



FINAL PROGRAM
FOR THE

**41st Annual
Rocky Mountain
Bioengineering Symposium**

*Practically Perfect in Every Way**

April 23-25, 2004

Colorado State University
and
University Park Holiday Inn
425 West Prospect Road
Fort Collins, Colorado, USA
(970) 482-2626

**" Due to the impracticalities and imperfections, I can not endorse this program." -- Mary Poppins*

Conference Information

The Rocky Mountain Bioengineering Symposium (RMBS) was formed 42 years ago to address the application of engineering principles to biology and medicine. The organization was originally comprised of educators, physicians, entrepreneurs, scientists and engineers from the Front range of the Rocky Mountains. Presently the conference draws national and international investigators.

The 2004 symposium will be held near Colorado State University at the University Park Holiday Inn in Fort Collins, Colorado. Transportation between the conference and the university for tours will be provided by the conference.

This year we will host several speakers:

Keynote Address: "Genomic Discovery of Osteoprotegerin (OPG) and Development of Inhibitors of the RANKL/RANK Signalling Pathway" by W. Scott Simonet, Director of Research, Department on Metabolic Disorders, Bone and Mineral Metabolism Division, at Amgen, Inc.

Scott Simonet will tell the story of how OPG was discovered and the clinical development of RANKL inhibitors.

Plenary Address: "Evolution of Mechanical Circulatory Support (MCS) and its Implications for Biomedical Engineers" by

Gordon Jacobs, Sr. Project Engineer, MedQuest Products, Inc.

Gordon Jacobs will provide a discussion of artificial hearts which includes the pathology, left ventricular and total artificial heart devices and a demonstration of a contemporary device. Gordon will include a historical perspective with a description of the past as well as the anticipated future development path of artificial hearts as it pertains to student and professional research.

Special Address: "Center for Human Simulation" by

Victor Spitzer . Director, Center for Human Simulation.

The Center for Human Simulation (CHS) is a synthesis of human anatomy and computed three-dimensional imaging. Its purpose is to facilitate the collaboration of anatomists, radiologists, computer scientists, engineers, physicians and educators to promote the application of this and other anatomical data to basic and clinical research, clinical practice and teaching. A major goal of the Center is to develop simulators that provide interactions with computerized anatomy in virtual space. The Visible Human Male already has become an accepted world standard of computer-based anatomy, and the Female, generated at higher resolution, represents an additional step forward.

During the **Awards Banquet** on Saturday night, Paul Heyliger, Professor of Civil Engineering at Colorado State University will provide a humorous snapshot of

what bioengineering research looks like from the outside and what the future looks like for our students.

This year we will also kick off a **mentor program** for student participants with a mentor panel discussion which is followed with an informal wine and cheese networking hour. The RMBS mentor services will provide an opportunity for students to contact professionals throughout the year to help with career choice decisions.

The conference will also host **tours** of the various research laboratories at CSU. An experienced member of the lab will guide each of the tours. Detailed information and a chance to sign-up for the tour of your choice will be available at the registration table.

A record number of abstracts were submitted this year. The resulting sessions were focused on established biomedical engineering topics. The conference has also returned to single sessions with generous opportunity for interaction with presenters. Additionally, the posters will be displayed throughout the entire conference and the poster session will feature "spotlight" sessions on individual presenters. A "**speaker-ready room**" will be available. Ask at the registration desk for information.

As always, the full printed program, which includes full papers and posters, will be available during registration. We have taken every opportunity to preserve the quality which RMBS has been known for over the past 42 years.

Hotel Accommodations

A block of rooms has been reserved from April 22 through the 25th at a special rate for conference attendees in the Holiday Inn. For a standard room the rate is \$ 78.50 for single, double, triple or quad occupancy. The King Suite is \$ 98.50 for single through quad occupancy. These rates are for the room not each occupant. For reservations call (970) 482-2626, fax (970) 493-6265 or on the web: www.jqhhotels.com. The block of rooms will be released on March 12th so reserve soon!

Transportation to Hotel

Ft Collins is 65 miles north of Denver and 45 miles south of Cheyenne. Auto rental and taxi service is available from Denver International Airport (DIA) and the Cheyenne Airport (CA). DIA has all the major rental companies and CA has Avis and Hertz.

From DIA take E470 to I-25 north*. Then get off I-25 at the Prospect Road Ft. Collins exit. From Cheyenne, turn right onto 8th Avenue out of the airport. Continue north and make another right onto Warren Avenue. Then turn left onto Central Avenue. Take Central Avenue to I-25 south. Then take I-25 to the Prospect Road Ft. Collins exit. Once on Prospect Road from either DIA or

Cheyenne, head west (toward the mountains) and it will take you directly to the Holiday Inn, which is at 425 West Prospect Road.

You can also take a shuttle (Shamrock Airport Express) from either DIA or Cheyenne. The DIA shuttle, leaves from Door 513, Island 5 every hour from 6:20 AM through 11:20 PM. Reservations are recommended, please call 303 772-5466. You can pick up the shuttle in Cheyenne at the Cheyenne Holiday Inn or the Cheyenne Hitching Post Hotels. Please call (307) 638-3940 for reservations from Cheyenne.

* If conditions are icy, it's better to exit from DIA onto Tower Road (north). Take Tower Road to 120 Ave and turn left heading west. Turn right onto 51 (north by the truck stop) to Bromley Lane. Take Bromley Lane west to Hwy 85. Take 85 north, a short distance to Highway 7. Head west on Hwy 7 to 25 north.

Weather

For the past three years the average high in Ft Collins during that weekend was 56 degrees F (40 - 68). The average low was 37 (34 - 42). Two weekends produced a small amount of rain (0.06 inches). One weekend had a trace of snow. However, this is Colorado and you should be prepared for snow. The altitude in Ft Collins is 5000 feet, considerable (4600 Feet) below that of Copper Mountain.

Recreation

Fort Collins is within an hour's drive of Estes Park, Red Feather Lakes, Horsetooth Reservoir and several mountain parks, including Roosevelt National Forest and Rocky Mountain National Park. Fort Collins also has a museum and public library as well as a civic symphony. Information at www.fcgov.com.

41st RMBS PROGRAM

Thursday, 22 April 2004 Evening

6:00^{pm} - 7:00^{pm} Registration - Holiday Inn Lobby

Friday, 23 April 2004 Morning

7:00^{am} Registration and Continental Breakfast - Holiday Inn Lobby

8:00^{am} Welcome – Arizona State Room

8:15^{am} ***Guest Speaker "Genomic Discovery of Osteoprotegerin (OPG) and Development of Inhibitors of the RANKL/RANK Signalling Pathway"***

9:15^{am} Break

Papers

9:30^{am} **Session One : Biomaterial Surfaces** – Arizona State Room

Synthesis and Characterization of Albumin Binding Surfaces for Implantable Devices. Author: Subramanian, Anu & Sarkar, Sabyasachi, University of Nebraska, Lincoln.

Morphology and Growth of Murine Cell Lines on Model Biomaterials. Author: Godek, M.L. et al., Colorado State University, Cell and Molecular Biology Program.

Surface Modification of UHMWPE Components of Total Joint Replacements. Author: Min Zhang & Susan P. James, Colorado State University.

Analysis of Regenerated Amine-reactive Polymer Microarray Slides. Author: Ping Gong & David W. Grainger Department of Chemistry, Colorado State University.

10:30^{am} Break

10:45^{am} **Session Two: Biomechanics** – Arizona State Room

Influence of Muscle Constriction on Whiplash Kinematics. Author: Brian D. Stemper & Narayan Yoganandan, Department of Neurosurgery, Medical College of Wisconsin and VA Medical Center.

Nmes-Assisted Standing Model from Varied Seated Postures.

Author: Jason C. Gillette & Catherine A. Stevermer,
Department of Health and Human Performance, Iowa State University.

Knee Loads in the Standard and Recumbent Cycling Positions.

Author: Raoul F. Reiser, II, PhD, CSCS & Jeffrey P. Broker,
Department of Health & Exercise Science,
Colorado State University, 215B Moby B, Ft. Collins, CO.

Motion Measurements in the Jumping of a Mountain Bike.

Author: Robin Redfield & Brian Self, US Air Force Academy.

11:45^{am} Working Lunch Buffet – Oklahoma State Room

1:00^{pm} **Session Three: Mechanical Testing** – Arizona State Room

Non-Contact Strain Measurement of Biological Tissue.

Author: Prachi Sanghavi, et al. Cornell University.

A New Technique of Tissue Repair for Ophthalmic Surgery.

Author: Grant T. Hoffman, et al.

Biomedical Engineering Program, Rose-Hulman Institute of Technology.

Brown widow (*Latrodectus geometricus*) Major Ampullate Silk Protein and its material properties.

Author: Dagmara Motriuk-Smith & Dr. Randolph V. Lewis University of Wyoming.

Analysis of Regenerated Amine-reactive Polymer Microarray Slides.

Author: Ping Gong & David W. Grainger, Department of Chemistry, Colorado State University.

Structural Testing of a Juvenile Prosthetic Foot Pylon, Author: Brian P. Self, et al. US Air Force Academy.

2:15^{pm} Break

2:30^{pm} **Session Four: Clinical Monitoring & Home Health Care** – Arizona State Room

A Java Mobile Phone-Based Home Helper Care Report Creation Support System. Author: Hidekuni Ogawa, et al. Department of Information & Intellectual Systems, Hiroshima Institute of Technology.

A New Flexible Automated System for the Study of Exhaled Gases.

Author: S Miodownik & J Melendez,

UCHSC & Memorial Sloan-Kettering Cancer Center.

Analysis of a Thermal Method for Assessing Endothelial Dysfunction.
Author: Nachiket Kharalkar & Jonathan Valvano, Department of Electrical and Computer Engineering, University of Texas at Austin.

3:15^{pm} Break

3:30^{pm} **Poster Session with SPOTLIGHT POSTERS** – State Room
For a list of posters, please see listing at the end of this program.

5:30^{pm} End Poster Session

6:00^{pm} **Mentor Panel** – Arizona State Room

7:00^{pm} **Networking with Panel Professionals** – Wine with Cheese, Tropical Fruit and Crudite Displays in the Arizona State Room

8:00^{pm} **Janet's Special Event** - a surprise fun and social event. Come meet the other conference attendees. Deli Buffet. – Oklahoma State Room

Saturday, 24 April 2004 Morning Sessions

7:00^{am} Continental Breakfast - Holiday Inn Lobby

8:00^{am} Announcements – Arizona State Room

8:15^{am} **Session Five: Bone I** – Arizona State Room

Biomedical Testing of Osteoconductive Disks for Cranioplasty in an Ovine Model.
Author: A S. Lyons & A. S. Turner, Colorado State University.

Low Dose Administration of Macrophage Colony Stimulating Factor in Mice.
Author: Yuyu Yuan, et al, Bioengineering Department, Clemson University.

Vertebral Body Bone Enhancement with Osteogenic Protein-1 (Op-1/bmp-7).
Author: Mohr, Karen E. & Phillips, Frank, Colorado State University.

Stimulation of Osteogenesis by means of Sustained Delivery of Various Natural Androgenic Hormones. Author: H. Benghuzzi, et al.
University of Mississippi Medical Center.

9:15^{am} Break

9:30^{am} **Session Six: Bone II** – Arizona State Room

Physical Properties of Retrieved Massive Cortical Allograft.
Author: Sulpizio, S, et al, Colorado State University.

Spaceflight and Hindlimb Suspension Disuse Models in Mice.
Author: Jeffery R. Milstead & Ted A. Bateman, Clemson University.

Effects of Sustained Delivery of Thymoquinone on Bone Healing of Male Rats.
Author: Philemon K. Kirui, et al.
Jackson State University & University of Mississippi Medical Center.

Quantification Methodology for Peripheral Quantitative Computed Tomography (PQCT) Data using public domain software. (NOTE: in the proceedings this paper is listed under the Image and Signal Processing session)
Author: M. E. Kovach & E. J. Eschbach, Colorado State University.
10:30^{am} Break

10:45^{am} **Gordon Jacobs “Evolution of Mechanical Circulatory Support (MCS) and its Implications for Biomedical Engineers”.** – Arizona State Room

11:45^{am} Lunch

1:00^{pm} **Session Seven: Cell Tissue & Drug Delivery** – Arizona State Room

Synthesis and Evaluation of Scaffolds Prepared from Chitosan Fibers for Potential use in Cartilage Tissue Engineering.
Author: Anu Subramanian, et al, University of Lincoln, Lincoln Nebraska.

Effect of Hydrogen Peroxide on Proliferation, Apoptosis and Interleukin-2 Production of Jurkat T Cells.
Author: Gabi Nindl, et al, Indiana University School of Medicine.

Hollow Calcium Phosphate Microcarriers for Bone Regeneration: In Vitro Osteoproduction and Ex Vivo Biomechanical Assessment.
Author: B G Santoni, et al. Colorado State University.

Comparison of Different Fabrication Techniques Used for Processing 3-Dimensional, Porous, Biodegradable Scaffolds from Modified Starch for Bone Tissue Engineering. Author: Vipin Kunjachan, et al. University of Nebraska.

Design and Synthesis of New Polymer-Drug Delivery.
Author: R. J. Christie, et al. Department of Chemistry, Colorado State University.

2:15^{pm} Break

2:30^{pm} **Session Eight: Bio Sensors** – Arizona State Room

A Model Study of Capacitive Micromachined Ultrasonic Transducers Fabricated using a Novel Atomic Layer Deposition (ALD) Process. Author: L. L. Liu, et. al., Department of Mechanical Engineering, University of Colorado at Boulder.

Design and Testing of a Fluorescence Glucose Sensor which incorporates a Bioinductive Material. Author: Ching-Hsung Chen & Jameel Ahmed, Rose-Hulman Institute of Technology.

Electric field Penetration Depth of Myocardial Surface Catheters and the Measurement of Myocardial Resistivity. Author: Anil Kottam & John A Pearce, University of Texas at Austin & University of Texas Health Science Center in San Antonio.

3:15^{pm} Break

3:30^{pm} Colorado State University **Veterinary Teaching Hospital and Lab Tour** with Donna Wheeler -- transportation provided – Meet at Main Entrance.

or

3:30^{pm} Colorado State University **Tissue engineering Workshop & Yates Building Laboratories Tour** with Tina Rinker-- transportation provided – Meet at Main Entrance .

or

3:30^{pm} Colorado State University **Human Performance and Motion Analysis Lab Tour** with Raoul Reiser-- transportation provided – Meet at Main Entrance.

6:00^{pm} **Awards Banquet with Paul Heyliger** – Dinner Buffet Oklahoma State Room

Sunday, 25 April 2003 Morning

7:00^{am} Board of Directors Meeting and

7:30^{am} Continental Breakfast - Holiday Inn Lobby

8:30^{am} Announcements

8:45^{am} **Session Nine: Image and Signal Processing** – Arizona State Room

Numerical Investigations of Intraluminal Impedance.
Author: A Al-Zaben & V. Chandrasekar,
Electrical & Computer Eng. Colorado State University.

A New Mathematical Approach based on Orthogonal Operators for the Detection of Interictal Spikes in Epileptogenic Data. Author: Malek Adjouadi, et al. Florida International University, Electrical & Computer Engineering.

An Optimization Approach to Recognition of Epileptogenic Data Using Neural Networks with Simplified Input Layers. Author: Melvin Ayala & Malek Adjouadi, Florida International University, Electrical & Computer Engineering.

An Integrated Auditory-Comprehension Process Augmented through Topographical Maps and a New Eigensystem Study.

Author: Mercedes Cabrerizo, et al.

Florida International University, Electrical & Computer Engineering.

9:45^{am} Break

10:00^{am} **Victor Spitzer “Center for Human Visualization”** – Arizona State Room

11:00^{am} Break

11:15^{am} **Session Ten: Modeling I** – Arizona State Room

Modeling 3-D Compliant Blood Flow with Fosts.

Author: Jeffrey J Heys, et al. Children's Hospital, Denver.

Dynamic Three-Dimensional Reconstruction and Modeling of Cardiovascular Anatomy in Children with Congenital Heart Disease Using Biplane Angiography.

Author: Craig Lanning, et al. Children's Hospital, Denver.

Designing Blood Oxygenators Using Blood Analogue Fluids.

Author: S. R. Wickramasinghe & B. Han, Colorado State University.

12:00^{am} Break

12:15^{am} **Session Eleven: Modeling II** – Arizona State Room

EIT Reconstructions and Faddeev Solutions for a Numerically Simulated Phantom Chest. Author: Jennifer L. Mueller, Colorado State University.

High Speed Photographic Verification of Intravascular Stent Strains During Accelerated Durability Testing. Author: Brunda Kattekola et al.

Southwest Missouri State University, Department of Physics.

CFD Simulation of Centrifugal Cell Washers.

Author: Beth Kellet et al., Colorado State University

1:00^{pm} Good Byes

Posters

Biomaterials and Surfaces

Probing the Elastic Nature of Spider Silk in Pursuit of the Next Designer Fiber.
Author: Amanda Brooks & Randy Lewis,
University of Wyoming.

Novel Melt-Processable Hyaluronan Esters for Biomedical Applications.
Author: Min Zhang & Susan P. James, Colorado State University.

Optimization of Print Buffer and Storage Conditions of Antibody-Based Protein Array. Author: Peng Wu & Dave Grainger, Colorado State University.

Constitutive Models for a Poly(ϵ -caprolactone) Scaffold.
Author: T.P. Quinn, et al., NIST.

Orthopaedics

Postmortum Retrieved Canine THR: Femoral and Acetabular Component Interactions. Author: Skurla CP & Sue James, Colorado State University.

Assessment of Equine Cartilage Degeneration.
Author: J. L. Harmel, et al., Colorado State University.

Potential Role of Proinflammatory Cytokines in Nerve Damage Injuries.
Author: Andrew Miesse & Ted Bateman, Clemson University Bioengineering.

Assessment of Subchondral Bone Mineral Density in Equine Metacarpophalangeal & Stifle Joints. Author: J. E. Walker, et al., Colorado State University.

General Biomechanics

Pneumatic Strength Assessment Device: Design & Isometric Measurement.
Author: David C. Paulus, et al.,
Department of Mechanical Engineering, Colorado State University.

Effect of Floor Slope on Submaximal Lifting Capacity.
Author: Eric E. Wickel & Raoul F. Reiser II,
Department of Health & Human Performance, Iowa State University.

Axial and Rotational Alignment of the Leg.
Author: Alizadeh RI, et al., University of Colorado Health Sciences Center.

Cardiovascular System

Comparison of Strength Properties of Normotensive and Hypertensive Rat Pulmonary Arteries. Author: E.S. Drexler, et al., NIST.

Stress and Strain in Rat Pulmonary Artery Material during a Biaxial "Bubble" Test. Author: Joyce E. Wright, et al., National Institute of Standards and Technology.

Cardiocirculatory Performance at High Altitude.
Author: A.M. Kunig & H.E. Kunig, Kunig Lab, Saltsburg, PA.

Linear and Non-linear Parameters of Heart Rate Variability During Static and Dynamic Exercise in a High - Performance Dinghy Sailor.
Author: Tanja Princi, et al., Physiology and Pathology Dept., University of Trieste, Trieste, Italy.

Improving Estimation of Cardiac Vagal Tone During Spontaneous Breathing Using a Paced Breathing Calibration. Author: Frank H. Wilhelm, et al. Basel University, Switzerland.

Simulation of Branching Blood Flows on Parallel Computers.
Author: Xue Yue, et al., University of Colorado at Boulder.

TGF-beta and TNF-alpha Affect Cell Surface Proteoglycan and Sialic Acid Expression on Vascular Endothelial Cells. Author: Amber L. Doiron, et al., Colorado State University, Department of Chemical Engineering.

Kullback-Leibler Clustering of Continuous Wavelet Transform Measures of Heart Rate Variability (HRV). Author: Donald E. Mager, et al., National Institute on Aging.

Continuous Monitoring of Cardiac Output from TCG Signals.
Author: Desmond B Keenan, VivoMetrics, Inc. Ventura, CA, USA.

Study of In Vitro Mitral Valve Filling Flow. Author: Timothy Drost, et al., Department of Mechanical Engineering, University of Colorado.

PIV Techniques

Echo PIV for Flow Field Measurement in Vivo. Author: Kim, Hyung-Bum,

Colorado State University.

Ultrasound Wave Propagation in Tissue and Scattering from Microbubbles for Echo Particle Image Velocimetry Technique.

Author: Osama Mukdadi & Robin Shandas

Department of Mechanical Engineering, University of Colorado, Boulder.

Advantages in Using Multi-Frequency Driving Ultrasound for Optimizing Echo Particle Image Velocimetry Techniques. Author: Hairong Zheng, et al., University of Colorado at Boulder.

Vehicular Biomechanics

Biomechanical Analysis of Seat Belt Restraint Deformation.

Author: Anthony Sances, Jr., University of California, Biomechanics Institute.

Multivariate Head Injury Threshold Measures for Various Size Children Seated Behind Vehicle Seats in Rear Impact. Author: Kenneth J. Saczalski, Ph.D. et al., Environmental Research & Safety Technologists, Inc., Newport Beach, CA.

The Locking and Unlocking Characteristics of a Seatbelt.

Author: Mark Ladd, et al.,

Rose-Hulman Institute of Technology.

Testing and Injury Potential Analysis of Rollovers with Narrow Object Impacts.

Author: Steven E Meyer, Safety Analysis & Forensic Engineering, Goleta, CA.

Physiology and Modeling

Edge Encoding Mechanisms in *Musca Domestica*.

Author: Steven Barrett & Mike Wilcox,

University of Wyoming.

Light Intensity appears to be more important than an Endogenous Seasonal Clock for Regulating Structural Rhythms in the Lateral Eye of the Horseshoe Crab. Author: Chad Zarse, et al., Rose-Hulman Institute of Technology.

3-D Physical Models of Mitosis (with asters) and Cytokinesis.

Author: Kang Cheng II & Changhua Zou, Edison NJ.

The Use of Digital Technology to Assess the Severity of the Experimental Allergic Encephalomyelitis (EAE) Spinal Cord Lesion. Author: D. Mohamed, et al.,

Anatomy and Cell Biology, University of Saskatchewan.

A Reduced Ambiguity Lexical System. Author: Paul Frenger MD,
A Working Hypothesis, Inc.

Instrumentation

Static and Quasi-Static Calibration of Bio-MEMS. Author: A.J. Slifka, et al.,
NIST, Materials Reliability Division, Boulder, CO.

Eye Movement Detector Calibration Device. Author: William Pruehsner, et al.,
University of Connecticut.

Mechano-electrical transduction in the Turtle Utricle. Author: Katherine J. Rennie,
et al., University of Colorado Health Sciences Center.

The Talking Hand. Author: Jennifer Barnes, Senior Bio/Electrical Engineering
University of Wyoming.

Design of Instrumentation and Data Acquisition System for Complex Admittance
Measurement. Author: Karthik Raghavan, et al.,
The University of Texas at Austin.

A Sleep Apnea Syndrome Detection System. Author: Ryouichi Ishida, et al.,
Department of Electronics, Hiroshima Institute of Technology.

Monitoring Eye Movement with a Computer Based EOG.
Author: Jamie Marie Dibble & Cherish Keri Teters,
University of Wyoming, University of Arizona, & University of Utah.

Multiple Position Calibration of Respiratory Waveform.
Author: Desmond B. Keenan, VivoMetrics, Inc. Ventura, CA, USA.

Health Care

Noninvasive Treatment of Inflammation Using Electromagnetic Fields: Current
and Emerging Therapeutic Potential. Author: Mary T. Johnson, et al.,
Indiana University School of Medicine.

Sending Data to a Central Repository. Author: Allen W. Hahn, et al.,
University of Missouri.

A Welfare Facility Resident Care Support System. Author: Hiromichi Maki, et al.,

Department of Clinical Engineering, International Trinity College.

Education

The University of Connecticut Biomedical Engineering Mentoring Program for High School Students. Author: John D. Enderle, et al., University of Connecticut.

Supporting Student Biomedical Entrepreneurship. Author: PE Patterson, Iowa State University.

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41st RMBS PROGRAM AT A Glance

Friday Morning

- 7:00am Registration and Continental Breakfast - Holiday Inn Lobby
- 8:00am Welcome – Arizona State Room
- 8:15am **Keynote Address** – Arizona State Room
- 9:15am Break
- 9:30am **Session One : Biomaterial Surfaces** – Arizona State Room
- 10:30am Break
- 10:45am **Session Two: Biomechanics** – Arizona State Room
- 11:45am Working Lunch Buffet – Oklahoma State Room

Friday Afternoon

- 1:00pm **Session Three: Mechanical Testing** – Arizona State Room
- 2:15pm Break
- 2:30pm **Session Four: Clinical Monitoring** – Arizona State Room
- 3:15pm Break
- 3:30pm **Poster Session with SPOTLIGHT POSTERS** – State Room
- 5:30pm End Poster Session

Friday Evening

- 6:00pm **Mentor Panel** – Arizona State Room
- 7:00pm **Networking Panel** – Wine and Cheese in the Arizona State Room
- 8:00pm **Janet's Special Event** – Deli Buffet Oklahoma State Room

Saturday Morning

- 7:00am Continental Breakfast - Holiday Inn Lobby
- 8:00am Announcements – Arizona State Room
- 8:15am **Session Five: Bone I** – Arizona State Room
- 9:15am Break
- 9:30am **Session Six: Bone II** – Arizona State Room
- 10:45am **Plenary Address** – Arizona State Room
- 11:45am Lunch

Saturday Afternoon

- 1:00pm **Session Seven: Tissue & Drug Delivery** – Arizona State Room
- 2:15pm Break
- 2:30pm **Session Eight: Bio Sensors** – Arizona State Room
- 3:15pm Break
- 3:30pm Tours – Meet at Main Entrance.

Saturday Evening

6:00pm **Awards Banquet** – Dinner Buffet Oklahoma State Room

Sunday Morning

7:00am Board of Directors Meeting

7:30am Continental Breakfast - Holiday Inn Lobby

8:30am Announcements

8:45am **Session Nine: Image and Signal Proc.** – Arizona State Room

9:45am Break

10:00 am **Special Address** – Arizona State Room

11:00am Break

11:15am **Session Ten: Modeling I** – Arizona State Room

12:00am Break

12:15am **Session Eleven: Modeling II** – Arizona State Room

1:00pm Good Byes