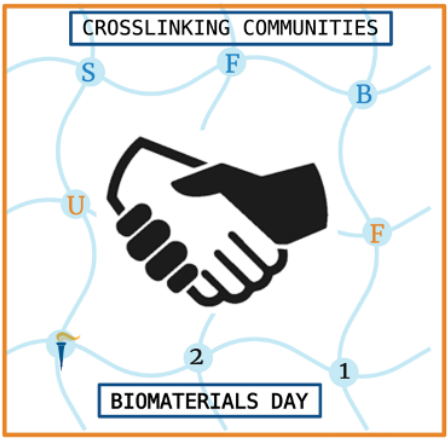
Tenth Annual

BIOMATERIALS DAY



March 26, 2021

Hosted by the University of Florida
Society For Biomaterials Student Chapter

Welcome to the University of Florida's Biomaterials Day 2021!

Welcome to our 10th annual Biomaterials Day organize by the University of Florida Student Chapter of the Society For Biomaterials! This year's theme is "**Crosslinking Our Community**" in the spirit of bringing together our University of Florida biomaterials community after a tumultuous, COVID-19 pandemic riddled 2020 that resulted in us canceling our 2020 Biomaterials Day. This year's symposium is virtual, a sign of the times; nonetheless, we have prepared what will be a fantastic program of activities and speakers. We want this event to not only be about the amazing biomaterials work of our students, professors, and alumni, but also to showcase the resiliency of our community! We are proud to host this one-day technical symposium to provide an interdisciplinary opportunity for students, faculty, and industry representatives to interact and discuss the newest and most exciting advances in the field of biomaterials. We thank you again for your support and hope to see you all again next year!

Regards,

Bryan James
Biomaterials Day Chair
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Faculty Advisor
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Biomaterials Day 2021

"Crosslinking Our Community"
March 26, 2021
Zoom

Schedule

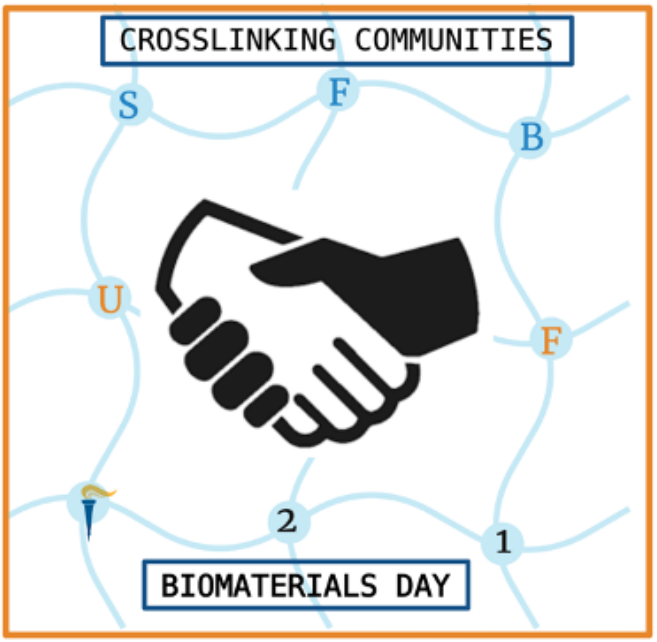
Time	Event	Speakers
9:00-9:05 AM	Welcome	Dr. Greg Hudalla (UF BME)
9:05-9:50 AM	Invited Speaker 1	Dr. Treena Livingston Arinzeh (NJIT)
9:50-10:35 AM	Invited Speaker 2	Dr. Lola Eniola-Adefeso (U Michigan)
10:35-10:50 AM	Coffee Break	--------
10:50-11:35 AM	Invited Speaker 3	Dr. Shannon Servoss (U Arkansas)
11:35 AM-12:35 PM	Student Talks (Live)	Adrienne Widener (BME) Julie Jameson (CHE) Noah Ferson (MSE) Duy Nguyen (MAE)
12:35-1:30 PM	Lunch	-------
1:30-2:15 PM	Invited Speaker 4	Dr. Allison Goins (Georgia-Pacific)
2:15-3:00 PM	Student Talks (On-Demand)	Link here
3:00-3:45 PM	Outreach Activity	UF SFB Outreach Team
3:45-4:00 PM	Closing Remarks	-------

Acknowledgments

The University of Florida Student Chapter of the Society For Biomaterials would like to acknowledge our generous sponsors without whose support this event would not be possible. Their sponsorship allows us to keep this event completely free of charge to attendees, and to host speakers from across the country. We would also like to thank all the SFB student members and faculty who have helped make this event possible.

Sponsors include:
Society for Biomaterials
UF Office of Research
UF Department of Materials Science and Engineering
UF J. Crayton Pruitt Department of Biomedical Engineering

Also, big thanks to **Marisa Pacheco** for designing our logo this year!



Invited Speakers

Treena Livingston Arinzeh, Ph.D.
Distinguished Professor
Department of Biomedical Engineering
Director of the Tissue Engineering and
Applied Biomaterials Laboratory
New Jersey Institute of Technology

"Functional Biomaterials for Tissue Regeneration"

Abstract:

Tissue engineering and regenerative medicine approaches for rebuilding damaged or diseased tissues have shown promise. Stem cells have been sought as an attractive cell source to be used in combination with biomaterials that act as scaffolds to regenerate tissues. Recent discoveries have shown that the properties of the scaffold can influence stem cell self-renewal and/or differentiation, which has had a tremendous impact on identifying strategies for using these cells effectively in the body. This presentation will describe studies examining the influence of biomaterials on stem cell behavior with an emphasis on identifying biomaterial properties and designs that impart appropriate cues to stem cells to affect their behavior both *in vitro* and *in vivo*. Recent results using biomimetic materials, specifically piezoelectric polymers and composites that provide electromechanical cues to stem cells and other cell types, will be discussed. Findings demonstrating stem cell differentiation and tissue formation using novel glycosaminoglycan mimetics, which are polysaccharides that also exhibit piezoelectric properties and prolong the bioactivity of growth factors, will be presented. These biomaterials and their potential use for orthopaedic and neural applications will be discussed.

Biosketch:

Treena Livingston Arinzeh, PhD is a Distinguished Professor of Biomedical Engineering and the Director of the Tissue Engineering and Applied Biomaterials Laboratory at the New Jersey Institute of Technology (NJIT). Dr. Arinzeh received her B.S. from Rutgers University in Mechanical Engineering, her M.S.E. in Biomedical Engineering from Johns Hopkins University, and her Ph.D. in Bioengineering from the University of Pennsylvania. She worked for several years as a project manager at a stem cell technology company, Osiris Therapeutics, Inc. Dr. Arinzeh joined the faculty of NJIT as one of the founding faculty members of the department of Biomedical Engineering and served as interim chairperson and graduate director. Dr. Arinzeh has been recognized with numerous awards, including the National Science Foundation (NSF) CAREER Award and the Presidential Early Career Award for Scientists and Engineers (PECASE). She is a fellow of the American Institute for Medical and Biological Engineering (AIMBE) and the Biomedical Engineering Society (BMES). She recently served as the chairperson for the National Institutes of Health (NIH) Musculoskeletal Tissue Engineering (MTE) Study Section. She is currently a co-PI and the Director of Diversity of the NSF Science and Technology Center on Engineering Mechanobiology, which is a multi-institutional center with the University of Pennsylvania.

Lola Eniola-Adefeso, Ph.D.
Professor
University Diversity and Social Transformation Professor of Chemical Engineering
Miller Faculty Scholar
Vice Chair for Graduate Education
Department of Chemical Engineering
University of Michigan

"Leveraging the natural cellular and biomolecular interactions in blood for the design of targeted, anti-inflammatory particle therapeutics. "

Abstract:

Localized delivery of therapeutics offers the possibility of increased drug effectiveness while minimizing side effects often associated with systemic drug administration. Factors that influence the likelihood of targeted particle therapeutics to reach the vascular wall are the ability to identify: 1) a disease-specific target, 2) the appropriate drug carrier type and geometry for efficient interaction with the vascular wall, and 3) a drug-carrier combination that allows for the desired release of the targeted therapeutics. Our work focuses on probing the role of particle geometry, material chemistry, and blood rheology/dynamics on the ability of vascular-targeted drug carriers to interact with the blood vessel wall - an important consideration that will control the effectiveness of drug targeting regardless of the targeted disease or delivered therapeutically. This presentation will highlight the carrier-blood cell interactions that affect drug carrier binding to the vascular wall and alter critical neutrophil functions in disease. The talk will present the material design parameters for optimal drug carriers' design for active and passive use in treating many inflammatory diseases.

Biosketch:

Dr. Omolola (Lola) Eniola-Adefeso is the University Diversity and Social Transformation Professor of Chemical Engineering and Biomedical Engineering at the University of Michigan-Ann Arbor (UM); Associate Director of the Cellular Biotechnology Training Program; and Vice-Chair for Graduate Studies in Chemical Engineering. She graduated from the University of Maryland Baltimore County (UMBC) with a bachelor's in Chemical and Biomolecular Engineering. She earned her master's (2000) and doctoral degree (2004) in Chemical and Biomolecular Engineering at the University of Pennsylvania. Eniola-Adefeso's research interest in the design and evaluation of particulate carriers has contributed significantly to advancing the field of vascular-targeted drug delivery, which is applicable in various diseases, including cancer and heart and lung diseases. Recent discoveries from her lab led to two US patent filings, one of which was recently licensed to Orange Grove Bio, which formed a startup with Dr. Eniola-Adefeso as the CSO. In recognition of her pioneering research, she has received numerous research awards, including the NSF CAREER award, Lloyd Ferguson Young Investigator Award, American Heart Association Innovator Award, and the BMES MIDCAREER Award. She is a Fellow of the American Institute for Medical and Biological Engineers (AIMBE) and Biomedical Engineering Society (BMES) and is appointed to the NIH BTSS study section. Dr. Eniola-Adefeso currently serves on the UM's CoE executive committee (Elected), Biosciences Initiative Coordinating Committee (BICC), and Provost's Academic Affairs Advisory Committee. She is currently a Deputy Editor for Science Advances and on the board of directors for BMES. Her research is currently funded by multiple grants from the NIH National Heart, Lung and Blood Institute, AHA, and the National Science Foundation.

Shannon L. Servoss, Ph.D.
Associate Professor
Ralph E. Martin Department of Chemical Engineering
University of Arkansas

"*Peptoid Microspheres: Characterization and Applications*"

Abstract:

Peptoids are protease-resistant oligomers that harness similarities to peptides for biomimetic functionality. They have potential for use in biomedical applications, including disease detection and biosensors, due to their high bioavailability and low immunogenicity. The incorporation of chiral, aromatic side chains in the peptoid sequence allows for the formation of distinct secondary structures and self-assembly into supramolecular assemblies, including microspheres. Peptoid microspheres can be coated onto substrates for use in biosensor technologies, tissue engineering platforms, and drug-delivery systems. In order to be useful for these applications, the peptoid coatings must be robust under physiological conditions. Work in our lab shows that microsphere size decreases with increasing peptoid helicity and the positively charged side chains are positioned on the outside of the microspheres. The peptoid microsphere coatings are robust under physiological conditions, but degrade in acidic conditions (pH < 7) and at low ionic strengths (< 150 μM). Our lab has tested the performance of the peptoid microsphere coatings for ELISA microarray and tissue engineering. The increased surface area provided by the peptoid microspheres leads to increased dynamic range for ELISA microarray experiments. The coatings have been shown to be non-toxic to various cells and facilitate the differentiation of neuronal stem cells to neurons.

Biosketch

Dr. Shannon Servoss received her bachelor's degree in Chemical Engineering from The University of Michigan, where she worked in the laboratory of Dr. Mark Burns. Her graduate work was completed at Northwestern University under the advisement of Drs. Annelise Barron and Mark Johnson. The focus of her thesis was peptoid-based mimics of lung surfactant protein B. After receiving her Ph.D., Shannon completed a postdoctoral position at Pacific Northwest National Laboratory working with Drs. Richard Zangar and Cheryl Baird. Here she worked on utilizing single chain antibody fragments for ELISA microarray. Shannon joined the faculty at University of Arkansas in 2007, where she is currently an Associate Professor of Chemical Engineering and Co-Director of the Office of Undergraduate Research. Her research group focuses on the design and characterization of peptoids for biomedical applications.

Allison Goins, Ph.D.
Research Engineer
Georgia-Pacific

"Experiences in Industry and Science Communication"

Biosketch:

Allison Goins, Ph.D. is a research engineer at Georgia-Pacific in the Building Products business unit and works on the development of new construction-related products. During her time at Georgia-Pacific Allison has led multiple projects with associated values over $5 million and filed more than 5 patents. Although Allison currently works in building materials this is not what she did her graduate research in. Before joining Georgia-Pacific Allison was a Ph.D. student at the University of Florida in the Department of Materials Science and Engineering. Working in the laboratory of Dr. Josephine Allen, Allison studied biomaterial implants to promote tissue regeneration. During her time as a graduate student, Allison co-authored 6 publications, 3 of which were first-author publications and filed 1 invention disclosure. Dr. Goins is also the face behind the YouTube channel *Relatable Science*, a science education channel focusing on materials science and how it relates to popular culture.

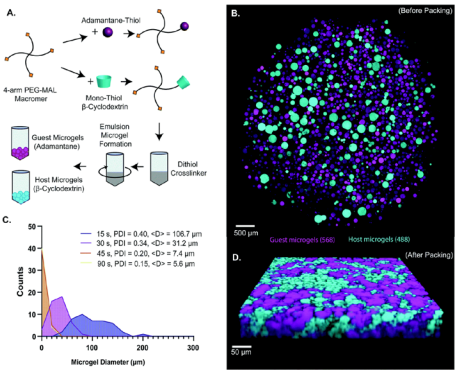
Live Student Talks

"Interlinked PEG-MAL Granular Hydrogels for Rapid Cell Migration"

Adrienne E. Widener[1], Thomas E. Angelini[2], Edward A. Phelps[1]

Department: J. Crayton Pruitt Department of Biomedical Engineering[1], Department of Mechanical and Aerospace Engineering[2]

Abstract: Polyethylene glycol (PEG) hydrogels have long been used in regenerative medicine and in vitro modeling due to their similarity to the extracellular matrix, biocompatibility, and off-the-shelf chemistry. However, due to the nano-porous crosslinking structure of these gels, cell must enzymatically degrade the crosslinks to migrate through the scaffold and weakening the mechanical integrity of the gel. Recently, granular hydrogels have emerged as a versatile platform for tissue engineering. These granular hydrogels are made from hydrogel microparticles either in a jammed state or interlinked via a secondary crosslinking network. In this study, we developed a polyethylene glycol maleimide (PEG-MAL) scaffold interlinked with guest-host interactions. These guest-host interactions are non-covalent and reversible interactions that provide structural stability, self-healing, injectability and an open interstitium that enables the study of rapid cell migration and immune cell-to-cell interactions. As an example application, we conducted a transwell invasion study to observe the ability of THP-1 monocytes to invade the granular hydrogel scaffold as compared to conventional bulk PEG hydrogels. The open interstitium and stability of the granular hydrogels interlinked with guest-host molecules enabled rapid migration of THP-1 monocytes into the bulk of the scaffold.



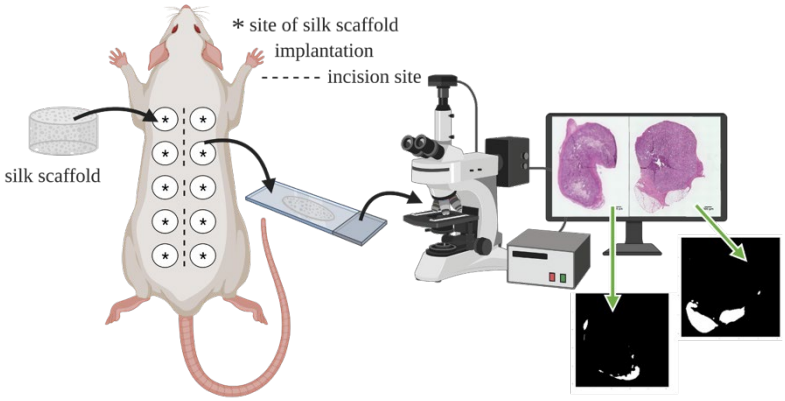
"Jointly Optimized Spatial Histogram U-Net Architecture (JOSHUA) for adipose tissue identification in histological images of lyophilized silk sponge implants"

Joshua Peoples[1], **Julie Jameson**[2], Nisha Kotta[3], Whitney Stoppel[2], Alina Zare[1]

Department: Department of Electrical and Computer Engineering[1], Department of Chemical Engineering[2], J. Crayton Pruitt Department of Biomedical Engineering[3]

Abstract: Biomaterials available for surgeons that are applicable for large soft tissue injuries can range from natural to synthetic materials. Silk fibroin, a protein extracted from Bombyx mori silkworm cocoons, has gained interest because silk fibroin has mechanical, structural, and chemical parameters that can be tuned to allow for a wide scope of final biomaterial formulations. When designing such biomaterials for the treatment of various soft tissue injuries and disorders, one must consider the extent of adipose tissue accumulation after biomaterial implantation. For example, biomaterials for skeletal muscle injuries and diseases should avoid extensive adipose tissue deposition as adipose tissue accumulation is a hallmark of disease pathology. Thus, it is critical that we understand how biomaterial formulation influences native adipose tissue accumulation in addition to promoting infiltration and regeneration of the tissue of interest (e.g., skeletal muscle). In this work, we subcutaneously implanted extracellular matrix-silk fibroin composite lyophilized sponges of varying compositions and noted varying degrees of adipose tissue accumulation at the site of biomaterial degradation over 8 weeks. However, current strategies for quantifying adipose tissue after biomaterial implantation are often tedious and prone to bias by the image analyzer. To combat this, we propose a convolutional neural network (CNN) model with novel spatial histogram layer(s) that can more accurately identify and segment regions of adipose tissue in images of hematoxylin and eosin stained sections. Use of the CNN model allowed for determination of the optimal formulation for the biomaterial that in this case, limited adipose tissue formation compared to other scaffold formulations. To obtain these results, we first compared our proposed method, Jointly Optimized Spatial Histogram U-Net Architecture (JOSHUA), to the baseline U-Net model currently used in biomedical image segmentation as well as to a version of both models with a supplemental attention mechanism (JOSHUA+ and U-Net+). The inclusion of histogram layer(s) in our models indicates improved performance through qualitative and quantitative (dice coefficient, intersection over union) evaluation. We

also introduce a new histological dataset and the code for our experiments are publicly available. As far as we know, this is the first time CNN models have been proposed to evaluate adipose tissue in images from biomaterial implants. This will have wide applicability to the biomaterial community as it can be a tool to study adipose tissue accumulation in response to biomaterial implants in an injury environment. Future work aims to improve the model design and investigate weakly supervised learning.

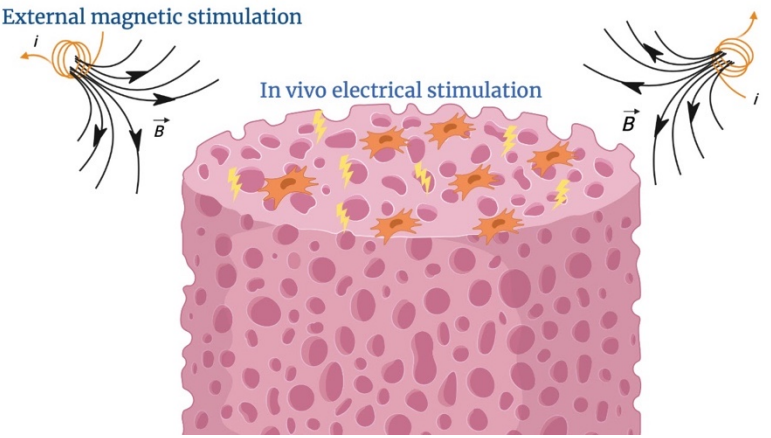


"Composite Magnetoelectric Scaffolds for Tissue Regeneration"

Noah D. Ferson, Amanda M. Uhl, and Jennifer S. Andrew

Department: Department of Materials Science and Engineering

Abstract: Electric fields are ubiquitous within wound healing environments and promote a surge of growth factors, proteins, and modifications in gene expression to promote regeneration. This can be leveraged to aid in the design of composite scaffolds that coax endogenous cues to promote regeneration. Previous reports demonstrate how the application of alternating electric fields across an injured nerve gap led to an accelerated upregulation of neurotrophic factors, actin, tubulin, and GAP-43 (a growth-associated gene). These effects resulted in a conspicuous acceleration in nerve regeneration. A major challenge for the field of regenerative medicine still lies in how to apply suitable electric fields in vivo in a minimally invasive manner. Current methodologies often require the use of invasive electrical leads or implanted power supplies. Magnetoelectric (ME) materials possess the intrinsic functionality to apply electric fields in vivo with the application of an external magnetic field. As a result, we have developed a ME nanocomposite where ME nanomaterials are dispersed within a collagen-hydrogel scaffold. Preliminary cytotoxicity studies show the cobalt ferrite-barium titanate nanowires were not toxic to PC-12 neuronal like rat cells. The effects these ME nanocomposites have on cellular proliferation and differentiation in hydrogel systems will also be presented, demonstrating their potential for tissue regeneration.

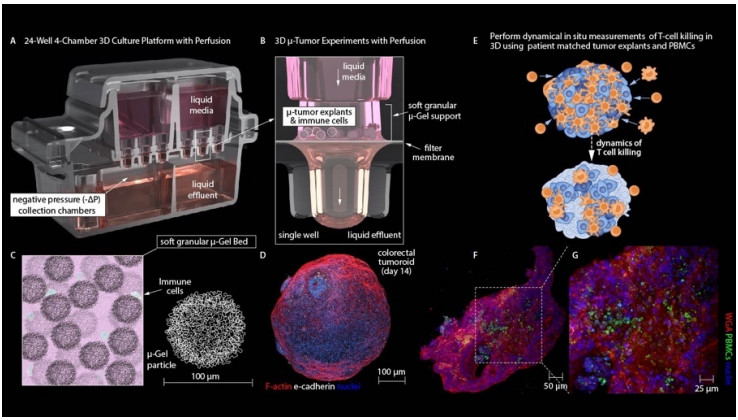


"Engineering the spatial and temporal dimensions of the microenvironment to probe immune response to anti-PD-1 therapy "

Duy T Nguyen, Juan Uruena Vargas, Ryan A Smolchek, Diego Ivan Pedro, Jack E Famiglietti, Gabriel Jose Rosa, Matthew A Kis, Issay Suzuki, Jiho Kim, Mathew A. Schaller, W. Gregory Sawyer

Department: Department of Mechanical and Aerospace Engineering

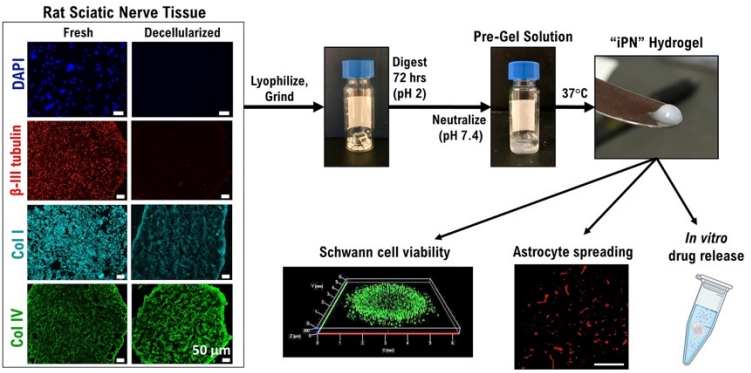
Abstract: Immunotherapy has gained significant popularity in recent years due to the discovery of a key target: programmed cell death-1 (PD-1) and programmed cell death ligand-1 (PD-L 1) pathway. Blocking this novel pathway alone or in combination with other therapeutic regimens has been proved to be a promising approach in the fight against many cancers. Current models available for screening cancer therapeutic drugs have limitations such as the absence of autologous immune cells – cancer cells interactions, non-trivial difference in cellular response in 2D culture, and the inaccurate representation of human cancer heterogeneity in animal models. Here, we developed a novel 3D culture platform enabling the long-term ex vivo coculture of colorectal cancer (CRC) explants and patient-matched PBMCs as a preclinical model for high-throughput anti-PD-1 drug screens. The resulting system has controlled perfusion of fresh media through soft granular microgels in which biological samples are suspended in place and kept viable for a long time. The ultralow yield stress (< 2 Pa) property of the microgels enables immune cell motility and interaction with CRC. This system could offer a preclinical model that closely retains the heterogeneity of the tumors and potentially helps identify intrinsic physiological parameters enabling drug response.



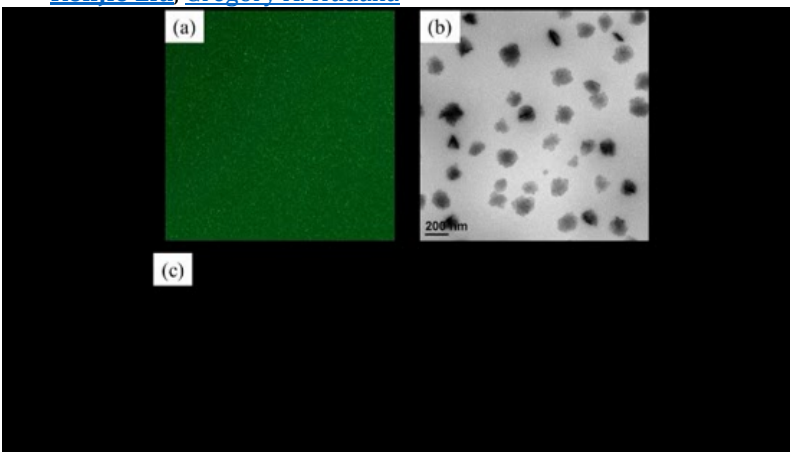
On-Demand Rapid-fire Student Talks

From the J. Crayton Pruitt Department of Biomedical Engineering

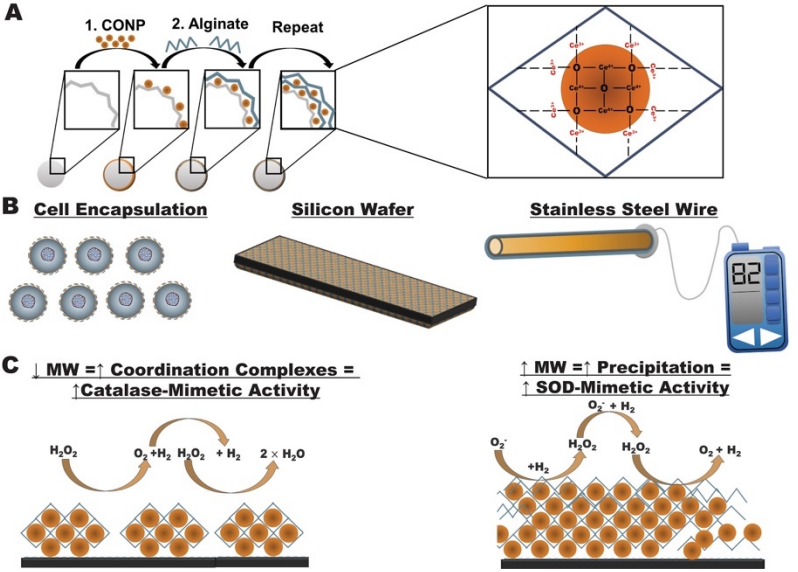
A. *"Assessing the Potential of a Decellularized Peripheral Nerve-based Hydrogel as a Spinal Cord Injury Therapeutic Delivery Vehicle"*
Deanna Bousalis, Michaela McCrary, Nora Hlavac, Ashley Evering, Shruti Kolli, Natalie Vaughn, Christine E. Schmidt



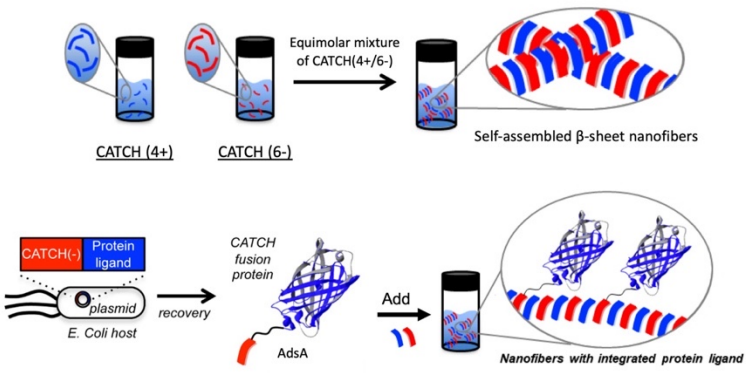
B. *"Co-assembled peptide nanoparticles for enzyme delivery"*
Renjie Liu, Gregory A. Hudalla



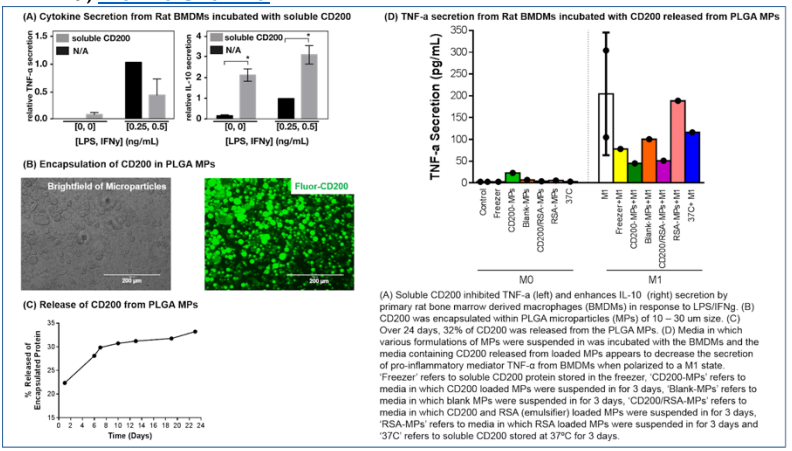
C. *"Engineering Cerium Oxide Nanoparticle-based Coatings to mitigate Oxidative Stress and Foreign Body Response to Biomaterials"*
Nicholas Abuid, Kerim Gattas Asfura, Caterina Zientek, Jose Torres, Cristina Isusi Silgo, Cherie Stabler



D. *"Hydrogels fabricated from co-assembling peptides for immunomodulatory enzyme delivery"*
Bethsymarie Soto-Morales, Renjie Liu, Gregory Hudalla

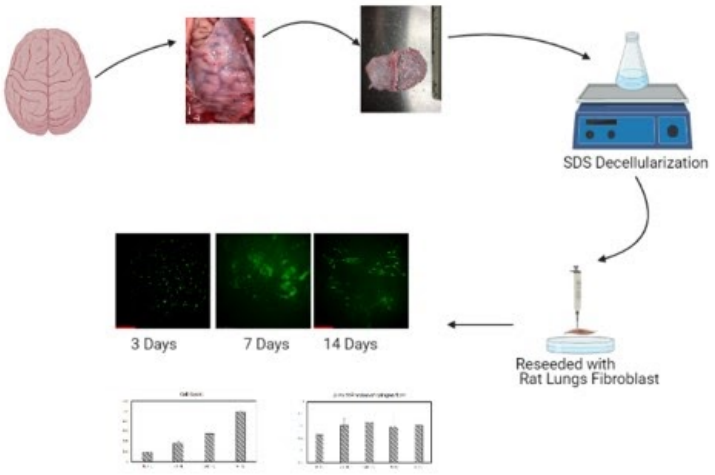


E. *"Immunomodulation of Synovial Macrophages in PTOA"*
Shreedevi Kumar, Joseph Hsu, Kiara Chan, Kyle Allen, Wendy Liu, Blanka Sharma

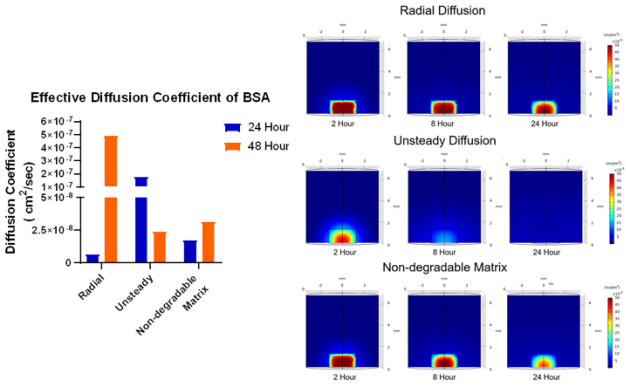


(A) Soluble CD200 inhibited TNF-a (left) and enhances IL-10 (right) secretion by primary rat bone marrow derived macrophages (BMDMs) in response to LPS/IFNg. (B) CD200 was encapsulated within PLGA microparticles (MPs) of 10 – 30 um size. (C) Over 24 days, 32% of CD200 was released from the PLGA MPs. (D) Media in which various formulations of MPs were suspended in was incubated with the BMDMs and the media containing CD200 released from loaded MPs appears to decrease the secretion of pro-inflammatory mediator TNF-α from BMDMs when polarized to a M1 state. 'Freezer' refers to soluble CD200 protein stored in the freezer, 'CD200-MPs' refers to media in which CD200 loaded MPs were suspended in for 3 days, 'Blank-MPs' refers to media in which blank MPs were suspended in for 3 days, 'CD200/RSA-MPs' refers to media in which CD200 and RSA (emulsifier) loaded MPs were suspended in for 3 days, 'RSA-MPs' refers to media in which RSA loaded MPs were suspended in for 3 days and '37C' refers to soluble CD200 stored at 37°C for 3 days.

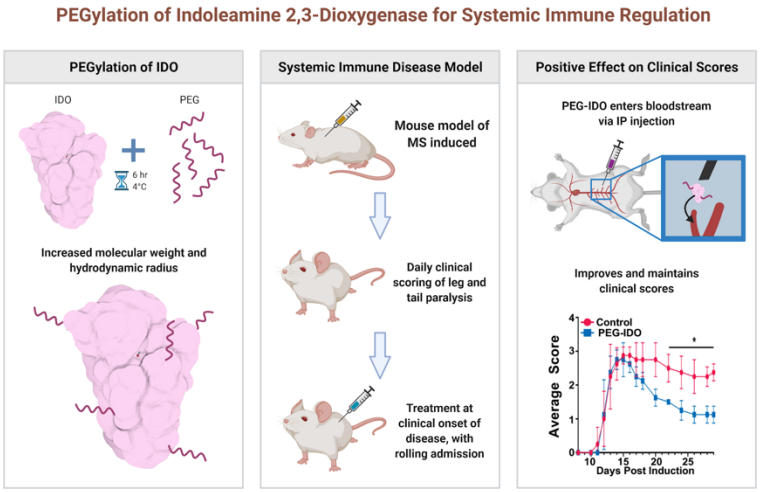
F. *"In vitro study of tissue engineered dura patch as a dura replacement"*
Ashma Sharma, Lakiesha Williams



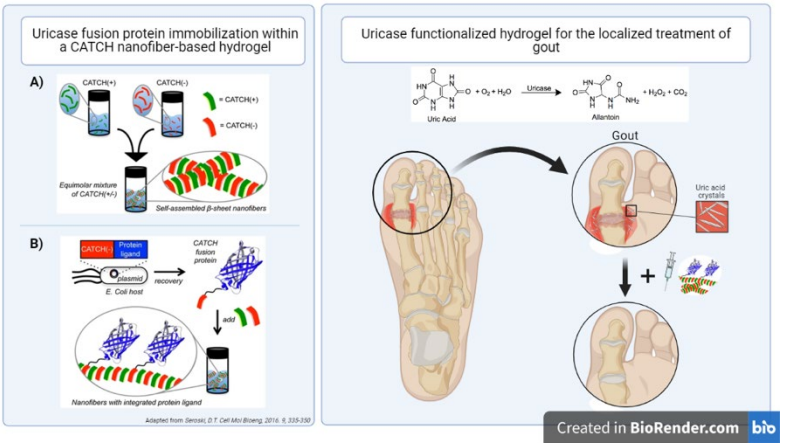
G. *"Modeling Diffusion of Proteins from PEG-Based Hydrogels Utilized for Investigating Natural Killer Cell Migration"*
Tiffany Conklin, Madison Temples, Blanka Sharma



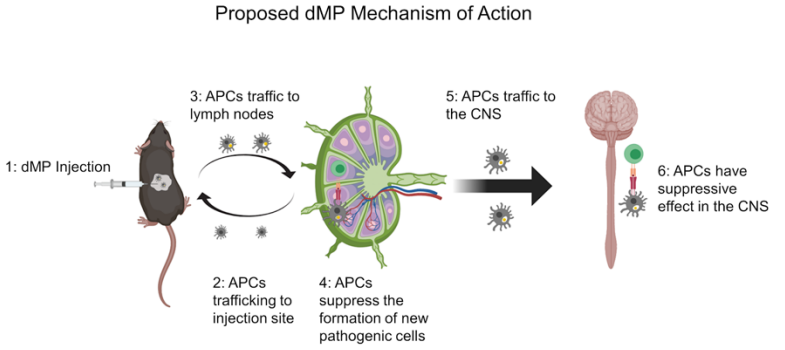
H. *"PEGylation of Indoleamine 2,3-Dioxygenase for Systemic Immune Regulation"*
Jennifer A. Simonovich, Alexander Kwiatkowski, Arun Wanchoo, Dorina Avram, Gregory Hudalla, and Benjamin G. Keselowsky



I. *"Uricase Functionalized Hydrogels for the Localized Treatment of Gout"*
Madeline Fuchs, Gregory Hudalla, Benjamin Keselowsky

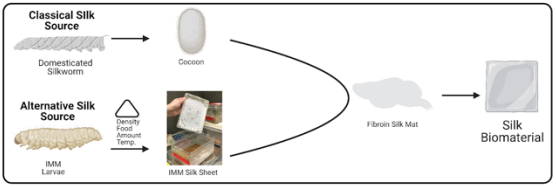


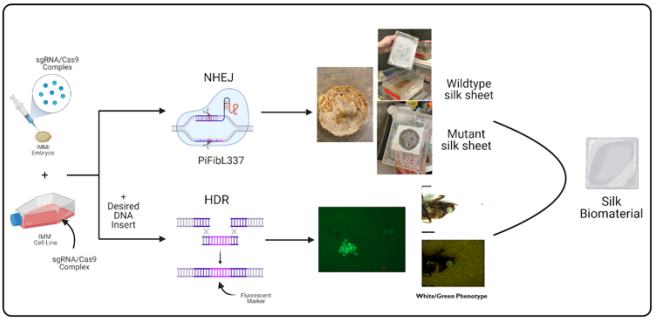
J. *"An Antigen-Specific Microparticle Formulation Shows Therapeutic Efficacy in Treating a Mouse Model of Multiple Sclerosis"*
Alexander J. Kwiatkowski, Joshua M. Stewart, Eric Y. Helm, Theodore T. Drashansky, Dorina Avram and Benjamin G. Keselowsky



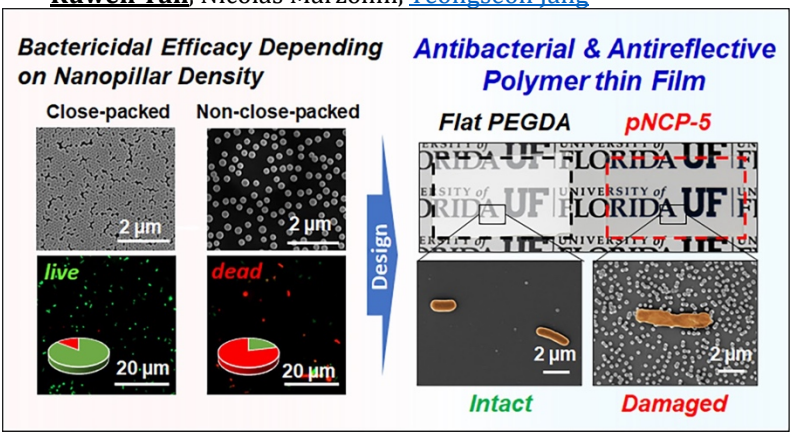
From the Department of Chemical Engineering

K. "*Leveraging Genome Editing in an Alternative Silk Fibroin Source for Enhanced Properties in Biomedical Applications*"
Bryce Shirk, Ali Lateef, and Whitney Stoppel

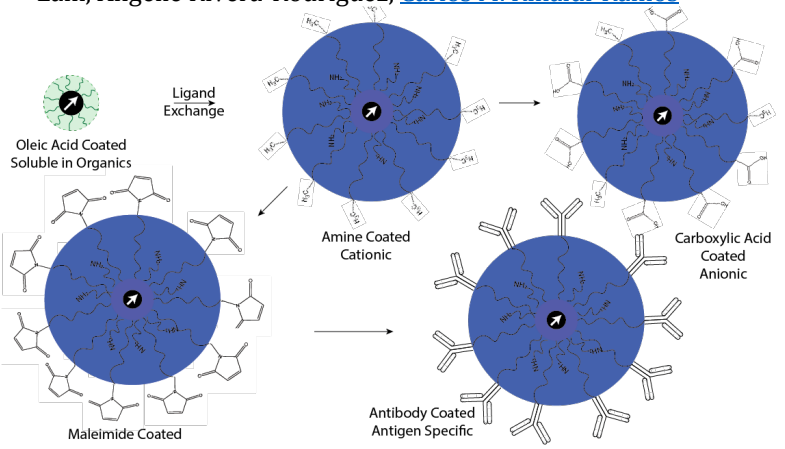




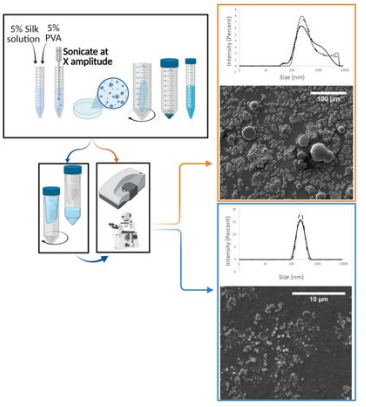
L. "*Engineering Nanostructure and Mechanical Stiffness of Polymer Thin Films to Achieve Surface Bactericidal Efficacy*"
Ruwen Tan, Nicolas Marzolini, Yeongseon Jang



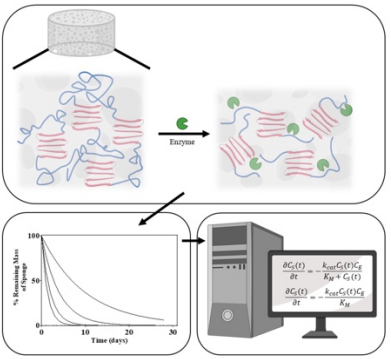
M. *"Functionalization of magnetic nanoparticles to influence charge-mediated and surface-receptor mediated in vitro cellular interactions"*
Hayden Good, Shehaab Savliwala, Sitong Liu, Andreina Chiu-Lam, Angelie Rivera-Rodriguez, Carlos M. Rinaldi-Ramos



N. *"Optimization of silk nanoparticles for use in encapsulating biologically relevant oxygen carriers"*
Marisa Pacheco and Whitney Stoppel

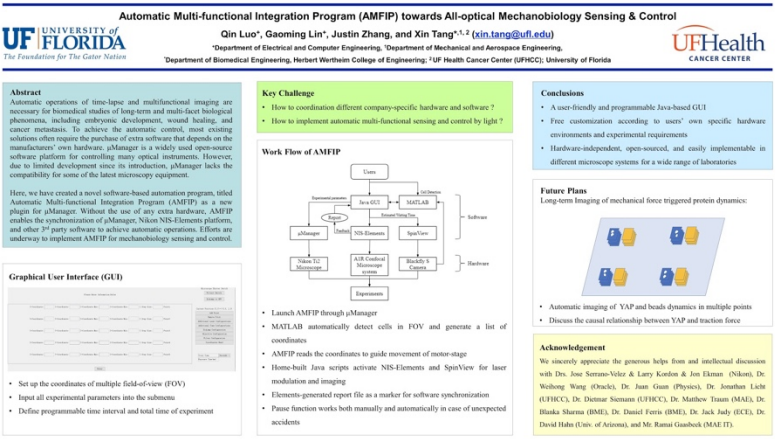


O. *"Estimating kinetic rate parameters for enzymatic degradation of lyophilized silk fibroin sponges"*
Julie Jameson, Jason Butler, Whitney Stoppel

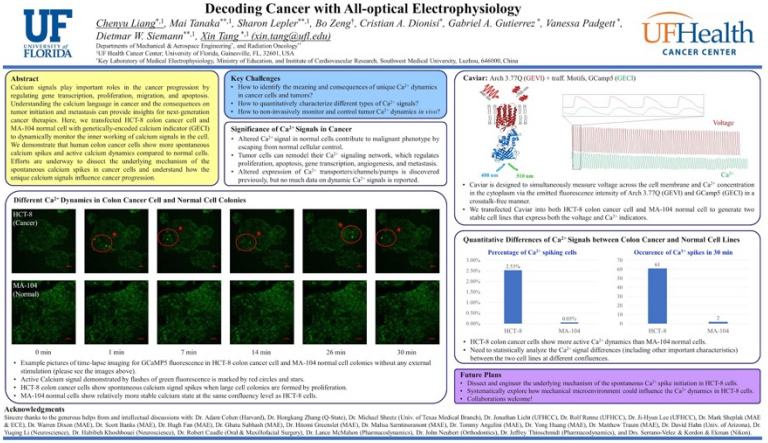


From the Department of Mechanical and Aerospace Engineering

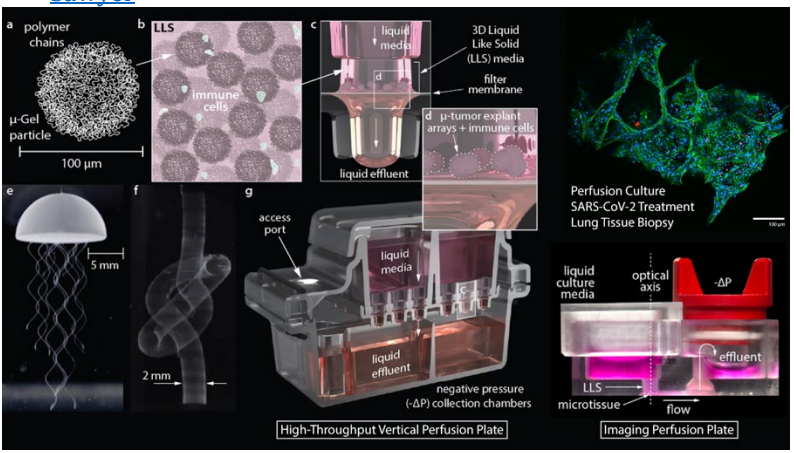
P. *"Automatic Multi-functional Integration Program (AMFIP) towards All-optical Mechanobiology Sensing & Control"*
Qin Luo, Gaoming Lin, Justin Zhang, and Xin Tang



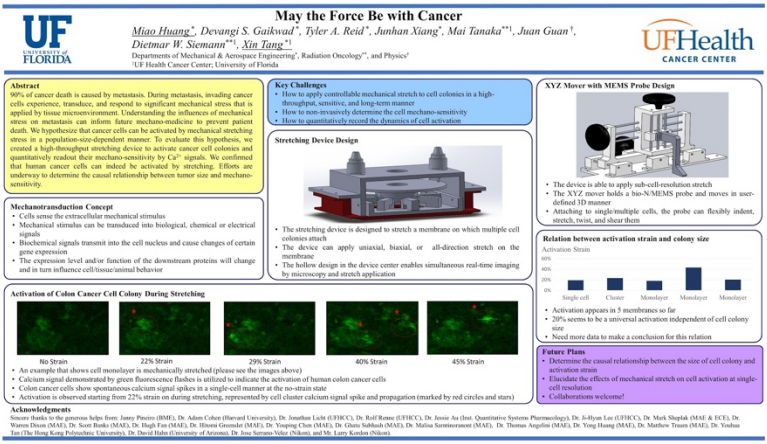
Q. “*Decoding Cancer with All-optical Electrophysiology*”
Chenyu Liang, Mai Tanaka, Sharon Lepler, Bo Zeng, Cristian A. Dionisi, Gabriel A. Gutierrez, Vanessa Padgett, Dietmar W. Siemann, Xin Tang



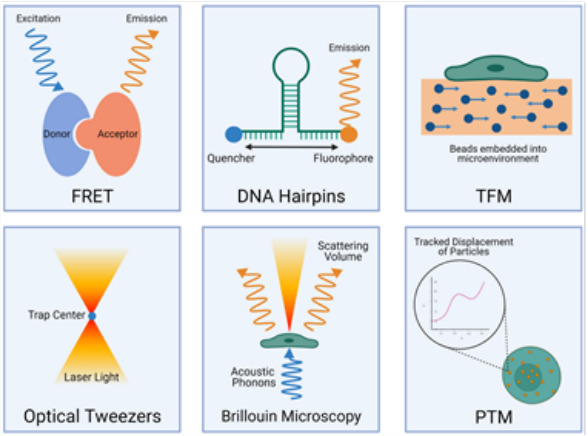
R. “*Development of 3D perfusion culture systems for high-throughput assays and microscopy imaging*”
Ryan Smolchek, Jack Famiglietti, Duy Nguyen, Juan Uruena Vargas, Diego Ivan Pedro, Jiho Kim, Gabriel Rosa, Gregory Sawyer



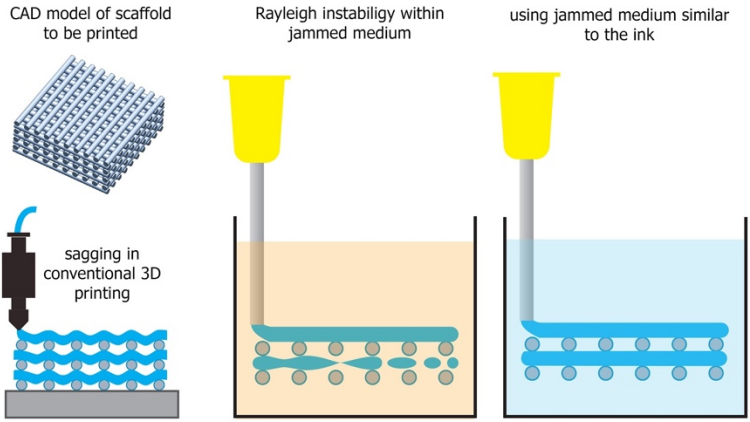
S. *"May the Force Be with Cancer"*
Miao Huang, Devangi S. Gaikwad, Tyler A. Reid, Junhan Xiang, Mai Tanaka, Juan Guan, Dietmar W. Siemann, Xin Tang



T. *"Mechanics in Cells: A Literature-based Technology Review"*
Sydney Yu, Li Keming, Xin Ying, Miao Huang, Charles Liang, Youhua Tan, and Xin Tang

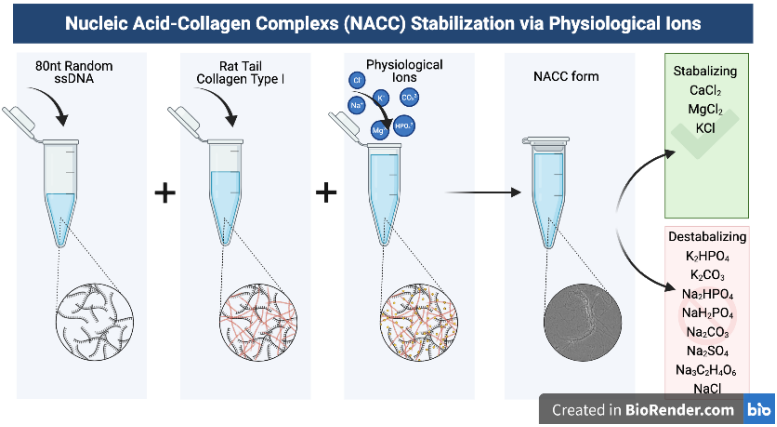


U. *"Ultra-low interfacial tension 3D printing of high definition silicone structures"*
Senthilkumar Duraivel and Thomas E. Angelini

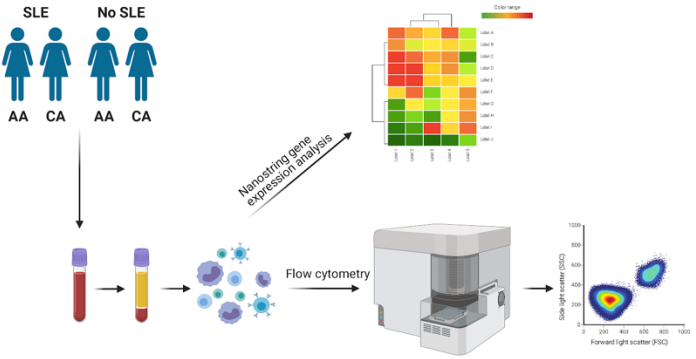


From the Department of Materials Science and Engineering

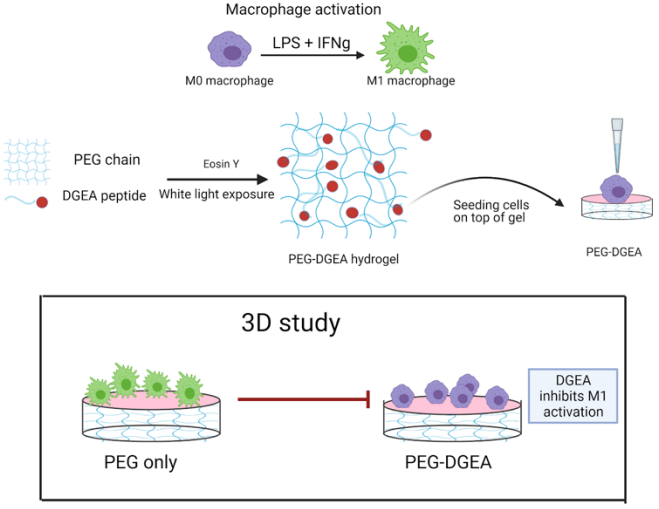
V. *"Nucleic Acid Collagen Complexes (NACC) Stabilization Via Physiological Ions"*
Paxton Guerin, Bryan D. James, and Josephine B. Allen



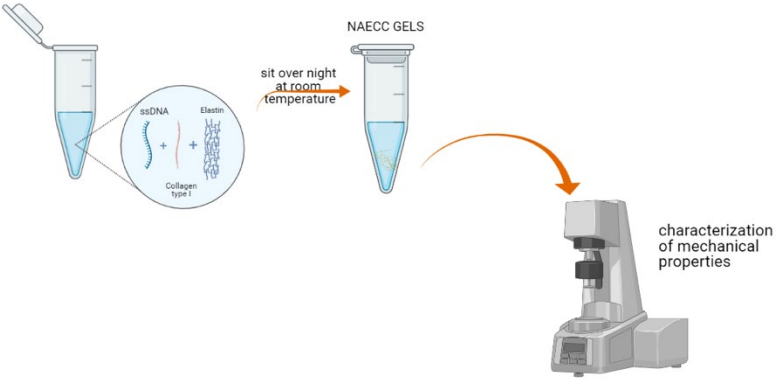
W. *"Characterization of monocyte activation states in patients with systemic lupus erythematosus"*
Holly Ryan and Erika Moore



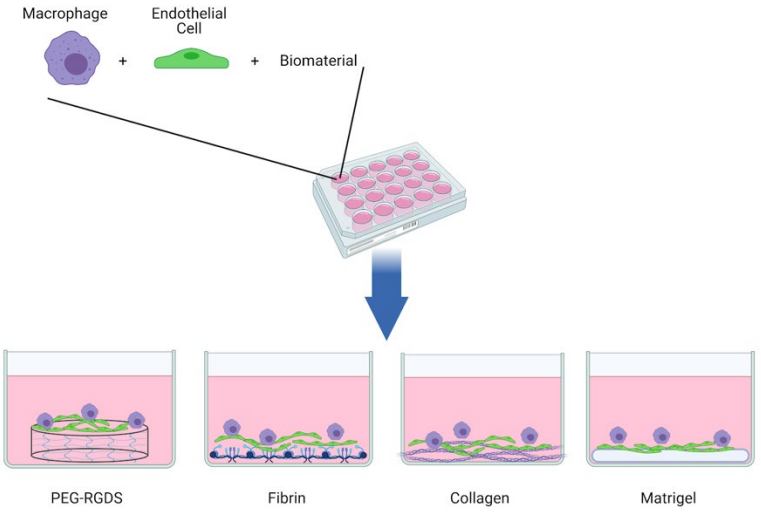
X. *"Designing a biomaterial to influence macrophage response and polarization"*
Aakanksha Jha and Erika Moore



Y. *"Nucleic Acid Elastin Collagen Complex (NAECC) Fibers and Gels Working Towards an ECM Mimic"*
Sophia Saenz, Bryan D. James, Josephine B. Allen



Z. *"Biomaterial Effects on Immune Cells and Vasculature"*
Justin Silberman and Erika Moore



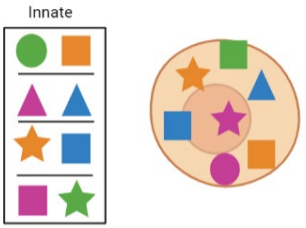
Outreach Activity Demonstration

A-Pop-Tosis

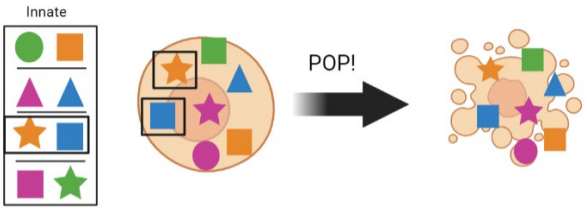
The Outreach Team will be discussing the immune system and how it responds to foreign objects such as bacteria, viruses, or biomaterials. They will lead us through both aspects of the immune system: the initial "innate" response and the long-term memory "adaptive" response. We'll learn how both work together to keep our bodies safe from harmful particles and can be influenced to deal with specific diseases through technologies such as vaccines or other biomaterials!

The virtual activity will put the audience in the shoes of innate or adaptive immune cells, and they will compete to see who can recognize and a-POP-tose the potential pathogens the fastest!

From this activity, we'll see where innate cells versus adaptive cells have advantages compared to each other, and in what way they can best work together to fight off infection!



In the above example, the innate team would look at their key and see that the orange star and the blue square are both present on the cell.



After seeing the pattern on the cell, the innate team can safely make the decision to POP the foreign object and be one step closer to clearing out the pathogens.