Biointerface 2019

WORKSHOP & SYMPOSIUM

Surfaces in Biomaterials Foundation

SEPTEMBER 4-6, 2019

Grand Summit Hotel - Park City, Utah
SIBF Mission Statement

The Surfaces in Biomaterials Foundation is dedicated to exploring creative solutions to technical challenges at the BioInterface by fostering education and multidisciplinary cooperation among industrial, academic, clinical, and regulatory communities.

Volunteer Opportunities

Don't miss an opportunity to be a part of the preparations for the 2020 BioInterface Conference! Contact info@surfaces.org or 612-351-2365 to express your interest.

What to do while in Park City

Park City’s trail system includes approximately 400 miles of continuous, non-motorized trail and has been designated a Gold Level Ride Center by the International Mountain Biking Association (IMBA). During summer months, trail access is available for mountain bikers, hikers, and trail runners. You can find more information and a trail finder at https://mountaintrails.org/trails.

Park City offers many great activities including an alpine slide, climbing wall, disc golf, golf, and zip line! For more information on these activities, including hours and lift schedules, please go to https://parkcitymountain.com/explore-the-resort/activities/summer-activities.aspx
Welcome from the President

I’d like to welcome you to BioInterface 2019, our 29th annual scientific workshop and symposium that has been organized this year by a dedicated group of volunteers within the Surfaces in Biomaterials Foundation. Our mission statement for the Foundation states that we are “dedicated to exploring creative solutions to technical challenges at the BioInterface by fostering education and multidisciplinary cooperation among industrial, academic, clinical and regulatory communities.” This year’s BioInterface nicely exemplifies this mission statement.

In attendance we have representatives from industry, academia, clinical practice, and regulatory agencies. I’m confident you will find numerous opportunities for learning, sharing, and leveraging collaborations this year, as has been present for the past 28 years of BioInterface.

A heartfelt thank you is extended to our sponsors, exhibitors, supporting members, and volunteers which have made this year’s meeting possible. Within our group of volunteers, a special call out to the Session Chairs, Organizing Committee, and the Foundation Board for the year of service and dedication to make this year’s BioInterface a success. Lastly, we are so grateful to the speakers (podium and posters) who have toiled to create a snapshot of their work to share with us all and a thank you to every attendee for joining us in picturesque Park City, UT.

I’m certain that you will find this year’s meeting to be a wonderful opportunity that will motivate and drive you throughout the coming year until we see each other again at BioInterface 2020.

Rob Kellar, Ph.D.
President, Surfaces in Biomaterials Foundation

2019 Program Committee

Timothy Becker
Northern Arizona University

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Colorado State University

Joshua Schmidt
SenzaGen, Inc.

Bill Theilacker
Medtronic, plc

Lijun Zou
W.L. Gore & Associates, Inc.
Wednesday, September 4

8:00 a.m. – 9:00 a.m.  Check In and Breakfast  
Kokopelli Parlors

9:00 a.m. – 4:00 p.m.  BIOINTERFACE WORKSHOP  
IMPLANTABLE SENSORS  
Chair: Roy Biran, W.L. Gore & Associates, Inc.

9:00 a.m. – 9:15 a.m.  Welcome and Introductions

9:15 a.m. – 10:00 a.m.  David Gough, University of California San Diego  
“Tissue-implant interface for continuous long-term glucose and oxygen sensors”

10:00 a.m. – 10:45 a.m.  Ted Lee, Dexcom  
“Foreign body response impact on CGM biosensors”

10:45 a.m. – 11:00 a.m.  Break

11:00 a.m. – 11:45 a.m.  Janet Tamada, J Tamada Consulting  
“Profusa’s subcutaneous hydrogel sensors for monitoring of small molecules”

11:45 a.m. – 12:30 p.m.  Ben Coppola, Abbott  
“Miniature implantable biosensor for diagnosis of cardiac arrhythmias”

12:30 p.m. – 1:30 p.m.  Group Photo and Lunch

1:30 p.m. – 2:15 p.m.  Florian Solzbacher, University of Utah  
“No patient left behind: materials innovation enabling neural engineering solutions and impact”

2:15 p.m. – 3:00 p.m.  Dustin Williams, University of Utah  
“Targeting biofilms in translational research and device development”

3:00 p.m. – 3:20 p.m.  Break

3:20 p.m. – 4:00 p.m.  APPLIED TECHNOLOGY WORKSHOP

3:20 p.m. – 3:40 p.m.  Andrew Kiezulas, Coatings2Go  
“Slippery when wet – hydrophilic coatings for the engineer”

3:40 p.m. – 4:00 p.m.  Kristin Taton, ISurTec  
“Encrustation on Urological Device Surfaces: Assays and Coatings”
Wednesday, September 4

4:00 p.m. – 5:00 p.m. KEYNOTE LECTURE
Ali Khademhosseini, University of California Los Angeles

Ali Khademhosseini is Professor of Bioengineering, and Chemical and Biomolecular Engineering at UCLA Henry Samueli School of Engineering and Applied Science, and at the UCLA Radiological Sciences David Geffen School of Medicine. He is a director of the Center for Minimally Invasive Therapeutics (C-MIT) and an associate director for the California NanoSystems Institute at UCLA. He is recognized as a leader in combining micro- and nano-engineering approaches with advanced biomaterials for regenerative medicine applications. In particular, his laboratory has pioneered numerous technologies and materials for controlling the architecture and function of engineered vascularized tissues.

“Nano-and microfabricated hydrogels for regenerative engineering”

Micro- and nanoscale technologies are emerging as powerful tools for controlling the interaction between cells and their surroundings for biological studies, tissue engineering, and cell-based screening. Hydrogel biomaterials have been increasingly used in various tissue engineering applications since they provide cells with a hydrated 3D microenvironment that mimics the native extracellular matrix. We have developed various approaches to merge microscale techniques with hydrogel biomaterials for directing stem cell differentiation and generating complex 3D tissues. In this talk, I will outline our work in controlling the cell-microenvironment interactions by using patterned hydrogels to direct the differentiation of stem cells; including the fabrication and the use of microscale hydrogels for tissue engineering by using a ‘bottom-up’ and a ‘top-down’ approach. Top-down approach for fabricating complex engineered tissues involves the use of miniaturization techniques to control cell-cell interactions or to recreate biomimetic microvascular networks within mesoscale hydrogels. Our group has also pioneered bottom-up approaches to generate tissues by the assembly of shape-controlled cell-laden microgels (i.e. tissue building blocks), that resemble functional tissue units. Microgels were fabricated and seeded with different cell types and induced to self-assemble to generate 3D tissue structures with controlled microarchitecture and cell-cell interactions.

6:30 p.m. – 8:30 p.m. SOCIAL MIXER
The Spur Bar & Grill
352 Main Street, Park City

Enjoy some time to meet and network with other BioInterface attendees. Stop by for drinks and dinner

A free shuttle (Pink 7) is available from the Grand Summit to the Canyons Transit Hub. It is also a 15 min walk to the Canyons Transit Hub. From Canyons Transit Hub, take either the Green 6 or White 10 to Old Town Transit Center. The Spur Bar & Grill is a 5 minute walk from the Old Town Transit Center.
Pink 7 departs Grand Summit at each :15 and :45
White 10 departs Canyons Transit Hub every 10 minutes
Last return shuttle is 11:30 p.m.
Excellence in Biomaterials Science Award

The Excellence in Biomaterials Science Award by the Surfaces in Biomaterials Foundation (formerly known as the Excellence in Surface Science Award) recognizes an individual who has made significant contributions to the biomaterials science field. It is the highest award given by the Foundation.

Rena Bizios, Ph. D., a chemical/biomedical engineer by training, is Lutcher Brown Chair Professor in the Department of Biomedical Engineering at the University of Texas at San Antonio. She pursued a career in academia. Her education-related contributions and research accomplishments have been recognized by several awards at the university, regional, and national levels. She is Fellow of six scientific/engineering national/international societies, The Academy of Medicine, Engineering and Science of Texas, and the National Academy of Medicine.

“The tissue-implant interface: Lessons learned from biology and physiology”

About Gore Medical

Gore Medical Products Division engineers devices that treat a range of cardiovascular and other health conditions. With more than 40 million medical devices implanted over the course of more than 40 years, Gore builds on its legacy of improving patient outcomes through research, education and quality initiatives. Product performance, ease of use and quality of service provide sustainable cost savings for physicians, hospitals and insurers. Gore is joined in service with clinicians and through this collaboration we are improving lives.
Thursday, September 5

7:30 a.m. – 8:15 a.m.   Check In and Breakfast  
                        Kokopelli Parlors

8:15 a.m. – 8:30 a.m.   President’s Welcome, Rob Kellar  
                        Development Engineering Sciences, LLC

8:30 a.m. – 10:00 a.m.  **SESSION 1: SURFACE MODIFICATIONS AND COATINGS**  
                        Co-Chair: Courtney Kay, Elkem  
                        Co-Chair: Lijun Zou, W.L. Gore & Associates, Inc.

8:30 a.m. – 9:00 a.m.   Invited Speaker: **Mathew T. Mathew**, University of Illinois College of Biomedical Sciences  
                        “Tribocorrosion aspects of biomedical implant coatings/surface modifications: progresses and new directions”

9:00 a.m. – 9:20 a.m.   **Jonathan Zhang**, LiquiGlide, Inc.  
                        “Reducing device-associated complications of vascular access devices with liquid-impregnated surfaces”

9:20 a.m. – 9:40 a.m.   **Bob Hergenrother**, BioCoat, Inc.  
                        “Performance evaluation of lubrious coatings for vascular catheters”

9:40 a.m. – 10:00 a.m.  **Jennifer Martinez**, Northern Arizona University  
                        “Controlling biointerfaces through genetically engineered polymers”

10:00 a.m. – 10:30 a.m. **Exhibitor Break and Poster Session**

10:30 a.m. – 12:00 p.m. **SESSION 2: TISSUE ENGINEERING AND REGENERATIVE MEDICINE**  
                        Chair: Robert Diller, Stem Cell Medical Center - Antigua

10:30 a.m. – 11:00 a.m. Invited Speaker: **Stuart Williams**, Bioficial Organs, LLC.  
                        “Surface modification of biomaterials to support the formation of new blood vessels”

11:00 a.m. – 11:20 a.m. **Jed Johnson**, Nanofiber Solutions  
                        “Nanofiber scaffolds: enabling regenerative medicine”

11:20 a.m. – 11:40 a.m. **Rick Murphy**, Vascudyne  
                        “Engineered tissue for bypass graft and other cardiology applications”

11:40 a.m. – 12:00 p.m. **Mary Beth Monroe**, Syracuse Biomaterials Institute  
                        “Shape memory polymer foams for traumatic wound healing”
Thursday, September 5

12:00 p.m. – 1:30 p.m. **LUNCH PRESENTATION OF THE EXCELLENCE IN BIOMATERIALS SCIENCE AWARD**

1:30 p.m. – 2:00 p.m. **SURFACES IN BIOMATERIALS FOUNDATION ANNUAL BUSINESS MEETING**

2:00 p.m. – 3:30 p.m. **SESSION 3: OPHTHALMIC**
Co-Chair: Chander Chawla, DSM Biomedical
Co-Chair: Joe Chinn, J Chinn LLC

2:00 p.m. – 2:30 p.m. Invited Speaker: **Mark Byrne**, Rowan University
“The future is now – increased efficacy of sustained ophthalmic drug delivery via the ocular biointerface”

2:30 p.m. – 2:50 p.m. **Robert Tucker**, Alcon Vision
“Surface characterization methods developed to optimize the “Smart Surface™” Chemistry for Precision 1™”

2:50 p.m. – 3:10 p.m. **Christian Gutierrez**, Verily Life Sciences
“Electronic interfaces for Smart Contact Lenses: Applications and Concepts”

3:10 p.m. – 3:30 p.m. **Talena Rambarran**, McMaster University
“Hyaluronic acid releasing contact lenses for improved lens comfort”

3:30 p.m. – 4:00 p.m. **BREAK – VISIT EXHIBITS**

4:00 p.m. – 4:30 p.m. **SESSION 4: POINT COUNTERPOINT**
Chair, Joshua Schmidt, SenzaGen Inc.

“Implanted vs Non-Implanted Sensors”

Be it resolved that wearable, telemetric, non-invasive, non-implanted sensors will become far more impacting to human health monitoring, diagnostics and healthcare than implantable real-time sensors.

**David Grainger**, University of Utah
**Ben Coppola**, Abbott

5:00 p.m. – 7:00 p.m. **Reception Featuring the Academic Poster Competition**
Student Posters

Thank you student poster award committee: Melissa Reynolds, Angela DiCiccio, Chris Jenney, Rob Kellar, Bill Theilacker, Clay Underwood

A multi-functional electrospun wrap to treat infection and enhance induced membrane formation in the Masquelet technique
-Taneidra Buie, University of Texas at Austin

Electrospun Shape Memory Polymers for Biomedical Applications
-Samuel Briggs, Texas A&M University

Development of PolyHIPE Scaffolds for Improved Bone Regeneration
-Prachi Dhavalikar, University of Texas at Austin

Polymerized High Internal Phase Emulsions for Porous Shape Memory Polymer Devices
-Grace Fletcher, Texas A&M University

A New Innovation in Pediatric Cancer Treatment
-Jenna Gordon, Colorado State University

Quantitative and Qualitative Analysis of Shape Memory Polyurethane Foam Biodegradation
-Lance Graul, Texas A&M University

In Vivo Comparison of the Healing Response to Porous Polymer-Coated and Bare Metal Coils for Aneurysm Occlusion
-Scott Herting, Texas A&M University

Electrospun Wound Healing Devices Containing Antibacterial Ionic Liquids/Deep Eutectic Solvents Resist Biofouling by Microbial Pathogens
-Marjorie Nguyen, Northern Arizona University

In Vitro Vascular Model Material Characterization
-Nicholas Norris, Northern Arizona University

Particle Counting Through In-Line Imaging for Endovascular Device Assessment
-Isaac Smith, Northern Arizona University

Three approaches for improving the performance of blood-contacting medical devices
-Yanyi Zang, Colorado State University
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Friday, September 6

8:00 a.m. – 8:30 a.m.  
Check In and Breakfast  
Kokopelli Parlors

8:30 a.m. – 10:00 a.m.  
**SESSION 5: NEUROVASCULAR-NEURAL INTERFACE DEVICES**  
Co-Chair: Tim Becker, Northern Arizona University  
Co-Chair: Landon Nash, Shape Memory Medical

Session Sponsor

8:30 a.m. – 9:00 a.m.  
Invited Speaker: **Christopher Ferwin**, NeuroNexus  
“Probe design considerations for neural interface research”

9:00 a.m. – 9:20 a.m.  
**Rami Tzafiri**, CBSET  
“Swine clot model for the evaluation of mechanical thrombectomy devices”

9:20 a.m. – 9:40 a.m.  
**Christopher Settanni**, Northern Arizona University  
“In vitro neurovascular model development for liquid embolic implant simulation”

9:40 a.m. – 10:00 a.m.  
**Duncan Maitland**, Texas A&M University  
“Pre-clinical and clinical experience with a biodegradable polyurethane foam-coated-coil occlusion device”

10:00 a.m. – 11:00 a.m.  
**EXHIBITOR BREAK**
Friday, September 6

11:00 a.m. – 12:30 p.m.  **SESSION 6: CARDIOVASCULAR**  
Co-Chair: Mallika Kamarajugadda, Medtronic, plc  
Co-Chair: Bill Theilacker, Medtronic, plc.

11:00 a.m. – 11:30 a.m.  Invited Speaker: **Shiril Sivan**, FDA (U.S. Food & Drug Administration)  
“Technical considerations for non-clinical assessment of medical devices containing Nitinol”

11:30 a.m. – 11:50 a.m.  **Marja Bulte-terMeer**, Radboud University Medical Center, Nijmegan, Netherlands  
“Localized synthesis of drugs using iron containing metallic implants”

11:50 a.m. – 12:10 p.m.  **Kevin Tingey**, W.L. Gore & Associates, Inc.  
“Establishing and utilizing standards in the development & testing of cardiovascular implants”

12:10 p.m. – 12:30 p.m.  **Rami Tzafriri**, CBSET  
“Quantitative preclinical insights into procedural and anatomical determinants of multi-electrode renal denervation efficacy”

12:30 p.m. – 1:30 p.m.  **SIBF AWARDS LUNCHEON**  
Student Poster Winner Announced  
President’s Award Presented  
Student Town Hall Meeting

1:30 p.m. – 3:00 p.m.  **SESSION 7: ADVANCES IN MEDICAL DEVICE IMAGING (FROM DEVICE DEVELOPMENT TO DEPLOYMENT)**  
Co-Chair: Mallika Kamarajugadda, Medtronic, plc  
Co-Chair: Bill Theilacker, Medtronic, plc.

1:30 p.m. – 2:00 p.m.  Invited Speaker: **Chao Huang**, University of Utah  
“Subsurface imaging of cardiac microstructure using finer-optics confocal microscopy”

2:00 p.m. – 2:20 p.m.  **Shivram Sridhar**, Medtronic, Inc.  
“Comparison of X-ray μ-Tomography and SEM imaging techniques for characterization of materials used in medical devices”

2:20 p.m. – 2:40 p.m.  **Bilal Malik**, QT Ultrasound  
“Breast and whole body imaging with transmission ultrasound”
Friday, September 6

2:40 p.m. – 3:00 p.m.  **Tyler Thompson**, University of Utah  
“Quantitative analysis of feather patterns in pigeons via computer vision”

3:00 p.m. – 3:15 p.m.  **BREAK**

3:15 p.m. – 4:45 p.m.  **SESSION 8: CHEMICAL AND BIOLOGICAL TESTING OF MEDICAL DEVICES**  
Chair: Joshua Schmidt, SenzaGen, Inc.

3:15 p.m. – 3:45 p.m.  Invited Speaker: **Maud Gorbet**, University of Waterloo  
“Towards biocompatibility: assessing cell-material interactions with medical devices in vitro”

3:45 p.m. – 4:05 p.m.  **Hailey Hibbard**, Colorado State University  
“Designing novel compounds for antibacterial medical device coatings to detect bacteria”

4:05 p.m. – 4:25 p.m.  **Mourad Rahi**, American Preclinical Services  
“Extractables and leachables: agonies and thrills of Es & Ls”

4:25 p.m. – 4:45 p.m.  **Mehdi Razavi**, Texas Heart Institute  
**Allison Post**, Texas Heart Institute (presenting)  
“From benchtop to market: A clinician perspective on device innovation and validation”

4:45 p.m.  **Conclusion**

Thank you for attending BioInterface 2019! See you again next year!
Notes

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Surfaces in Biomaterials Foundation
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Park City, Utah

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