of IFMBE include: the journal *Medical and Biological Engineering and Computing*, the electronic magazine *IFMBE News*, and the Book Series on Biomedical Engineering. In cooperation with its international and regional conferences, IFMBE also publishes the IFMBE Proceedings Series. All publications of the IFMBE are published by Springer Verlag. The Federation has two divisions: Clinical Engineering and Health Care Technology Assessment.

Every three years the IFMBE holds a World Congress on Medical Physics and Biomedical Engineering, organized in cooperation with the IOMP and the IUPESM. In addition, annual, milestone and regional conferences are organized in different regions of the world, such as Asia Pacific, Europe, the Nordic-Baltic and Mediterranean regions, Africa and Latin America.

The administrative council of the IFMBE meets once a year and is the steering body for the IFMBE: The council is subject to the rulings of the General Assembly, which meets every three years. Information on the activities of the IFMBE can be found on the web site at: <http://www.ifmbe.org>.

### **About SBEC**

The Southern Biomedical Engineering Conference was started 28 years ago as an effort to bring together engineers and scientists in the South with interest in biomedical applications and showcase development in the emerging field of biomedical engineering. It has grown into not only a regional conference, but an international conference with participants from every part of the United States, Canada, South America, Europe, and Asia. The aim of this conference is to bring together researchers, clinicians, students, and industry leaders to discuss current ideas and concepts in biomedical research. The program includes keynote lectures, presentations in diverse areas of biotechnology, and student competitions.

Even though this was originally intended as a regional conference, attendance from all regions of US, Latin America and the world is strongly encouraged and welcomed. An important incentive of the Southern Biomedical Engineering Conference is that it is not as large as many of the other international meetings, so that interactions between students and prominent biomedical engineers from many diverse fields are facilitated. These interactions are key to the field's continued development and advancement, and they provide an excellent platform for networking and exchanging ideas.

### **About the University**

Florida International University is Miami-Dade County's first public, four-year university. Its powerful record of innovation and research continues to improve the quality of life in its communities. FIU opened for classes in 1972 with 5,667 students - the largest opening day enrollment in U.S. collegiate history. Today it has more than 38,000 students, 1,000+ full-time faculty and more than 134,000 alumni. FIU is one of the 25 largest universities in the nation, based on enrollment.

The College of Engineering and Computing at Florida International University continues to be the top producer of Hispanic engineers at all levels from BS to PhD in the Continental US. FIU ranks 6<sup>th</sup> among all engineering colleges in the nation in BS degrees awarded to African Americans, and 3<sup>rd</sup> in percentages of PhD degrees granted to women. According to the ASEE 2007 Profiles of Engineering and Engineering Technology Colleges our college ranks 5<sup>th</sup> among all engineering schools in the ratio of doctoral degrees to research expenditures.

This year marks the 10 anniversary of Biomedical Engineering program at FIU and the 6<sup>th</sup> anniversary of the establishment of the Department of Biomedical Engineering. Of the eleven universities in the State University System of Florida, FIU is the only university with the full slate of programs (BS, MS, PhD) in Biomedical Engineering.

The FIU College of Medicine, South Florida's only public medical school, is transforming the future of public health and educational opportunity in the region. Created in 2006 amid pressing community health concerns and a projected critical shortage of physicians nationally, the College of Medicine is developing a curriculum that reflects an innovative, 21st century approach to health care and medical education.

### **About Miami:**

Described as the only great city of the world that started as a fantasy, Miami, with its subtropical climate, naturally protected harbor, and spectacular beaches, has traditionally been a haven for tourism. Since the late 1980s, however, the city has sustained unprecedented growth and, while transforming its image, has emerged as a center of international finance and commerce and as a regional center for Latin American and Haitian art. An unincorporated village shortly before the turn of the twentieth century, Miami boasts a metropolitan area that includes a large unincorporated area and 30 incorporated areas or municipalities, all of which make up Miami-Dade County. Greater Miami offers a diversity of lifestyles and attractions to both residents and visitors in a variety of small towns and cities such as Coconut Grove, Miami Beach, South Beach, Coral Gables, and Bal Harbor. With easy access to other parts of the country, Miami has developed into one of America's major transportation hubs, and today it is a year-round city that offers something for everyone.

**Keynote Speaker: C. Mauli Agrawal, Ph.D., P.E., Dean, College of Engineering  
The University of Texas at San Antonio  
Enabling Blood Flow: From Tissue Engineering to Drug Eluting Stents**



Dr. Agrawal is the Dean for the College of Engineering at the University of Texas at San Antonio (UTSA). He also serves as the Director of the Institute for Bioengineering and Translational Research at UTSA and holds the Peter Flawn Professorship in Biomedical Engineering. He took the lead role in establishing the Joint Biomedical Engineering Graduate Program at UTSA and the University of Texas Health Science Center at San Antonio (UTHSCSA). Prior to joining UTSA in 2003, he worked at the UTHSCSA since 1991 and before that he served on the faculty at Duke University.

Dr. Agrawal's research specializes in the area of orthopedic and cardiovascular biomaterials/implants. During his professional career, Dr. Agrawal has been the recipient of several honors and awards, and has authored more than 260 scientific publications and 18 patents. Internationally known for his work, he was inducted as a Fellow of Biomaterials Science and Engineering (FBSE) by the International Union of Societies for Biomaterials Science and Engineering (IUSBSE) in 2008. He is also a Fellow of the American Institute for Medical and Biological Engineering and was elected the 2006 President of the U.S. Society for Biomaterials. He was the Program Chair of the Annual Scientific Meeting of this society for 2001.

Dr. Agrawal has served or serves on the editorial boards of the Journal of Biomedical Materials Research, Journal of Biomedical Materials Research (Applied Biomaterials), Tissue Engineering, Journal of System of Systems (IEEE), Journal of ASTM International, and the Journal of Tissue Engineering and Regenerative Medicine. He serves on the Board of Trustees of the Southwest Research Institute and on the Board of Keystone School in San Antonio. He also serves on the Clemson University's College of Engineering Advisory Board.

Dr. Agrawal's work has resulted in several patents (12 issued, others pending), many of which have been licensed to commercial entities. His bioengineering research group has been responsible for the launching of three companies in San Antonio. He is a founder of Xilas Medical, Inc. (now Diabetica Solutions), a San Antonio based medical device company working in the area of diabetic foot problems. In 2007, he was awarded the Chancellor's Entrepreneurship and Innovation Award from the University of Texas System, and the Healthcare Hero Award for biomedical research by the San Antonio Business Journal. In 2008 Governor Rick Perry of Texas appointed Dr. Agrawal to the Advisory Board for the Emerging Technology Fund. The \$200 million ETF invests in start-up technology companies.

**Keynote Speaker: Subrata Saha, Ph.D.  
Department of Orthopedic Surgery and Rehabilitation Medicine  
SUNY Downstate Medical Center, Brooklyn, NY  
The History of the Southern Biomedical Engineering Conference**



Subrata Saha is presently the Director of Musculoskeletal Research and Research Professor in the Department of Orthopaedic Surgery & Rehabilitation Medicine at SUNY Downstate Medical Center in Brooklyn, New York. Dr. Saha received a BS in Civil Engineering from Calcutta University in 1963, an MS in Engineering Mechanics in 1969 from Tennessee Technological University, and Engineering and PhD degrees in Applied Mechanics from Stanford University in 1972 and 1974, respectively. He has been a faculty member at Yale University, Louisiana State University Medical Center, Loma Linda University, Clemson University, and Alfred University.

Dr. Saha has received many awards from professional societies, including Orthopedic Implant Award, Dr. C. P. Sharma Award, Researcher of the Year Award, C. William Hall Research Award in Biomedical Engineering, Award for Faculty Excellence, Research Career Development Award from NIH, and Engineering Achievement Award. He is a Fellow of The Biomedical Engineering Society (BMES), The American Society of Mechanical Engineers (ASME), and the American Institute for Medical and Biological Engineering (AIMBE).

He has received numerous research grants from federal agencies (NIH and NSF), foundations, and industry. Dr. Saha is the founder of the Southern Biomedical Engineering Conference Series. He also started the International Conference on Ethical Issues in Biomedical Engineering. Dr. Saha has published over 90 papers in journals, 35 book chapters and edited volumes, 347 papers in conference proceedings, and 84 abstracts. His research interests are bone mechanics, biomaterials, orthopedic and dental implants, drug delivery systems, rehabilitation engineering, and bioethics.

Dr. Saha is presently the Editor-in-Chief of the Journal of Long-Term Effects of Medical Implants and Associate Editor of the International Journal of Medical Implants & Devices and was an Associate Editor of the Annals of Biomedical Engineering and Trends in Biomaterials and Artificial Organs. He has been a Member of the Editorial Boards of many journals, including Journal of Biomedical Materials Research; Medical Engineering and Physics; Journal of Applied Biomaterials; Medical Design and Material; Biomaterials, Artificial Cells, and Immobilization Biotechnology; Biomaterials, Medical Device and Artificial Organs; Journal of Bioengineering, Biotelemetry and Patient Monitoring; Journal of Basic & Applied Biomedicine and TM Journal.

**Friday May 15, 2009**

6:00 – 8:00pm	<b>Registration and Conference Reception – Eclipse Atrium Embassy Suites</b>
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**Saturday, May 16, 2009**

7:15-12:00	<b>Registration – Key Biscayne Foyer</b>
8:00 am	<b>Welcome: Anthony McGoron, Acting Chair, Biomedical Engineering, Florida International University</b>
8:10 – 9:00 am	<b>Keynote Speaker: C. Mauli Agrawal, Ph.D., P.E., Dean, College of Engineering The University of Texas at San Antonio</b>
	<b>Enabling Blood Flow: From Tissue Engineering to Drug Eluting Stents</b>

**Session 1: Optical Imaging: 9:15 – 10:45 am – Havana**

Time	Authors	Paper title	Chair: Anuradha Godavarty
9:15 am	Ge, <u>Erickson</u> , Godavarty	FLUORESCENCE TOMOGRAPHIC IMAGING USING A HAND-HELD OPTICAL IMAGER: EXTENSIVE PHANTOM STUDIES	
9:30 am	<u>Erickson</u> , Ge, Sanchez, Godavarty	CLINICAL TRANSLATION OF A NOVEL HAND-HELD BASED OPTICAL IMAGER: <i>IN VITRO</i> AND <i>IN VIVO</i> STUDIES	
9:45 am	Larina, Ivers, Syed, Dickinson, <u>Larin</u>	REAL-TIME IMAGING OF CIRCULATING INDIVIDUAL BLOOD CELLS IN MAMMALIAN EMBRYOS WITH DOPPLER SSOCT	
10:00 am	<u>Chaudhary</u> , Zhu, Godavarty	BRAIN CONNECTIVITY STUDIES OF JOINT ATTENTION USING FREQUENCY-DOMAIN DIFFUSE OPTICAL IMAGING	
10:15 am	<u>Travascio</u> , Gu	NOVEL VIDEO-FRAP METHOD FOR THE DETERMINATION OF ANISOTROPIC DIFFUSION: PRINCIPLES AND OPTIMIZATION	
10:30 am	<u>Ruggeri</u> , Jiao, Major, Cebulla, Rosenfeld, Gregori, Tsechpenakis, Wang, Murray, Porciatti	ULTRA HIGH-RESOLUTION OPTICAL COHERENCE TOMOGRAPHY FOR OCULAR IMAGING OF SMALL ANIMALS	

**Session 2: Instrumentation, Signals and Systems: 9:15 – 10:45 am – Coconut Grove**

Time	Authors	Paper title	Chair: Sanghoon Oh
9:15 am	Beidaghi, Penmatsa, <u>Chen</u> , Wang	CHARACTERIZATION OF POROUS ELECTRODES FOR 3D MICROSUPERCAPACITORS	
9:30 am	Vanicatte, Lee, <u>Krishnan</u> , Goldman	INCORPORATION OF INTEROPERABILITY IN A ROBOT-ASSISTED ORTHOPEDIC SURGERY SYSTEM	
9:45 am	<u>Nathan</u> , Jeutter	EXPLORING THE EFFECTS OF COGNITIVE LOAD ON MUSCLE ACTIVATION DURING FUNCTIONAL UPPER EXTREMITY TASKS	
10:00 am	<u>Lweesy</u> , Fraiwan, Shatat, Abdo, Dawodiah, Sameer.	DESIGN AND EVALUATION OF A THREE DIMENSIONAL ULTRASOUND SYSTEM FOR TISSUE ABLATION FOR TREATMENT OF KIDNEY TUMORS	
10:15 am	<u>Farkoush</u> , Najarian, Emamieh, Sarkar	DESIGN AND CONSTRUCTION OF A NOVEL SURGICAL INSTRUMENT APPLICABLE IN ESOPHAGECTOMY	
10:30 am	<u>Hortamani</u> , Zabihollah, Sokhanvar	MEASURING THE FORCE/PRESSURE IN MINIMALLY INVASIVE SURGERY GRASPER	

**Session 3: Biomechanics and Biomaterials: 9:15 – 10:45 am – Bimini**

Time	Authors	Paper title	Chair: Arvind Agarwal
9:15 am	Mur, <u>Gaytan</u> , Medina, Lopez, Martinez, Wicker	ADDITIVE LAYERED MANUFACTURING OF RETICULATED Ti-6Al-4V BIOMEDICAL MESH STRUCTURES BY ELECTRON BEAM MELTING	
9:30 am	<u>Ibanez</u> , Eberhardt, Lemons	OSTEOINTEGRATION OF HA-COATED SUBPERIOSTEAL DENTAL IMPLANTS: PRELIMINARY WORK	
9:45 am	<u>Balani</u> , Brito, Kos, Agarwal	NANOMECHANICAL PROPERTY EVALUATION OF MURINE CARDIAC TRICUSPID HEART VALVE	
10:00 am	<u>Rodriguez</u> , Khanal, Panepucci	NANOSCALE HOLE FABRICATION IN CYLINDRICAL DEVICES FOR BUBBLE GENERATION	
10:15 am	<u>Haider</u> , Munroe, Pulletikurti, Gill	CORROSION BEHAVIOR OF ELECTROPOLISHED AND NON-ELECTROPOLISHED TERNARY NITINOL ALLOYS	
10:30 am	<u>Kurra</u> , Zhang, Pennathur	FLOWCHART FOR BASIC NON-DESTRUCTIVE TESTING TECHNOLOGIES IN BIOMATERIALS	

**Session 4: Rehabilitation: 9:15 – 10:45 am – Key Largo #3**

Time	Authors	Paper title	Chair: Vibhor Agrawal
9:15 am	<u>Kenia</u> , Mokha, Ludwig, Poczwardowski.	THE EFFECTS OF VERBAL AND VISUAL FEEDBACK ON GAIT BIOMECHANICS AND FUNCTIONALITY: TWO CASE STUDIES	
9:30 am	<u>Chung</u>	DYNAMIC RESPONSE OF WHEELCHAIR CUSHIONS TO THE ISO IMPACT DAMPING TEST	
9:45 am	<u>Kuruganti</u> and Chester	FORCE PRODUCTION AND NEUROMUSCULAR FUNCTION IN BILATERAL MOVEMENTS AMONG YOUNG FEMALES AT LOW AND HIGH SPEEDS	
10:00 am	<u>Chester</u> and Kuruganti	TRUNK KINEMATICS DURING PEDIATRIC GAIT	
10:15 am	<u>Vadnala</u> , Satyanarayana	REAL TIME ASSESSMENT OF GAIT PARAMETERS BY USING MOTION SENSOR	

10:45-11:00	<b>Break and Exhibits – Key Biscayne Foyer</b>
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