3rd Annual Great Plains Biomaterials Day

Slawson Hall Room G192
Beren Petroleum Conference Center
University of Kansas, School of Engineering
November 4th, 2022

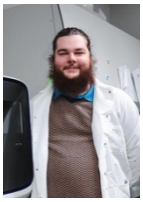
Society For Biomaterials
KU Student Chapter

Biomaterials Days were conceived as an opportunity for student chapters of the Society for Biomaterials to highlight cutting edge research and the work done by students. The Society For Biomaterials provides financial support for Biomaterials Day symposiums at five different locations throughout the United States. The purpose of these meetings is to attract students and SFB members in academics, industry, and government as well as non-SFB members interested in the biomaterials field to foster collaboration.

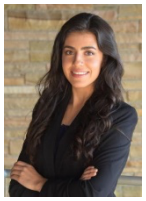
The Great Plains Biomaterials Day is a regional event planned and executed by the KU Student Chapter of the Society For Biomaterials. Our hope is to foster collaboration within the region, and host students and faculty from many of the Great Plains universities at this event. We also hope to provide an overview of exciting career opportunities in the field of biomaterials and translational medicine. In the future, we hope to collaborate with other regional SFB Student Chapters to host rotating Biomaterials Days across the region.

Sponsored By:

KU STUDENT CHAPTER EXECUTIVE TEAM

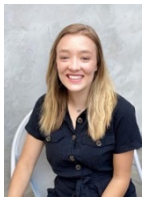


John Bradford is a third-year Bioengineering Ph.D. student and the President of KU's SFB Chapter. His research is focused on interrogating sex differences in regeneration of the knee meniscus, growth of human mesenchymal stem cells due to exogenous estrogens in cell culture media, and microfluidics for high throughput small molecule signaling studies.



Andrea Villela is a second-year Bioengineering Master's student and the Vice President of KU's SFB Chapter. Her research is focused on working with bifunctional peptide inhibitor (BPI) molecules that regulate T cell activity and prevent immune attacks on the myelin sheath in mice with experimental autoimmune encephalomyelitis (EAE), as an animal model for MS.

Nicole D'Souza is a second-year Bioengineering Master's student and the Director of Biomaterials Day of KU's SFB Chapter. Her research is focused on incorporating novel antimicrobial peptides into poly(methyl-methacrylate) bone cement to reduce the incidence of orthopedic infection.

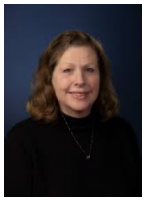


Savannah Mosier is a third-year Bioengineering Ph.D. student and is the Secretary of KU's SFB Chapter. Her research is focused on a proof of concept electrically active hernia repair mesh product to improve soft tissue wound healing, post-operative recovery, and reduce risk of infection.

Kara Hageman is a third-year Bioengineering Ph.D. student and is the Treasurer of KU's SFB Chapter. Her research is focused on preventing periprosthetic joint infection by using borate bioactive glass as an additive to poly(methyl-methacrylate) bone cement.

FACULTY ADVISORS

Jenny Robinson, Ph.D. is an Assistant Professor of Chemical and Petroleum Engineering at KU. Her research interests include sex and age-specific biomaterials, regeneration of soft-to-hard tissue interfaces, and determination of sex differences in musculoskeletal tissue. She serves as a Co-Faculty Advisor of the KU student chapter of Society For Biomaterials.



Lisa Friis, Ph.D. is Professor and Chair of the Mechanical Engineering Department at KU. Her research interests are in structural biomaterials, spine biomechanics, and the design and testing of medical devices. She serves as a Co-Faculty Advisor of the KU student chapter of Society For Biomaterials.

SCHEDULE OF EVENTS

8:30 - 9:15 AM	Registration, Poster Set-Up, and Breakfast
9:15 - 9:30 AM	Welcome & Opening Remarks
9:30 - 10:30 AM	**Keynote Speaker – Dr. Michelle Oyen** Washington University in St. Louis, Missouri
10:30 - 11:00 AM	**Featured Speaker – Dr. John Clegg** *Modulating Neuroinflammation with Injectable Biomaterials* University of Oklahoma in Norman, Oklahoma
11:00 – 11:15 AM	Morning Break
11:15 – 12:00 PM	Student Rapid Fire Talks
12:00 – 1:30 PM	Lunch Time Networking with Academic and Industry Professionals Slawson Room 198: Early Career Professionals Slawson Room 298: Middle Career Professionals Beren Conference Center: Industry Professionals
1:30 – 2:00 PM	**Featured Speaker - Dr. Rebecca Wachs** *Novel Models and Treatments for Low Back Pain* University of Nebraska – Lincoln in Lincoln, Nebraska
2:00 – 2:30 PM	**Featured Speaker - Dr. Steve Harrington** *Non-academic careers for biomaterial engineers: getting there, and what to expect when you do* Likarda, LLC in Kansas City, Missouri
2:30 - 2:45 PM	Afternoon Break and Final Poster Preparation
2:45 – 3:45 PM	Poster Session
3:45 – 4:30 PM	Networking, Reception, and Awards

NOTES

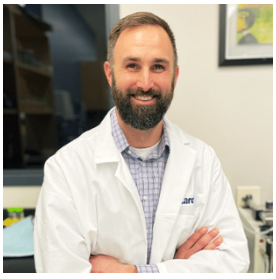
KEYNOTE SPEAKER

Michelle L. Oyen, **PI** is the inaugural Director of the new Center for Women's Health Engineering, based in the Department of Biomedical Engineering, Washington University in St. Louis. Prior to her current appointment, she was on the faculty at the University of Cambridge (2006 - 2018) in the UK and then briefly at East Caroline University (2018 – 2021). Michelle has degrees in Materials Science and Engineering (BS), Engineering Mechanics (MS), and a PhD in Biophysical Sciences. She has worked on many problems in tissue biomechanics and biomimetic materials. She has researched engineering approaches to pregnancy and women's health for over twenty years, particularly in methods to prevent, diagnose, and intervene in preterm birth. Current research projects include multi-scale modeling of placenta function, microstructural fracture models for amniotic sac rupture, and physical properties of the healthy and pathological uterus.

FEATURED SPEAKERS

John Clegg, Ph.D. is an assistant professor in the Stephenson School of Biomedical Engineering at the University of Oklahoma. Before starting at OU, he completed a post-doctoral fellowship through Harvard University and the Wyss Institute for Biologically Inspired Engineering. Dr. Clegg has degrees in Biomedical Engineering from the University of South Carolina (BS) and the University of Texas at Austin (MSE & PhD). He also has a master's degree in Science, Technology, Engineering, and Mathematics Education from the University of Texas at Austin. Currently, Dr. Clegg leads the Neuro-Immuno-Engineering collective which investigates hydrogel and innate immune cell-based therapeutics for the treatment of neurological diseases and traumatic injuries. Current research projects include hierarchical synthesis of soft biomaterials for sustained release of immunomodulators, engineered brain-tissue barrier models, tandem delivery of macrophage cell-based therapeutics via immunomodulatory scaffold, and translation of therapeutics to treat brain injury and brain cancer.

Rebecca Wachs, Ph.D. is an assistant professor in the Biological Systems Department at the University of Nebraska, Lincoln. She has degrees in Mechanical Engineering from Worcester Polytechnic Institute (BS) and Biomedical Engineering from Rensselaer Polytechnic Institute (MS). Before joining the faculty at UNL, Dr. Wachs worked for Carl Zeiss Microimaging Inc. as a 3D imaging specialist. She completed her PhD in Biomedical Engineering at Rensselaer Polytechnic Institute. Her dissertation focused on mechanisms of low back pain, and was completed with Dr. Eric Ledet. She then completed her post-doctoral research under Dr. Christine Schmidt at the University of Florida in neural engineering. Dr. Wachs leads the Orthopedic and Neural Engineering Lab which engineers solutions to treat painful degenerative conditions such as osteoarthritis and low back pain. Current research projects include optimizing novel decellularization methods to maintain essential ECM proteins, developing injectable formulations of decellularized tissue, investigating the ability of decellularized tissue to modulate immune response, and delivering neuromodulatory molecules to enable painless disc degeneration.



Steve Harrington, Ph.D. is the Director of Hydrogel and Cell Formulation at Likarda, a biotech company developing cell therapies and enabling technologies to transform the way cell therapies are delivered and function. Likarda's foundational technology is based on cell encapsulation and delivery in hydrogels using their patented CSS™ (Core-Shell Spherification) system, which utilizes readily available and biocompatible hydrogel materials such as Hyaluronic Acid, PEG, and a number of other chemistries to create microcapsules that easily house cell-based therapies. Dr. Harrington has a degree in Chemistry from Emporia State University (BS) and a Ph.D. in Bioengineering from the University of Kansas (Rock Chalk!). He has been with Likarda since graduating from KU in 2017.

STUDENT ABSTRACT RAPID FIRE TALK PRESENTATIONS

01 Grahmm Funk, E. Menuey, A. Parrales, T. Iwakuma, K. Kilway, T. McIff. *Orthopedic Cements as Carriers of Doxorubicin for Local Chemotherapy Treatment*
More details at Poster 31

02 Domenic Cordova, A. Rodriguez, C. Crosby. *Engineering an Ultra-Low Open-Source 3D Bioprinter from a Creality Ender 3D FDM 3D Printer*
More details at Poster 32

03 Jacob Hodge, A.J. Mellot, J. Robinson. *Novel 3D Hydrogel System Enhances Regenerative Capacity of Stem Cells and Improves Tailorability of Biologics*
More details at Poster 33

04 Noah Pyles, K. Cheng, R. Ajeeb, J. Clegg, C. Crosby. *Adding Hyaluronic Acid Methacrylate (HAMA) and Poly(lactic-co-glycolic acid) (PLGA) Nanoparticles to Gelatin Methacryloyl (GelMA) Creates an Extrudable Biomaterial Ink Suitable for Mimicking the Blood-Brain Barrier (BBB)*
More details at Poster 34

05 Kara Hageman, R. Blatt, R. Brow, T. McIff. *Bacterial Attachment on Bioactive Glass Induced Hydroxyapatite-Like Layer over Poly(methyl-methacrylate) Bone Cement*
More details at Poster 35

STUDENT ABSTRACT POSTER PRESENTATIONS

01 Rylie Parr, A. Fica, M. Kumar. *Water Permeability of Droplet Interface Bilayer Systems*

02 Jordan Gamble, L. Friis. *Digital Model of an In Vitro Electrical Stimulation Cell System*

03 Allison Goehl, M. Hamilton, P. Dhar. *Passive Microrheology During Enzymatic Degradation of Hyaluronic Acid Hydrogels*

04 Aidan Alemifar, S. Hurt, J. Robinson. *Modulating Macrophage Polarization Using Biomaterial Surface Roughness to Improve Healing of Soft-Tissue Injuries*

05 Waleed Elballa, A. Gregory, T. Siahaan, M. Hageman. *Evaluation of Peptide-Mucin Interacting using Simple In Vitro Mucin Model*

06 Suna Jo, W.M Park. *A Self-assembled Recombinant Protein Coating Platform for Calcium Ion Sensing*

07 Kyley Burkey, K. Castillo, P. Elrod, J. Robinson. *Tuning Viscoelastic Properties of Thiol-ene Crosslinked Hyaluronic Acid Hydrogels to Promote Cell Spreading for Meniscus Tissue Engineering*

08 Amanda Varner, K. Hageman, G. Funk, E. Menuey, K. Kilway, T. McIff. *Surface and Antimicrobial Characterization of Silorane-Based Bone Cement*

09 Nicole D'Souza, G. Funk, A. Coleman, K. Hageman, A. Varner, A. Cloyd, K. Boone, N. Kamathewatta, C. Tamerler, T. McIff. *Biological Activity and Elution Profile of an Antimicrobial Peptide Released from Poly(methyl methacrylate) Bone Cement*

10 August Hemmerla, K. Dahlgren, D. Madugula, B. Ulery. *N-Acetylcysteine and Hydrogen Sulfide releasing Biomaterials for Neuronal Protection and Differentiation in Peripheral Nerve Injury Regeneration*

11 Kayla Castillo, P. Elrod, K. Burkely, M. Suekuni, J. Scalet, E. Aikman, S. Gehrke, A. Allgeier, J. Robinson. *Characterizing Properties of Thiol-ene Crosslinked Hyaluronic Acid Hydrogels for Meniscus Tissue Engineering*

12 Jack Terry, M. Hageman. *Improving the physiochemical properties of a model anti-cancer drug through utilization of acyl sulfonamide prodrug strategies*

13 Negar Jafari, C. Addison, H. Lou, M. Hageman. *Modulation of Lanreotide Gel Formation and Diffusional Release from Emulated Subcutaneous delivery*

14 Alyssa Morrell, J. Bradford, J. Robinson. *Investigating Female Predisposition to Musculoskeletal Disease Through in Vitro Spheroid Models of Meniscal Fibrocartilage*

15 Xi Luan, H. Lou, M. Hageman. *Development of a novel drying technique to produce solid-state proteins using biocompatible polymer hyaluronic acid*

16 Jasmine Deng, S. Barbay, J. Townsend, B. Andrews, R. Nudo, M. Detamore. *Model Development in Testing the Benefits of Hydrogel Cranioplasty*

17 Katie Donnelly, J. Robinson. *Spheroid Culture on a Concentration Gradient Chip for High Throughput Analysis of Sex Differences in Tissue Repair*

18 Ranjith Madhana – Gopal, S. Wilson. *Estimation of the Fingertip Position with a Limited Data Set*

19 Katherine Meinhold, J. Robinson. *Investigation of the effect of non-ionic surfactant on aligned fiber system characteristics.*

20 Rachel Galfo, N. Green. *Conjugating Modified DNA to Thiolated Silica Nanoparticles Towards Nanoparticle Self-Assembly*

21 Zahraa Al-Tamimi, M. Hageman. *The Effect of Polymeric Bile Acid Sequestrants on the Interaction Between Octreotide and Bile Acid-Phospholipid Mixed Micelles*

22 Katie Childers, S. Soper. *Characterization of Elastomeric Cyclic Olefin Copolymer for its Use in Microfluidic Valves*

23 Samuel Hurt, K. Knewtson, K. Meinhold, A. Alemifar, J. Robinson. *Mechanical Properties of Human Meniscal Fibrochondrocytes Seeded on Fibrous Scaffolds*

24 Ashley Kennedy, N. Green. *Conjugation of Gold Nanorods with ssDNA*

25 Maryann Melendrez, C. Cáceres. *To What Extent are the Microplastics Vectors of Heavy Metals in the Waters of the Chili River, Arequipa*?

26 Joshua Lawton, W. Rankin, P. Vora, A. Varner, A. Coleman, T. McIff. *Characterization of Antimicrobial Properties of Commercially Available Bone Cement*

27 Saba Amirfattahi, R. Dyke, H. Honaryar, Z. Niroobakhsh. *Fabrication of Microneedles via Associative Surfactant System using Liquid – in – Liquid 3D Printing*

28 Tyler Tankersley, K. Meinhold, J. Robinson. *Electrospinning as a Technique for Tissue Engineering*

29 Mohamad Mahmoud, W.M. Park. *A Structure-Guided Design of Two-Dimensional Self-Assembling Proteins from Hydrophobins and Hexameric Coiled Coils*

30 Grahmm Funk, A. Geer, I. Hurwitz, M. Hageman. *Spray Dried Essential Oil-encapsulated Yeast for Biosafe Malarial Control*

31 Grahmm Funk, E. Menuey, A. Parrales, T. Iwakuma, K. Kilway, T. McIff. *Orthopedic Cements as Carriers of Doxorubicin for Local Chemotherapy Treatment.* Rapid Fire Talk 01

32 Domenic Cordov, A. Rodriguez, C. Crosby. *Engineering an Ultra-Low Open-Source 3D Bioprinter from a Creality Ender 3D FDM 3D Printer.* Rapid Fire Talk 02

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Thank you to all faculty, staff, faculty advisors, KU School of Engineering, sponsors, speakers, and most importantly our student presenters. This event could not be possible without every one of you. We hope you had a great time presenting your research, networking with other researchers, and spending time at the University of Kansas! We look forward to seeing you at the 4th Annual Great Plains Biomaterials Day next year!

Rock Chalk!

KU SFB Executive Board