

PROGRAM AT GLANCE

BMES-SPRBM Conference on *Cellular and Molecular Bioengineering*
29th SPRBM Scientific Conference
Molecular Imaging and Mechanotransduction

Eden Roc Renaissance Miami Beach, Miami Beach, Florida

Program Committee

Co-Chairs: X. Edward Guo (SPRBM) and Cheng Dong (BMES)
Yingxiao Wang (BMES), Chris Jacobs (SPRBM), Anshu Mathur (SPRBM),
Yi-xian Qin (BMES), and Michael Detamore (SPRBM)

Local Committee

Chair: Peter Murray
X. Lucas Lu, Genevieve Brown, Andrew Baik, Ji Wang

JANUARY 4-8, 2011

TUESDAY, JANUARY 4, 2011

7:00 PM SPRBM Council Meeting

**10:20 AM-12:20 PM SESSION II –
MOLECULAR/CELLULAR IMAGING**

WEDNESDAY, JANUARY 5, 2011

7:00 AM Continental Breakfast

10:20-11:00 Keynote Robert Clegg
*Chasing Fluorescence Lifetimes in
Images: Fluorescence Lifetime
Imaging Microscopy*

7:45 AM **Welcome/Introduction**

11:00-11:20 Peter So
*Quantitative Imaging of
Mechanotransduction Cellular
Processes: the Potential of Wide
Field Multiphoton Excitation*

**8:00-10:00 AM SESSION I - MOLECULAR
PROBES**

8:00-8:40 Keynote Shuming Nie
*Next Generation Quantum Dots for
Molecular and Cellular Imaging*

11:20-11:40 Brian Helmke
*Spatiotemporal Organization of
Mechanoresponses in the Endothelial
Cytoskeleton*

8:40-9:00 Yingxiao Wang
*Visualize Molecular Activities at
Subcellular Compartments by FRET*

11:40-12:00 Daniel Fletcher
*Measuring the Mechanical Response
of Adherent Cells with AFM*

9:00-9:20 Rich Day
*The Fluorescent Proteins as Probes
for FRET and FLIM*

12:00-12:20 X. Edward Guo
*A Quasi-3D Microscopy Technique
for Measuring Intracellular
Deformation under Flow*

9:20-9:40 Robert Campbell
*New Strategies for the Engineering of
Genetically Encoded Biosensors*

9:40-10:00 Gang Bao
*Engineering Fluorogenic and FRET-
based Probes for Live Cell Imaging*

12:20-2:30 PM Afternoon Break

10:00-10:20 AM Coffee Break

2:30-4:00 PM SESSION III – Short Talks from Students/Fellows Posters

- 2:30-2:40 David Hoey
The Effect of Oscillatory Fluid Flow on the Osteogenic Differentiation of Human Bone Marrow Stromal Cells
- 2:40-2:50 Jie Sun
SHP2 Conformational Changes in Live Cells Captured by FRET
- 2:50-3:00 Kevin Davis
Surface Shape Memory Substrates for Active Cell Culture
- 3:00-3:10 Kristen Lee
TRPV4 is Required for Mechanotransduction in MC3T3 Osteoblasts
- 3:10-3:20 Li Cao
Biomechanical Effect of Flow on Endothelial Progenitor Cells in Coculture with Smooth Muscle Cells
- 3:20-3:30 Matthew Downs
Modeling and Analysis of Primary Cilia Under Fluid Flow
- 3:30-3:40 John Slater
Biophysical and Biochemical Manipulation of Cell Adhesion Sites Using Multifaceted Micropatterned Surfaces
- 3:40-3:50 Ganesh Ingavle
Interpenetrating Network (IPN) Hydrogels Incorporating Chondroitin Sulfate: A Novel Approach Toward Regeneration of Articular Cartilage
- 3:50-4:00 Nora Khanarian
Zonal Chondrocyte Interactions Regulate Cartilage Mineralization

4:00-6:00 PM POSTER SESSION (Wine/Cheese)

6:00 PM WELCOME RECEPTION
SPECIAL INVITED SPEAKER Van C. Mow
The Tipping Point in Cellular and Molecular Bioengineering

THURSDAY, JANUARY 6, 2011

7:15 AM Continental Breakfast

8:00-10:00 AM SESSION IV – MOLECULAR MECHANICS

- 8:00-8:40 Keynote Deborah Leckband
Adhesion and Mechanosensing At Cell-Cell Junctions
- 8:40-9:00 Cheng Zhu
Regulation of Catch Bonds by Rate of Force Application
- 9:00-9:20 Daniel J. Müller
Probing Individual Proteins Regulating the Mechanics of Cell Division
- 9:20-9:40 David J. Odde
The Kinetics of Microtubule Assembly
- 9:40-10:00 Muhammad Zaman
Integrin Cluster Diffusion and Downstream Signaling in 3D Environments
- 10:00-10:20 AM Coffee Break

10:20 AM-12:20 PM SESSION V – Rising Stars

- 10:20-10:40 Alisa Clyne
Endothelial Cell Shear Stress Response is Inhibited by Glycated Collagen
- 10:40-11:00 Robert L. Mauck
Differentiation and Deformation Modulate Nuclear Mechanics During Mesenchymal Stem Cell Fibrochondrogenesis
- 11:00-11:20 Lance Kam
Rigidity Sensing by Mouse Lymphocytes
- 11:20-11:40 Peter Butler
Molecular Dynamics of Stressed Membrane Nanodomains
- 11:40-12:00 Roland Kaunas
Multiple Roles for Myosin II in Tensional Homeostasis - Experiment and Theory
- 12:00-12:20 Sanjay Kumar
Dissecting and Genetically Engineering Microscale Tensional Homeostasis in Living Cells

12:20-4:00 PM Afternoon Break

4:00-5:00 PM Industrial Sponsors Workshop

4:00-4:15 Bose
4:15-4:30 Fluxion
4:30-5:00 Bruker

5:00-6:00PM Bruker AFM Imaging Workshop

6:00-9:30 PM GALA DINNER
SPECIAL INVITED SPEAKER Shu Chien
Mechanotransduction in Endothelial Cells

FRIDAY, JANUARY 7, 2011

7:15 AM Continental Breakfast

8:00-10:00 AM SESSION VI – CELLULAR MECHANICS

8:00-8:40 Keynote Forbes Dewey
Cellular Mechanics

8:40-9:00 Masaaki Sato
Force Transmission and Strain Field in a Cell under Mechanical Environment

9:00-9:20 Ning Wang
Downregulating Cell-matrix Traction Promotes Self-renewal of Embryonic Stem Cell Colonies

9:20-9:40 William Guilford
The Peculiar Dynamics of Microtubule-based Motors in a Living Cell

9:40-10:00 Cheng Dong
Applications of Micro-PIV Side-view Imaging Techniques for Studying Cell Adhesion in a Flow Environment

10:00-10:20 AM Coffee Break

10:20 AM-12:20 PM SESSION VII – MECHANOTRANSDUCTION

10:20-11:00 Keynote Richard Waugh
Mechanochemistry of the Neutrophil-Substrate Interface

11:00-11:20 Dennis Discher
Matrix, Myosin II, and Nuclear Mechanics

11:20-11:40 Paul Janmey
Remodeling the Cytoskeleton by Changing Matrix Stiffness

11:40-12:00 Christopher Chen
Regulation of Stem Cells by the Mechanics of Cell-Material Interactions

12:00-12:20 Yi-xian Qin
Low Intensity Ultrasound Increase Rate of Osteoblastic Proliferation and Mineralization in Simulated Microgravity

12:20-6:00 PM Afternoon Break

6:00 PM Round Table: Future of Cellular and Molecular Bioengineering and SPRBM

SATURDAY, JANUARY 8, 2011

7:15 AM Continental Breakfast

8:00-10:00 AM SESSION VIII – MECHANICAL MODULATION OF TISSUE REGENERATION

8:00-8:40 Keynote Steve Goldstein
Mechanical and Biological Influences on Bone Repair and Regeneration

8:40-9:00 Robert Tranquillo
The Ups and Downs of Cyclic Stretching to Promote Tissue Growth

9:00-9:20 Michael Sacks
Multi-level Studies of Valvular Cellular Deformation and Tissue Formation Using Elastomeric Scaffolds

9:20-9:40 Clark T. Hung
A Paradigm for Functional Tissue Engineering of Articular Cartilage

9:40-10:00 Jay D. Humphrey
Mechanics of Free-floating Tissue Equivalents: Insights into Non-uniform Cell Behavior

10:00 AM **Annual SPRBM Business Meeting and SPRBM/BMES Awards Ceremony**