MEET THE FACULTY CANDIDATES

Candidates are displaying in alphabetical order by last name. Prospective employers are invited to attend and no event pre-registration is required however they must be registered for the BMES 2018 Annual Meeting. A business card will be required to enter the event.

COMPLETE DETAILED CANDIDATE INFORMATION AVAILABLE at www.bmes.org/faculty.

**Specialty - Biomaterials**

<table>
<thead>
<tr>
<th>Alessia Battigelli</th>
<th>Woo-Sik Jang</th>
<th>Sejin Son</th>
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<tr>
<td>John Clegg</td>
<td>Patrick Jurney</td>
<td>Young Hye Song</td>
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<td>R. Cornelison</td>
<td>Kevin McHugh</td>
<td>Ryan Stowers</td>
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<td>Yonghui Ding</td>
<td>Yifeng Peng</td>
<td>Varadraj Vernekar</td>
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<tr>
<td>Victor Hernandez-Gordillo</td>
<td>Shantanu Pradhan</td>
<td>Scott Wilson</td>
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<tr>
<td>Marian Hettiarachi</td>
<td>Eiji Saito</td>
<td>Yaoying Wu</td>
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<tr>
<td>Era Jain</td>
<td>Andrew Shoffstall</td>
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**Specialty - Biomechanics**

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<tr>
<th>Adam Abraham</th>
<th>Vince Fiore</th>
<th>Panagiotis Mistriotios</th>
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<tr>
<td>Edward Bonnevie</td>
<td>Zeinab Hajjarian</td>
<td>Simone Rossi</td>
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<tr>
<td>Alexander Caulk</td>
<td>Xiao Hu</td>
<td>Alireza Yazdani</td>
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<td>Venkat Keshav Chivukula</td>
<td>Heidi Kloefkorn</td>
<td>Rana Zakerzadeh</td>
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<td>Jacopo Ferruzzi</td>
<td>Yizeng Li</td>
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**Specialty - Biomedical Imaging**

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<tr>
<th>Mahdi Bayat</th>
<th>Chong Huang</th>
<th>Katheryne Wilson</th>
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<td>Zhichao Fan</td>
<td>Jingfei Liu</td>
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<td>Kihwan Han</td>
<td>Alexandra Walsh</td>
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**Specialty - BioMEMS**

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<tr>
<th>Jaehwan Jung</th>
<th>Aniruddh Sarkar</th>
<th>Mengxi Wu</th>
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**Specialty - Cardiovascular Engineering**

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<tr>
<th>Reza Avaz</th>
<th>Kristin French</th>
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**Specialty - Cellular Engineering**

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<tr>
<th>Annie Bowles</th>
<th>Kate Galloway</th>
<th>Kuei-Chun Wang</th>
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<tr>
<td>Alexander Buffone</td>
<td>Laurel Hind</td>
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<td>Mahsa Dabagh</td>
<td>Matthew Kutys</td>
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<tr>
<th>Specialty - Device Engineering (Microfluidics, Electronics, Machine-Body interface)</th>
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<tr>
<td>Taslim Al-Hilal</td>
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<td>Jungil Choi</td>
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<td>Haishui Huang</td>
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<th>Specialty - Drug Delivery</th>
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<td>Heather Gustafson</td>
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<th>Specialty - Molecular Engineering/Biophysics</th>
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<td>Felipe Garcia Quiroz</td>
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<th>Specialty - Nanotechnology</th>
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<td>Sambeeta Das</td>
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<td>Zeinab Jahed</td>
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<td>Brian Meckes</td>
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<th>Specialty - Neural Engineering</th>
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<tr>
<td>Tyler Clites</td>
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<td>Melanie Ecker</td>
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<td>Matthew Hemphill</td>
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<th>Specialty - Synthetic Biology</th>
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<td>Nichole Daringer</td>
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<td>Joseph Decker</td>
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<th>Specialty - Systems/Computational Biology</th>
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<tr>
<td>Sepideh Dolatshahi</td>
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<td>Kaitlin Fogg</td>
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<th>Specialty - Tissue Engineering/Regenerative Medicine</th>
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<tr>
<td>Ramkumar Annamalai</td>
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<td>Derfogail Delcassian</td>
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<td>Jonathan Grasman</td>
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<td>Vivian Lee</td>
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<td>Neil Lin</td>
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<td>Adam Mellott</td>
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<th>Specialty - Not Specified</th>
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<tr>
<td>Suman Bose</td>
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<tr>
<td>Joseph Chen</td>
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<td>Taisuke Kojima</td>
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ADAM C. ABRAHAM, PhD
Orthopedic Surgery, Columbia University, 390 Fort Washington Ave, #6E, New York, NY, 10033
aca2175@cumc.columbia.edu

Research Overview:
My multi-disciplinary background spans the fields of mechanical and biomedical engineering with additional training in metabolic diseases and immunology. My research expertise includes multi-scale biomechanics, inflammation, and musculoskeletal disease modeling. Specifically, my research is focused on how musculoskeletal joint structure and function is regulated by inflammatory signaling and uses surgical and genetic murine models of human disease, molecular biology, and multi-scale mechanics for applications in exercise adaptation, osteoarthritis, and intervertebral disc disease.

Education:
Ph.D. Mechanical Engineering, 2013, Colorado State University, Fort Collins, CO
M.S. Mechanical Engineering, 2009, Michigan Technological University, Houghton, MI
B.S. Mechanical Engineering, 2006, Michigan Technological University, Houghton, MI

Research/Work Experience:
• Visiting Research Scholar (July / August 2017) Institute of Infection, Immunity & Inflammation, Advisors: Neal Millar & Stavros Thomopoulos, College of Medical, Veterinary & Life Sciences at the University of Glasgow

Selected Publications:

Awards/Honors:
Columbia Univ./Univ. of Glasgow Research Exchange Award, 2017
Philadelphia Spine Research Society Meeting, 1st Place Poster, Biomechanics, 2015
R.L. Kirschstein National Research Service Award Institutional Fellowship (T32), 2013 – 2015
R.L. Kirschstein National Research Service Award Pre-Doctoral Fellowship (F31), 2011 – 2013
Michigan Space Grant Consortium Graduate Fellowship, 2010
TASLIM AHMED AL-HILAL, PhD
Pharmacy, Texas Tech university Health Sciences Center, 1300 Coulter Dr, Amarillo, Texas, 79106
taslim.a.al-hilal@ttuhsc.edu

Research Overview:
Deregulated angiogenesis or disorders of the vasculature contribute to numerous malignant, cardiovascular, or lung diseases. Molecular insight into these processes has generated new therapeutic opportunities, but controlled and site-specific regulation of a molecular signaling pathway remains a major challenge to current vascular-targeting therapies, i.e anti-angiogenic drugs indiscriminately target both physiological (good) and pathological (bad) vasculature. Thus, with a goal to identify a new molecular target that is only expressed in diseased but not healthy vessels, I discovered that a prion-like protein, doppel, is selectively expressed in pathological angiogenesis such as tumor-related, but not in normal vasculature. Animal and cellular models have been also instrumental in understanding the process of many vascular diseases, but they fail to recapitulate the human physiology. On the other hand, experimental models of blood vessels (organ-on-a-chip) are of great importance for understanding the pathophysiology of angiogenesis-dependent diseases, for screening purposes and for development of new and improved therapeutics and diagnostics. Thus, to create experimental systems recapitulating tissue- and organ-level physiology of blood vessels in-vitro, I have deployed the state-of-the-art microfluidic technology and developed a tissue-on-a-chip model, mimicking a multimodal complex disease afflicting pulmonary arteries, pulmonary arterial hypertension (PAH). Thus, my research interest focuses to explore the role of doppel, develop doppel-targeted therapeutics, and deploy microfluidic-based new tools to screen and identify new targets involved in vascular pathologies.

Education:
Ph.D., 2014; Seoul National University, Seoul, South Korea
MS, 2010; Seoul National University, Seoul, South Korea
B.Pharm, 2006; University of Development Alternative, Dhaka, Bangladesh

Research/Work Experience:
2015-Present, Post-doctoral Research Associate, School of Pharmacy, Texas Tech University Health Sciences Center 2014-2015, Research Scientist, Center for Theragnosis, Korea Institute of Science and Technology

Selected Publications:

Awards/Honors:
Recipient of the Texas Tech University Health Sciences Center Postdoctoral Career Enhancement Award, 2016
Recipient of Brain Korea 21 Scholarship for doctoral studies at Seoul National University, Seoul, 2010 - 2014
Recipient of Brain Korea 21 Scholarship for master studies at Seoul National University, Seoul, 2007 - 2010
RAMKUMAR T. ANNAMALAI, PhD
Biomedical Engineering, University of Michigan, 1101 Beal Ave, LBME 2166, Ann Arbor, MI, 48109
ramta@umich.edu

Research Overview:
As an independent researcher, I am interested in understanding the roles of the immune system in neotissue formation and applying this knowledge to the development of immunomodulatory therapies for musculoskeletal and vascular regeneration. To this end, I study the role of macrophages in physiological and pathological conditions to elucidate their regenerative potential. I also develop microengineered material systems and immunomodulatory strategies to make cellular and molecular therapies useful in treating disease and trauma. My research interests span both basic and translational research areas and can be categorized into following themes: 

(i) Regenerative immunology: In healing fractures, inflammation, osteogenesis, and angiogenesis are intimately linked. My preliminary studies show that the activated macrophages promote endochondral differentiation of MSC and enhance sprouting of endothelial cells in vitro. My goal is to study the role of macrophages in physiological and pathological ossification scenarios and harness their potential for developing clinically relevant bone regenerative therapies. My research will also shed light on immune contributions to vascularization to engineer material-based therapies for vascular diseases. 

(ii) Immunomodulation and immunoengineering: Immune cells infiltrate tissues swiftly after an injury or infection steered by their secretion of MMPs. To deliver drugs to such conditions, materials can be engineered to synchronize their response with the local inflammatory milieu. I plan to develop a flare-responsive ‘smart’ delivery system for inflammatory conditions that can titrate the drug release to synchronize with the inflammatory response. Further, I will also apply matrix-mediated immunomodulation techniques for creating an instructive microenvironment for immune cells to promote the regeneration of various tissues including bone and vasculature. Overall, my work as an independent researcher will revolve around immunological challenges and opportunities in regenerative medicine. My research will provide insights into the role of the innate immune response in tissue regeneration, as I embark on an independent research career in the field of immunomodulatory biomaterials and immunoengineering.

Education:
- PhD in Biomedical Engineering, Fall 2009 – 14 (GPA 3.9/4.0). Wayne State University.
- MS in Biomedical Engineering, Fall 2007 – 09 (GPA 3.9/4.0). Wayne State University.
- BTech (Bachelor of Technology) in Biotechnology, 2003 – 07 (1st class with distinction). Bharathidasan University, India.

Research/Work Experience:
- Assistant Research Scientist: (Since Aug 2017) Department of Biomedical Engineering at University of Michigan.
- Postdoctoral Research Fellow: (2014-2017) Department of Biomedical Engineering at University of Michigan.
- Graduate Research Assistant: (2009-2011, 2012-2014) Department of Chemical Engineering at Wayne State University.
- Thomas C. Rumble University Graduate Fellow: (2011-2012) Department of Biomedical Engineering at Wayne State University.
- Research Fellow: (Winter 2007) Department of Gastroenterology at Christian Medical College, Vellore, India.
- Biomedical Intern: (May-Dec 2008). Technology Management services, Henry Ford Hospital, Detroit.

Selected Publications:
- Annamalai RT, Hong, Schott, Tiruchinapally, Levi and Stegemann. bioRxiv, 2018; 10.1101/362772, Modular microtissues for the regeneration of functional bone in large defects.

Awards/Honors:
- Thomas C. Rumble Fellowship, 2011-2012, Wayne State University, USA
- Student Travel Award: 2010, 2012: Biomedical Engineering National Society (BMES), USA
**REZA AVAZ, PhD**
Institute for Computational Engineering and Sciences, Department of Biomedical Engineering, University of Texas (UT), Austin, TX rezaavaz@ices.utexas.edu

**Research Overview:**
Cardiac modeling and simulation are important tools that can (i) advance our understanding of the fundamental mechanisms of cardiac physiology and pathophysiology and (ii) improve the efficacy of the personalized cardiac medicine including simulation-guided surgery planning and optimal design of stem-cell interventions.

My research interests are to develop and utilize multiscale computational frameworks that integrate innovative material models, experimental biomechanical data, and high-fidelity structural imaging to gain unprecedented insights into the normal, pathophysiological and cell-based reparative processes of the heart. Specifically, my research program will focus on developing integrated models towards three synergic goals:

(i) Understanding and predicting the remodeling taking place at cellular, tissue, and organ levels of the heart during the development of structural heart diseases such as cardiac hypertension and infarction.

(ii) Predicting the local structural and mechanical adaptations of diseased myocardium upon stem-cell interventions to assist the optimal design of cell injection strategies.

(iii) Guiding the design of 3-D printed cardiac tissues based on the prediction of the target properties and understanding how the printing conditions and properties of feedstock bioink govern the properties of the tissues printed at high fidelity.

**Education:**
Ph.D. | Mechanical Engineering & Applied Mechanics, 2009-2014, University of Pennsylvania
M.S. | Mechanical Engineering, 2005-2007, Sharif University of Technology, Tehran, Iran
B.S. | Mechanical Engineering, 2000-2005, Iran University of Science and Technology, Tehran, Iran

**Research/Work Experience:**
Spring 2009 | Lecturer, University of Damavand, Damavand, Iran
2007-2009 | Research Assistant, Sharif University of Technology, Tehran, Iran

**Selected Publications:**

**Awards/Honors:**
- NIH/NHLBI Pathway to Independence (K99/R00) Award, 2018-2023
- American Heart Association Career Development Award (formerly known as SDG Award), 2018
- NIH/NHLBI Ruth L. Kirschstein NRSA Postdoctoral Fellowship (F32), 2016-2018
ALESSIA BATTIGELLI, PhD
Center for Biomedical Engineering, Brown University, 184 Hope Street, Providence, RI, 02912
alessia_battigelli@brown.edu

Research Overview:
My research interests stand at the intersection of chemistry, biomaterials and nanotechnology. I am a material chemist and I have worked in highly interdisciplinary projects. My doctoral research was focused on the surface modification of carbon nanotubes (CNTs) for gene therapy. The covalent functionalization of CNTs with positively charged dendrons and targeting peptides led to the effective complexation and delivery of genetic material to cancer cells and to the specific targeting of mitochondria. My interests in nanomaterials led me to pursue a postdoctoral research in 2D self-assembled materials based on peptoids. Using such sequence define polymers, I designed a novel nanoplatorm capable to display bioactive functionalities on its surface and to readily interact with guest proteins. This strategy allows me to develop biosensing systems for the detection of threat and warfare agents. During my current postdoc at Brown I have broadened my expertise in biomedical engineering to study the interactions between materials and biology. Exploiting bioorthogonal chemistry, I developed a new methodology to anchor mesenchymal stem cells to a polymeric hydrogel surface, with the ultimate goal to create a biomaterial with antimicrobial properties. In my future research I want to integrate my expertise in chemistry and biomaterials to tackle some of the most important challenges in medicine. I want to apply my knowledge in sequence define polymers towards the development of novel materials for drug delivery and regenerative medicine.

Education:
• Ph.D. in Chemistry and Pharmaceutical Sciences from “Università degli Studi di Trieste” (Italy) and “Université de Strasbourg” (France), 2012
• Diploma (5 years degree - Combined Bachelor’s and Master’s degree) in Chemistry and Pharmaceutical Technologies, “Università degli Studi di Trieste” (Italy), 2008

Research/Work Experience:
• Postdoctoral Research Associate, 2016-Present, Brown University, Center for Biomedical Engineering, Providence (RI), Department of Engineering, Advisor: Dr. Anita Shukla
• Postdoctoral Research Associate, 2014-2016, Lawrence Berkeley National Laboratory, The Molecular Foundry, Biological Nanostructures Facility, Berkeley (CA), Advisor: Dr. Ronald Zuckermann
• Postdoctoral Research Associate, 2012-2013, Centre National de la Recherche Scientifique, Institut de Biologie Moléculaire et Céllulaire, Strasbourg (France), Advisor: Dr. Alberto Bianco
• Graduate Research Fellow, 2009-2012, Università degli Studi di Trieste (Italy) and Université de Strasbourg (France), Co-advisors: Prof. Maurizio Prato and Dr. Alberto Bianco
• Erasmus Undergraduate Researcher, 2008, School of Pharmacy, University College London, London (UK), Advisor: Prof. Oya Alpar

Selected Publications:

Awards/Honors:
• “Doctor Europaeus” title (international honorary qualification given in addition to the doctoral diploma), 2012
• Erasmus Placement Grant (graduate research support) 2010
• Vinci Fellowship for Italian-French international research, 2009-2012
• Erasmus Grant (undergraduate research support), 2008
MAHDI BAYAT, PhD
Electrical Engineering and Computer Science, Case Western University, 10900 Euclid Avenue, 510 Glennan, Cleveland, Ohio, 44106
mahdi.bayat@case.edu

Research Overview:
My research interests are in computational and transnational biomedical imaging with emphasis on ultrasound-based methods. In computational domain, I am interested in devising novel image formation methods based on different combinations of excitation and sensing mechanisms. In this regard, I am specifically interested in image formation using model-based and optimization-based methods as well as data-driven approaches. The applications include but not limited to:
- Low dimensional and sparsity-driven data separation methods with applications in image clutter removal
- Inverse methods for imaging mechanical properties (e.g. elastography, viscoelasticity imaging etc.)
- Machine learning approaches for image formation and image analysis.

In translational imaging my research addresses problems in angiographic imaging such as label-free ultrasonic imaging of microvasculature and low-speed hemodynamics as well as non-invasive, in vivo visualization and characterization of tissue mechanical properties.

Education:
PhD, Electrical Engineering, University of Minnesota, Twin Cities, 2014
MS, Electrical Engineering, University of Minnesota, Twin Cities, 2014
BSc, Electrical Engineering, Iran University of Science and Technology, Tehran, Iran, 2004

Research/Work Experience:
Adjunct Assistant Professor, Department of Electrical Engineering and Computer Sciences, Aug 2018-Present
Research Associate, Ultrasound Research Lab, Mayo Clinic, Jun 2016-Aug 2018
Research Assistant, Ultrasound Imaging and Signal Processing Lab, Department of Electrical and Computer Engineering, University of Minnesota, Aug 2011-Jun 2014
Visiting Research Scholar, Ultrasound Research Lab, Mayo Clinic Jun-Aug 2011

Selected Publications:

Awards/Honors:
• R21 trailblazer early investigator grant, National Institute of Biomedical Imaging and Bioengineering (in review)
• Acous. Soci. of America press coverage on breast cancer viscoelasticity imaging May 2016
• American Inst. of Ultras. in Medicine new investigator excellent presentation award Mar 2016
• University of Minnesota's council of graduate students (COGS) travel award May 2014
• 14th International Symposium on Therapeutic Ultrasound travel grant, Apr 2014
EDWARD D. BONNEVIE, PhD
Orthopaedic Surgery and Bioengineering, University of Pennsylvania, 110 Stemmler Hall, Philadelphia, PA, 19104
edbon@pennmedicine.upenn.edu

Research Overview:
The overarching goal of my research is to develop multi-scale approaches to probe the mechano-biological basis of soft tissue injury and degeneration, with the end goal of guiding therapeutic intervention. I began my research career as an undergraduate, working with Prof. Dave Burris at the University of Delaware, where I developed devices to probe the micromechanics of soft tissue (cartilage, meniscus, TMJ disc) [1]. Following my time at Delaware, I joined Prof. Larry Bonassar’s lab at Cornell University. There, I developed techniques to probe the molecular basis of cartilage lubrication [2] and determine how poor lubrication leads to chondrocyte dysfunction [3]. These findings advanced functional tissue engineering processes, where I developed protocols to engineer lubricating surface layers in engineered meniscus tissue [4]. After leaving Cornell, I joined Prof. Rob Mauck’s lab in Orthopaedic Surgery and Bioengineering at the University of Pennsylvania as a postdoctoral fellow in the Pennsylvania Muscle Institute and as an NRSA Fellow. My current work is focused on determining how evolving mechanical microenvironments dictate cellular phenotype in the context of soft tissue injury and subsequent remodeling in complex tissues, including the intervertebral disc [5]. For this, I’ve coupled in vivo, ex vivo, and in vitro models to study how the evolving microenvironment in the disc provides biophysical cues to either promote or inhibit the emergence of fibrotic phenotypes. By connecting both animal and scaffold based assays, I screened small molecule inhibitors to abrogate such aberrant responses. Looking forward, I aim to couple my background in mechanical engineering with my postdoctoral work in mechanobiology to focus on determining how the mechanisms of strain-transfer from a tissue surface to the cell nucleus are altered in the context of injury and degeneration. This will enable high throughput screening of small molecules that can inhibit aberrant responses or promote anabolic responses after injury in order to alter the course of degeneration and regeneration in load bearing-tissues.

Education:
Ph.D. - 2016 Cornell University, Biomedical Mechanics, Mechanical Engineering
B.M.E. - 2011 University of Delaware, Mechanical Engineering Summa Cum Laude with Distinction

Research/Work Experience:
2016 – Present: NIH NRSA Postdoctoral Fellow, University of Pennsylvania, Departments of Orthopaedic Surgery and Bioengineering, Mauck Lab
2011 – 2016: NSF Graduate Research Fellow Cornell University, Department of Mechanical Engineering, Bonassar Lab
2009 - 2011: Science and Engineering Research Scholar University of Delaware, Department of Mechanical Engineering, Burris Lab

Selected Publications:

Awards/Honors:
2018 NIH Ruth L. Kirschstein National Research Service Award (F32) Individual Postdoctoral Fellowship
2018 Cellular and Molecular Bioengineering Shooting Star Postdoctoral Award (BMES)
2017 Orthopaedic Research Society New Investigator Recognition Award, San Diego CA
2017 NIH Ruth L. Kirschstein National Research Service Award (T32) Training Grant Appointee
2016 Sibley Prize for Excellence in Graduate Teaching Assistance
2012 National Science Foundation Graduate Research Fellowship
2011 NCAA DI Academic All-American (Track and Field/Cross Country)
SUMAN BOSE, PhD
K99/R00 Postdoctoral Fellow, Koch Institute, Massachusetts Institute of Technology, Cambridge, MA
sumanb@mit.edu

Research Overview:
My research program will develop new tools for interrogating complex biological systems at the single cell level, that can help identify new cellular players and uncover strategies cells use to execute system-level behavior. I will leverage recent advances in biomaterials, microfluidics, nanotechnology and molecular biology to build broadly applicable platforms, that can precisely profile biomolecules (e.g., RNA and protein) within single cells, perform targeted manipulations and examine cellular behaviors in situ. One of my immediate focuses is profiling miRNA and other noncoding RNA in single cells, and study how variations within a “homogenous” population of cells can affect cellular processes such as differentiation and drug resistance. Supported by a recently funded K99/R00 award, I have developed a high-throughput microfluidic platform that can profile miRNA within single cells and I am using it to study ES cells and leukemia cells from patients. Ultimately, this work will identify key molecular signatures that can lead to better prognostic markers and develop new targeted therapies to combat drug-resistant cancer. Another focus area is to develop new tools for studying cellular ensembles within the in vivo environment. In my postdoc funded by the JDRF fellowship, I have created a novel platform that allows transplanting and maintaining foreign cells within immunocompetent animals. I will leverage this platform to study how cells (e.g., immune cells) communicate and respond to different stimuli within the body. This research will develop strategies to create effective cell-based therapies (including immunotherapies) and reduce the side effects of current treatments. Collectively, my future research will yield transformative new technologies for comprehensively profiling complex biological system, and will enhance our understanding of cellular response, communication, disease, and therapeutics.

Education:
2014  Ph.D., Mechanical Engineering, Massachusetts Institute of Technology, USA
2009  M.S, Mechanical Engineering, Massachusetts Institute of Technology, USA
2007  B.Tech, Mechanical Engineering, IIT Kharagpur, India

Research/Work Experience:
2014-p resent: Postdoctoral Fellow in the laboratory of Drs. Daniel Anderson and Robert Langer, MIT
2012: Research Internship (Immunology), Adviser: Prof. Ulrich Von Adrian, Harvard Medical School.

Selected Publications:
• Bose S, Singh S, Hollatz M, Shen C, Lee CH, Dorfman DH, Karp JM, Karnik R, Affinity flow fractionation of cells via transient interactions with asymmetric molecular patterns, Scientific Reports, 3, 2013, p. 3724
• Bose S, et.al., A semianalytical model to study the effect of cortical tension on cell rolling, Biophysical Journal, 99(12), 2010. Total of 13 first or co-authored journal publications and co-inventor on 1 filed and 2 issued patent applications.

Awards/Honors:
Grants/Funding:
• NIBIB/NIH Pathway to Independence Award (K99/R00), 2018-23
• KI Mission Possible Grand Prize, 2016
• JDRF Postdoctoral Fellowship 2015-18
• Pappalardo Fellowship, MIT, 2007
Academic (selected):
• Keystone Future of Science Award (Sweden) 2017
• Top 40 under 40 Healthcare Innovators, MedTech Boston, 2016
• Outstanding paper award, ASME Nano Engineering in Medicine and Biology 2013
• Institute Silver Medal, IIT Kharagpur, 2007
ANNIE BOWLES, PhD
Biomedical Engineering, University of Miami, 1951 NW 7th Ave 475, Miami, FL, 33136, Diabetes Research Institute, University of Miami, 1450 NW 10th 3012, Miami, FL, 33136
acb233@miami.edu

Research Overview:
As a postdoctoral associate at the University of Miami, I am mentored by Ashutosh Agarwal, PhD and Diego Correa, MD, PhD who are both well-trained by leading mentors in the fields of biomedical engineering and stem cell biology, respectively. Their expertise offers opportunities to integrate multi-disciplinary applications, including biomaterials, device fabrication, and clinical techniques, in my investigations.

In the laboratory of Dr. Agarwal of the Physiominetic Biosystems Laboratory of the Biomedical Engineering Department, patented technologies of organ-on-chip devices with microfluidic platforms are designed, fabricated, and functionalized. Using these innovations, mesenchymal stem cells (MSCs) are interrogated under various conditions including contact with other cells, under mechanical forces, and with various stimuli. I am also developing platforms such as a pancreas-on-chip device to model Type I Diabetes and cell transplantation to evaluate underlying mechanisms. With Dr. Correa of Orthopedics, Sports Medicine Division and Diabetes Research Institute Cell Transplant Center, elucidating phenotypic and mechanistic qualities of MSCs for clinically translational approaches are aimed to treat musculoskeletal indications and autoimmunity. Specifically, my research evaluates methods to enrich the quality of MSCs using in vitro techniques and selection of specific subpopulations of bone marrow-derived MSCs. Collectively, the goals for all of my work are to develop and evaluate promising cell-based and cell-free therapies for treatment of Osteoarthritis, Tendinopathies, and Type I Diabetes.

Education:
Doctorate of Philosophy, 2017, Tulane University
Master of Science, 2012, Tulane University
Bachelor of Science, 2008, Louisiana State University

Research/Work Experience:
My graduate work in the laboratory of Bruce Bunnell, PhD at Tulane University’s Center for Stem Cell Research and Regenerative Medicine, I was a leading researcher for evaluating adipose-derived mesenchymal stem cells (MSCs) for the treatment of neurodegenerative and autoimmune diseases and wound healing, as well as identifying environmental and biological factors that alter the physiology of MSCs. My training focused on development and regenerative biology, immunology, and neuroscience.

Now as a postdoc, I seek to further my skillset with bioengineering approaches. I am currently developing and evaluating MSCs, pancreatic islets, vascular and immune cells using microfluidic platforms to model disease and investigate physiologic changes.

Selected Publications:

Awards/Honors:
• Travel Award and Poster Presentation, Executive Advisory Board meeting for DJITMF Biomedical Nanotechnology Institute at the University of Miami, 2017
• James de la Houssaye Mentor Award, Greater New Orleans Science and Engineering Fair, 2016
• Best Research Poster in Stem Cell Research and Regenerative Medicine, Tulane University Health Sciences Research Day, 2016
• Best Research Poster in Stem Cell Research and Regenerative Medicine, Tulane University Health Sciences Research Day, 2014
• Best Presentation Award, 1st Annual Cell and Molecular Biology Retreat at Tulane University, 2014
• National SMART Grant, Louisiana State University, 2006-2008
• Taylor Opportunity Program for Students Scholarship, Louisiana State University, 2004-2008
ALEXANDER BUFFONE, Jr., PhD
Chemical and Biomolecular Engineering, University of Pennsylvania, 540 Skirkanich Hall-210 S 33rd Street, Philadelphia, PA, 19104
abuff@seas.upenn.edu

Research Overview:
The Buffone Lab: Genetic Engineering of Immune Cell Recruitment
Chronic medical conditions including heart disease, hypertension, cancer, diabetes, and chronic obstructive pulmonary disease (COPD) are responsible for 7 in 10 of the deaths per year in the United States. Yet despite spending nearly $2,000 dollars more per person on healthcare cost than any other nation, the United States has the second lowest life expectancy among those nations. Translational research has the potential to discover therapeutics to combat chronic diseases and is as such of critical interest to reduce chronic disease mortality. My research focuses on the identification of critical targets of the innate immune response which can provide a possible therapeutic benefit for controlling inflammation and the development of chronic conditions. Specifically, I will focus on manipulating the steps of the leukocyte adhesion cascade as it is a prerequisite for trafficking to sites of inflammation, maintaining hemostasis, and providing immmuno-surveillance. My overall research program aspires to the overarching goal of translating research on immune cell trafficking into the identification, through genetic engineering, of potentially exploitable therapeutic targets against chronic inflammatory diseases. The Buffone Lab will take a global view of leukocyte trafficking and will focus on controlling three of the interrelated steps of the cascade 1) identifying the critical glycosyltransferases and ligands which promote greater selectin mediated adhesion; 2) perturbing chemokine mediated immune cell activation and function through glycan modification to tune trafficking to the sites of inflammation and 3) controlling the direction of integrin mediated migration in HSPCs and neutrophils migrating along the cellular adhesion molecules (CAMs) presented on the endothelial surface.

Education:
State University of New York at Buffalo, May 2012. PhD, Chemical Engineering
State University of New York at Buffalo, June 2006. BS, Chemical Engineering

Research/Work Experience:
• Postdoctoral Fellow, University of Pennsylvania (Philadelphia, PA), Department of Chemical and Biomolecular Engineering, September 2015-Present, Advisor: Dr. Daniel Hammer.
• Postdoctoral Fellow, Roswell Park Cancer Institute (Buffalo, NY), Department of Molecular and Cellular Biology, September 2012-August 2015, Advisor: Dr. Joseph Lau.
• Graduate Research Assistant/PhD Student, SUNY Buffalo (Buffalo, NY), Department of Chemical and Biological Engineering, September 2006-July 2012 Advisor: Dr. Sriram Neelamegham.
• Undergraduate Researcher, SUNY Buffalo (Buffalo, NY), Department of Chemical and Biological Engineering, June 2005 – May 2006, Advisor: Dr. Mattheos Koffas.

Selected Publications:

Awards/Honors:
• Keynote Speaker SUNY Buffalo Chemical and Biological Engineering Department Open House, 2011
• Society for Glycobiology Travel Award Recipient, 2014
• Highlighted in a First Person Interview in Journal of Cell Science, 2018
• Research Highlighted in a BMES Blog Post, 2018
ALEXANDER W. CAULK, PhD
Biomedical Engineering, Yale University, 55 Prospect Street, New Haven, Connecticut, 06511
alexander.caulk@yale.edu

Research Overview:
The lymphatic system is a network of vessels and nodes that plays a critical role in transport of dietary lipids, immune cell trafficking, and tissue fluid balance. These functions place the lymphatic system at the center of many long-studied diseases, such as atherosclerosis and aortic aneurysms, that persist as prominent sources of morbidity and mortality. Despite the relevance of the lymphatic system in the development of such conditions, lymphatic dysfunction as a mediator of pathogenesis is often overlooked. Thus, my primary research aim is to reduce this knowledge gap by furthering our understanding of the relationship between lymphatic biomechanics, inflammation, and soft tissue remodeling in chronic inflammatory diseases. To accomplish this, my laboratory will apply an interdisciplinary approach that combines principles of: 1) tissue biomechanics, 2) cellular mechanobiology, and 3) systems biology to study how the local mechanical environment contributes to cellular signaling that translates to systems level inflammatory diseases. During my graduate studies at Georgia Tech, I worked with Brandon Dixon and Rudy Gleason to utilize ex vivo experimental testing with a microstructurally-motivated model in a finite elasticity framework to quantify the active and passive mechanical properties of rat lymphatic tissue. This data was incorporated into a lumped parameter model of contractile adaptation and volumetric growth to simulate mechanically-mediated lymphatic failure to identify parameters contributing to lymphedema development. This work in tissue biomechanics and mechanically-mediated remodeling highlighted the need to better understand cellular responses to the local mechanical environment. Thus, I continued my training with Jay Humphrey at Yale University to gain expertise in mechanobiology of inflammation by working with an interdisciplinary team of investigators including George Tellides, a surgeon-scientist at Yale, and Kevin Janes, a systems biologist at the University of Virginia. In this collaborative environment, I have quantified roles of aortic contractility in hypertensive inflammation and aortic remodeling and implemented techniques for data dimensionality reduction to correlate changes in inflammatory profiles to hypertensive remodeling of the mouse aorta. This work poses a unique and exciting opportunity to utilize strategies traditionally employed in cell biology to link tissue biomechanics to cell signaling events. Ultimately, I plan to combine the interdisciplinary skillsets I have obtained to quantify cellular responses to changes in tissue mechanics to elucidate roles of lymphatic biomechanics in inflammatory diseases that lead to debilitating and/or fatal tissue level remodeling.

Education:
PhD, 2015, Bioengineering, Georgia Institute of Technology, Atlanta, GA
BS, 2010, Mechanical Engineering, Georgia Institute of Technology, Atlanta, GA

Research/Work Experience:
2015-pres., Postdoctoral Associate, Yale University, Adviser: Jay D. Humphrey, PhD
2010-2015, Graduate Research Assistant, Georgia Institute of Technology, Advisers: Rudolph L. Gleason, Jr., PhD and J. Brandon Dixon, PhD
2009-2010, Undergraduate Research Assistant, Georgia Institute of Technology, Adviser: Rudolph L. Gleason, Jr., PhD

Selected Publications:
Caulk AW, Humphrey JD, Murtada SI. Fundamental roles of axial stretch in isometric and isobaric evaluations of vascular contractility. Revised and resubmitted at J Biomech Eng.

Awards/Honors:
Petit Institute for Bioengineering and Bioscience Service Award, 2013
Georgia Tech President's Undergraduate Research Award, 2010
JOSEPH CHEN, PhD
Bioengineering, UC Berkeley, 205 Stanley Hall, University of California, Berkeley, Berkeley, CA, 94720
chen.joseph@berkeley.edu

Research Overview:
My research is at the intersection of cancer stem cell biology, biomaterials, biophysics, and cytoskeletal mechanics. In my doctoral work with Dr. W. David Merryman, I investigated the mechanobiological role of cyclic strain in calcific aortic valve disease (CAVD) and identified the biophysical and biomolecular function of the cell-cell adhesion protein, cadherin-11, in modulating CAVD maturation. During my postdoctoral work with Dr. Sanjay Kumar, I diversified my research experience by studying the mechanisms of actin cytoskeletal organization in the context of glioblastoma cancer stem cell invasion. By manipulating critical actin regulators, I was able to dramatically impair cell invasiveness and significantly improve survival in animal studies. In parallel, I have explored the interaction between mechanobiology and tumor genetics by utilizing novel hyaluronic acid biomimetic platforms and biophysical tools to affect glioblastoma subtype transitions. This ongoing work has led to an F32 award investigating the mechanobiological roles of cell-cell adhesion proteins in glioblastoma subtype transitions and invasion. My long-term research goal is to identify mechanobiological dysfunction (extrinsic and intrinsic) present in a glioblastoma and other pathologies and dissect the pertinent biophysical and molecular mechanisms involved in promoting and driving disease.

Education:
Ph.D. Biomedical Engineering, 2015, Vanderbilt University
M.S. Biomedical Engineering, 2010, Mississippi State University
B.S. Biomedical Engineering, 2008, Mississippi State University

Research/Work Experience:
Postdoctoral fellow (Advisor: Sanjay Kumar, M.D., Ph.D.), University of California – Berkeley 2015 - Present
Graduate Researcher (Advisor: W. David Merryman, Ph.D.), Vanderbilt University 2010 - 2015 Graduate Researcher (Advisor: Jun Liao, Ph.D.) Mississippi State University, 2008 - 2010

Selected Publications:
(Out of 15 manuscripts)

Awards/Honors:
NIH NCI Ruth L. Kirschstein National Research Service Award Postdoctoral Fellowship (F32CA221366, 2017 - 2020)
Young Investigator Finalist at International Society for Applied Cardiovascular Biology Conference (2014)
American Heart Association Predoctoral Fellowship (11PRE7990023, 2011 - 2013)
Thomas R. Harris Graduate Fellowship (2010 - 2011)
Research Overview:

My primary research area is cardiovascular biomechanics. I seek to establish an independent research program focused on determining hemodynamically driven, evidence-based translational treatment strategies for cardiovascular diseases. Currently, my focus is reducing thrombogenicity and determining hemodynamically optimized left ventricular assist device (LVAD) implantation and patient management strategies in collaboration with cardiology. Over the past decade, I have been involved in multiple novel and high impact cardiovascular projects including micro scale blood cell modeling, cancer metastasis and hemodynamic underpinnings of congenital heart diseases. I wish to explore the relationship between mechanical stimuli and biological response by working at the intersection of biology and technology. I will adopt interdisciplinary techniques and skills to perform multi-faceted in silico (virtual surgery and optimization, thrombogenicity prediction, patient-specific hemodynamic modeling and management) and in vitro (platelet biochemical assays, mock loop testing, patient-specific phantom creation, rapid prototyping) investigations in the short term. My longterm vision is to consolidate the aforementioned techniques with cutting-edge technologies such as multi-scale modeling, machine learning and genetic engineering. Armed with these tools, I envision my research program to navigate the challenges anticipated in determining strategies for efficiently diagnosing and treating the ever-increasing threat of cardiovascular disease. A future that delivers on the long-promised efficiency and benefits of personalized therapies motivates me to push the envelope of current technologies in biomedical research and I envision a future where personalized medicine will deliver on its promise.

Education:

Ph.D. in Biomedical Engineering, The University of Iowa, Iowa City, IA, USA (2014)
M.S. in Mechanical Engineering, The University of Arizona, Tucson, AZ, USA (2010)
B.S. in Mechanical Engineering, The University of Mumbai, Mumbai, Maharashtra, India (2008)

Research/Work Experience:

Postdoctoral Research Associate, Department of Mechanical Engineering, The University of Washington (2015 – present)
Advisors: Alberto Aliseda, PhD, Claudius Mahr, DO and Michael Levitt, MD
Postdoctoral Researcher, Department of Biomedical Engineering, Oregon Health and Science University (2014-2015) Advisor: Sandra Rugonyi, PhD
Graduate Research Assistant, Department of Biomedical Engineering, The University of Iowa (2010-2014) Advisor: Sarah Vigmostad, PhD
Graduate Research Assistant, Aerospace and Mechanical Engineering, The University of Arizona (2008-2010) Advisor: Jeffrey Jacobs, PhD

Selected Publications:

- V. Chivukula, JA Beckman, AR Prisco, TF Dardas, S Lin, JW Smith, NA Mokadam, A Aliseda and C Mahr, LVAD Inflow Cannula Angle and Thrombosis Risk, accepted for publication in Circulation: Heart Failure (2018)

Awards/Honors:

American Society of Artificial Internal Organs (ASAIO) Young Innovator Fellowship (2017)
U.S. National Congress of Computational Mechanics (USNCCM) Travel Award (2013)
Graduate College Fellowship, The University of Iowa (2010)
Outstanding Graduate Student Award in Mechanical Engineering, The University of Arizona (2010)
Research Overview:
My research focuses on integrating microfluidics with cell culture system, soft materials, wearable electronics for providing rapid and accurate diagnostic system, skin-interfaced physiological sensor and implantable drug delivery devices. I propose four innovative research projects that can be achieved in next 3~5 years: (1) Developing a microfluidic system for a rapid and accurate detection and drug testing platform of circulating-tumor cells: I will develop a microfluidic culture chip for rapid CTC detecting and drug testing simultaneously and characterize the morphological change of CTC in various hydrogel and drug conditions. (2) Constructing soft microfluidic device for diagnosis of a head impact: I will develop microfluidic accelerometer to visualize the level of head impact and understand the fluidic behavior in a microfluidic channel under high acceleration. (3) Constructing a biodegradable microfluidic device for drug delivery system for brain pressure control: I will develop an autonomous microfluidic device that delivers drug according to under designed pressure and develop a completely biodegradable microfluidic device. (4) Developing multi-functional wearable sensor analyzing motion of body and sweat for rehabilitation of stroke patients: I will develop a hybrid wearable device that combines wearable electronics and soft microfluidics to enable physiological monitoring, sweat rate analytics, and biochemical sensing in real-time.

Education:
M.S. Mechanical and Aerospace Engineering, Seoul National University (2010). 
B.E. Mechanical and Aerospace Engineering, Seoul National University (2007).

Research/Work Experience:
During my Ph.D. study, I developed a rapid diagnostic system for antimicrobial susceptibility testing (AST) of pathogens facilitating microfluidic and image processing technologies. I firstly suggested and demonstrated single-cell morphological analysis of bacteria in microfluidic testing chip. (Sci. Trans. Med., 2014). I also developing a fully automated system for direct rapid AST from blood culture of patient’s blood (Sci. Rep., 2017). During postdoctoral researcher in Dr. John Rogers group from June 2016, I have developed wearable sweat analyzing devices from soft material that analyzes sweat using microfluidics and colorimetric assay. (Adv. Health. Mat., 2017 and Lab Chip, 2017) Also, I developed in vitro fluidic experimental set up for understanding relation between blood pressure and pulse wave velocity in artificial human arteries. This research allows the wearable sensors to estimate the blood pressure continuously. (PNAS, in Press)

Selected Publications:

Awards/Honors:
1. Most Cited Paper Award by Seoul National University (2017) 
2. Best Paper Award by Seoul National University (2015) 
4. Best Poster Award by the Korean BioChip Society (2013)
Research Overview:
I build human cyborgs. Having graduated from the MIT/Harvard Medical School Program in Health Sciences and Technology, my training consists of traditional mechanical engineering coursework, medical school coursework, and clinical rotations. This curriculum enabled me to gain fluency and comfort in both clinical and engineering environments, and played an essential role in my dissertation work, in which I developed a method to provide natural proprioceptive sensations of joint position, speed, and torque from a prosthetic limb. This new approach, called the agonist-antagonist myoneural interface (AMI), leverages a novel surgical paradigm for limb amputation in conjunction with a complementary myoelectric control architecture to enable bi-directional neural communication between a robotic limb prosthesis and the central nervous system. My doctoral work culminated in a manuscript highlighting the potential of the AMI to improve volitional prosthetic control, preserve essential reflexes, and facilitate a patient’s embodiment of their prosthetic limb. In addition to my work on the AMI, I have also studied the biomechanics of human and quadrupedal gait. The insights gained while developing reflex-driven neuromusculoskeletal models, investigating joint impedance across terrains of varying stiffness, and modeling the impact of replacing an active joint with a passive dynamic system have shaped my understanding of biological locomotion. As a principal investigator, I propose to integrate and apply the skillsets acquired during my doctorate to explore a realm of biomedical engineering in which surgeons and engineers work in synchrony to simultaneously engineer human and machine, in pursuit of bionic performance that is superior to what is achievable with mechatronics alone. My long-term goal is to transform human rehabilitation and augmentation by creating bionic systems that incorporate with the human sense of identity, and improve human function beyond what may otherwise be possible.

Education:
• Massachusetts Institute of Technology, May 2018, Ph.D. Health Sciences and Technology – Medical Engineering and Medical Physics.
• Harvard University, May 2014, S.B. Engineering Sciences – Bioengineering (Magna cum Laude with Highest Honors)

Research/Work Experience:
• Massachusetts Institute of Technology, 2014-2018
  Graduate Research Assistant; Advisor: Hugh Herr Ph.D.
• Massachusetts Institute of Technology, Harvard University 2013-2014
  Undergraduate Thesis Researcher; Advisors: Ron Riso Ph.D., Maurice Smith Ph.D.
• Massachusetts Institute of Technology 2011-2013
  Undergraduate Research Assistant; Advisors: David Sengeh Ph.D., Hugh Herr Ph.D.

Selected Publications:

Awards/Honors:
Lemelson-MIT Graduate Student Prize (2018)
Hugh Hampton Young Memorial Fellowship (2017) ·
NSF Graduate Research Fellowship Program (2014)
Harvard College Scholarship (2013)
Massachusetts Life Sciences Center Internship Challenge (2013)
Weissman International Fellowship Program (2012)
R. CHASE CORNELISON, PhD
Biomedical Engineering and Mechanics, Virginia Tech, 325 Stanger St, Blacksburg, VA, 24061
rcorneli@vt.edu

Research Overview:
My research strives to understand and leverage interactions in the neural microenvironment towards developing novel therapies for neural injury and disease. In particular, I use biomaterials-based strategies to interrogate how extracellular and biophysical factors affect brain parenchymal cells such as glial cells and contribute to tissue pathology. As a doctoral student, I developed and characterized an injectable hydrogel derived from peripheral nerve extracellular matrix for minimally-invasive application into the injured rat spinal cord. I showed that this material modified the acute inflammatory environment in vivo by biasing macrophages toward an anti-inflammatory M2 phenotype. Furthermore, I worked with an interdisciplinary team to demonstrate that this material supported clinically-relevant Schwann cell transplantation and effective functional recovery. My postdoctoral research has focused on studying how biophysical forces such as interstitial fluid flow and shear stress associated with brain tumors affect glial cells. I have shown that convective forces directly stimulate glial cells to promote cancer cell invasion, and these pro-tumor effects are mitigated by inhibiting glial flow-stimulation. I also collaborated with neuroscientists to demonstrate that conversely increasing interstitial fluid flow in the brain via sustained drug delivery decreased age-related cognitive deficits and Aβ accumulation in mice. My own research program will focus on devising biomaterial strategies for manipulating biomechanical forces and the neural cell microenvironment towards limiting neurodegeneration and promoting functional regeneration in myriad models of neuropathology.

Education:
• Ph.D., Chemical Engineering, The University of Texas at Austin, 2015
• B.S., Chemical and Biomolecular Engineering, The University of Tennessee, Knoxville, 2011

Research/Work Experience:
• Postdoctoral Associate in Biomedical Engineering, University of Virginia/Virginia Tech, 2015 – present
  Advisor: Jennifer M. Munson, PhD
• Graduate Research Assistant in Chemical Engineering, The University of Texas at Austin, 2011 – 2015
  Advisor: Christine E. Schmidt, PhD
• Undergraduate Researcher in Chemical Engineering, University of Tennessee, Knoxville, 2007 – 2011
  Advisor: Eric T. Boder, PhD

Selected Publications:
• Cornelison RC, Brennan CE, Munson JM. “Convective forces increase CXCR4-dependent glioblastoma cell invasion in GL261 murine model.” (under review at Scientific Reports)

Awards/Honors:
• Best poster presentation, UVA Graduate Biomedical Engineering Society fall symposium, 2016
• National Science Foundation travel award in regenerative medicine, 2015
• Temple Foundation Graduate Fellowship Fund, 2014-2015
• Larry Holmes Endowed Presidential Scholarship in Chemical Engineering, 2012-2013 • Engineering Foundation Endowed Graduate Presidential Scholarship, 2011-2012
MAHSA DABAGH, PhD
Duke University, Durham, North Carolina
mahsa.dabagh@duke.edu

Research Overview:
My research interests are largely towards understanding, in molecular and cellular level, how mechanosensitive diseases, including atherosclerosis and cancer, progress in human body. I am particularly interested in learning how cells interact with their environment and how this interplay influences the development and progression of the atherosclerosis and cancer. The benefit of my ideas can result in identifying new molecular and cellular mechanisms underlying the progression of mechanosensitive disease. This knowledge will be applied by my group for individual patients to advance the early detection of disease; predict the disease progression with accurate location in vasculature and timing; develop effective and customized targeted treatment and prevention strategies.

My strong biomedical engineering background paired with my passion for complex disease research launched my successful cancer and vascular disease research endeavors. As an Academy of Finland research fellow at LUT with Prof. Sarkomaa, I developed multiscale, multilayer computational models to investigate changes in arterial wall layers during progression of atherosclerosis. Immediately after my PhD dissertation, I was granted a four-year postdoctoral fellowship by Academy of Finland (equivalent to NIH). Prof. John M Tarbell (City College of New York) acted as my external supervisor during the fellowship, his lab is internationally known for its work on cardiovascular and mechanotransduction. I conducted and contributed in several projects funded by the Academy of Finland. I developed a novel multiscale, multicomponent 3D models of endothelial cells monolayer to investigate the response of deformable cells to hemodynamic forces. This work published in J of the Royal Society Interface was internationally recognized and covered by media outlets and was selected as the top 3 most-accessed article in 2014 within NAVBO (North American Vascular Biology Organization). As Academy of Finland visiting scientist at Georgia Tech and Emory University with Prof. Hanjoong Jo, I analyzed in vitro the response of endothelial cells and subcellular organelles to unidirectional laminar and disturbed blood flow. As Academy of Finland visiting scientist at MIT with Prof. So, I applied state-of-the-art quantitative phase microscopy, for the first time, to quantify the deformation of plasma membrane of endothelial cells in microfluidics. Following my fellowship, I have moved to Duke University working as the research associate under supervision of Prof. Amanda Randles an eminent scientist. In Duke, I have I am expanded my knowledge on cancer metastasis and developing parallel computational fluid dynamics codes.

Education:
PhD Biomedical Engineering, Lappeenranta University of Technology, Finland.
MSc Biomedical Engineering, Sharif University of Technology, Tehran.
BSc Chemical Engineering, Sharif University of Technology, Tehran.

Research/Work Experience:
Duke University, Durham
MIT, 06-11.2014; Visiting Scientist
Georgia Tech, 09-12.2012; Visiting Scientist
City College of New York, 08-10.2011; Visiting Scientist
Academy of Finland postdoctoral fellow, 11.2010-11.2014

Selected Publications:

Awards/Honors:
2018 Reviewer of Scientific Reports-Nature 2017
Late Breaking Science Abstract, CNS.
2010 One of three granted Academy of Finland Postdoctoral Fellowship (for 4 years, 2011-2014).
2009 Lappeenranta University of Technology grant for best doctoral thesis.
2008 Co-PI of general research project funded by Academy of Finland (2008-2012).
NICHOLE DARINGER, PhD
Institute for Medical Engineering and Science, Massachusetts Institute of Technology, 25 Carleton St, Cambridge, MA, 02142
daringer@mit.edu

Research Overview:
During my doctoral research, I applied synthetic biology tools to study the structure-function relationships of native receptors as well as developed synthetic receptors that drive expression of a gene of interest in response to extracellular proteins. Using this system, which was the first synthetic receptor able to detect and respond to soluble extracellular ligands, we demonstrated secretion of IL-2, a proinflammatory cytokine, in response to VEGF, an anti-inflammatory cytokine, in T-cells. During my postdoctoral research, I developed a novel platform for synthetic post-translational circuits in mammalian cells that respond to extracellular ligands with the same speed and tight control inherent in native signaling pathways. To avoid interaction with native signaling pathways, the active domains of native signaling proteins were linked to peptides that replace the native recruitment mechanisms with highly specific targeted inducible interactions. My long-term goal is to develop novel platforms that integrate additional post-translational and posttranscriptional mechanisms used by eukaryotic cells for tight control of cellular behavior. These platforms can be applied to study diseases that involve immune dysfunction, such as cancer, and to develop safer and more effective cell-mediated therapies for the treatment of these diseases.

Education:
• Ph.D., Chemical and Biological Engineering, December 2014, Northwestern University
• B.S.E., Chemical and Biochemical Engineering, May 2008, University of Iowa

Research/Work Experience:
Postdoctoral Research, September 2014 – present
Massachusetts Institute of Technology, Institute for Medical Engineering and Science. Research advisor: Jim Collins
Doctoral Research, 2008 – 2014
Northwestern University, Department of Chemical and Biological Engineering. Research advisor: Joshua Leonard
Undergraduate Honors Research 2007 – 2008
University of Iowa, Department of Chemical and Biochemical Engineering. Research advisor: David Murhammer

Selected Publications:
• Daringer NM, Bashor CJ, Benning S, Mao N, Collins JJ. Synthetic Biology Framework for Engineering Post-Translational Circuits. (in preparation)

Awards/Honors:
• Cancer Prevention and Control Travel Scholarship Awardee, 2013
• Biotechnology Training Program, 2009 – 2011
• 2010 National Science Foundation Graduate Research Fellowship Program Honorable Mention, 2010
Fate specification and differentiation of embryos during development is controlled by concentration gradients of morphogens. Most of these gradients are formed through diffusion of the signaling molecule from a localized source and can be described by a reaction diffusion equation with production and degradation terms. It is less clear, however, how subcellular processes lead to the observed gradient shapes. As well, temporal variations in gradient amplitudes during pattern formation have been observed. Current methods in literature rely on static one-and-done patterns to study tissue-level gradient shapes, which are not sufficient to map the kinetics of pattern formation. Thus, there are significant theoretical and technical gaps to overcome if we are to determine how dynamic gradient behavior governs cell fate downstream. My goal is to use microrobotic systems to deliver signaling molecules to a network of engineered cells to generate user defined patterns with spatial and temporal control. This will help us to understand how single cells communicate in space and time to generate organs and to harness this knowledge to develop organoids. Using genetic technology and synthetic biology, and armed with the better control over cell differentiation, I will endeavor to create high fidelity 3D tissues from engineered stem cells.

Education:

**PhD in Chemistry:** Sep 2010-May 2016, Pennsylvania State University, USA
- Advisor: Prof. Ayusman Sen
- Thesis Title: Designs for Directing Motion at the Nano and Microscale

**MSc in Chemical Research:** Aug 2007-Aug 2008, University of London, UK
- Advisor: Prof. Adrian Dobbs
- Thesis Title: Investigation of Two-Directional Radical Cyclizations

**BSc in Physics:** Aug 2004-May 2007, Presidency University, India

Research/Work Experience:

**Postdoctoral Researcher**, University of Pennsylvania, Jun 2016-Present, Advisor: Dean Vijay Kumar and Prof. Kathleen Stebe - Designing micro-robots and their control algorithms, Integration of micro-robots with bacterial and mammalian cells for pattern generation

**Graduate Student**, Pennsylvania State University, Jan 2011-May 2016, Advisor: Prof. Ayusman Sen
- Design and optimization of various nano patterns using advanced lithography techniques, Use of lithographic techniques to make complex patterns and enzyme pumps, Analysis of single molecule diffusion of enzymes and development of enzyme separation techniques

- Synthesis of novel ring analogues of steroids, Testing the above analogues for Glucocorticoid activity

Selected Publications:

- S. Das et.al. 'Controlled Delivery of Signaling Molecules using Magnetic Microrobots', in 2018 International Conference on Manipulation, Automation and Robotics at Small Scales (MARSS), IEEE, Nagoya, Japan
- S. Das et.al. 'Modelling and Ensemble Control of Multiple Catalytic Microrobots', Journal of Micro-Bio Robotics, In Press
- S. Das et.al. 'Boundaries can steer active Janus spheres', Nat. Comm., 6, 8999 (2015)
- K.K. Dey, S. Das et.al. 'Chemotactic Separation of Enzymes', ACS Nano, 8, 11941 (2014)

Awards/Honors:
- Selected for Nexus 2018 in University of California Berkeley
- Selected for NextProf 2017 workshop in University of Michigan
- Department of Chemistry Travel Award, Pennsylvania State University, 2015
- Department of Chemistry Travel Award, Pennsylvania State University, 2014
- Incoming Graduate Student Award, Pennsylvania State University, 2010
- Distinction in Thesis, Queen Mary University of London, 2008
- International Science and Engineering Excellence Fellowship, Queen Mary University of London, 2007
JOSEPH T. DECKER, PhD
University of Michigan, 1600 Huron Parkway, Ann Arbor, MI, 48105
jtdecker@umich.edu

Research Overview:
My research sits at the intersection between systems biology and materials science, merging the two to advance biomedical science and improve patient care. My current research at the University of Michigan focuses on applying dynamic systems biology to the study and circumvention of drug resistance mechanisms in breast cancer. We have developed a parallel reporter assay, called TRACER, which can be used to measure dynamic changes to cancer cells during therapy. We can apply TRACER to both simple and complex culture systems and have developed the capabilities to measure a variety of regulatory elements in both primary cells as well as established cell lines. I have applied this technology to the identification of therapeutic targets in PARP inhibitor resistant BRCA mutated breast cancer and am currently working on multifactorial mechanisms of resistance in HER2+ breast cancer. My long-term goal is to merge my expertise in systems biology with an emphasis on materials development, which was the focus of my graduate work at the University of Florida. This intersection of materials development and systems biology will lead to the next generation of devices for cell detection, prevention of co-morbidities and regenerative medicine.

Education:
PhD, Materials Science and Engineering, 2014, University of Florida
MS, Materials Science and Engineering, 2012, University of Florida
BS, Biomedical Engineering, 2010, University of Wisconsin-Madison

Research/Work Experience:
Research Fellow, 2014-present
University of Michigan, Ann Arbor, Michigan, Department of Biomedical Engineering, Advisor: Lonnie Shea, PhD

Graduate Research Assistant, 2010-2014
University of Florida, Gainesville, Florida, Department of Materials Science and Engineering, Advisor: Anthony Brennan, PhD, DSc

Undergraduate Researcher, 2009-2010
University of Wisconsin-Madison, Madison, Wisconsin, Department of Mechanical Engineering, Advisor: Robert Rowlands, PhD

Selected Publications:

Awards/Honors:
Graduate Alumni Fellowship - University of Florida (2010)
Best Poster Award – UF Biomaterials Day (2014)
Outstanding Poster Award – Moses Gunn Research Conference (2017)
DERFOGAIL DELCASSIAN, PhD  
MIT, Koch Institute, 76-687, 500 Main Street, Cambridge, MA, 02139  
ddelcass@mit.edu

Research Overview:

My research focuses on Immunoengineering - the design of biomaterials that control immune cell behaviour. To date, I have been independently awarded over 750k GBP ($1million USD) of my own, peer-reviewed research funding, including several international fellowships and awards. I design artificial cells and lymph nodes, 3D biomimetic interfaces and targeted gene/drug delivery systems to direct immune cell behaviour in vivo. During my PhD, I focused on developing nanopattern interfaces for the controlled ex vivo activation and expansion of T cells for cancer immunotherapy. During my postdoctoral Fellowship, I developed drug and gene delivery systems which can locally regulate T cell behaviour in vivo to protect cell and organoid transplants. Additionally, I have investigated innate immune response to implanted biomaterials and have developed new polymer based mRNA delivery systems for cancer vaccination. My independent lab will focus on the development of tools for mechanical, biochemical and genetic manipulation of T cells for scalable therapeutic use of T cells in adoptive immunotherapy and immunotolerance.

Education:

2005-2009 BSc and MChem, Chemistry, First Class Hons (equiv. to GPA 4.0)  
Chemistry with a year in Industry at GlaxoSmithKline, Department of Chemistry, University of York, UK  
Awarded Pfizer Undergraduate Excellence Sponsorship and Robert Jackson Chemistry Prize

2010-2014 PhD “Biomimetic interfaces for immune cell signalling”  
Advisors; Dr. Iain Dunlop and Prof. Molly Stevens, Department of Materials, Faculty of Engineering, Imperial College London  
Awarded Departmental PhD scholarship and Doctoral Prize. Collaborated and worked at partner labs in NYU (Dustin Lab), Max Plank Institute (Spatz Lab). Published 3 first author papers, and filed a patent application

Research/Work Experience:

Senior Research Fellow (EPSRC Fellowship, Marie Curie Fellowship)  
2015-2016 Phase 1: Home country  
Advisor; Prof. Kevin Shakesheff, Division of Regenerative Medicine and Cellular Therapies, University of Nottingham 2016-present  
Phase 2: Abroad  
Advisors; Prof. Daniel Anderson and Prof. Robert Langer, Biological Engineering, Koch Institute, MIT & Harvard Medical School  
Awarded over $850,000 USD in independent research funding as PI during postdoctoral research, including an EPSRC ETERM Fellowship (250,000 GBP), a Marie Curie Fellowship (280,000 EUR) plus other grants. Directly supervised 3 MSc/PhD students at Nottingham, lectured undergrad/MSc courses, co-manage the diabetes research sub-group at MIT. Authored /co-authored 7 papers (with a further 2 in preparation), a book chapter, and 3 UK Government policy responses.

Selected Publications:

1- D. Delcassian, D. Depoil, D. Rudnicka, et al. NANOLETTERS, Nanoscale Ligand Spacing Influences Receptor Triggering in T Cells and NK Cells, 2013  
3- D. Delcassian, S. Sattler, I.E. Dunlop, INTEGRATIVE BIOLOGY, Biomaterials for T Cell Interactions, 2017 (corresponding)  
4- L. Miao*, L. Li*, Y. Huang*, D. Delcassian,et al., NATURE BIOTECHNOLOGY Heterocyclic lipidoids for combined mRNA vaccines and STING mediated immune cell activation (in review)  
5- D. Delcassian, I.Luzhansky, V. Spanadouki, et. al PNAS Magnetic retrieval of encapsulated beta cell transplants using dualfunction MRI visible and retrievable microcapsules (submitted)

Awards/Honors:

Total >£750k awarded independently as lead researcher ($1million USD), selected awards and grants detailed below;  
2018 Horizon 2020 Marie Curie Sklodowska Global Fellowship Award (USD300k)  
2017 MIT/Harvard/Sloan Business School Entrepreneur Program and IMPACT Fellow  
2015 EPSRC E-TERM Landscape Fellowship (GBP250k)  
2016 UKRMP Hub-to-Hub Acellular/Immunomodulation in the Transplant Niche Grant (GBP50k)  
2015 Biomaterials Gordon Research Conference, Best Poster and Oral Presentation Prize  
2014 Future Investigators in Regenerative Medicine Travel Award (GBP800)
Research Overview:
My academic and research expertise is at the interface of materials science, manufacturing, and vascular biology. My overall research goal is to engineer physiologically relevant microenvironments through biomaterials design and manufacturing to better understand how different microenvironmental factors contribute to vascular pathophysiology, with the eventual goal of informing new treatments for vascular diseases. As a faculty, I will build a research program focused on engineering physiologically relevant tissue models for impaired tissue regeneration and disease modeling. My motivation, academic background, training, and publication records established a strong foundation for successful execution of proposed research. For my doctoral research, I engineered surface topography and biomolecular ligands of blood-contacting biomaterials to improve their blood and vascular compatibility. During my postdoctoral training, I have been focusing on engineering microenvironments (ligands, stiffness, and structure) and directing vascular/stem cell fates for vascular tissue regeneration by integration of photo-click hydrogels, combinatorial ECM array technology, and fibrous scaffold manufacturing. Recently, to tackle the major challenge in replicating mechanical heterogeneity of native tissues, I have developed a new 3D printing paradigm to enable the spatial control of stiffness and geometry in 3D complex structures.

Education:
Ph.D. in Mechanical Engineering, 2014, Hong Kong University of Science & Technology, Hong Kong
M.Phil. in Biomedical Engineering, 2011, Hong Kong University of Science & Technology, Hong Kong
B.Eng. in Materials Science & Engineering, 2009, Chongqing University, China

Research/Work Experience:
2015-present: Postdoctoral Research Associate, CU-Boulder; Advisor: Drs. Wei Tan and Xiaoyun Ding
2009-2014: Graduate Research Assistant in HKUST, HK; Advisor: Drs. Yang Leng and Pingbo Huang
2011-2014: Teaching Assistant at HKUST, HK

Selected Publications:

Awards/Honors:
• CIRTL Associate by Evidence-Based Introduction to Teaching (EBIT), CIRTL at CU-Boulder, 2017
• Tony B. Academic Travel Award by the Society for Laboratory Automation and Screening, 2016
• Best Young Scientist Award by the 4th Asian Biomaterials Congress (top 3 out of 400+), 2013
• Best Teaching Assistant, HKUST, 2012
SEPIDEH DOLATSHAHI, PhD
Biological Engineering, Massachusetts Institute of Technology, 77 Massachusetts Ave., 56-353, Cambridge, MA, 02139
sepideh@mit.edu

Research Overview:
The goal of my research program will be to create and utilize new systems biology approaches to understand fundamental mechanisms of immune regulation and dysregulation, with an ultimate objective of identifying strategies to improve immunotherapies. By building computational models that integrate experimental data across various molecular and cellular scales, my laboratory will seek to: (1) ascertain how biophysical properties of the immune factors (defined as their subclass and post-translational modifications) determine their function, (2) uncover mechanisms responsible for dysregulation of these properties in inflammatory disease states, and (3) use this knowledge to guide biomarkers for early disease diagnosis, patient stratification and optimized immunotherapies. A next critical step in translational immunotherapies is the design of maximally informative animal studies for reliable prediction of the outcome in humans. To this end, my lab will also (4) create predictive computational transfer functions relating mechanistic models of cellular processes in animals to those in humans. Such functions will enable inter-species translation of molecules to phenotypes. My unique background, including graduate experience in network inference, signal processing and modeling of metabolic pathways, together with postdoctoral training at the interface of glycobiology, systems serology and synthetic biology, have prepared me to accomplish these goals.

Education:
(2015) PhD, Electrical Engineering, Georgia Institute of Technology, Atlanta, GA
(2013) MSc, Bioengineering, Georgia Institute of Technology, Atlanta, GA
(2009) MSc, Electrical and Computer Engineering, University of Massachusetts, Amherst, MA
(2007) BSc, Electrical Engineering, University of Tehran, Iran

Research/Work Experience:
(2016-Present) Post-doctoral Research Associate, Massachusetts Institute of Technology, Department of Biological Engineering, Advisor: Dr. Douglas A. Lauffenburger, Co-advisor: Dr. Ron Weiss
(2009-2015) Graduate Research Assistant, Georgia Institute of Technology, Coulter Department of Biomedical Engineering, Laboratory for Biological Systems Analysis, Advisor: Dr. Eberhard O. Voit
(2007-2009) Graduate Research Assistant, University of Massachusetts, Amherst, Advisors: Dr. Dennis Goeckel and Dr. Hossein Pishro-Nik

Selected Publications:
1. S Dolatshahi, M Sumit, B Figueroa, BC Mulukutla, DA Lauffenburger. “New insights into the regulation of the glycosylation pathway through kinetic modeling of antibody glycosylation by wild-type and genetically engineered Chinese Hamster ovary production cells,” (To be submitted)
(Complete list of published work: https://scholar.google.com/citations?user=hB0D494AAAAJ&hl=en)

Awards/Honors:
(2013) Computational Cell Biology summer course scholarship award from Cold Spring Harbor Laboratory, NY
(2010) School of Information Theory scholarship award, University of Southern California, Los Angeles, CA
MELANIE ECKER, PhD
The University of Texas at Dallas, 800 West Campbell Road, BSB 13, Richardson, TX, 75080
melanie.ecker@utdallas.edu

Research Overview:
I am a chemist with a strong background and expertise in polymer chemistry and the structure-property relationship of polymeric materials, including shape memory polymers. My current research focuses on the development and characterization of self-softening shape memory polymers as substrates for flexible bioelectronics. These materials have the capability to undergo softening after insertion in the body, and therefore reduce the mismatch in modulus that usually exists between the device and the tissue. We want to understand how a key material property, stiffness, influences the robustness of implantable neuroprosthetic technology. The degree of softening can easily be tuned by tailoring the polymer composition. This allows a detailed study of the relationship between the materials properties and the tissue response. Important for the applicability of self-softening, SMP based devices in vivo is, that they can be sterilized without altering their thermomechanical properties. Hence, we have studied the response of our SMPs to various sterilization methods. We have found, that the sterilization with ethylene oxide is an appropriate method for our temperature sensitive polymers. To get a better understanding of the robustness of the devices, we are currently studying the mechanical durability of the base material and the electrochemical integrity of test devices against accelerated aging in physiological solution at elevated temperatures. My goal as an independent researcher is to combine the field of polymer science with that of biomedical engineering. One part of my research will focus on the enteric nervous system (ENS). Many gastrointestinal diseases are related to dysfunctions of the ENS, but they are not well understood. I want to use my expertise in structure-property relationships of polymers and my knowledge about neural devices, to develop conformal electrode arrays for recording and stimulation of the gut.

Education:
• Freie Universität Berlin, Germany, Ph.D., 2015
• Freie Universität Berlin, Germany, Diploma in Chemistry/equivalent to M.S., 2010
• Freie Universität Berlin, Germany, Intermediate Diploma in Chemistry/equivalent to B.S., 2006

Research/Work Experience:
• University of Texas at Dallas, Richardson, TX, 2015-present, Postdoctoral Research Associate, Self-softening shape memory polymers as substrate for bioelectronic devices, Mentors: Dr. Walter Voit and Dr. Joseph Pancrazio
• BAM Federal Institute for Materials Research and Testing, Berlin, Germany, 2012-2014, Research Associate (Doctoral Research), Development, characterization and durability of switchable information carriers based on shape memory polymers, Advisor: Dr. Thorsten Pretsch
• Max Planck Institute of Colloids and Interfaces, Berlin, Germany, 2011, Diploma Thesis and Research Associate, Sequence-defined insertion of anionic groups into linear and monodisperse poly(amidomines), Advisor: Dr. Laura Hartmann
• Freie Universität Berlin, Germany, 2006-2010, Tutor/Teaching Assistant for thermodynamics, Advisors: Dr. Eugen Illenberger and Dr. Klaus Christmann

Selected Publications:
• D.-H. Do, M. Ecker, and W. Voit, Characterization of a thiol-ene/acylate-based polymer for neuroprosthetic implants, ACS Omega, 2017, 2 (8), 4604–4611

Awards/Honors:
• ACS Postdoc to Faculty Workshop Scholar, 2017
• Submitted a proposal for the NIH Pathway to Independence Award (Parent K99/R00), July 2018
ZHICHAO FAN, PhD
Division of Inflammation Biology, La Jolla Institute for Allergy and Immunology, 9420 Athena Circle Drive, La Jolla, California, 92037
zfan@lji.org

Research Overview:
My research focuses on using advanced microscopy to study integrin activation and leukocyte trafficking in inflammatory diseases. Using quantitative dynamic footprinting microscopy and intravital microscopy, I found an unexpected bent-open conformation of β2 integrins in human neutrophil adhesion and a novel allosteric pathway of integrin activation, which expanded the paradigm of integrin activation beyond the canonical switchblade model. I also discovered an auto-inhibitory mechanism in which bent-open integrins bind ICAM ligands in cis and inhibit neutrophil adhesion and aggregation (Fan, Nat. Commun. 2016). By introducing stochastic optical reconstruction microscopy and structural molecular modeling in my study, I developed SuperSTORM (Fan, bioRxiv 2018). With this method, I found that bent-open integrins form nanoclusters and orient in a “face-to-face” molecular pattern by pairwise in-cis interactions with ICAM dimers. Furthermore, I have developed a novel flow-cytometry-based high-throughput screening (HTS) to find small molecular inhibitors of integrin activation. Preliminary data in my submitted R01 grant (unpublished) shows five molecules that keep β2 integrins in the bent-open auto-inhibited conformation. I am testing the auto-inhibitory mechanism and my HTS hits in a clinically relevant myocardial ischemia-reperfusion injury model (heart attack). I was recently awarded a Career Development Award from the American Heart Association ($70,000 direct cost per year added to my startup, active from 07/2018-06/2021).

During my Ph.D. work, I gained expertise in an uncommon optical method – in vivo flow cytometry (IVFC), which enables monitoring of circulating cells in real time in vivo. IVFC is capable of detecting rare cells, such as circulating tumor cells in the blood of tumor-bearing mice. I was the first to detect these cells in a clinically relevant orthotopic model of metastatic hepatocellular carcinoma (Fan, Cancer Res. 2012). I assessed the effects of therapies, including surgical resections and sorafenib treatment, on cancer metastasis. By using both advanced optical imaging (structured illumination microscopy) and the biochemical methods, I found that eEF1A1 plays an important role in the photodynamic therapy of hepatocellular carcinoma (Fan, Sci. Rep. 2016). I developed a pH-activatable near-infrared fluorescence probe for probing cancers in vivo (Wang and Fan, Int. J. Cancer 2015). Using a novel multicolor imaging IVFC, I propose to investigate the dynamics of leukocytes (neutrophils, monocytes, T cells) during inflammation.

Education:
Ph.D. in Chemical Biology, 06/2013, Fudan University (Thesis with Dr. Xunbin Wei in the field of Biomedical Optics) B.S. in Biotechnology, 06/2008, Soochow University

Research/Work Experience:
2018.01-present Instructor, La Jolla Institute for Allergy & Immunology
2013.08-2018.01 Postdoctoral Fellow, La Jolla Institute for Allergy & Immunology, Dr. Klaus Ley, M.D.
2011.09-2013.08 Research Assistant, Shanghai Jiao Tong University, Dr. Xunbin Wei, Ph.D.
2008.09-2011.08 Research Assistant, Fudan University, Dr. Xunbin Wei, Ph.D.

Selected Publications:

Awards/Honors:
2018-2021 Career Development Award (American Heart Association, U.S.A., Active, $231,000)
JACOPO FERRUZZI, PhD
Department of Biomedical Engineering, Boston University, 44 Cummington Mall, Boston, MA, 02215
jacopofe@bu.edu

Research Overview:
My research efforts are aimed towards exploring the mechanisms of soft tissue growth and remodeling in health and disease and understanding the effects of disrupted tissue homeostasis on disease initiation and progression. My work incorporates tools from soft tissue biomechanics and cellular biophysics, techniques spanning from in vitro to in vivo experiments at different length and time scales, as well as theoretical and computational modeling. In order to provide a better understanding of complex diseases, I employ a multiscale approach to investigate the relationship between altered mechanical homeostasis, extracellular matrix organization, and cellular function. In the future, I seek to combine my background in cardiovascular soft tissue mechanics and my current work on the biophysics and mechanobiology of metastatic breast cancers with cutting-edge techniques from molecular and cellular biology. The overall goal is to provide a better understanding of pathological conditions in which abnormal cell or tissue mechanical behaviors play a key role in disease initiation and progression, such as cardiovascular disease and cancer.

Education:
• Ph.D. in Biomedical Engineering, Yale University, New Haven, CT, December 2015
• M.S. in Biomedical Engineering, University of Pisa, Italy, December 2009 • B.S. in Biomedical Engineering, University of Pisa, Italy, November 2006

Research/Work Experience:
2015-Present: Postdoctoral Associate, Department of Biomedical Engineering, Boston University, Boston, MA
2010-2015: Graduate Research Assistant, Department of Biomedical Engineering, Yale University, New Haven, CT
2009-2010: Visiting Research Scientist, Department of Biomedical Engineering, Texas A&M University, College Station, TX
2006: Undergraduate Research Assistant, Department of Mechanical and Nuclear Engineering, University of Pisa, Italy

Selected Publications:
• Ferruzzi J, Di Achille P, Tellides G, and Humphrey JD. Combining In Vivo and In Vitro Biomechanical Data Reveals Key Roles of Perivascular Tethering in Central Artery Function. PLOS One, Accepted.

Awards/Honors:
- Cancer Systems Biology Consortium and Physical Sciences - Oncology Network Junior Investigator Travel Award (2018).
- IBBM Fellowship, Center for Integrative Biomedical Computing, University of Utah (2016)
- North American Vascular Biology Organization Travel Award (2015)
- Scholarship "Progetto FSE 2008--2009" awarded by the European Social Fund (2008)
VINCE FIORE, PhD
Rockefeller University, 1230 York St., New York, NY, 10065
vfiore@rockefeller.edu

Research Overview:

Tissues are precisely built in their three-dimensional shape and the arrangement of specific cell types. How this architecture emerges – by mechanosensitive signaling and gene regulatory processes that must coordinate across length scales – is a fundamental open question in biology and tissue engineering. My global objective is to understand how tissue architecture emerges during development and disease by engineering tools for in vivo force measurement and manipulation. During my doctoral work with Tom Barker at Georgia Tech I uncovered fundamental mechanisms of mechanotransduction at the molecular and cellular length scales. At the single molecule level, I discovered that dual binding of a ligand by integrin and a co-receptor caused force-triggered affinity, elucidating a novel mechanochemical molecular switch. At the cell level, I discovered that coupling between the on-rate of integrin-ECM ligand bonds and signaling effector recruitment tunes how cells sense ECM stiffness. Through this work, I learned not only the diversity of ways biological systems can read mechanical signals from their environment, but also the tremendous complexity of the cellular mechanical environment in its native setting of tissue. Realizing the challenge of modeling such tissue environments in vitro, I set out to learn and develop new tools for in vivo genetic manipulation for my postdoc. By developing new tools to measure and manipulate ECM tension vivo, I have discovered that mechanical forces coupled with oncogene-specific ECM gene expression programs dictate tumor tissue architecture and mechanical integrity of the epithelial-stromal boundary. This interdisciplinary work, in the lab of Elaine Fuchs at The Rockefeller University, is likely to uncover a conceptually novel role for the ECM as a mechanical regulator of tumor initiation relevant to tumors in solid tissues throughout the body. In the future, my goal is to develop a systems-level understanding of how mechanotransduction is integrated across length scales to build complex tissues using complementary computational and experimental toolkits. Using these tools, I will explore the broad hypothesis that individual cell types within tissues are tuned to sense and respond to ‘niche-specific’ mechanical forces, which ultimately dictate their cell-type-specific biological function. 1) I’ll develop a bioinformatics platform, computing scaling relationships of defined tissue architecture parameters using the massive amount of untapped genomic-era data. This approach will uncover novel hypotheses and suggest fundamental physical constraints governing tissue architectures. 2) To test these hypotheses, I’ll develop a platform of mouse genetic tools to manipulate forces, at will, on specific cell types within a living tissue in vivo, and measure the biological response with molecular resolution. I will accomplish this by engineering a suite of epigenetically-specified optogenetic force actuators. Altogether, my work will propel an integrated understanding of how mechanotransduction shapes tissue architecture, from molecular to tissue scales in living organisms.

Education:

2014, Ph.D. Biomedical Engineering, Georgia Institute of Technology and Emory University
2008, B.S.E. Biomedical Engineering, Pennsylvania State University

Research/Work Experience:

2015-present, Postdoctoral Fellow, The Rockefeller University
2008-2014, Graduate Research Fellow, Georgia Institute of Technology and Emory University

Selected Publications:


Awards/Honors:

2018, Charles H. Revson Senior Postdoctoral Fellowship (*1 of 6 in Tri-state area)
2018, American Society for Matrix Biology Founders Award (*one award given internationally)
2015, Ruth L. Kirschstein Institutional National Research Service Award (T32)
2015, Best Fundamental Research Award, Georgia Tech Department of Biomedical Engineering
2014, Sigma Xi Best Ph.D. Thesis Award
2010, National Science Foundation Graduate Research Fellowship
KAITLIN C. FOGG, PhD
Biomedical Engineering, University of Wisconsin - Madison, 1111 Highland Ave, 4553 WIMR 2, Madison, WI, 53705
kfogg@wisc.edu

Research Overview:
My lab will use biomaterials to generate 3D models of cervical cancer in combination with statistical modeling to guide treatment selection, discover novel targets, and design potential treatment strategies in a high throughput manner. To accomplish this goal, my lab will incorporate my background in 1) design of experiments (DOE) to engineer natural polymers, 2) macrophage and endothelial cell modulation to generate in vitro models of disease, and 3) systems biology to study cancer dynamics. My graduate studies provided me with a strong foundation in using DOE to tailor biomaterials in order to instruct cell fate and engineer the immune response. Specifically, I used DOE to engineer the 3D microenvironment in order to optimize the survival, pro-angiogenic, and/or anti-inflammatory potential of mesenchymal stem cells for tissue repair. I carried this expertise into my postdoctoral work to develop in vitro models of ovarian cancer, adding complementary systems biology modeling tools such as partial least squares regression (PLSR) that allow me to analyze paracrine signaling in the metastatic niche. I recently identified critical components of the pro-tumor macrophage secretome that drive ovarian cancer progression as well as the central signaling pathway that dictates this response. Additionally, by using RNA-Seq in conjunction with an in vitro model of the monocyte-ovarian cancer tumor microenvironment, I elucidated a non-canonical pathway by which ovarian cancer cells corrupt naïve monocytes towards a pro-tumor phenotype. Together, this work provides me with a strong foundation to couple multi-cellular 3D models and a systems biology-based approach in order to identify key aberrant pathways in cervical cancer as well as develop personalized predictive models for pre-clinical evaluation.

Education:
2016 | Ph.D., Biomedical Engineering, University of California, Davis
2010 | B.S., Chemical and Biological Engineering, University of Wisconsin – Madison

Research/Work Experience:
2016 - Present | Postdoctoral Researcher
Biomedical Engineering, University of Wisconsin – Madison (Advisor: Pam Kreeger)
2011 - 2016 | Graduate Research Assistant
Biomedical Engineering, University of California, Davis (Advisor: Kent Leach)
2009 - 2010 | Undergraduate Research Assistant
Chemical and Biological Engineering, University of Wisconsin – Madison (Advisor: Paul Nealey)
2004 - 2007 | Research Assistant
Mechanical Engineering, University of Wisconsin – Madison (Advisor: Heidi Ploeg)

Selected Publications:

Awards/Honors:
2017 - Present | Rivkin Center for Ovarian Cancer Scientific Scholar Award
2018 | Postdoctoral Fellow Shooting Star Award, BMES CMBE conference
2016 | Biomedical Engineering Graduate Group Outstanding Graduate Student Award, University of California, Davis 2015
2017 | American Heart Association Predoctoral Fellowship
KRISTIN FRENCH, PhD
Internal Medicine, Cardiology, UT Southwestern Medical Center, 5323 Harry Hines Blvd, Dallas, TX, 75390
kristin.french@utsouthwestern.edu

Research Overview:
The elaborate complexity of the myocardium affords simultaneous challenges and innumerable opportunities for therapeutic intervention. Among these opportunities, harnessing engineering approaches to parse molecular cascades and their elaborate cellular responses may facilitate the therapeutic objective of improving or replacing myocardial tissue. My interdisciplinary training uniquely qualifies me for this work. My research focuses on understanding how cells communicate with each other and integrate environmental signals to alter their behavior in the context of disease. During my doctoral work with Michael Davis, Ph.D. at Emory University, I demonstrated that immature cardiac progenitor cells in culture prefer a complex, naturally-derived cardiac extracellular matrix and respond to cyclic mechanical strain. We further demonstrated that paracrine signaling of cardiac progenitor cells through exosomes improves outcomes in ischemic cardiac disease. My postdoctoral work with Joseph Hill, M.D., Ph.D. at UT Southwestern Medical Center delved into the molecular pathogenesis of heart disease. We have uncovered a previously unrecognized, fed-state nuclear receptor in cardiomyocytes and delineated its downstream mechanisms. We have also developed a novel and exciting murine model of heart failure with preserved ejection fraction that recapitulates the myriad clinical features of the syndrome, opening the door to defining novel mechanisms. In my laboratory, we will strive to understand how 1) time, 2) mechanics, and 3) chemical cues alter cell-cell communication, tissue integrity, transcription and extracellular vesicle secretion in order to develop novel regenerative therapies for a range of cardiovascular diseases. To do this, we will leverage molecular biological techniques to develop highthroughput assays for developing biomimetic therapies and for understanding the molecular basis of their successes and failures.

Education:
Ph.D. Biomedical Engineering, 2015, Georgia Institute of Technology & Emory University
B.S. Biochemistry, 2009, Denison University

Research/Work Experience:
2015-present, Postdoctoral Research Fellow, UT Southwestern Medical Center
2015, Tissue Engineering co-teacher, Georgia Tech BME Galway Summer Program
2009-2010, Conversational English Teacher, Újszász, Hungary
2008, Battelle Internship Grant, UNC Chapel Hill

Selected Publications:

Awards/Honors:
Ruth L. Kirschstein (F32) National Research Service Award (3rd percentile), 2016
Training in Cardiovascular Research at UT Southwestern (T32), 2015
Georgia Tech Research and Innovation Conference $1,500 Travel Award, 2013
National Science Foundation Graduate Research Fellowship, 2012
Georgia Institute of Technology Presidential Fellowship, 2010
Barry M Goldwater Scholarship and Excellence in Education Program Honorable Mention, 2008
Anderson Scholarship for Excellence in Science Award, 2007
XIAOJING J. GAO, PhD
Biology and Biological Engineering, California Institute of Technology, Apt 1, 12433 Pacific Ave, Los Angeles, CA, 90066
xiaojing.j.gao@gmail.com

Research Overview:
Mammalian synthetic biology holds a great promise for biomedicine. To take cancer as an example, traditional molecular drugs are limited in their ability to process and integrate information from multiple hallmarks often required to distinguish cancer cells, while cell-based therapies largely leave the rich cytosolic hallmarks untapped. In contrast, in circuit-based therapies, we envision “smart” circuits that enter patient cells, detect cancer hallmarks, process signal, ablate the cell only if it is determined cancerous, and, upon mission accomplishment, are self-removed without mutagenizing healthy cells. To help realize this vision, I propose to establish a general-purpose platform for the rational design, robust implementation, and safe delivery of synthetic molecular circuits to program the behavior of mammalian cells.

In graduate school, I used state-of-the-art genetic and quantitative methods to dissect neural circuits1, 2. Meanwhile, I realized the lack of tools for recording neural activity over long time scales (hours/days) that are key indicators of animals’ ”state of mind”. I thus established a method to convert neural activity (represented by [Ca²⁺]) to the expression of a transcriptional reporter3, suitable for recording gradual changes of neural activity in intact animals. It has since been used by other labs in processes as diverse as mating, circadian rhythm, and stem cell proliferation. Through my studies in neuroscience, I have reinforced my taste for quantitative and systems approaches. I have also witnessed the transformative power of molecular tools and had a rewarding experience building them. Combining these threads for my postdoctoral studies, I have evolved into a platform developer, aspiring to enable not just one tool, but many different ones suitable for diverse scenarios, i.e., a “programming language” for mammalian synthetic biology. I engineered viral proteases so that they can be connected in different ways to implement diverse protein-level circuits4, featuring compact delivery, robust performance, fast operation, and direct coupling to cellular inputs/outputs. In parallel, I explored the engineering of a RNA virus as a delivery vector, which would circumvent traditional DNA vectors’ mutagenic risks. My proof-of-principle studies showed that an RNA virus can be regulated at 4 layers during transmission and replication (manuscript in preparation), conducive to high specificity and safety upon further optimization.

Building on my postdoctoral achievements, I plan to apply my molecular engineering and quantitative skills to expand the capacity of my protein circuits and improve their delivery on RNA-based vectors, towards my ultimate vision elaborated in the first paragraph.

Education:
B.S., Biology, Graduate with Honor, Peking University (2009)
Ph.D., Biology, Stanford University (2015)

Research/Work Experience:
Graduate Research Assistant, with Dr. Liqun Luo and Dr. Thomas Clandinin, Stanford University (2010-2015)
Helen Hay Whitney Postdoctoral Fellow, with Dr. Michael Elowitz, California Institute of Technology (2015-present)

Selected Publications:

* denotes equal contribution; ^ denotes corresponding author.

Awards/Honors:
Damon Runyon Fellowship (2016, declined)
Helen Hay Whitney Fellowship (2016-2019)
DARPA Riser, DARPA’s 60th Anniversary Symposium (2018)
Research Overview:
As a chemical engineer specializing in molecular systems biology, my ultimate goal is to leverage synthetic biology principles to transform how we understand cellular transitions and engineer cellular therapies.

Synthetic biology aims to harness the power of biological systems to perform tasks such as tumor surveillance, pathogen identification, and metabolite homeostasis. Native biological circuits (e.g. connected networks of genes) query data within the cell to coordinate cellular behaviors in space and time. Within mammalian systems, there exists a tremendous opportunity to use synthetic circuitry to dynamically access information in the cell. My research focuses on integrating synthetic circuitry to interrogate and drive cellular behaviors. As a postdoc, I identified tradeoffs that limit reprogramming and discovered that topoisomerases—the enzymes responsible for curating DNA topology—mitigate these tradeoffs. In fact, topoisomerases increase the speed, efficiency, and efficacy of reprogramming. My discovery suggests that topological stress across the genome represents a primary barrier to cellular reprogramming. This finding opens completely new questions around how the structure of the human genome stabilizes cellular identity and buffers cells against transitions to pathological states. My discovery also offers reasons for why particular circuit designs fail and suggests principles to improve the performance of circuits integrated into the genome. I will establish a leading research program focused on designing and constructing integrated synthetic circuits to probe and actuate changes in DNA topology that drive changes in cell fate.

Education:
PhD, Chemical Engineering, Minor in Biology | Jun 2007 – Jun 2012 | California Institute of Technology, Pasadena, CA
MS, Chemical Engineering | Sep 2005 – Jun 2007 | California Institute of Technology, Pasadena, CA
BS, Chemical Engineering, Graduated with Honors | Aug 2001 – May 2005 | University of California, Berkeley, CA

Research/Work Experience:
NIH Postdoctoral Research Fellow | Sep 2013 – Present | University of Southern California, Los Angeles, CA
Adjunct Assistant Professor in Department of Chemistry | Jan 2013 – May 2013 | Harvey Mudd College, Claremont, CA

Selected Publications:
- Babos, KN*, Galloway, KE*, Kisler, K, Zitting, M, Li, Y, Quintino, B, Chow, RH, Zlokovic, BV, and Ichida, JK. Balancing dynamic tradeoffs to drive reprogramming. (In review at Science). *These authors contributed equally to this work. Available at bioRxiv: https://doi.org/10.1101/393934.

Awards/Honors:
ARCS Maggie McKnight Russell Memorial Postdoctoral Fellow Award | Oct 2017-Present | Awarded to one USC postdoc
1st Place Winner of Annual USC Postdoctoral Symposium | May 2017 | TED talk-style competition for all USC postdocs
Doerr USC Stem Cell Challenge Award with Hoaze Yu | 2017 | Internal collaborative grant competition | Role: Co-PI
Fluidigm USC Single Cell Project Grant | 2016 | Corporate-sponsored grant competition | Role: PI
NIH Ruth L. Kirschstein NRSA Postdoctoral Fellowship | Fall 2015 – Fall 2018
California Institute of Regenerative Medicine Postdoctoral Fellowship | Fall 2013- Fall 2015
Caltech Everhart Lecturer | May 2011 | Lecture awarded yearly to 3 grad students for excellence in research & communication
Research Overview:

My graduate work focused on the development and optimization of biomaterials to support the regeneration of skeletal muscle tissue. I developed novel crosslinking and post-processing techniques to generate tunable structural and biochemical properties of fibrin microthreads, demonstrated that these materials supported myoblast culture, and, ultimately, restored the functional mechanical loading of skeletal muscle in a mouse model of volumetric muscle loss. One of the major barriers to successful scaffold and construct integration with host tissue is the lack of proper signaling for innervation and vascularization of the implanted constructs. To understand how these two critical components develop, my postdoctoral work has focused on developing in vitro model systems to study the molecular events surrounding angiogenesis and neurogenesis, specifically studying the interplay between these two systems during development. We have recently expanded this work into developing one of the first in vitro tissue systems designed to study neural repair and regeneration, and are using it to study how neural networks develop and repair after laceration.

The long-term goal of my laboratory is to combine these two facets of tissue engineering: design materials to actively develop functional tissues such as skeletal muscle as well as understand the molecular events that lead to tissue innervation and vascularization. The ultimate goal of our group will be to generate complex tissue systems with which to (1) study regeneration and toxicity events in vitro, (2) study molecular signaling events involved in the crosstalk between these somatic cell types, and (3) to generate complex tissues to regenerate large tissue trauma.

Education:

2015 Ph.D., Biomedical Engineering, Worcester Polytechnic Institute, Worcester, MA
2008 B.S., Bioengineering, University of Pittsburgh, Pittsburgh, PA

Research/Work Experience:

2015 – Present Postdoctoral NRSA Fellow, Tufts University, Biomedical Engineering, (Mentor: Dr. David L. Kaplan)
2017 – Present Part-time Lecturer, Tufts University, Biomedical Engineering
2008 – 2015 Graduate Student/NRSA Fellow, Worcester Polytechnic Institute, Biomedical Engineering (Mentor: Dr. George Pins)
2006 – 2008 Undergraduate Research Assistant, University of Pittsburgh, Bioengineering (Mentor: Dr. Stephen F. Badylak)

Selected Publications:


Awards/Honors:

2016 – Present NIDCR National Research Service Award (NRSA) Individual Post-doctoral Fellowship (F32-DE026058)
2015 – Present Kaplan Laboratory Lab Leader
2015 Sigma Xi Outstanding Doctoral Dissertation Award
2013 – 2014 NIDCR National Research Service Award (NRSA) Individual Pre-doctoral Fellowship (F31-DE023281)
2011 Alfred R. and Janet H. Potvin Award, Worcester Polytechnic Institute
2008 – 2009 Harold L. Pierson Memorial Fellow, Worcester Polytechnic Institute
HEATHER H. GUSTAFSON, PhD
University of Washington, Seattle, WA, 98195
hhgustaf@uw.edu

Research Overview:
Macrophages (MΦ) are an extremely plastic cell type, adapting their functional phenotype swiftly and sometimes dramatically in response to environmental cues. Not surprisingly, this unique behavior provides a strong predictive model for clinical disease outcomes. For example, disease-associated MΦs that are functionally responsible for general wound repair (e.g. immune suppressive, angiogenetic, etc) and pathogenic clearance (e.g. immune promoting, phagocytic, etc), are indicative of poor prognosis in cancer and autoimmune disorders, respectively. What remains unclear is how these functional phenotypes arise, and if the function is driving disease progression or is a symptom of environmental cues. My career has focused on harnessing existing and developing novel technology platforms that alter MΦ function through environmental manipulation, both as a graduate student with nanotechnology and as a postdoc with peptide therapeutics. My lab will focus on understanding A. how environmental cues impact MΦ function, B. how that function drives disease progression and C. how to harness that understanding to engineer novel technologies to treat disease. My independent research lab will focus on engineering changes in MΦ function through environmental manipulation in the following ways: 1. Initiation and blockage of inflammatory cell death. Inflammatory cell death is a mechanism through which pathogens are identified and eliminated. Unsurprisingly, the machinery responsible for this form of cell death is upregulated in MΦs. These forms of cell death are implicated in cancer (under-active death) and autoimmune disorders (over-active death). As a postdoc (in collaboration with Seth Masters and James Vince), I generated the first peptide therapeutic that can induce this form of cell death and treat cancer. Currently, I am working on a series of candidate peptides that can both block and initiate these mechanisms, altering MΦ behavior. 2. Manipulation of extracellular matrix (i.e. CSPGs, fibrin, tenascin, etc). It is well known that ECM deposition plays a role in wound healing. As a postdoc (in collaboration with Suzie Pun and Nathan White), I used synthetic injectable material that altered fibrin deposition, changed MΦ behavior and drove metastasis. I believe this concept can be expanded to other ECM molecules and disease states. 3. Manipulation of trained innate immunity. Through a clinical collaboration with Seattle Children’s Research Institute, I am exploring how epigenetic changes train and drive MΦ functional behavior. I hope to harness this understanding to develop novel tools.

Education:
Ph.D., Bioengineering, University of Utah, USA and Helmholtz Institut, Germany (Dec 2014)
- Dissertation: Macrophage Silica Nanoparticle Interactions: Cellular Uptake and Fate
B.S., Biomedical Engineering, Minor: Chemistry, Case Western Reserve University, USA (May 2008)

Research/Work Experience:
Postdoctoral Fellow, Walter and Eliza Hall Medical Institute, Australia, Advisors: Dr. James Vince, Dr. Seth Masters
Postdoctoral Fellow, University of Washington, Advisor: Dr. Suzie Pun
Graduate Fellow, University of Utah, and Helmholtz Institut, Germany, Advisors: Dr. Hamid Ghandehari, Dr. Claus-Michael Lehr
Undergraduate Fellow, Case Western Reserve University, Advisors: Dr. Anirban Sen Gupta, Dr. Roger Marchant

Selected Publications:

Awards/Honors:
Research Overview:
I am an instructor in the lab of Dr. Seemantini Nadkarni, at the Harvard Medical School, where I completed my postdoctoral training in biomedical optics and biomechanics. For my postdoctoral research, I worked on developing a novel Laser Speckle Rheology (LSR) technique for evaluating the biomechanical properties of tissue in a non-contact, non-invasive manner. Speckle, a random granular pattern formed by the back-scattered laser beam from tissue, has no immediate resemblance to tissue microstructure. Yet the rate of speckle fluctuations is intimately related to the viscoelastic susceptibility of the evaluated tissue. I have previously established that the rate of speckle fluctuations is correlated with the viscoelastic modulus, G*, as evaluated by conventional mechanical tests, in hydrogels and tissue over a wide range of moduli. To extract the actual G*, from the speckle signal, I have developed a patented algorithm to both quantify and compensate for the influence of optical properties and scattering particles size distribution on speckle dynamics and demonstrated the close correspondence between G* evaluated by LSR and the conventional rheology in several gels and biological fluids. I have also contributed to the establishment of an optical coagulation sensor, which is an LSR based point-of-care device, for diagnosing the coagulopathies from a drop of blood, in a few minutes. The research in my future lab will focus on the next paradigm in laser speckle based micro-rheology technologies, which is to develop an optical imaging modality for 3-dimensional, high-resolution, micro-mechanical mapping of cells, tissues, and biomaterials. I will use this technological innovation for micromechanical profiling of the tumor-associated extra-cellular matrix (ECM) in various types of human cancer to investigate as to how the micromechanical cues conferred by the ECM mediate cancer aggression. I will also continue to develop optical sensors for evaluating the scattering particle size distribution of bio-fluids for cytological analysis and characterization. My interdisciplinary research agenda will bridge the optical, mechanical, and biomedical sciences to understand the mechano-biological underpinning of the pathogenies, progression, and treatment of human disease.

Education:
PhD, Electrical Engineering, 2009, Pennsylvania State University.
MSc, Electrical Engineering, 2006, University of Tehran.
BS, Electrical Engineering, 2003, Sharif University of Technology.

Research/Work Experience:
Instructor, 2013-present, Wellman Center for Photomedicine, Harvard Medical School.
Postdoctoral Fellow, 2010-2013, Wellman Center for Photomedicine, Harvard Medical School.
Lecturer, 2009-2009, Department of Electrical Engineering, Pennsylvania State University.

Selected Publications:

Awards/Honors:
BMES Career Development Award,2018
Scholarly Writing Award,2017
Best Poster Presentation Award,2016
Yau Su Best Mentor Award,2014
KIHWAN HAN, PhD
Center for BrainHealth, University of Texas at Dallas, 2200 W Mockingbird Ln, Dallas, TX, 75235
kihwan.han@utdallas.edu

Research Overview:
My research goal is to better understand neural systems of individuals with mild Traumatic Brain Injury (TBI) by performing statistical analysis of their medial imaging data acquired from advanced Magnetic Resonance Imaging (MRI) such as functional MRI (fMRI) and Diffusion Tensor Imaging (DTI). TBI is an injury induced by external force to the head that leads to disruptions in brain function. TBI is a substantial threat to public health in the United States, contributing to 30% of all injury deaths. Yet, the limited capacity of conventional imaging methods to detect abnormality and the heterogeneity of TBI remain as major challenges in TBI research for optimal treatment of this population. My research strives to overcome these challenges with advanced brain imaging techniques, better model of neural systems, and sophisticated data analyses. In this context, the overarching goals of my TBI research are to (1) develop neuroimaging biomarkers for the diagnosis of TBI in a more reliable, objective fashion, (2) to quantify improvements of the brain systems following rehabilitation in TBI, and (3) to quantitatively model injury progress after TBI or recovery after treatment for TBI.

Education:
• PhD, Electrical and Computer Engineering, Purdue University, 2011
• BE, Electrical Engineering, Korea University, 2002

Research/Work Experience:
• Research Scientist, Center for Brain Health, University of Texas at Dallas, 2017-Present
• Postdoctoral Research Associate, Center for Brain Health, University of Texas at Dallas, 2013-2017
• Postdoctoral Research Associate, Department of Neurology, Washington University in St. Louis, 2011-2013
• Research Assistant, School of Electrical and Computer Engineering, Purdue University, 2007-2011 • Summer Research Intern, School of Electrical Engineering, Korea University, 2000

Selected Publications:

Awards/Honors:
• Sapphire Foundation, $25,000, Project: Neural Networks Underlying Training-induced Improvement in Traumatic Brain Injury, 2016-2017
• Friends of BrainHealth, $25,000, Project: Brain-based Predictors of Rehabilitation Outcomes in Traumatic Brain Injury, 2015-2016
• Travel Grant Award, Jun, The Neurotrauma 2015 Symposium, 2015
• ILJU Academic and Cultural Research Foundation Fellowship, 2006-2009
• Valedictorian, College of Engineering, Korea University, 2002
Research Overview:
Mild TBI (mTBI), or concussion, is a major health problem, yet both our prognostic and therapeutic capabilities are inadequate. Much of the limitation is due to a lack in our fundamental understanding of how cells within the brain respond to physical forces. We now understand that changes in cognitive function associated with mTBI are not due to direct structural damage of tissue but due to secondary pathological responses that affect connectivity within neural networks. During my training, my research has focused on identifying mechanisms of injury and the subsequent pathological response at both the neuronal and neural network level. I have acquired a skillset including substantial experience with both in vitro and in vivo models of TBI, microscopy techniques for imaging live neural activity in both in vitro and in vivo capacities, and multiple murine behavioral models to assess cognitive deficits. Collectively, my training has prepared me to pursue my research goal of identifying novel mechanisms of pathological mechanotransduction at the cellular level and to understand how these changes scale to affect both neural network function and behavioral performance. Mechanotransduction mechanisms are the earliest biological response to physical trauma and thus represent promising therapeutic targets. Unfortunately, little of the established mTBI pathology can be traced back to a known mechanotransduction mechanism. Therefore, my future research will have two general aims: (1) Identify novel mechanotransduction mechanisms that exist in cells within the central nervous system, including a range of cell types such as neurons, astrocytes, and microglia and (2) elucidate pathways that link these mechanotransduction mechanisms to remodeling of neuronal connectivity at the network level. I propose that these mechanisms can be activated in a pathological manner in mTBI subsequently leading to network remodeling and impairment. Therefore, targeting these pathways may provide novel therapeutic strategies for treating the secondary injury cascades that ultimately lead to behavioral impairment and/or cognitive deficits.

Education:
- B.S. Biomedical Engineering (2008) at Washington University in St. Louis, St. Louis, MO
- Ph.D. Engineering Sciences (2014) at Harvard University, Cambridge, MA
- Postdoctoral Fellow (Current) at University of Pennsylvania, Philadelphia, PA

Research/Work Experience:
Postdoctoral Fellow with Professor David Meaney at University of Pennsylvania SEAS
• Studied TBI induced neural circuitry alteration and cognitive deficits utilizing miniaturized, in vivo microscopy of neuronal activity in an unconstrained live mouse
• Studied effects of repetitive mechanical insult on the brain and identified underlying mechanisms of neuroprotection
PhD Candidate with Professor Kevin Kit Parker at Harvard SEAS
• Studied the role of acute mechanical stimuli in initiating axonal injury in primary neuronal culture
Graduate Student with Professor Maurice Smith at Harvard SEAS
• Utilized control theory approaches to understand learning in humans
Undergraduate Research with Professor Igor Efimov at Washington University in St. Louis:
• Studied initiation of reentrant waves in cardiac arrhythmia

Selected Publications:

Awards/Honors:
• Ruth L. Kirschstein NRSA Fellowship
• Selected as Poster Finalist (Top 20) at National Neurotrauma Society Annual Meeting (2017)
• W. Alfred Hayes Award. Given by the University Chancellor for constructive leadership by a student athlete - Magna cum laude Washington University in St. Louis
Research Overview:
Organoids have gained relevance in stem cell biology, drug discovery, and disease modeling because they resemble aspect of the native organ. Matrigel is the preferred commercial hydrogel used for growing organoids in vitro. Matrigel’s lot-to-lot variability, ill-defined composition and residual bioactive molecules (i.e. growth factors and cytokines) have prevented the parsing of the role of the matrix and the soluble factors in stem cell morphogenesis. Further, the biophysical properties of Matrigel cannot be tailored to build organotypic models (i.e. stromal and epithelial cells) that require month-long (or longer) in vitro cultures. My research focuses on the rational design of well-defined, easy-to-assemble, and reproducible, synthetic matrices. Integrin expression in the target cell serves as the initial framework. “Binder peptides” that sequester cell-secreted ECM, and MMP-degradable crosslinkers are incorporated within the hydrogel to recreate the native cell niche. On-demand dissolution of the synthetic matrix is accomplished with a bacterial enzyme that have few targets in mammalian proteins. This allows the recovery of cell-secreted metabolites within the hydrogel for a more accurate read-out of the cellular microenvironment. I have designed synthetic matrices that supports human and mouse intestinal organoids. Intestinal stem cells embedded in these matrices show different proliferative capacity compared to Matrigel. I am using this feature to identify key components (soluble factors or ECM components) that drive stem cell proliferation. Further, these matrices can also be tailored in terms of stiffness, degradability, and geometry to generate tissue-like structures in 3D or 2.5D configurations. My lab will use off-the-shelf and made-to-order reagents to facility the transfer of technology to collaborators or other potential users. This technology has potential application with other epithelial organoids so I will actively look for collaborators within the department and across the institution.

Education:
Purdue University, West Lafayette, IN. May 2013. PhD Biological Sciences. Mentor: Jean Chmielewski
Oklahoma State University, May 2005. M.Sc. Plant Pathology, Advisor: Carol Bender
Universidad Autonoma de Chiapas, December 1999. B.S. Biotechnology

Research/Work Experience:
2014-Present Postdoctoral Research Associate, Massachusetts Institute of Technology,
2010-2014 Graduate Research Assistant, Purdue University, Department of Chemistry
2006-2010 Graduate Research Assistant, Purdue University, Department of Medicinal Chemistry 2003-
2005 Graduate Research Assistant, Oklahoma State University, Entomology and Plant Pathology

Selected Publications:
Hernandez-Gordillo, V. Koppes N. A. Griffith, L. Breault, D and Carrier, R. Chapter 37 - Engineering the Niche for Intestinal Regeneration.” In Biology and Engineering of Stem Cell Niches, 601–15, 2017

Awards/Honors:
2018 Speaker at the EMBO/EMBL organoid conference, Heidelberg Germany
2018 Best Poster award at the GRC signal transduction by extracellular matrices, Andover NH
2017 3rd place in poster competition at the MIT Center for Environmental Health Sciences
2015 2nd Place, at the MIT Postdocs Share Their Science poster competition event. MIT
2012 1st place, poster competition H.C. Brown Centennial Celebration, Purdue University
2012 1st Place, Sigma Xi Purdue University poster competition
2011 Invited Speaker to the Gordon Collagen Research Seminar, NH
2002-2005 Fulbright Scholarship for Master Degree
MARIAN H. HETTIARATCHI, PhD
Department of Chemical Engineering & Applied Chemistry, University of Toronto, Toronto, Ontario, Canada
m.hettiaratchi@utoronto.ca

Research Overview:
Tissue repair requires a carefully orchestrated series of events in which numerous cell populations, proteins, and matrix molecules participate under precise spatiotemporal control. Biomaterials developed to deliver cells and proteins to damaged tissues often fail to recapitulate the complex, endogenous healing response to injury, and lack the ability to control the bioactivity and local presentation of therapeutics in the injury environment. I aim to address this critical need within the field of protein delivery, by synergizing chemical and biomedical engineering approaches to develop tunable, affinity-based biomaterials that can provide precise control over cell and protein delivery to repair injured tissues. My research integrates expertise in bio-transport models, protein engineering, and affinity-based biomaterials to (1) interrogate events leading to impaired tissue repair, and (2) develop instructive biomaterials to enhance the endogenous healing response.

My doctoral work with Drs. Todd McDevitt and Robert Guldberg at Georgia Tech illustrated the importance of exerting spatiotemporal control over protein delivery to direct/harness cell fate and stimulate repair in large bone defects, while demonstrating the utility of heparin-based affinity interactions to achieve such control [3-5]. Since a critical aspect of protein delivery is transport through tissues and biomaterials, I also initiated collaborations with other engineering labs at Georgia Tech to develop in vitro and in silico models to further investigate protein diffusion through polymer matrices [1,3]. However, affinity-based biomaterials that rely on natural protein-matrix interactions provide limited specificity and tunability, and maintaining protein bioactivity in the harsh in vivo injury environment poses a challenge. As a post-doctoral fellow in Dr. Molly Shoichet’s lab, I have sought to engineer affinity-based hydrogels to provide spatiotemporal control over protein delivery to the central nervous system [2]. I am using expertise in protein engineering and synthetic biology to (1) computationally screen amino acid modifications that improve protein activity and stability, and (2) employ directed evolution platforms to generate novel protein binding partners to independently control release of multiple proteins from a single material. Together, this work lays the foundation for my long-term goal of leveraging affinity interactions and bio-transport principles to create more effective biomaterial-based protein delivery strategies.

Education:
2016, PhD, Biomedical Engineering, Georgia Institute of Technology & Emory
University 2011, BSc, Chemical Engineering, University of Calgary

Research/Work Experience:
2017-present, Postdoctoral Fellow, University of Toronto
2011-2016, Graduate Research Assistant, Georgia Institute of Technology
2009-2010, Internship Student, Syncrude Canada Ltd. Research & Development Centre

Selected Publications:

Awards/Honors:
Postdoctoral Fellowship, Natural Sciences and Engineering Research Council of Canada (NSERC), 2018-present
Invited Speaker, Distinguished Young Scholars Seminar Series, University of Washington, 2017
Scholar Award, Philanthropic Educational Organization (PEO), 2014-2015
Doctoral Scholarship, Natural Sciences and Engineering Research Council of Canada (NSERC), 2011-2015
LAUREL E. HIND, PhD
Medical Microbiology and Immunology, University of Wisconsin-Madison, 1550 Linden Street Room 4225, Madison, WI, 53706 lhind@wisc.edu

Research Overview:
My research is focused on investigating immune cell behavior using a combination of biological and engineering techniques. Specifically, I use engineered platforms to study the migration and antimicrobial functions of innate immune cells and how these functions are altered by their microenvironment. During my doctoral training with Daniel A. Hammer, PhD at the University of Pennsylvania, I studied the migration and force generation of macrophages and published the first traction force maps generated by primary human macrophages which showed that in contrast to neutrophils, macrophage concentrate their force at the leading edge of the cell. Furthermore, I investigated the differences in the migration and force generation of differentially polarized M1/M2 macrophages and found that M2 macrophages are more motile and produce higher forces than M1 macrophages. I then obtained a T32-funded postdoctoral fellowship to develop new in vitro models for studying neutrophil migration in the context of infection with Dr. Anna Huttenlocher, MD at the University of Wisconsin-Madison. As a postdoctoral researcher, I developed a new microscale model for investigating neutrophil migration to infection using a multicellular system that incorporated physiologically relevant geometries. Most recently, I used this model to show that neutrophil interaction with a model endothelial blood vessel increases neutrophil response to an infection. We are furthering this study by investigating the specific signaling mechanisms responsible for this response. I believe that multicellular, physiologically relevant in vitro models for have the potential to help us better understand the infectious microenvironment and the innate immune response. My experience in both engineering and biology laboratories make me uniquely poised to identify the most important questions in the field and develop the best models possible to answer them.

Education:
▪ Ph.D. Biological Engineering 2015, University of Pennsylvania, Philadelphia, PA
▪ B.S. Chemical Engineering 2009, University of Wisconsin-Madison, Madison, WI

Research/Work Experience:
▪ Postdoctoral Fellow: April 2015 – Present, Medical Microbiology and Immunology, University of Wisconsin-Madison Advisor: Anna Huttenlocher, MD
▪ Graduate Researcher: August 2009 – April 2015, Biological Engineering, University of Pennsylvania Advisor: Daniel A. Hammer, PhD
▪ Undergraduate Researcher: May 2006 – June 2009, Chemical & Biological Engineering, University of Wisconsin-Madison, Advisor: Sean Palecek, PhD

Selected Publications:
Hind LE, Ingram PN, Beebe DJ, Huttenlocher A. “Interaction with an endothelial lumen increases neutrophil lifetime and motility in response to P. aeruginosa,” Blood, in press.

Awards/Honors:
▪ Hematology T32 Postdoctoral Fellowship, NIH, 2015-2017
▪ National Science Foundation Graduate Research Fellowship, 2010 – 2013
Research Overview:

Millions of Americans suffer from neuromusculoskeletal disorders, such as muscular dystrophy, cerebral palsy, stroke, etc. Undoubtedly, human neuromusculoskeletal system is at the center for understanding, diagnosis, treatment planning and prognosis of neuromusculoskeletal disorders. However, limitations of experimental approach alone make it difficult to quantitatively assess how the neuromusculoskeletal system responds to disorders and the related treatments. When personalized with patient-specific data, multiscale neuromusculoskeletal simulation with its non-invasive nature will provide a critical tool for elucidating mechanisms of disorders and guiding treatment planning. **My overall research goal is to apply multiscale, personalized neuromusculoskeletal modeling and simulation to understand the mechanisms of neuromusculoskeletal disorders and develop rehabilitative and therapeutic strategies for limiting their impact on patients and society.**

In my PhD work, using combined neuromusculoskeletal simulation and experimental approaches, I revealed the neural and biomechanical mechanisms that the central nervous system uses to regulate limb posture and force, two essential requirements for completing any functional tasks, in the presence of unexpected perturbations. These findings are important for understanding how injury and disease to the neuromusculoskeletal system alter the ability to regulate arm mechanics in a functionally appropriate manner. To develop my experience towards clinically orientated, collaborative research, my postdoctoral work applied multiscale neuromusculoskeletal simulations to examine the pathophysiological mechanisms that lead to impairments and functional deficits in devastating neuromusculoskeletal disorders, such as Duchenne muscular dystrophy (DMD) and volumetric muscle loss injury. Currently, supported by the NIH grant R21AR068562, I am integrating imaging, strength and gait measurements to create patientspecific dynamic simulations of walking that examine the relationship between muscle function in locomotion and muscle degeneration in DMD.

As a junior faculty, I will leverage my experiences to build a multi-disciplinary research program that will: **1) develop a framework for fast development of multiscale, personalized neuromusculoskeletal models; and 2) utilize simulations to guide the development of rehabilitative strategies that prolong walking in patients with DMD.**

Education:

- PhD, Biomedical Engineering, Dec 2012, Northwestern University, Evanston, IL
- MS, Mechanical Engineering, May 2007, Tsinghua University, Beijing, China
- BS, Measurement and Control Technology and Instruments, May 2004, Tsinghua University, Beijing, China

Research/Work Experience:

- Postdoctoral Research Associate, 2013 – Present, University of Virginia, BME, Advisor: Silvia Blemker, PhD
- Postdoctoral Research Fellow, 2012 – 2013, Rehabilitation Institute of Chicago, SMPP, Advisor: Wendy Murray, PhD
- Graduate Research Assistant, 2007 – 2012, Northwestern University, BME, Advisors: Eric Perreault, PhD & Wendy Murray, PhD

Selected Publications:


Awards/Honors:

- NIH/NIAMS R21 Grant (R21AR068562), 2016-2019, National Institutes of Health
- SEAS Post-Doctoral Teaching Fellowship, 2018, School of Engineering & Applied Science, University of Virginia
- NCSRR/OpenSim Visiting Scholarship, 2016, National Center for Simulation in Rehabilitation Research, Stanford University
- ISB Student International Travel Award, 2011, International Society of Biomechanics
Research Overview:
My academic research focuses on development of diffuse optical techniques for noninvasive monitoring or 3D imaging of hemodynamics and metabolism in relative deep tissues. This work includes systematic structure design and construction, imaging algorithm development and medical/clinical applications. The techniques that I have developed and each individual biomedical applications are listed as following:

- Noncontact diffuse correlation spectroscopy (ncDCS), has been applied in monitoring head and neck tumor free flaps and mastectomy skin flaps peri-operatively to predict ischemia and failed tissue reconstruction;
- Noncontact diffuse correlation tomography (ncDCT), has been applied in breast tumor screening and pressure ulcer therapy monitoring;
- Noncontact speckle contrast diffuse correlation tomography (nc_scDCT), has been applied in mastectomy skin flaps for localization ischemia, also in continuous and longitudinal imaging cerebral blood flow during ischemic stroke and traumatic brain injury of rodents for disease mechanism studies;
- Wearable diffuse speckle contrast flow-oximeter (DSCF), has been applied in continuous cerebral blood flow monitoring in awake rodents for stroke studies and has been granted for real-time monitoring neonates for monitoring treatment of patent ductus arteriosus.

All my research work has generated 21 peer-reviewed journal papers (including 12 as the first author) and 31 international conference papers. I have awarded a Chinese patent and applied 3 US patents (1 awarded). I have acted as co-investigator in 4 grants from National Institutes of Health (NIH), American Heart Association (AHA) and The Plastic Surgery Foundation.

Education:
- B.S. Optical Science and Technology, Huazhong University of Science and Technology (HUST), China, 2005
- M.S. Optical Engineering, HUST, 2007
- Ph.D. Optical Engineering, HUST, 2011

Research/Work Experience:
- Research Assistant, Optical Engineering, HUST, 2005-2011
- Postdoctoral Researcher, Biomedical Engineering, UK, 2012-2016
- Research Scientist, Biomedical Engineering, UK, 2016-Present

Selected Publications:
- C. Huang, Y. Gu, J. Chen, etc., IEEE Journal of Selected Topics in Quantum Electronics, 2018, DOI: 10.1109/JSTQE.2018.2854597
- C. Huang, D. Irwin, M. Zhao, etc., IEEE Transactions on Medical Imaging, 36(10), 2068-2076 (2017)
- C. Huang, M. Seong, J. P. Morgan, etc., Journal of Biomedical Optics, 21(8), 080501 (2016)

Awards/Honors:
- Top Level Student Scholarship of Huawei Co., Ltd., 2006
- Student Science and Technology Achievement Award, HUST, 2009
- Student Outstanding Publication Award, HUST, 2010
- Funding for International Academic Exchange, HUST, 2010
- Distinguished Graduate Student Award, HUST, 2010
- Quality Scientific Peer-Review during 2015-2016 Publishing Season, the Optical Society of America, 2016

Patents
- Chinese Patent ZL 200910273527.0, 2011
- US Patent 9861319, 2018
HAISHUI HUANG, PhD
Harvard Medical School, Boston, MA
haishuihuang@gmail.com

Research Overview:
My research interests focus on the development and application of Biomedical Microelectromechanical Systems (BioMEMS), especially the multiphase droplet-based microfluidics. I designed and tested droplet-based microfluidic devices for the construction of hydrogel microcapsules for biological samples (e.g. bacteria, mammalian cells, and tissues) with fine internal structures. I also developed an elegant on-chip approach of passive and active extractions of hydrogel microcapsules from toxic oil phase into aqueous phase to dramatically enhance microcapsule retrieval efficiency and cell viability. Based upon these advances on multiphase microfluidic devices, I applied this platform on various biomedical applications. For example, I accomplished in vitro 3D biomimetic tissue culture for preantral follicles in mechanically heterogeneous hydrogel microcapsules for improved follicle development and ovulation. I also obtained guided cell expansion and stem cell differentiations in mechanically and chemically engineered microcapsules. Moreover, I combined those multiphase systems with biopreservation technologies (e.g. vitrification and supercooling preservation). I reduced the concentration of cryoprotectants by 4 times and increased sample size by 100 times for stem cell vitrification preservation by revealing astonishing capabilities of devitrification and recrystallization inhibition of alginate hydrogel microcapsules. I also achieved long-term (100 days) deep-supercooling (-20 °C) for large-volume (100 ml) water and red cell preservation via surface sealing with immiscible oil agents. Overall, these research activities would significantly benefit the advances of BioMEMS technology, cell/stem cell therapeutics, tissue engineering, and biopreservation and transplantation.

Education:
Ph.D. in Mechanical Engineering, 2016, The Ohio State University, USA

Research/Work Experience:
Postdoc Fellow, 9/2016 - Present, Harvard Medical School
Graduate Research Associate, 9/2012 – 5/2016, The Ohio State University

Selected Publications:

Awards/Honors:
Excellence in Innovation, 2018, Partners Healthcare
Outstanding Graduate Student, 2012, Xi’an Jiaotong University
Excellent Undergraduate Dissertation Award, 2009, Xi’an Jiaotong University
ZEINAB JAHED, PhD
Chemistry, Stanford University, Palo Alto, Ca
zjahed@stanford.edu

Research Overview:
My research to date has been extremely multidisciplinary. My ultimate goal is to use nano and micro technologies to answer fundamental questions in biology and to unravel the mechanisms by which cells interact with nano materials.

Education:
PhD. Applied Science and Technology with Designated Emphasis in Nano-scale Science and Engineering, Molecular Cell biomechanics lab, Departments of Bioengineering and Mechanical Engineering, University of California Berkeley, CA, USA. 2013-2018
MASc. Mechanical Engineering, University of Waterloo, Waterloo, ON, Canada. 2010-2012,
BASc., Honors Mechatronics Engineering Co-operative Education program, University of Waterloo, Waterloo, ON, Canada. 2004-2009

Research/Work Experience:
Position Title: Postdoctoral Scholar – Cui Lab, Department of Chemistry, Stanford University, CA, USA. 2018-Present

Selected Publications:

Awards/Honors:
- 1 of 24 recipients of Canada’s Banting Postdoctoral Fellowship (2018) - Declined
- Ranked in top 4% of all applicants
- Natural Sciences and Engineering Research Council of Canada (NSERC) Postdoctoral Fellowship (2018)- Declined
- Ranked #1 nationally in Selection committee for Chemical, Biomedical and Material Science and Engineering
- University of California, Berkeley Applied Science & Technology Excellence in Research Award (2018)
- University of California Cancer Research Coordinating Committee (CRCC) predoctoral fellowship award (2016-2017)
- Biophysical Society Education Committee Travel Award (2016)
- 1st place winning image in the Biophysical Society Art of Science Image Contest (2016) link
- UC Berkeley Non-Resident Tuition Additional Award (2014-2016)
- University of Waterloo President’s Graduate Scholarship (PGS) (2013)
- Provost Doctoral Entrance Award for Women in Engineering (2011-2012)
ERA JAIN, PhD
Biomedical Engineering, Washington University, One Brookings Drive, Saint Louis, MO, 63130
erajain@wustl.edu

Research Overview:
My long-term goal as an independent investigator is to develop multifunctional biomaterial-based therapeutics for the treatment of musculoskeletal disorders. My academic training and research experience have provided me with an excellent background in multiple disciplines including biomaterials, drug delivery, and tissue engineering. During my graduate studies, I developed macroporous scaffolds called cryogels (polymerized under sub-zero conditions) and utilized those as a matrix for high density in vitro culture of mammalian cells for tissue engineering. The work further sparked my interest in developing novel biomaterial therapeutics. As a postdoctoral fellow, I developed biodegradable polyethylene glycol (PEG) hydrogels with customized biodegradability. I further applied these PEG hydrogels for sustained protein delivery specifically for platelet-rich plasma (PRP) derived growth factors for the treatment of osteoarthritis (OA). The PEG hydrogels showed sustained release of PRP growth factors and decreased expression of proinflammatory cytokines and enzymes in cultured human osteoarthritic chondrocytes. I further tested the ability of the PEG hydrogels for enzyme replacement therapy for treatment of other musculoskeletal disorders namely mucopolysaccharides diseases. Advancing my research in the area of musculoskeletal disorders I am currently engaged in developing preclinical models of osteoarthritis and designing novel drug depots for sustained release of small molecule antagonists of inflammation for early intervention and treatment of osteoarthritis.

Education:
1. Ph.D., Indian Institute of Technology (IIT), Kanpur, India (2011)
2. Bachelor of Pharmacy (B. Pharm), RG Technical University, Bhopal, India (2004)

Research/Work Experience:
Research Scientist Washington University at Saint Louis Feb 2017-present
Postdoctoral Researcher, Saint Louis University, Missouri Oct 2013- Feb 2017

Selected Publications:

Awards/Honors:
• Travel Award for Poster presented at Musculoskeletal Research Center winter symposium, Washington Univ. 2018
• Travel Award for attending "World Biomaterial Congress 2008" at the Netherlands from CSIR, India. 2008
WOO-SIK JANG, PhD
Bioengineering, University of Pennsylvania, 275 S Bryn Mawr Avenue, Apt J29, Bryn Mawr, PA, 19010
jangw428@gmail.com

Research Overview:
My research career centers around experimental soft matter physics. Specifically, my current research focuses on the fabrication of artificial cellular structures and their biomedical applications. In one demonstration, I fabricate polymeric protocells and incorporate enzymatic power system into protocell structure to show how these protocells communicate each other and react to external stimulations.

My previous research at Yale University was focused on understanding basic physical principles underlying equilibrium structures and dynamics of soft matter using synchrotron-based small angle x-ray scattering (SAXS) and x-ray photon correlation spectroscopy (XPCS).

I anticipate my future research direction to conjoin fundamental soft matter physics and biomedical applications. As detailed in my research statement, I aim to create self-motile protocells powered by enzymatic or catalytic reactions. Novel polymer vesicles made from protein-polymer hybrid materials will be developed. The proposed protocell research can be divided into two areas: studying phase behavior of protein and polymer amphiphiles confined in bilayer structures and understanding the microscopic energy conversion process caused by enzymatic reactions incorporated in protein amphiphiles. Such synthetic protocell research may potentially be applicable for future in vivo studies, which I believe I can achieve with the prospect of collaboration with the other researchers in those fields. In this direction, I had attempted to win the research support from the National Science Foundation (NSF) and American Chemical Society and am currently preparing the research proposal aiming NSF Division of Civil, Mechanical and Manufacturing Innovation-Biomechanics and Mechanobiology program.

Education:
• Ph.D., Mechanical Engineering, Texas A & M University (2008)
  Academic Advisor: Jaime C. Grunlan (979-845-3027, jgrunlan@tamu.edu)
• M.S. Mechanical Engineering, University of Colorado (2003)
  Academic Advisor: Roop L. Mahajan (540-231-2597, mahajanr@vt.edu)
• B.S., Mechanical Engineering, Korea University (2000)

Research/Work Experience:
• Research Associate, Bioengineering, University of Pennsylvania (2016 ~)
  Project Supervisor: Daniel A. Hammer (215-573-6761, hammer@seas.upenn.edu) Daeyeon Lee (215-573-4521, daeyeon@seas.upenn.edu)
• Postdoctoral Associate, Chem. and Biomol. Engineering, University of Pennsylvania (2013 ~ 2016)
  Academic Advisor: Daniel A. Hammer (215-573-6761, hammer@seas.upenn.edu) Daeyeon Lee (215-573-4521, daeyeon@seas.upenn.edu)
• Postdoctoral Associate, Physics, Yale University (2009 ~ 2013)
  Academic Advisor: Simon G. Mochrie (203-436-4809, simon.mochrie@yale.edu)
• Hyundai Eng. & Construction (1999 ~ 2001)

Selected Publications:

Awards/Honors:
Society of Plastics Engineers Graduate Student Scholarship (2005)
BRIAN P. JOHNSON, PhD  
Biomedical Engineering, UW-Madison, 1111 Highland Ave, 6009 WIMR, Madison, Wisconsin, 53705  
bpjohnson5@gmail.com

Research Overview:  
I’m a toxicologist with world-class training in biomedical engineering and expertise in creating practical solutions for 21st century toxicology. My research bridges the gap in biological complexity between traditional animal testing models and modern highthroughput screening approaches. To fill this void, I engineer multi-cellular culture models that reconstruct paracrine and endocrine signaling interactions for hypothesis testing and chemical screening. I’ve constructed models of human orofacial development and steroid signaling (funded as a K99/ROO) and prostate cancer progression (processed 10 of 30 patients in a DOD clinical trial) using a manufacturing technique I developed dubbed microplate micromilling. Through this approach, I design, construct and test practical multi-culture platforms that balance biological complexity and experimental tractability. As evidence of their translational utility, I’ve been awarded both state (UW-SEED) and federal grants (Phase1 SBIR) to commercially develop one of these devices. These new tools are allowing me to pursue fundamental questions such as: How do chemical exposures affect morphogenic Hedgehog gradients? and What pro-agonists are we missing in modern endocrine disruptor screening assays? and have already yielded new insights into how patient specific microenvironments differentially confer chemotherapeutic resistance that would have been difficult or impossible with traditional approaches. The long-term goals of this research are to identify dangerous chemical hazards, uncover mechanisms of toxicity, reveal new pharmacological targets and inform personalized treatment and avoidance strategies in at-risk human populations.

Education:  
Postdoctoral: University of Wisconsin – Madison, Biomedical Engineering Advisor: David Beebe, (2014-present)  

Research/Work Experience:  
•Assistant Scientist/K99 Fellow: University of Wisconsin College of Engineering, Madison, WI. (2017-present)  
•Chief Scientific Officer: Onexio Biosystems LLC, Madison WI (2016-present)  
•Postdoctoral Fellow: University of Wisconsin College of Engineering, Madison, WI. (2014-2016)  
•Research Assistant: McArdle Laboratory for Cancer Research, University of Wisconsin, Madison, WI. (2007-2013)

Selected Publications:  
•Morgan MM1, Johnson BP1, Livingston MK, Schuler LA, Alarid ET, Sung KE, Beebe DJ (2016) Personalized in vitro cancer models to predict therapeutic response: Challenges and a framework for improvement Pharmacology & Therapeutics, 1co-first authors  
•Johnson BP, Walisser JA, Liu Y, Shen AL, McDearmon EL, Moran SM, McIntosh BE, Vollrath AL, Schook AC, Takahashi JS, and Bradfield CA (2014) Hepatocyte circadian clock controls acetaminophen bioactivation through NADPH-cytochrome P450 oxidoreductase. Proc Natl Acad Sci U S A.

Awards/Honors:  
•NIH NIEHS K99/R00 Pathway to Independence Award. 1K99-ES028744. ($946,572 direct) Sept 2018-present  
•NIH NIEHS Small Business Innovation Research Award R43-ES029864 Role: PI (transferred) ($225,000 total) Aug 2018-present  
•Wisconsin State Economic Engagement and Development (SEED) Award Role: PI ($150,000 total) July 2017-June 2018  
•NIH & EPA Transform Tox Testing Challenge Finalist Role: PI ($110,000 prizes) Nov. 2017, ongoing  
•T32 –Postdoctoral (2015-2016); Predoctoral (2009-2012)
JAEHWAN JUNG, PhD
Georgia Institute of Technology, 315 Ferst Dr NW, Atlanta, GA, 30318
jjung320@gatech.edu

Research Overview:
During PhD studies, my research focused mainly on developing miniaturized portable diagnostic devices based on microfluidics with Dr. Tae Seok Seo at KAIST. I developed a number of different microfluidic chips using diverse materials such as glass, PDMS, quartz, plastic, and paper, and controlling microfluidics using centrifugal and pneumatic valve/pump Microsystems. To detect targets such as RNA/DNA, proteins, virus, and, bacteria, I have investigated immune/genetic detection methods (i.e., ELISA, PCR, and isothermal amplification methods) using graphene oxide and gold/silica/magnetic nanoparticles. I also have an experience in biogenic nanomaterial synthesis using recombinant Escherichia coli. As a postdoctoral fellow at Georgia Tech, I am working on ocular drug delivery into the suprachoroidal space to treat posterior ocular diseases using a microneedle. This work has involved device design and fabrication, formulation development and in vitro and in vivo studies in animals in a highly interdisciplinary environment. In addition, I am working on fabrication of microneedle structures using 3D printer and photolithography to deliver drugs and cosmetics into the body.

Education:
1. Integrated M.S. & Ph.D., Chemical and Biomolecular Engineering, August 2014, Korea Advanced Institute of Science and Technology (KAIST), Daejeon, Republic of Korea
2. B.S., Environmental Engineering, February 2008, University of Seoul, Seoul, Seoul, Republic of Korea

Research/Work Experience:
1. Post-Doctoral Fellow, Georgia Institute of Technology, 06/2015- present, Advisor: Dr. Mark R. Prausnitz
2. Post-Doctoral Fellow, Korea Advanced Institute of Science and Technology (KAIST), Republic of Korea, 09/2014- 04/2015, Advisor: Dr. Tae Seok Seo
3. Integrated M.S. & Ph.D./Teaching assistant (TA), KAIST, 09/2010-08/2014
-Courses: Industrial Organic Chemistry, Chemical and Biomolecular Engineering Laboratory, Micro-Chemical and Biomolecular Systems, Nucleic Acid Engineering
-13 SCI journal publications as a first author were published (Total 30 publications)
-10 registered patents in Korea and USA

Selected Publications:

Awards/Honors:
PATRICK JURNEY, PhD
Biomedical Engineering, Oregon Health & Science University, 3303 SW Bond Ave, Portland, Oregon
jurney@ohsu.edu

Research Overview:
Project 1) Cardiovascular biomaterials for endothelial cell integration and reduction of neointimal hyperplasia and thrombosis.
Project 2) Polymeric nanoparticle drug delivery: transport phenomena and nanoparticle behavior in biological systems.
Project 3) 3D printing and vascularization of co-cultured artificial tissues.

Education:
PhD: 2015, The University of Texas at Austin
MSME: 2011, The University of Texas at Austin
BSME: 2009, The University of Portland

Research/Work Experience:
Postdoctoral Fellow: Oregon Health & Science University (September 2016-present)
Adjunct Professor (EGR 491/591-Biomicrofluidics), University of Portland, Spring 2018 (developed and taught graduate-level course)
Adjunct Professor (EGR 110-Introduction to Engineering), University of Portland, Fall 2017

Selected Publications:

Awards/Honors:
• Adjunct Faculty Member, The University of Portland (2017-present)
• NIH T-32 Postdoctoral Fellow (2016-2018)
• David Bruton, Jr. Graduate School Fellowship (2013-2014)
• NSF Graduate Research Fellowship Honorable Mention (2010)
• Graduate Presidential Scholar (2010)
• The Outstanding Mechanical Engineering Student (Donald P. Shiley School of Engineering, 2009)
• Karel and Marta Tietze Endowed Scholar (2005-2009)
• University of Portland Men’s Soccer Cumulative GPA Award (2006-2008)
• NCAA All-West Region Academic All American (2007 and 2008)
CHRIS A. KIESLICH, PhD
Biomedical Engineering, Georgia Institute of Technology, Engineered Biosystems Building, 950 Atlantic Drive, Suite 3213, Atlanta, GA, 30332
kieslich@gatech.edu

Research Overview:
My research focuses on multi-scale modeling of proteins and leveraging these models to gain insights into disease, as well as to design potential therapeutics. Biophysical and physicochemical understanding of protein function is a central element of my work, but one theme of my research has been developing models across physiological scales by using data mining and machine learning to integrate multiple types of experimental and computational data. A primary application area of my work has been computational immunology, where I have been involved in projects focused on topics such as the complement immune system and HIV. My recent research has focused on a family of proteases known to be upregulated in various types of cancer, but the development of tools for general protein structure prediction and protein design is also of great interest. My recent work, has started to combine molecular modeling with systems-level models to better understand the contribution of molecular changes in complex protein networks. One major interest of mine is the development of computational tools for research and teaching, including the development of multiple R packages and more recently the development of intuitive online interfaces to allow nonexperts to interact with models using the R Shiny platform. Future areas of interest are centered around multi-scale biomolecular systems modeling and optimization, and fall into three main areas: 1) data-driven models of biology and disease for personalized medicine; 2) modeling of protein structure and dynamics across atomistic and systems scales; 3) multi-scale design of peptide-based theranostics targeting cancer.

Education:
PhD. Bioengineering, 2012, University of California, Riverside, Bourns College of Engineering, Riverside, CA
B.S. Biomedical Engineering, 2007, Saint Louis University, Parks College of Engineering, Aviation and Technology, St. Louis, MO

Research/Work Experience:
• Research Engineer II: (2016 – Present) Georgia Institute of Technology, Coulter Department of Biomedical Engineering, Advisor: Prof. Manu Platt
• Postdoctoral Research Associate: (2012 – 2016) Princeton University/Texas A&M University, Department of Chemical and Biological Engineering, Advisor: Prof. Chris Floudas (deceased)
• Graduate Research Assistant: (2007 – 2012) University of California, Riverside, Department of Bioengineering, Advisor: Prof. Dimitrios Morikis

Selected Publications:

Awards/Honors:
• UCOP Tobacco Related Disease Research Program Dissertation Fellowship (2010-2012)
• Outstanding Engineering Student Award, Orange County Engineering Council (2012)
• Co-Chair Bioengineering Graduate Student Association (2009–2011)
• Best Participant Poster at 2011 NBCR Summer Institute, UC San Diego
• 2011 NBCR Summer Institute Scholarship, UC San Diego
• NSF/DAAD Central Europe Summer Research Institute Research Fellowship – Poland (2010)
• NSF/JSPS East Asia and the Pacific Summer Institute Research Fellowship – Japan (2009)
• TechHorizons (UC Riverside) Student Poster Competition 2009, Second Place
• Outstanding Teaching Assistant, Department of Bioengineering, UC Riverside (2007-2008)
Research Overview:
Radiopharmaceuticals are widely used in the clinic to detect, image and treat prevalent diseases such as cancer, cardiovascular diseases, and neurodegenerative diseases in a non-invasive manner. Since radioisotopes can be attached to essentially any biomarkers or drugs, the global market for radiopharmaceuticals is valued at USD 6.3 billion (as of 2016). However, current in vitro investigation of new radioactive drugs is limited to bulk or cell population studies, making it difficult to predict the true labeling efficiency until in vivo studies are performed.

My goal is to significantly improve the development of new radiopharmaceuticals by designing multidisciplinary engineering tools that detect radioactive molecule uptake at the single cell level. I designed 1) a low-light microscope coupled to a microfluidic incubator to allow sensitive counting of radiopharmaceuticals present within individual cells and 2) a droplet assay that provides high-throughput radionuclide uptake information of each encapsulated cells.

My future work will focus not only on developing translational microfluidic imaging platforms for nuclear medicine, but also on exploratory projects such as investigation of biological responses using organ-on-a-chip mimicking human physiology and studying fundamental physics of radiopharmaceutical flow. I possess knowledges in bio-fluid mechanics, physics of nuclear/medical radiation, optical imaging, and bioMEMS to lead these projects.

Education:
- Ph.D. Department of Mechanical Engineering, University of Texas at Austin, USA, 2013
- M.S. Department of Mechanical Engineering, Yonsei University, Korea, 2008
- B.S. Department of Mechanical Engineering, Yonsei University, Korea, 2006

Research/Work Experience:
- Stanford Molecular Imaging Scholars Fellow, Stanford University, 2017-Present
- Postdoctoral Scholar, Department of Radiation Oncology and Division of Medical Physics, Stanford University, 2014-2017
- Postdoctoral Scholar, Department of Mechanical Engineering, University of Texas at Austin & Northeastern University, 2013-2014

Selected Publications:

Awards/Honors:
- NIH T32 Stanford Molecular Imaging Scholars Fellowship, 2017-2019
- Principal investigator, CLARIONS Research Award, Cutaneous Lymphoma Foundation, 2015-2016
HEIDI KLOEFORM, PhD
Physiology, Emory University, 615 Michaels Street, Decatur, Goergia, 30033
hkloefk@emory.edu

Research Overview:
My longterm goal is be a professor solving clinically relevant problems using preclinical models. My research interests center on applying engineering principles to answer fundamental physiological questions relating to orthopaedic degenerative diseases. My research experience in orthopaedics, neuroscience, automated analysis techniques, and animal behavioral analysis has uniquely prepared me to address gaps in the field of degenerative joint disease. My postdoctoral research has focused on quantifying autonomic nervous system disfunction after severe spinal cord injury using non-invasive biosensor technology and electrophysiology. This work has allowed me to draw connections between animal behavior and anatomical changes previously not possible. Furthermore, as a trainee of an NIH-funded postdoctoral program at Emory University, I have proficiency in pedagogical training for active learning techniques and gained experience teaching underrepresented minorities in the STEM fields. In the future, I am interested in applying quantitative, non-invasive biosensing techniques to explore the relationship between behavioral and anatomic consequences of both neural and orthopaedic degenerative diseases.

In addition to these research skills, I have also developed soft skills including: organizing successfully published collaborations with clinician and research PIs, managing multidisciplinary project teams, grantsmanship, mentoring scientific projects with both graduate and undergraduate students, and developing and teaching undergraduate STEM curricula.

Together, these research, teaching, and soft skills make me uniquely suited to lead a diverse lab utilizing basic science techniques to more accurately understand pre-clinical models and increase translational efficacy.

Education:
PhD - Biomedical Engineering, 2016, University of Florida
BS - Biomedical Engineering, 2011, Georgia Institute of Technology

Research/Work Experience:
2016-present - Postdoctoral Fellow. Advised by Shawn Hochman. Physiology. Emory University, Atlanta, GA.

Selected Publications:

Awards/Honors:
2017 - Biomedical Engineering Society Career Development Award. Biomedical Engineering Society, Landover, MD.
2017 - Travel Award for the Controls in Animal Studies for Rigor and Reproducibility Workshop. American Physiological Society. Bethesda, MD.
2016-present - NIH/Emory FIRST Fellow Recipient. Fellowships in Research and Science Teaching (FIRST) is part of the NIH Institutional Research and Academic Career Development Awards (IRACDA) initiative. Emory University, Atlanta, GA.
TAISUKE KOJIMA, PhD
Biomedical Engineering, Georgia Institute of Technology, 950 Atlantic Dr. NW, Atlanta, Georgia, 30332
taisuke.kojima@bme.gatech.edu

Research Overview:
Conventional homogeneous bulk environments require large quantities of samples and reagents as well as significant effort to functionalize and characterize materials. Living cells efficiently process biomolecules and biochemical reactions utilizing liquid-liquid phase separation (LLPS) and compartmentalization. Engineering such cell-mimetic microenvironments can enhance in vitro material synthesis and analysis.

The focus of my research program will be to utilize liquid liquid phase separation (LLPS) for environmental, material, and healthcare applications in order to demonstrate novel material fabrication that conventional processes fail to achieve.

Education:
Ph.D., Macromolecular Science and Engineering, 2016, University of Michigan, Ann Arbor, US.

M.S., Department of Biomolecular Engineering, 2011, Tokyo Institute of Technology, Tokyo, JP.

B.S., Department of Biotechnology, 2009, Tokyo Institute of Technology, Tokyo, JP.

Research/Work Experience:
Work Experience
1) Georgia Institute of Technology / May 2017 – present Postdoctoral Researcher
Development of extracellular traps to study inflammatory responses and in vitro microbiome to culture anaerobic gut bacteria using aqueous two-phase systems.

2) University of Freiburg – IMTEK / May 2016 – April 2017
Postdoctoral Researcher
Fabrication of polymeric micropillared actuators to stimulate dental stem cells for mechano-differentiation.

Selected Publications:


Awards/Honors:
1) Richard and Eleanor Towner Prize
University of Michigan (2014)

2) Yoshida Scholarship
Yoshida Scholarship Foundation (2011 – 2014)

3) Takamiya Award
Tokyo Institute of Technology (2009)
MATTHEW L. KUTYS, PhD
Biomedical Engineering, Boston University, 610 Commonwealth Avenue, Boston, MA, 02215,
Wyss Institute, Harvard University, 3 Blackfan Circle, Boston, MA, 02115
mkutys@bu.edu

Research Overview:
My long-term research interest is to understand the fundamental molecular and mechanical underpinnings that shape 3D tissue morphogenesis and their dysregulation during disease pathogenesis. My research program will adopt novel in vitro systems that permit a quantitative and physical understanding of cell and tissue dynamics within native 3D tissue architectures. These platforms will be complimented by innovative cellular/molecular technologies (CRISPR/Cas9 editing, synthetic biology approaches), to decipher the molecular pathways that control the cell mechanics and shape changes driving tissue morphogenesis. During my doctoral research, I developed 3D cell-derived and synthetic extracellular matrix (ECM) models to study the influence of ECM rigidity and composition on 3D directed cell migration. I gained a fundamental understanding of ECM and adhesion biology, and expertise in the biochemical, molecular, and microscopy techniques required for dissecting these signaling pathways in 3D culture and in vivo. With this skillset, I discovered and characterized a novel, conserved Rho GTPase signaling pathway governing normal and cancer cell force generation and migration within 3D collagen microenvironments. As a postdoctoral fellow, I have complemented this skillset with a solid foundation in microfluidics, 3D organotypic modeling, and cellular biomechanics. I have to designed new platforms to control 3D tissue architectures and their microenvironments while focusing my research on vascular and cancer biology. By integrating CRISPR/Cas9 editing, biochemistry, proteomics, and molecular engineering with a 3D microfluidic platform, we discovered a novel, mechanotransduction mechanism by which the Notch1 receptor controls the morphogenic response of endothelial cells to blood flow. We further defined how this Notch1 pathway modulates the mechanical state of endothelial cells to ultimately manifest as a master in vivo regulator of vascular barrier function. My recent work has explored whether similar mechanisms exist for the Notch1 receptor in the context of epithelial biology. Enabled by the development of a biomimetic 3D mammary duct-on-chip platform, we have uncovered a tumor suppressive role for Notch1 through the regulation of epithelial adherens junction and cortical cytoskeletal stability. This training has laid the foundation to establish an interdisciplinary research program that bridges biomedical engineering, cell biology, and translational disciplines to make meaningful contributions to understanding the molecular and mechanical regulators of tissue growth and integrity, with the goal of informing precision targets for cancer and cardiovascular disease.

Education:
B.S., Biomedical Engineering, Pennsylvania State University, 2009
Ph.D., Cell and Developmental Biology, University of North Carolina – Chapel Hill, National Institutes of Health, 2014

Research/Work Experience:
Postdoctoral Fellow, Advisor: Christopher S. Chen, M.D., Ph.D. 12/2014 – Present
Tissue Microfabrication Laboratory, Boston University, Harvard University, Boston, MA.
Graduate Research Fellow, Advisor: Kenneth M. Yamada, M.D., Ph.D. 2009 – 2014
Laboratory of Cell and Developmental Biology, NIDCR, NIH, Bethesda, MD.
Undergraduate Research Fellow, Advisor: William O. Hancock, Ph.D. 2006 – 2009
Molecular Biomechanics Laboratory, Pennsylvania State University, University Park, PA.

Selected Publications:

Awards/Honors:
NIH K99/R00 Pathway to Independence Award from NCI, Impact Score: 10 09/2018 – Present
The Hartwell Foundation Postdoctoral Fellowship 2016 – 2018
NRSA/T32 Training Fellowship in Translational Research in Regenerative Medicine 2015 – 2016
Research Overview:

My research focuses on the biomedical application of water microdroplets chemistry. I have developed a new chemistry technique named microdroplet chemistry at Stanford University. The microdroplet chemistry provide new opportunities of monitoring bimolecular reactions under confined environments that is similar to cells. I have found that biochemical reactions including protein unfolding, protein-ligand interaction, and chlorophyll demetallation are markedly accelerated by the factor of 1,000 or higher in microdroplets (PNAS, 2015; QRB, 2015; QRB, 2017). I have also reported that the biochemical synthesis including RNA nucleosides and nucleotides that is thermodynamically unfavorable in bulk solution can spontaneously occur in microdroplets without any catalyst, enzymes, or biological energy source (PNAS 2017). In water microdroplets, nano-crystallization process can also spontaneously occur without any reducing agent or template (Nat Comms, 2018). I have also found that heterogeneous interface of microdroplets can promote redox reactions that play significant roles in photosynthesis, respiration, and energy transfer (Nature, under review). These discoveries suggest that the cellular metabolism in cells would behave much differently than the behaviors reported from bioassays in bulk solution and the microdroplet chemistry may provide a useful platform for monitoring and understanding abnormal biomolecular behaviors in cells. With these motivations, my future research will focus on the application of the biological findings from microdroplet chemistry to solving various biomedical problems including (1) the studies of the origin of neurodegenerative diseases such as Alzheimer's disease, (2) the studies of enzyme-free biological synthesis and metabolism, and (3) bioenergy production using spontaneous redox reactions on cellular membrane.

Education:

- University of Southern California, PhD, Biomedical Engineering, 2011
- Seoul National University, MS, Biomedical Engineering, 2005
- Seoul National University, BS, Physics, 2003

Research/Work Experience:

- Research Scientist, Richard N Zare Lab, Department of Chemistry, Stanford University, 2017-Present
- Postdoctoral scholar, Richard N Zare Lab, Department of Chemistry, Stanford University, 2012-2017

Selected Publications:

- Jae Kyoo Lee, Hong Gil Nam, and Richard N. Zare, “Microdroplet Fusion Mass Spectrometry: Accelerated Kinetics of Acid-Induced Chlorophyll Demetallation”, Quarterly Reviews of Biophysics 50, e2, 2017. (Original research article)

Awards/Honors:

- Young Investigator Award, Inaugural conference of the American Society for Nanomedicine (ASNM), Potomac, MD.
- Best Poster Award, 13th Annual Fed S. Grodins Graduate Research Symposium, Los Angeles, CA.
- Best Paper Award, Nano Bioelectronics & Systems Research Center Workshop, Seoul, Korea.
Research Overview:
My long-term research goal is to develop and translate the next generation of optical sensing technology for rapid, quantitative, and noninvasive assessment of biological tissues. I am particularly interested in miniaturized optoelectronic sensors on a wearable platform coupled with computational (including machine learning) algorithms to derive biophysically-relevant parameters. From my research experience, potential applications include cerebral blood flow (CBF) and oxygenation monitoring for pediatric brain diseases, pancreatic cancer diagnosis, and tissue viability monitoring. My PhD studies at Michigan focused on diffuse reflectance and fluorescence spectroscopy for both pancreatic cancer detection and viability assessment of implanted tissue-engineered constructs. Extending my research as a postdoctoral fellow at Michigan, I designed and fabricated a needle-compatible ultra-miniaturized optoelectronics sensor for evaluating human pancreatic tissues in situ. I also validated a compact diffuse optics system to monitor perfusion of a transferred skin flap. Afterwards, I continued to work as a postdoctoral fellow at Georgia Tech/Emory University where I am focusing on multiple approaches for translational diffuse optics for pediatric brain monitoring. First, I am working to utilize diffuse correlation spectroscopy to measure microvascular CBF in children with sickle cell disease at the Children's Healthcare of Atlanta. Secondly, I am developing a miniaturized speckle contrast optical spectroscopy system to estimate tissue oxygen metabolism. My strong electrical/optical/biomedical engineering background and versatile clinical and translational research experience has established the foundation for a highly multidisciplinary research program to pursue my overarching goal of making noninvasive optical sensing ubiquitous.

Education:
- Ph.D. Biomedical Engineering 2015, University of Michigan, Ann Arbor, MI
- M.S. Biomedical Engineering 2006, Seoul National University, South Korea
- B.S. Electrical Engineering 2004, Seoul National University, South Korea

Research/Work Experience:
- Postdoctoral Fellow, 2016 – present, Department of Biomedical Engineering at Georgia Tech/Emory Univ.
- Postdoctoral Fellow, 2015 – 2016, Department of Biomedical Engineering at University of Michigan
- Graduate Student Instructor, 2013 – 2014, Year-long BME design class, University of Michigan
- Graduate Research Fellow, 2011 – 2015, Department of Biomedical Engineering at University of Michigan
- Research Engineer, 2006 – 2010, Korea Electrotechnology Research Institute, South Korea

Selected Publications:

Awards/Honors:
- Best Scientific Poster Award (2nd place), 2018 Southeastern Pediatric Research Conference  
- Best Seminar Award, 2018 Department of Biomedical Engineering, Georgia Tech/Emory Univ.
- Petit Scholar Mentor, 2017 & 2018, Petit Institute of Biological Engineering, Georgia Tech  
- Rackham Centennial Fellowship, 2013 University of Michigan  
- Department Graduate Fellowship, 2010 University of Michigan
Research Overview:
My research interests are i) to develop biofabrication technologies for creating full-size vascularized tissues/organs and ii) to understand the tissue-specific interactions between vasculatures and surrounding cells during vessel formation and maturation process. My research experiences include the design/development of bioprinting equipment and bioreactors, vascular engineering, tissue engineering, and cancer study model development. During my PhD, I built a custom 3D bioprinting system (hardware and software), designed bioreactors, and established protocols to create vascular tissues and skin tissues. I developed fabrication methods to create millimeter-scale vessels within soft materials and connect them to micrometer-scale capillaries. The multi-scale vascular network improved perfusion throughout thick tissues, increasing long-term tissue viability, and also provided a foundation for engineering larger and more complex tissues/organs. My postdoctoral work has focused on creating 3D in vitro models of brain tumor-vascular niche. Glioblastoma multiforme (GBM), a malignant brain tumor, is highly invasive and frequently exploit microvessels as guides for migration. Interfering GBM perivascular invasion may add a new therapeutic direction to reduce the spread of tumor, but the lack of proper 3D niche models restricts studying GBM-vasculature interactions. I adapted an interdisciplinary approach combining patient-derived GBM cells and 3D bioprinting technology to create vascularized brain tissues with multiple cell types and matrices. The 3D models with embedded tumor cells recapitulate various GBM characteristics such as cancer stemness, patient-specific invasion patterns, and drug responses with therapeutic resistance. I am currently working on utilizing the tumor-vasculature models for drug tests and personalized therapy applications. I am also focusing on fine-tuning the brain tissue microenvironment to better recapitulate the in vivo tissues and to characterize the interactions between brain cell types and ECMs in a reductionist way. During my training, I have also developed numerous professional skills including how to set up a new laboratory, craft grant proposals, establish and maintain collaboration projects, and manage research/personnel budgets. I believe I will be uniquely suited to pursue my research goals to solve challenges for large tissue engineering and study vascular biology within full-size tissues/organs.

Education:
• Ph.D. in Biomedical Engineering, 2014, Rensselaer Polytechnic Institute (RPI), Troy, NY
• B.S. in Bio and Brain Engineering, 2009, Korean Advanced Institute of Science and Technology (KAIST), Daejeon, South Korea

Research/Work Experience:
• Postdoctoral Research Associate, 2016-present, Northeastern University, Boston, MA
• Postdoctoral Research Associate, 2014-2016, Rensselaer Polytechnic Institute (RPI), Troy, NY
• Visiting Researcher, 2007-2008, Brigham and Women’s Hospital, Harvard Medical School, Boston, MA

Selected Publications:
• VK Lee*, MS Ozturk*, et al., “Mesoscopic fluorescence molecular tomography of reporter genes in bioprinted thick tissue”, Journal of Biomedical Optics, 2013
• VK Lee*, L Zhao*, et al., "The integration of 3-D cell printing and mesoscopic fluorescence molecular tomography of vascular constructs within thick hydrogel scaffolds". Biomaterials, 2012

Awards/Honors:
• Rising Stars in Biomedical: Women 2018, held at Johns Hopkins University, 2018
• IMPACT Program Fellow, MIT, 2018
• The Arnold O. Beckman Postdoctoral Fellows Award, 2015 ($179,729)
• Karen and Lester Gerhardt Prize in Science and Engineering, Rensselaer Polytechnic Institute, 2014
• Nominated as a top presentation in the Tissue Engineering Track at the 2013 BMES Meeting, 2013
• Most Valuable Teaching Assistant Award, Rensselaer Polytechnic Institute, 2012
• Founders Award of Excellence, Rensselaer Polytechnic Institute, 2010
YIZENG LI, PhD
Department of Mechanical Engineering, The Johns Hopkins University, 223 Latrobe Hall, 3400 N. Charles St., Baltimore, MD, 21218 yizengli@jhu.edu

Research Overview:
Cells in vivo live in diverse physical environments that provide mechanical cues for cells to deform, migrate, and carry out their biological function. I use mathematical models to explore fundamental mechanisms of cell motility with special emphasis on the impact of hydrodynamics effect from both the extracellular and intracellular environments. Over the past a few years, I have developed a couple of theoretical frameworks with strong emphasis on water flow to understand electro-motility, electro-volume regulation, cytokinesis, and two-phase cell migration. In the two-phase cell migration model, where the actin-network phase and the cytosol phase are treated equally, I investigated the physics laws behind actin-driven cell migration on 2D surface versus water-driven cell migration in confined channels and found that the transition between actin-driven and water-driven cell migration depends on the coefficient of the external hydraulic resistance. Moreover, contrary to intuitions, I found that water-driven cell migration speeds up under higher external hydraulic resistance, which can also be verified through experimental investigations. My work has implications on early embryonic development, morphogenesis, and cancer cell metastasis.

Education:
Ph.D. 2013 Mechanical Engineering University of Michigan-Ann Arbor
M.S. 2012 Applied Mathematics University of Michigan-Ann Arbor
M.S.E 2009 Mechanical Engineering University of Michigan-Ann Arbor
B.S. 2007 Theoretical and Applied Mechanics Fudan University

Research/Work Experience:
07/2018 – date Assistant Research Scientist Johns Hopkins University
12/2013 – 06/2018 Postdoctoral Fellow Johns Hopkins University
05/2013 – 12/2013 Research Fellow University of Michigan-Ann Arbor

Selected Publications:
• Yizeng Li, Sean X. Sun, Transition between actin-driven and water-driven cell migration depends on the external hydraulic resistance. Biophys. J., 114 (12), 2018, pp. 2965 – 2973

Awards/Honors:
2018 Mechbio Conference Travel Award
2014 Johns Hopkins University Emergency Ebola Design Challenge: Second Place
2012 Association for Research in Otolaryngology Travel Award
2011 Mechanics of Hearing Workshop Scholarships
2009 Tau Beta Pi
2006 Tung-OOCL Scholarship
2006 Chun-Tsung Scholar
NEIL LIN, PhD
Wyss Institute for Biologically Inspired Engineering, Harvard University, Boston, MA, 02115
nlin@g.harvard.edu

Research Overview:
Approximately one in three Americans is at the risk for chronic kidney disease. In the United States alone, nearly 700,000 people rely on dialysis for life support. Sadly, 70% of these patients die before they can obtain a kidney transplant due to the shortage of donor organs. Over the past 60 years, there has been little technological innovation aimed at renal replacement therapies. My lab will address this critical need by creating 3D kidney tissues in vitro. My proposed research combines tissue engineering, soft matter physics, and 3D bioprinting to enable the scientific and technological advances needed for creating bioprinted human kidney tissues and living medical devices for renal replacement therapies. Specifically, my research focuses on three major areas. 1) Printing 3D kidney tissue with multiscale vasculature: To improve the intercellular signaling and solute transport efficiency in bioengineered kidneys, 3D extrusion printing combined with two-photon stereolithography will be used to generate vascularized kidney tissues that recapitulate the multiscale architecture and function akin to native kidneys. 2) Cell mechanics in 3D kidney tissues: 3D live-cell stress microscopy will be developed to study how physical cues regulate the intercellular stresses and tissue function in 3D printed kidney tissue. 3) Living renal assist devices: Living Integrated Filtration-Reabsorption Extracorporeal (LIFE) device will be created to address the current limitations of dialysis. This device will be composed of bioprinted renal filters and tubules that recapitulate kidney functions at a physiological level.

Education:
Ph.D. Physics, Cornell University, 2016
B.S. Physics, National Tsing-Hua University, 2008

Research/Work Experience:
NIH Ruth L. Kirschstein Postdoctoral Fellow,
Jennifer Lewis Lab, Wyss Institute and SEAS at Harvard University

Selected Publications:

Awards/Honors:
·NIH Ruth L. Kirschstein Postdoctoral Fellowship (F-32) (2018 - Present)
·F. Hoffmann-La Roche Postdoctoral Fellowship (2016-2018)
·ACS Colloid Langmuir Thesis Presentation Award, 2nd Prize (2016)
·Poster Award, Society of Rheology Annual meeting, Final (2014)
·Studying Abroad Scholarship, Ministry of Education, Taiwan (2013)
·Douglas Fitchen Memorial Award, Cornell University (2013)
·Graduate Student Travel Grant, Cornell University (2013)
·Department Outstanding Journal Award, National Tsing Hua University (2009)
·National Outstanding Journal Award, National Science Council of Taiwan (2009)
·Honor Society: Phi-Tau-Phi (2008)
·Undergraduate Research Award, National Science Council of Taiwan 96-2815-C007-006 (2007)
JINGFEI LIU, PhD
Georgia Institute of Technology, 251 10TH ST NW, APT C103, ATLANTA, GA, 30318
benjamin.jf.liu@gatech.edu

Research Overview:
Supported by the training in both acoustics and microelectronics, my research in biomedical engineering focuses on elastography (ultrasound- and MR-based) and ultrasound instrumentation, aiming at both medical diagnosis and image-guided therapy. (i) Ultrasound-based elastography research. The main aim of my research is to apply ultrasound elasticity imaging in biomechanical property assessment for soft tissue. Tissue pressure is closely related to its physiological status and the occurrence of many diseases is associated with tissue pressure change. Therefore, detecting and/or monitoring pressure change of the targeted tissue can provide valuable diagnostic information. However, there is no method to directly measure the tissue internal pressure. We developed an elastography-based technique, which enables tissue internal pressure detection using commercial ultrasound scanning. (ii) MR-based elastography research. This work developed transient shear wave elasticity imaging technique associated with MRI. This technology can image small local region of interest in the body instead of a large volume as in conventional MRE, which paved the way for real-time monitoring of MR-guided focused ultrasound therapy. (iii) Ultrasound instrumentation. Aiming at ultrasound image-guided drug delivery, the developed system utilizes ultrasound thermal strain imaging to guide ultrasound hypothermia. With further development, more accurate control of drug delivery can be realized in a real-time manner. In addition, my research interests also include biomedical ultrasound signal/image processing. Currently, I am working on applying ultrasound transit time spectrum to medical imaging of soft tissue aiming at improving the temporal resolution in ultrasound imaging.

Education:
Ph.D. Electrical and Computer Engineering (Bioengineering), Georgia Institute of Technology, Atlanta, GA, 05/2019.
Ph.D. Mechanics and Energy (Acoustics), Université de Lorraine, Metz, France, 06/2014.
M.S. Electrical and Computer Engineering, Georgia Institute of Technology, Atlanta, GA, 12/2012.
M.S. Mechanical Engineering, Clarkson University, Potsdam, NY, 05/2009.
B.E. Process Equipment and Control, Dalian University of Technology, Dalian, China, 06/2002.

Research/Work Experience:
- Graduate Research Assistant, School of Electrical and Computer Engineering & Wallace H. Coulter Department of Biomedical Engineering (Georgia Tech & Emory), Georgia Institute of Technology, Atlanta, GA, 2017-2019.
- Postdoctoral Research Fellow, Department of Biomedical Engineering, University of California, Davis, Davis, CA, 2014-2017.
- Graduate Research Assistant, Georgia Tech Lorraine, Metz, France, 2009-2014.
- Graduate Research Assistant, Department of Mechanical & Aeronautical Engineering, Metz, France, 2009-2014.
- Full-time Lecturer, College of Automobile Engineering, Beijing Polytechnic, Beijing, China, 2003-2007.

Selected Publications:
- Jingfei Liu, Heechul Yoon, Stanislav Y. Emelianov, “Tissue Internal Pressure Assessment Based on Ultrasound Elasticity Imaging and Its Implications to Diagnosis”, IEEE Transactions on Ultrasonics, Ferroelectrics, and Frequency, 2018. (In review)

Awards/Honors:
- Postdoc Travel Grant, Postdoctoral Scholars Association, University of California, Davis, 2015.
- Award for Teaching Excellence, Beijing Polytechnic, Beijing, 2005. (Top 2% of the faculty)
Research Overview:
I am currently an NIH Pathway to Independence (K99) postdoctoral fellow in the lab of Mikhail Shapiro at California Institute of Technology (Caltech). During my postdoctoral training, I led a project to engineer genetically encoded protein nanostructures as molecular reporters for acoustically modulated magnetic resonance imaging (AM-MRI), a new non-invasive molecular imaging modality (Lu et al., *Nature Materials* 2018). More recently, I started new directions to develop the first genetically encoded contrast agents for optical coherence tomography and a method of ultrasound-controlled gene expression in deep tissues (both *unpublished*). Prior to these experiences, I conducted my PhD research on structural biology of membrane proteins, where I solved the structure of mercury transporter protein MerF, and method development of nuclear magnetic resonance spectroscopy, which included new spectral assignment method, solid-state NMR pulse sequence and analytical theories.

The Laboratory for Structural Biomolecular Engineering will work at the intersection of biomolecular engineering and structural biology and take a unique cross-disciplinary approach to developing novel technologies for bioimaging and cell therapy. In one aspect, I will apply a structural biologist’s approach to engineered protein nanostructures by first gaining a mechanistic understanding of their biochemistry and then engineering their functionalities. In the other aspect, I will take a synthetic biology approach to address key bottlenecks in structural biology with the goal of imaging atomic-resolution protein structures in physiological conditions. These projects build on a common pipeline of biochemistry, structure, computation and engineering of proteins, which will be established as the core expertise of the laboratory. The technologies developed in the lab will have a broad impact on both basic research and therapeutic development.

Website: [http://georgelu.org](http://georgelu.org)

Education:
Ph.D. 2014 University of California, San Diego (UCSD)
B.Sc. 2007 University of Alberta, Canada

Research/Work Experience:
2014 – present, Postdoctoral research, California Institute of Technology
Advisor: Mikhail G. Shapiro
Keywords: Protein engineering, Synthetic biology, Magnetic resonance imaging

2009 –2014, PhD research, University of California San Diego (UCSD)
Advisor: Stanley J. Opella
Keywords: Membrane protein structural biology, Nuclear magnetic resonance spectroscopy

Selected Publications:

Awards/Honors:
Lu GJ (*P.I.*), Shapiro MG, Tirrell DA (*mentors*). Sonomagnetic imaging and sonomechanical control of biological processes in deep tissues. NIH Pathway to Independence Award (K99/R00) Starting 08/2018.
Research Overview:
Cellular morphology and morphodynamics are phenotypic outcomes of numerous cellular processes, such as migration, differentiation, proliferation, and apoptosis. They commonly serve as indicators of physiological and pathological states of cells. Moreover, innumerable molecular signaling pathways converge onto the regulation of the cytoskeleton to determine and guide morphological progression of cells. Therefore, quantification on cell morphodynamics can also provide profound information and insight on signaling states of cells. Biochemical essays have broadly revealed the close correlation between cell morphology and signaling state. However, they are indirect to unveil the dynamics of cells with continuous shape change. Thanks to live cell imaging, cellular morphogenesis can be accurately tracked and quantified. There have been numerous studies using global shape descriptors, such as cell area change and polarization degree, to statistically extract features from live cell imaging data, and characterize morphogenetic progression of cells. However, the dynamic nature, transient and localized variation of cellular morphogenesis associated with specific signaling responses remain largely unclear. By developing a computational framework that analyzes cellular morphodynamics and molecular signaling dynamics in sufficiently high spatiotemporal resolution, I plan to elucidate the driving forces, phenotypic indicators and spatiotemporal regulation of cell morphogenesis in response to activity of characteristic signaling molecules, such as GTPases. In the long run, I intend to investigate the cancers cell with dysregulated morphogenetic pathways, behaving differently in comparison to normal cells in morphodynamics and subcellular signaling microdomains.

Education:
Ph.D, Iowa State University, Mechanical Engineering, 2013
M.S., Tsinghua University, Mechanical Engineering, 2007
B.S., Tsinghua University, Mechanical Engineering, 2004

Research/Work Experience:
Postdoctoral research fellow, University of Texas Southwestern Medical Center, Bioinformatics/Cell Biology, 2014 – present
Research assistant, Iowa State University, Mechanical Engineering, 2007-2013
Teaching assistant, Iowa State University, Mechanical Engineering 2009 – 2013, & UT Southwestern Medical Center, Bioinformatics/Cell Biology, 2015 – present
REU (Research education for undergraduates) mentor, Iowa State University, 2011 & 2012

Selected Publications:

Awards/Honors:
Cancer research and advanced research certificate, UT Southwestern, 2018 & 2016
Platform panelist in Computational Biology selected for BMES2017, ICSB 2017 and BPS2017
Research Excellence Awards, Iowa State University, top scientific research award, 2013
Travel Awards Fellowship for best graduate student paper competition in 47th & 49th SES conference, 2012 & 2011
PFF (Prepare Future Faculty) member, Iowa State University, 2011 - 2013
Teaching Excellence Awards, Iowa State University, top teaching award, 2009
Excellent Student Scholarship III, Tsinghua University, top scientific research award, 2005
JOHN R. MARTIN, PhD  
Chemical Engineering, Massachusetts Institute of Technology, 500 Main St, Office 76-579, Cambridge, MA, 02139  
jrmart@mit.edu

Research Overview:  
As a scientist trained in the fundamentals of biomedical engineering, my research interfaces at the disciplines of drug delivery, biomaterials, and regenerative medicine and is guided by a motivation to develop new technologies and translational tools for improving patient health in the clinic. Despite the initial promise of local drug delivery from degradable substrates in orthopedic regenerative technologies, controlling drug release kinetics and scaffold degradation in vivo remains a difficult challenge. During my graduate and postdoctoral work, I have developed a number of synthetic polymer modalities that selectively degrade in response to cell-generated signals, most notably reactive oxygen species (ROS). My lab will apply these “healing-responsive” materials to create a platform of implantable biomaterials that will enhance tissue regeneration in orthopedic applications. These material platforms will encompass both moldable, cell-degradable bone void fillers and implant coatings that locally deliver regenerative therapeutics on demand. In short, my lab will develop and employ healing-responsive materials that will both regenerate difficult to treat bone injuries and provide insight into the complex pathways that produce the body’s natural healing processes.

Education:  
• Ph.D., Biomedical Engineering, 2016, Vanderbilt University  
• M.S., Biomedical Engineering, 2013, Vanderbilt University  
• B.S., Biosystems Engineering, 2011, University of Kentucky

Research/Work Experience:  
• Postdoctoral Associate/Fellow, Massachusetts Institute of Technology, Koch Institute of Integrative Cancer Research/Department of Chemical Engineering, 2017 - present; Advisor: Paula T. Hammond, Ph.D.  
• Graduate Research Assistant/Fellow, Vanderbilt University, Department of Biomedical Engineering, 2011 - 2017; Advisor: Craig L. Duvall, Ph.D.  
• Summer Research Assistant, Virginia Tech University, Bioengineering/Bioinformatics Summer Institute, 2010; Advisor: M. Nichole Rylander, Ph.D.  
• Undergraduate Research Assistant, University of Kentucky, Center for Biomedical Engineering, 2009 - 2010; Advisor: Marnie M. Saunders, Ph.D.

Selected Publications:  

Awards/Honors:  
• Ruth L. Kirschstein (F32) Postdoctoral Fellowship Recipient, NIH National Institute of Dental and Craniofacial Research, 2018 – 2020  
• NIH T32 Fellowship Recipient, Vanderbilt Integrated Training in Engineering and Diabetes Program, 2014 – 2015  
• 1st Place Poster Presenter, Fusion Drug Delivery Conference, 2015  
• Travel Award, Fusion Drug Delivery Conference, 2015  
• 2nd Place Platform Presenter, University of Kentucky Biomaterials Day, 2014  
• National Science Foundation Graduate Research Fellowship Honorable Mention, 2013
KEVIN J. McHUGH, PhD  
Koch Institute for Integrative Cancer Research, Massachusetts Institute of Technology, 77 Massachusetts Avenue, Cambridge, MA 02139  
kjmchugh@mit.edu

Research Overview:  
My primary research interest is in the use of biomaterials for drug delivery and tissue engineering applications with an emphasis on developing translational technologies. I plan to leverage the high resolution of microfabrication and two-photon 3D printing to create nano- and micro-scale platforms with the potential to improve patient health.

Education:  
Ph.D., Biomedical Engineering, Boston University, 2014  
M.S., Biomedical Engineering, Boston University, 2012  
B.S., Biomedical Engineering, Case Western Reserve University, 2009

Research/Work Experience:  
2014-Present  Postdoctoral Fellow/Associate  
Laboratory of Dr. Robert Langer, Koch Institute for Integrative Cancer Research, Massachusetts Institute of Technology

2010-2014  Graduate Research Assistant  
Laboratory of Dr. Magali Saint-Geniez, Schepens Eye Research Institute, Harvard Medical School

2008-2009  Undergraduate Research Assistant  
Laboratory of Dr. James M. Andersonm Departments of Biomedical Engineering, Pathology, & Macromolecular Science  
Case Western Reserve University

Selected Publications:  

Awards/Honors:  
• Ruth L. Kirschstein Postdoctoral Fellowship, National Institutes of Health, 2017-2019  
• LRP Award, National Institutes of Health, 2016-2018 & 2018-2020  
• Biomedical Engineering Society Career Development Award, 2018  
• Rising Stars in Biomedicine Nominee, Broad Institute of MIT and Harvard, 2018  
• Koch Institute Marlena Felter Bradford Research Travel Fellowship, 2016  
• Controlled Release Society Foundation Allan Hoffman Student Travel Grant, 2016  
• Biomedical Engineering Society Annual Meeting Travel Award, 2012 & 2013  
• Research Grant, The Grimshaw Foundation via Massachusetts Eye & Ear Infirmary, 2013  
• Coulter College Travel Stipend, Wallace H. Coulter Foundation, 2012  
• GEN TEN Award, Genetic Engineering and Biotechnology News, 2012  
• Boston University CTSI Translational Research Symposium Poster Award, 2012  
• Association for Research in Vision and Ophthalmology Travel Grant, National Eye Institute, 2012  
• Translational Research in Biomaterials T32 Training Grant, Boston University, 2009-2011  
• Presidential Scholarship, Case Western Reserve University, 2005-2009  
• Graduated cum laude, Case Western Reserve University, 2009  
• Case Alumni Association Travel Award, 2008  
• National Science Foundation, Summer Research Experience for Undergraduates, 2007
BRIAN MECKES, PhD
Chemistry, Northwestern University, 2145 Sheridan Rd, K146, Evanston, IL, 60208
brian.meckes@northwestern.edu

Research Overview:
Next-generation cell-based therapeutics will require new materials and cell culture conditions that mimic the complexity of native tissue at the nanoscale. To meet this challenge, my past and future research focuses on the development and use of nanotechnology to control and study cell behavior. As a graduate student, my research sought to develop nanotechnology-enabled tools for structure-function imaging of gap junction proteins, ion channels that electrically and metabolically couple neighboring cells. As a postdoctoral researcher, I utilize nanotechnology to modulate cell behavior. Specifically, I use high-throughput nanolithography techniques to generate unique arrangements of extracellular matrix (ECM) ligands to control stem cell fate. In addition to my work manipulating the ECM, I investigate how the structure of nanoparticles influences their interactions with cells. Leveraging these experiences, my faculty research plan aims to create new nanomaterials that enable precise control over cell-cell and cell-ECM interactions by combining nanoeengineering, chemistry, and cell biology. In particular, I am interested in controlling stem cell fate by modulating cytoskeletal mechanics, ECM physicochemical properties, and cell-junction arrangements.

Education:
University of California, San Diego, Bioengineering, Ph.D., 2015
Rice University, Bioengineering, B.S.B., 2009

Research/Work Experience:
Department of Chemistry, Northwestern University, 2015-Present
  Postdoctoral Fellow. Advisor: Chad Mirkin
Department of Bioengineering, University of California, San Diego, 2009-2015
  Graduate Student. Thesis Advisor: Ratnesh Lal
Department of Chemical Engineering, Stanford University, 2008
  NSF REU Scholar. Advisor: Gerald Fuller
Department of Biostatistics, University of Washington, 2007
  Amgen Scholar. Advisor: Xiao-Hua Andrew Zhou

Selected Publications:
* Denotes Equal Contribution

Awards/Honors:
Eden and Steven Romick Postdoctoral Fellow, 2017-Present
International Institute for Nanotechnology Postdoctoral Fellowship, 2015-Present
Purdue Prospective Faculty Workshop, Invited Participant, Purdue University, 2015
NIH Ruth Kirschstein NRSA F31, 2013-2015
James Street Fulton Service Prize, Rice University, 2009
NSF REU Scholarship, Stanford University, 2008
Will Rice College Academic Fellow, Rice University, 2007-2009
Amgen Scholar, University of Washington, 2007
Louis J. Walsh Scholarship in Engineering, Rice University, 2006-2007
Research Overview:
The discrete and sophisticated behaviors of how stem cells interact with each other and interface with the surrounding environment have captivated my intellectual interests for a decade and have driven my research pursuits in tissue engineering. My basic science interests range from stem cell gene manipulation for cellular reprogramming, to intracellular trafficking and dynamic construction of cytoskeletal filaments, to the effect of mechanical signaling in the extracellular matrix on adult stem cells. Applying my interests to biomedical challenges has enabled me to focus my efforts toward development of expandable biomaterial scaffolds, 3D printing, and physiological dynamic cell substrates. Investigating how changes in micro and macro mechanical forces at the cell-to-extracellular matrix level and tissue-to-tissue level affect cell proliferation, migration, differentiation, stratification, transcription, and cell signaling fascinate me. My research applies what I learn from the underlying mechanisms of stem cell behavior to evaluating the effectiveness of wound therapies in wound healing applications, engineering 3D constructs to facilitate tissue development in inner ear tissue engineering, and developing scaffolds to encourage neuron regeneration in both the central nervous system and peripheral nervous system.

Education:
2008 – 2014 - Ph.D., Bioengineering – University of Kansas, Lawrence, KS, USA
Thesis Title: “Approaching Inner Ear Hair Cell Regeneration Through Non-Viral Gene Delivery”

2004 – 2008 - B.S., Biology – University of Kansas, Lawrence, KS, USA
Research: Comparing conservation of gene sequences from different species of Drosophila

Research/Work Experience:
2015 – Present - Research Assistant Professor – Department of Plastic Surgery, University of Kansas Medical Center, Kansas City, KS
2014 – 2015 - Postdoctoral Researcher – Chemical and Petroleum Engineering Department, University of Kansas, Lawrence, KS
2009 – 2014 - Graduate Research Assistant – Bioengineering Program, University of Kansas, Lawrence, KS
2008 – 2008 - Graduate Teaching Assistant – Bioengineering Program, University of Kansas, Lawrence, KS

Selected Publications:

Awards/Honors:
03/2016 - Proof of Concept Award, University of Kansas Medical Center, Kansas City, KS
06/2014 - Science/AAAS Excellence in Science Nominee
01/2012 - Best Research Poster for the University of Kansas at the 9th Annual Capitol Research Summit, Topeka, KS
06/2011 - National Science Foundation East Asia and Pacific Islands Summer Institutes Fellowship, University of Tokushima, Tokushima Prefecture, Japan
05/2006 - J.O. and V.H. Edson Award for Outstanding Undergraduate Research, University of Kansas, Lawrence, KS
Research Overview:
The intimate association between host and microbe over the course of a lifetime has profound implications on human health. In recent years, the human microbiota has been inextricably linked to health and disease across multiple physiological axes, from inflammatory bowel disease to allergies, metabolic syndrome to autism. These natural interactions make the microbiota an attractive avenue for engineering human physiology. However, despite a wealth of correlative, observational studies on the microbiota and various human diseases, causal, functional studies to translate these promising findings to actionable therapies remain challenging. My research focuses on developing fundamental technologies to enable the study and engineering of the microbiome. During my graduate work at MIT in the laboratory of Dr. Timothy K. Lu, I explored strategies to resolve the technology and knowledge gap between the current promise of manipulating the microbiome for human health and targeted microbiome therapeutics. These strategies include (1) using natural and modified bacteriophages to specifically eliminate target strains from microbial communities; (2) engineering commensal Bacteroides spp. to modulate host immunity; and (3) interfacing bacterial biosensors with microelectronics to detect biomarkers in the gut. Together, these diverse approaches enable both basic and translational research on elucidating host-microbe interactions to address major unmet clinical needs.

Education:
Ph.D. Microbiology, Massachusetts Institute of Technology, Cambridge, MA, USA, 2018
B.Sc. Microbiology & Immunology, McGill University, Montreal, QC, Canada, 2011

Research/Work Experience:
2018-Present: Bacterial Group Leader - Lu Lab
Synthetic Biology Center, MIT. Advisor: Timothy K. Lu.
2011-2018: Graduate Research Assistant
Synthetic Biology Center, MIT. Advisor: Timothy K. Lu.
2009-2011: Undergraduate Research Assistant
Department of Microbiology & Immunology, McGill University. Advisor: Samantha Gruenheid.

Selected Publications:

Awards/Honors:
HHMI International Student Research Fellowship (2013-2016)
Qualcomm Innovation Fellowship (2014)
Master’s Training Award from les Fonds de recherche du Québec - Santé (FRQS) (2011-2013)
Bourse d'études Hydro Québec en Science Major Entrance Scholarship (2008-2011) Dean's Convocation Prize (2011)
McGill FRQS Undergraduate Summer Research Award (2010)
CAG/CCFC/CIHR Summer Studentship for Research in Gastroenterology (2009)
PANAGIOTIS MISTRIOTIS, PhD
Institute of Nanobiotechnology, The Johns Hopkins University, 3400 N Charles St, Croft Hall Room G65, Baltimore, Maryland, 21218
pmistr1@jhu.edu

Research Overview:
My research focuses on mechanobiology and cellular engineering which are fundamental components of the biomedical engineering discipline. During my graduate studies, I developed a lentiviral library of promoters and response elements to monitor in real-time and in a high-throughput manner the differentiation of stem cells derived from hair follicle. This technology enabled the discovery of novel genes/pathways that participated in lineage commitment and enhanced our understanding on stem cell specification. I also studied the effects of aging on stem cell function and discovered that ectopic expression of a single pluripotent factor, NANOG, is sufficient to restore the proliferation, myogenic as well as the extracellular matrix remodeling capacity of aged stem cells. This work demonstrated that age-associated cellular dysfunction could be reversed with no need for reprogramming to the pluripotent state, thereby increasing the potential of stem cells from aged donors for cellular therapies and tissue regeneration. During my postgraduate studies, I integrated microfluidics, imaging techniques, molecular biology and mathematical modeling to uncover the role of different compressive forces on intracellular signaling during cancer cell migration. This project provided a better understanding of the complex process of cancer metastasis and will likely aid in the development of therapeutic interventions aiming to halt metastatic spread. Moving forward, I am interested in applying my interdisciplinary education to better understand the mechanobiology of aged cells/tissues, and thereby develop novel strategies to reverse organismal and cellular aging.

Education:
• SUNY at Buffalo, February 2016, PhD, Chemical and Biological Engineering
• University of Copenhagen, March 2010, MSc, Human Biology
• National Technical University of Athens (NTUA), May 2007, Diploma, Chemical Engineering

Research/Work Experience:
• Postdoctoral Fellow, Johns Hopkins University, Institute of Nanobiotechnology, 2016 – present; Advisor: K. Konstantopoulos, PhD
• Graduate Research Assistant, SUNY at Buffalo, Chemical and Biological Engineering, 2008 – 2016; Advisor: S. Andreadis, PhD
• Undergraduate Research Assistant, NTUA, Biotechnology, 2006 – 2007; Advisor: F. Kolisis, PhD
• Undergraduate Research Assistant, German Research Center for Environmental and Health, Analytical Chemistry, 2005; Advisor: B. Michalke, PhD

Selected Publications:
(Out of 15 manuscripts)
3. P. Mistriotis, VK Bajpai, X Wang, N Rong, MS Liang, A Shahini, M Asmani, J Wang, R Zhao, S Liu, ST Andreadis. NANOG reverses the myogenic differentiation potential of senescent stem cells by restoring ACTIN filamentous organization and SRFdependent gene expression. STEM CELLS, 2017, #co-1st authors
4. RM Padmashali #, P Mistriotis #, MS Liang #, ST Andreadis. Live-cell dynamic monitoring of gene and pathway activity during stem cell differentiation. Molecular Therapy, 2014, #co-1st authors
5. VK Bajpai#, P Mistriotis#, ST Andreadis. Clonal multipotency and effect of long term in-vitro expansion on differentiation potential of hair follicle derived mesenchymal stem cells. Stem Cell Research, 2012, #co-1st authors

Awards/Honors:
• Postdoctoral Fellowship, American Heart Association (2018-2020)
• Best Poster Presentation award at the 12th annual Nano-Symposium, Johns Hopkins University (2018)
• Graduate student and Postdoctoral Fellow Research and Education Award, Johns Hopkins University (2017)
• Best Poster Presentation Award at the CBE Graduate Research Symposium, SUNY Buffalo (2013)
• Thomaidio Award for undergraduate research, NTUA (2007)
Research Overview:
My research synthesizes highly interdisciplinary training to engineer complex human tissue models of clinically-relevant biological processes from morphogenesis to fibrosis. After my early graduate publications on engineering ECM scaffolds for tissue engineering, I focused on developmental-biology inspired approaches to engineer lung tissue. My pioneering PhD thesis work on engineering vascularized fetal pulmonary organoids laid a foundation for the growing field of lung organoids. My first postdoctoral fellowship at Temple School of Medicine focused on studying mechanisms of acute lung inflammation in the setting of experimental sepsis using animal models and standard cell culture models. Our work revealed the mechanistic role of PKC-delta in pulmonary endothelial activation and neutrophil influx to the lungs and established a paradigm for selective inhibition of PKC-delta to protect the lungs from inflammatory injury. This vital experience leading preclinical research on testing therapeutics frames my standards for developing engineered tissue and organ models for preclinical research. I am currently applying the expertise gained in innate immunology to build resident innate immune cells into engineered models of inflammatory and fibrotic disease. My second postdoctoral fellowship here at Penn built multiple major projects currently nearing publication on the development of a human small airway tissue chip to model smoking-induced epithelial injury and fibrosis, as well as tissue chip platforms for engineering the spatial heterogeneity of injury-induced fibrosis. This work combines a suite of tissue engineering, biomaterials, microfabrication and cell biological approaches to model the complex tissue interactions that drive fibrotic disease. My other work at Penn affiliated with the Center for Engineering Mechanobiology hinges on collaboration with Prof. Vivek Shenoy’s leading computational group. We combined engineered tissue patterning experiments with multiscale continuum modeling of cell-ECM mechanics to develop a first-of-its-kind theoretical model describing the relationship between physical boundary constraints, cell contractility, tissue anisotropy and tissue mechanics. In addition to deriving novel fundamental insights, we applied the platform technology to direct mesenchymal stem cell differentiation in engineered tissues and to create new models of skeletal muscle pathophysiology, including the first engineered multi-tissue model of human cancer cachexia (muscle wasting). The computational approaches developed in that work will be applied to the study of fibrosis in future projects. Collectively, these research experiences have built a uniquely interdisciplinary toolkit that will be needed to realize my long-term goal of leading a diverse group focused on engineering ever-improving models of human health and disease to ultimately transform clinical care.

Education:
Drexel University, 2011. PhD, Biomedical Engineering.
Florida State University, 2002. B.Sc. Chemical Engineering; B.Sc. Biological Chemistry.

Research/Work Experience:
Research Associate (Huh lab), Department of Bioengineering, University of Pennsylvania. 9/2017-present.
Instructor (part time teaching), Department of Bioengineering, University of Pennsylvania. 1/2016-6/2016.
Postdoctoral Fellow, Dept. of Bioengineering, Univ. of Pennsylvania. 9/2014-9/2017. Advisor: Dan Huh, PhD
Postdoctoral Fellow, Center for Inflammation, Clinical and Translational Lung Research, Temple University School of Medicine. 9/2012-9/2014. Advisor: Laurie Kilpatrick, PhD
Adjunct Asst. Professor (Teaching only), Department of Bioengineering, Temple University. 9/2012-12/2013.

Selected Publications:

Awards/Honors:
Jeanette Piperno Memorial Award (for excellence in vascular biology research), Sol Sherry Thrombosis Research Center - 33rd Annual Margulies Awards, November 2013.
Best PhD Dissertation in the Physical and Life Sciences, Drexel University, 2011.
Research Overview:
Despite over 100 years of research into blood disorders, we are just now finding that the mechanics and biophysics of blood cells play critical roles in modifying a range of hematological functions, from governing immune cell trafficking (Fay & Myers et al., PNAS, 2016) to regulating clot integrity (Myers et al., Nat. Mat., 2017). Defining the role and relative importance of the mechanical aspects of hematological disorders will lead to new therapeutic approaches, as hematological dysfunction causes or is associated with many diseases including cancer, stroke, heart attack, bleeding, sepsis, asthma, and diabetes. However, since these hematological disorders involve multiple interacting cell types, soluble factors, and matrix proteins within a moving dynamic environment, a quantitative engineering approach is needed to identify how and why mechanics change in pathological conditions. The blood clot environment exemplifies this need and will be a central focus of our initial research. To aid in our studies, we create novel sensors for living systems and pioneer new advanced micro and nano-scale devices and techniques. Another central focus of my lab will be translating biomedical microsystems from the cleanroom into the clinic. We will focus on a new paradigm of “lab on a person” devices that integrate blood collection techniques, automation, electronics, and microfluidics to directly perform quantitative measurements on a person, instantaneously, and at the bedside. Initially, we will focus on measuring parameters relevant to hematologists and we will later expand into other medical specialty areas. My extensive experience helps us create biomedical micro-chip based systems that are: 1) based on detailed knowledge of the clinic, 2) practical, and 3) address a significant clinical problem.

Education:
- University of California at Berkeley, Dec 2010, PhD, Mechanical Engineering
- University of California at Berkeley, Dec 2007, MS, Mechanical Engineering
- Virginia Commonwealth University, May 2004, BS Dual Major, Mechanical Engineering & Physics

Research/Work Experience:
- 2018–present – Assistant Professor Research Track (non-tenure), Department of Pediatrics, Emory University,
- 2016-2018 – Instructor, Department of Pediatrics, Emory University
- 2011-2016 – Postdoctoral Fellow, Georgia Institute of Technology & Emory University, Advisor: Wilbur A. Lam, MD, PhD
- 2004-2010 - Graduate Student Researcher, UC Berkeley, Advisor: Albert P. Pisano, PhD

Selected Publications:

Awards/Honors:
- Pending Awards: K25. PO is recommending for funding. NIH/NHLBI. 2018-2022
- 2011 / 2012 / 2017 American Society of Hematology (ASH) Abstract Achievement Award
- VCU Presidential Scholarship (Full Scholarship include room & board) // VCU Goodwin Scholarship
Research Overview:
My general research interest lies in the field of nanomedicine that aims diagnosing, treating, and preventing diseases using nanotechnology tools. During Ph.D., I had dealt with various nano-biomaterials for cancer imaging and therapy with a particular expertise on inorganic nanoparticles composed of metallic or semiconductor elements. My current works focus on the nanotechnology-based immuno-engineering to manipulate immune functions in the context of cancer immunotherapy. Specifically, I am developing 1) novel nanoparticle platforms for vaccine, drug delivery, other therapeutic functions (e.g. gold nanoparticles, polymer/lipid-based nanoparticles), and 2) effective treatment strategies using these platforms (e.g. combination of various nonimmunological and immunological therapies), which together aim to completely eliminate local as well as metastatic cancers in a personalized manner. The ultimate goal is to develop nano-biomaterial platforms and treatment regimen that are clinically applicable for cancer therapy, through a series of systemic pre-clinical and translational researches.

Selected Publications:

Awards/Honors:
1. Bong-Whan Kim and Young-Soon Hong Scholarship, POSTECH. 2011
3. Excellent Presentation Award, Daegu-Gyeongbuk Korean Chemical Society, 2009
4. Prize for Nanotechnology Research Innovation & Symposium Chair Award, NanoKorea, 2009
Research Overview:
I have multidisciplinary experience in translational research, in which I not only developed novel chemistry and biomaterials, but also successfully pushed forward their applications into preclinical trials. I am currently employed as an Instructor of Pediatrics at Harvard Medical School and Boston Children’s Hospital, where I also conducted postdoctoral research before my promotion to the current position in 2017. I was hired and tasked by my current employer to develop new oxygen carriers for intravenous injection to treat hypoxic emergencies. During this time, I developed a new chemical approach using interfacial nanoprecipitation to create stable and functional polymeric microbubbles (MBs), and responsive MBs as intravenous oxygen carriers that overcame problems of vascular obstruction and increased the rate of survival in asphyxial cardiac arrest. Moving into preclinical studies in swine models, I am studying the long-term toxicity and biodistribution of polymeric materials, and have improved the safety by materials design for fast renal clearance. I’ve also expanded the chemistry toolbox to develop new micron and nano—size bubbles as ultrasound contrast agents with tunable acoustic properties(paper submitted) , in collaboration with Prof. Tyrone Porter, an ultrasound expert at BU. The ideas I have developed into my proposed research program for faculty application were inspired from my training in organic synthesis and rich experience in translational fields. The central theme is exploring how modulating amphiphilic polysaccharide structure will alter their interfacial and bulk properties for fabrication of advanced biomaterials. Based on the insights I have acquired on bubble fabrication through interfacial nanoprecipitation, I will focus on altering the acoustic properties of micro-(MBs) and nano(NBs) bubbles, and assess their translational potentials for advanced Ultrasound imaging and Drug Delivery, stroke treatment, as well as their novel uses in Magnetorheological(MR) fluids. I will also capitalize on the aqueous assembly behaviors of modified polymers to design prolonged blood volume expanders with high osmolarity and programmed degradation and clearance profile as therapeutics for Hemorrhagic Shock and pulmonary edema. The translational nature of the proposed biomaterials research will have clinical impact and broader utilities. Thus, I anticipate the program will generate ample funding and fruitful collaborations. In fact, experts from various fields have already approached me personally to propose exciting opportunities for collaborations.

Education:
• Ph.D. Materials Chemistry New York University, USA (2014) Advisor: Prof. Richard A. Gross
• B.S. Pharmaceutical Science Xiangtan University, Hunan, China (2008) Advisor: Prof. Yuanli Cai

Research/Work Experience:
My PhD research under Prof. Richard Gross explored chemo-enzymatic routes to synthesize glycolipids called sophorolipids (SLs). I focused on transformations of fermentation produced sophorolipids using metathesis and enzymatic catalysis to create both polymeric materials and small functional molecules. Then, I investigated structure-property relationships of polysophorolipids for Tissue Engineering, and low molecular weight modified sophorolipids for colloid stabilization and antimicrobial activity.
I conducted a 10 months postdoctoral fellowship at Gerogia Tech with Prof. Johnna Temenoff, a biomaterial expert, to study affinity hydrogels based on chemically modified heparins for drug delivery.

Selected Publications:

Awards/Honors:
2018 Peer Review Awards Top 1% in Field of Chemistry, by Publons. // Seymour Shapiro Award (NYU 2011) “outstanding third year PhD student in organic chemistry” //Eirich-Morawetz Prize (NYU 2009)
JESSE KENNETH PLACONE, PhD
Department of Bioengineering, University of California San Diego, 2880 Torrey Pines Scenic Dr, La Jolla, CA, 92037
jplacone@ucsd.edu

Research Overview:
My research interests lie in the development of 3D printed substrates to facilitate the study of cell-cell and cell-substrate interactions. In tissue engineering, 3D printing (3DP) is becoming more prevalent and widespread due to its unique ability to aid in the fabrication of patient-specific tissues or model systems. However, this field of research is still in its infancy in terms of adoption and success. There are many areas which need to be improved for the clinical adaptation of 3DP such as controlling cell-substrate interactions and substrate properties. Through my PhD thesis work, I focused on protein-protein interactions on the surface of cells and on cell-derived vesicles. My postdoctoral work at UMD focused on the generation of novel substrates suitable for 3DP that support cell survival, growth, and proliferation for bone and vascular grafts. To better understand the biology of those systems, I transitioned to UCSD as a postdoctoral fellow to study how induced pluripotent stem cell-derived endothelial cells were affected by micropatterned 3DP vascular grafts. During this time, I also broadened my focus to understand the physical mechanisms that contribute to cardiovascular disease and cancer, through developing unique fluidic shear stress models and dynamic substrates. My future research will focus on the combination of these strategies, capitalizing on my knowledge of signaling cascades and ability to create unique materials to understand and influence cell fate for regenerative therapies and oncology.

Education:
Doctor of Philosophy in Materials Science and Engineering, 2013, Johns Hopkins University, Baltimore MD
Bachelor of Science in Biomedical Engineering, 2008, Johns Hopkins University, Baltimore MD

Research/Work Experience:
Postdoctoral Fellow, Department of Bioengineering, University of California San Diego, 2016-Present, Advisor Dr. Adam J. Engler
Postdoctoral Research Associate, Fischell Department of Bioengineering, University of Maryland, 2013-2016, Advisor Dr. John P. Fisher
Graduate Research Associate, Department of Materials Science and Engineering, Johns Hopkins University, 2008-2013, Advisor Dr. Kalina Hristova

Selected Publications:
• Placone JK, Engler AJ. Recent advances in Extrusion-based 3D printing for biomedical applications. Advanced healthcare materials. 2018 Apr;7(8):e1701161
• Kumar A, Placone JK, Engler AJ. Understanding the extracellular forces that determine cell fate and maintenance. Development. 2017. 144(23):4261-4270

Awards/Honors:
Ruth L. Kirschstein National Research Service Award Individual Postdoctoral Fellowship (F32), NIH, 2016
Integrative Graduate Education and Research Traineeship (IGERT), NSF/Johns Hopkins Institute for NanoBioTechnology, 2008
Pond Fellowship Recipient, Whiting School of Engineering Johns Hopkins University, 2008
SHANTANU PRADHAN, PhD
Biomedical Engineering, University of Delaware, 5 Innovation Way, Suite 200, Room 103, Newark, Delaware, 19716
spradhan@udel.edu

Research Overview:
My research lies at the interface of engineered biomaterials, cancer metastasis and tissue-engineered models to study cancer-vascular interactions and tumor dormancy. In my doctoral work under Dr. Elizabeth Lipke, I developed novel 3D models based on PEGfibrinogen hydrogels to study tumorigenic behavior of cancer cells and a microfluidic on-chip platform to study tumor-stromalendothelial interactions for anti-cancer drug testing applications. In my current postdoctoral research under Dr. John Slater, I have developed a hydrogel-based biomaterial platform to modulate cancer cell behavior, with specific focus on tumor dormancy or latency, with the aim of discovering novel targets for dormant subpopulations of cancer cells. As an assistant professor, I will build off on my expertise in cancer tissue engineering to:
1) develop 4D evolutionary models of tumorigenic progression, drug resistance and metastatic relapse;
2) develop models for vascular diseases including tumor angiogenesis and chemotherapy-induced vascular complications and;
3) investigate causal mechanisms between obesity, obesity-induced systemic inflammation and their role in tumor progression and vascular abnormalities.

Education:
• Ph.D. in Chemical Engineering, Auburn University, Auburn, AL, August 2016.
• B.Tech. in Chemical Engineering, National Institute of Technology, Durgapur, India, July 2010.

Research/Work Experience:
• University of Delaware, 2016-Present. Postdoctoral Researcher; Advisor: Dr. John Slater
• Auburn University, 2010-2016. Graduate Research Assistant; Advisor: Dr. Elizabeth Lipke
• Auburn University, 2010-2012. Graduate Teaching Assistant; Department of Chemical Engineering
• NIT Durgapur, 2009-2010, Undergraduate Research Assistant; Advisor: Dr. Jaya Sikder, Co-advisor: Dr. Parimal Pal
• Central Mechanical Engineering Research Institute, 2009-2010, Undergraduate Research Assistant; Advisor: Dr. Biswajit Ruj, Co-advisor: Dr. Pradip Kumar Chatterjee

Selected Publications:

Awards/Honors:
• 2018: Auburn University Graduate School Distinguished Dissertation Award.
• 2014: Distinguished Graduate Engineering Student Award, Auburn University.
• 2014-2016: Auburn University Research Initiative in Cancer (AURIC) Graduate Fellowship.
• 2012: McLeod Outstanding Chemical Engineering Graduate Student Teaching Award, Auburn University.
SHAQYU QIAO, PhD
Center for Neural Science, New York University, 4 Washington Place, RM 1167, New York, New York, 10003
sqiao@nyu.edu

Research Overview:
My interest in neurotechnology development to treat neurological disorders has taken me from studying neural interfacing technologies at Purdue University to investigating large-scale network mapping and manipulation of decision-making architecture in the primate brain at New York University (NYU). At Purdue, I developed a novel method of estimation of electrode-fiber bioelectrical coupling to extract spatial and temporal information about the single units detected by flexible intrafascicular multichannel neuroprosthetic microelectrodes in the peripheral nerve. The bioelectrical coupling function is an estimate of the electrode sensitivity function traversed by the nerve fiber, suggesting that it can be used as a means to directly measure the spatial relationship between the nerve fiber and electrode. It not only reflects a shape change to the single fiber action potential, but has implications for in situ nerve fiber location tracking, in situ diagnostics of nerves and neuroprosthetic electrodes, and assessment of the biocompatibility of neural interfaces and the health of the reporting nerve fibers. At NYU, as a researcher working on the DARPA SUBNETS project which aims to develop new treatments for neuropsychiatric conditions, my research has been focusing on developing a large-scale brain-machine interfacing system to target the cortical and subcortical decision-action networks in non-human primates performing a probabilistic reinforcement learning task. Using my newly developed network-based active-sensing approach, i.e. a multi-site spatiotemporal intracortical microstimulation paradigm, I am able to uncover and manipulate neural pathways across the targeted mesolimbic networks that play an essential role in reward processing and mood regulation. Disorders of these brain networks underlie many neuropsychiatric disorders. This work offers new insights into how the effects of electrical stimulation at particular nodes, frequencies, and duration will cascade throughout the mesolimbic networks. The results have implications for the rational design of therapeutic patterns of closed-loop stimulation based on a network-level understanding of the neuropsychiatric conditions. As an independent investigator, I will integrate the state-of-the-art neural interfacing technologies and neural signal processing and computational tools I developed to understand and manipulate the dynamics of large-scale neural circuitry across the peripheral, central and autonomic nervous systems. These insights will fuel next-generation treatments for neurological and biomedical diseases.

Education:
08/2009 – 08/2014 Ph.D. Biomedical Engineering Purdue University, West Lafayette, IN, USA
08/2007 – 08/2009 M.S. Biomedical Engineering Purdue University, Indianapolis, IN, USA
09/2003 – 07/2007 B.E. Biomedical Engineering Capital Medical University, Beijing, China

Research/Work Experience:
07/2014 – present Postdoctoral Associate, Center for Neural Science, New York University. Advisor: Bijan Pesaran, Ph.D.
06/2008 – 06/2014 Graduate Research Assistant, Weldon School of Biomedical Engineering, Purdue University
Advisors: Ken Yoshida, Ph.D. and Kevin J. Otto, Ph.D.

Selected Publications:

Awards/Honors:
2014 The Jack Perkins Prize for the best paper published in Medical Engineering & Physics
2013 Travel Award to the 6th Int’l IEEE-EMBS Neural Engineering Conference
2013 Bilsland Dissertation Fellowship, Purdue University
2012 1st Place Sigma Xi Graduate Student Research Awards Competition, Purdue University
2007 Outstanding Undergraduate Thesis Award, Capital Medical University
XULEI QIN, PhD  
Cardiovascular Institute, Stanford University, 300 Pasteur Drive, Grant Building S114, Stanford, CA, 94305  
xqin@stanford.edu

Research Overview:
As a biomedical engineer, I am passionate about developing translational approaches for early detection and treatment of heart failure by leveraging biomedical imaging, image computing, and regenerative medicine. As population aging is rapidly becoming a global phenomenon, heart failure will become an urgent healthcare problem in the next decades. I am fully motivated and prepared with my interdisciplinary expertise to conduct translational projects to directly help millions of heart failure patients. During the pursuit of my Ph.D. degree, I accurately measured physiological parameters of vocal folds for the diagnosis of voice disorder by developing novel high-speed imaging and computational modeling methods. This work led to two first-author papers in a leading journal of this field and was honored with the University’s Outstanding Doctoral Dissertation Award. Later on, I took my postdoctoral training at Emory University and Stanford University to develop novel approaches for the detection and treatment of heart failure. I received rigorous training in the field of molecular imaging, medical image computing, and regenerative medicine, maintained a productive publication record, and established broad collaborations with scientists from multidisciplinary area. Due to their significance and innovation, my research projects have been highlighted and funded by multiple grants, including AHA scientist development grant (0.3% percentile), NHLIBI PCBC research award, and Stanford translational research pilot grant. My future research program will focus on translating biomedical engineering technologies into patient care to make heart failure nonlethal any more. By leveraging my interdisciplinary expertise, I will pursue two major research directions: 1) early detection of heart failure with preserved ejection fraction; 2) regenerative therapy of ischemic heart failure.

Education:
- Ph.D. in Biophysics, Dept. Biomedical Engineering, Xi’an Jiaotong University, 2010
- B.E. in Biomedical Engineering, Dept. Biomedical Engineering, Xi’an Jiaotong University, 2005

Research/Work Experience:
- Stanford University, 2016-present, Instructor, Cardiovascular Institute,
- Stanford University, 2014-2016, Postdoctoral Fellow, Cardiovascular Institute
- Emory University, 2011-2014, Postdoctoral Fellow, Dept. Radiology and Imaging Sciences
- Mindray Medical International Limited, 2010-2011, Investigator, Beijing Research Institute
- Xi’an Jiaotong University, 2005-2010, Research Assistant, Dept. Biomedical Engineering

Selected Publications:

Awards/Honors:
- Outstanding reviewer award, Physics in Medicine and Biology, 2018
- American Heart Association scientist development award, 2017
- Visualsonics travel award, Fujifilm Visualsonics, 2017
- NIH Progenitor Cell Biology Consortium (PCBC) research award, 2016
- Stanford translational research and applied medicine (TRAM) fellow award, 2016
- Stanford Cardiovascular Institute travel award, 2016
- Outstanding doctoral dissertation award, Xi’an Jiaotong University, 2011
- National scholarship award, Ministry of Education of China, 2002
FELIPE GARCIA QUIROZ, PhD
The Rockefeller University, 1230 York Ave, New York, New York, 10065
fgarciaqui@rockefeller.edu

Research Overview:
Life is sustained by scaffolds of repetitive elements made of DNA, RNA and proteins. In eukaryotes, repetitive DNAs (reDNAs) account for over 50% of the genome. Nature recurrently uses repeat elements to build material systems, including complexes for receptor signaling and subcellular compartments. While ubiquitous, the physical and biological properties of repetitive material systems remain poorly understood. My work scrutinizes nature’s repetitive language to reveal its biological meaning and extract design principles for materials engineering.

To study this language, reDNAs must be sequenced and synthesized, but historically, this has been a major technical challenge. As a result, their function in genomic contexts is poorly understood. Our knowledge gap increases further as reDNAs transcribe into RNA and translate into repeat proteins (RPs), which then undergo post-translational modifications (PTM) that alter their properties. This gap in understanding has hampered therapeutic advances for a variety of human disorders involving reDNAs or their translated RPs. Recently, however, breakthroughs in protein and DNA sequencing have opened an avenue to sequence long reDNAs and PTMs in RPs. My career goal is to uncover functional properties of a broad class of repetitive DNA, RNA and protein elements, and of the corresponding material systems, in biology and engineering.

My fascination with repetitive elements started with my PhD in biomedical engineering, in which I developed tools to synthesize reDNAs and elastin-like RPs. This work allowed me to dissect sequence-encoded features of RPs that control their phase transition behavior, which I then exploited to create self-assembling and stimuli-responsive biomaterials. Motivated by a newly-acquired ability to predict the phase behavior of RPs, for my postdoctoral work I turned my attention to the underexplored biology of genome-encoded RPs.

Using genetics, live imaging and newly-developed tools to study phase behavior in vivo, my postdoctoral work has led to the discovery that terrestrial mammals evolved gigantic RPs to orchestrate a dramatic event of liquid-liquid phase separation that is crucial to the poorly understood process of skin barrier formation. Humans with mutations in these RPs, most notably Filaggrin (Flg), have a defective skin barrier and these mutations abolish or severely impact phase behavior. Besides providing new insights into the process of skin barrier formation, my findings have broad implications to the emerging field of cellular mechanisms driven by phase behavior, and beg the exploration of the underlying strategies for the engineering of novel self-assembling and stimuli-responsive materials. To move forward with my exploration of nature’s repetitive language, I recently received a Career Award at the Scientific Interface (CASI) from the Burroughs Wellcome Fund. With this award and the support of colleagues and administrators at my future institution, two exciting avenues of my work will seek to establish platforms for manipulation and sequencing of reDNAs in genomes, as well as unprecedented characterization of PTMs in RPs. Altogether, my previous, current and proposed work set the stage for a multidisciplinary effort to uncover and exploit the genius underlying the repetitive elements of life.

Education:
- Postdoctoral training, The Rockefeller University [September 2014- present] Advisor: Prof. Elaine Fuchs
- Ph.D. in Biomedical Engineering, Duke University [2008- April 2013] Advisor: Prof. Ashutosh Chilkoti

Research/Work Experience:
Postdoctoral Research Associate, Duke University [May 2013-July 2014]

Selected Publications:

Awards/Honors:
- Burroughs Wellcome Fund Career Award at the Scientific Interface (2017 recipient): Repetitive elements of life, from genomes to proteins and material systems.
SHREYA RAGHAVAN, PhD
Materials Science and Engineering, University of Michigan, 2800 Plymouth Rd. NCRC Building 28 Room 3030E,
Ann Arbor, MI, 48109
shreyar@umich.edu

Research Overview:
My long-term research interests lie in creating novel tissue engineered niches to facilitate the inquisition of the stem cell/immune axis in cancer and regenerative medicine. During graduate school, I constructed tissue engineered models of gut smooth muscle using scaffolds, hydrogels and soft-lithography. I introduced enteric nerves into the bioengineered constructs to intrinsically regulate smooth muscle motor function. Using biomaterials-based approaches, I demonstrated the ability to direct enteric neural stem cell differentiation within bioengineered constructs. Lastly, I performed extensive transplantation studies in rodents to demonstrate the feasibility of using tissue engineered intestinal constructs for regenerative medicine. Through my doctoral research experience, I gained a solid foundation in regenerative medicine applied to gastrointestinal pathologies. I sought out postdoctoral training that would enable me to apply my training to cancer. I used a novel hanging drop array platform to establish micro-tissue models of primary ovarian cancer stem cells, capable of differentiating and mimicking primary patient tumors and their clinical response to platinum. Combining in vitro with in vivo studies, I demonstrated the utility of this 3D system for personalized medicine. Within this micro-tissue model, I currently investigate the reciprocal interactions between ovarian cancer stem cells and cells of the tumor immune microenvironment (specifically macrophages), with the aim of elucidating the role of the immune system in ovarian cancer progression. As an independent researcher, my lab will develop tissue-engineered tools to ask and answer a diverse set of biological questions pertaining to stem cell/immune interactions in cancer and regenerative medicine. As a natural amalgam of my research training, I am highly motivated in integrating regenerative medicine principles with the power of biomaterial and biomimetic cues to create physiologically attuned engineered stem cell/immune niches.

Education:
PhD, Biomedical Engineering, 2014, Virginia Polytechnic and State University, Wake Forest University, Winston-Salem NC
MSE, Biomedical Engineering, 2008, University of Michigan, Ann Arbor MI
BE, Instrumentation and Control Engineering, 2006, Anna University, Chennai India

Research/Work Experience:
· Research Fellow, 2014- present, Engineered Cellular Microenvironments Lab, Materials Science and Engineering, University of Michigan, Ann Arbor MI
· Graduate Student Research Assistant, 2010-2014, Wake Forest Institute for Regenerative Medicine, Wake Forest University, Winston-Salem NC
· Research Technician Specialist, 2008-2010, Pediatrics-Gastroenterology, University of Michigan, Ann Arbor MI
· Graduate Student Research Assistant, 2006-2008, Biomedical Engineering, University of Michigan, Ann Arbor MI

Selected Publications:

Awards/Honors:
2017-present Ruth L. Kirschstein National Research Service Award, NIH
2013,2014- Travel Awards, TERMIS
2013- Travel Award, BMES
2011-2012 Graduate Student Fellowship, Virginia Tech & Wake Forest University
SIMONE ROSSI, PhD
Mathematics, University of North Carolina, 108 Grapevine Trl, Chapel Hill, North Carolina, 27707
simone.rossi@unc.edu

Research Overview:
My general research interests are in mathematical and numerical methods for computational biomechanics. Mechanics have a strong influence on many biological processes of living tissues, such as organ function regulation, morphological and structural adaptation, tissue damage and repair, among many others. My goal is to complement biological experiments with multiphysics and multiscale mathematical modeling and computational methods. More specifically, I wish to integrate computational models, imaging, and experiments to investigate the mechanisms of heart development. In fact, experiments on the embryonic heart can be too expensive, unethical or simply impossible, but computational models can still be used to investigate the underlying biological mechanisms.

Education:
• PhD in Mathematics, 2014, École polytechnique fédérale de Lausanne, Switzerland.
• PhD in Mathematics, 2014, Instituto Superior Técnico de Lisboa, Portugal.
• MSc in Physics, 2009, Università degli Studi di Milano, Italy.
• BSc in Physics, 2079, Università degli Studi di Milano - Bicocca, Italy.

Research/Work Experience:
• Visiting Postdoctoral Fellow, 2018-present Department of Cell Biology and Physiology, University of North Carolina at Chapel Hill
• Postdoctoral Fellow, 2016-present, Department of Mathematics, University of North Carolina at Chapel Hill
• Postdoctoral Fellow, 2016-present Department of Civil & Environmental Engineering, Duke University - Postdoctoral Fellow, Spring 2014 Department of Mathematics, EPFL, Switzerland

Reviewer for the journals: Transaction in Biomedical Engineering; Computer Methods in Applied Mechanics and Engineering; Journal of Computational and Applied Mathematics; Communications in Applied and Industrial Mathematics.

Selected Publications:

Awards/Honors:
- NIH-1U01HL14333 - Multiscale Modeling of Clotting Risk in Atrial Fibrillation, Co-Investigator
- Fundação para a Ciência e a Tecnologia, Ph.D. Fellowship (4 years)
- MSc degree in Physics summa cum laude
ADAM G. ROUSE, MD, PhD
Neuroscience, University of Rochester, 601 Elmwood Dr., Box 603, Rochester, New York, 14642
adam_rouse@urmc.rochester.edu

Research Overview:
My primary research goals are to understand the neural control of finger and hand movements and its application to braincomputer interfaces (BCI). BCI technology has made tremendous advances in recent years. However, current BCI and robotic technology come nowhere close to restoring the range of healthy human performance. The fundamental question I want to help answer is: how does the nervous system generate natural movement and how can we better replicate it?

My graduate training at Washington University in St. Louis with Dr. Dan Moran provided me a strong foundation in neurophysiology, bioinstrumentation, and signal processing. Since moving to the University of Rochester as a post-doctoral associate, I have expanded my expertise in the neurophysiology of finger movements under the training of Dr. Marc Schieber. In addition to basic neurophysiology I have expanded the lab’s focus on BCIs. Specifically, I’ve explored the integration of multi-joint hand movements and created one of the fastest, most precise BCIs replicating hand movements in a virtual hand. In the lab, I analyze the neural dynamics of large populations of single neuron recordings and devise novel algorithms for decoding neural signals into BCI output.

I recently received an NIH K99/R00 Pathway to Independence Award from the National Institute of Neurological Disorders and Stroke to serve as the foundation for my independent research program. The research plan is titled “Neural encoding of motor precision for advancing brain-machine interfaces” and involves two aims. The first aim studies the neural encoding of precise reaching by having monkeys reach to small targets that often require corrective movements. The results of recently collected data are promising and show that most movements are made up of submovements with multiple peaks in the speed profile. These peak speeds phase-align with cyclic neural activity in primary motor cortex. The second aim will test whether a novel non-linear BCI decoder utilizing gain scheduling can improve upon classic fixed, linear decoders.

I also have two other collaborations for advancing my future research. First, with Dr. Tom Howard at the U. of Rochester, I am incorporating robotic arms into my BCI work. Second, with Dr. Ben Hayden at the U. of Minnesota, we are developing a wireless recording platform for studying diverse motor behavior and cognitive decision making in free-ranging tasks.

Education:
B.S., Biomedical Engineering with 2nd Major in Economics, Washington University in St. Louis, May 2004.

Research/Work Experience:
-Research Assistant Professor, U. of Rochester Medical Center, Department of Neuroscience, July 2017-Present.
-Postdoctoral Associate, U. of Rochester Medical Center, Department of Neuroscience, Lab of Marc Schieber, July 2012-June 2017.
-Lecturer to U. of Rochester NSC 531 - Integrative and Systems Neuroscience, Spring 2016-Present.
Annual guest lecture to U. of Rochester BME218–NeuroEngineering, Fall 2015-Present.
-Teaching Assistant, Washington U., Department of Biomedical Engineering, Fall 2007. Course: Bioelectric Phenomena (BME 471)

Selected Publications:
1) Rouse AG, Schieber MH. (2018). The dimensionality and neural dynamics of general task modulation, location & object tuning, and noise in primary motor cortex during a reach-grasp-manipulate task. Revised and re-submitted to Cell Reports.

Awards/Honors:
Selected for inclusion in 2016 Society for Neuroscience Annual Meeting’s Hot Topics press packet
Medical Scientist Training Program grant trainee, Washington University School of Medicine, 2004-2012.
DEBAJIT SAHA, PhD
Biomedical Engineering, Washington University in St. Louis, 1 Brookings Drive, St Louis, MO, 63130
dsaha@wustl.edu

Research Overview:
My research in neuroengineering is aimed at understanding the ‘functional connectome of the brain’ by uncovering the rules of neural computations that translate to behavior. I employ multi-channel in-vivo neural recordings, quantitative behavioral assays, functional imaging, multiscale computational modeling, and information theoretic approaches to understand the neural basis of behavior. My research also extends to bio-robotics and bio-nanoscience where I aim to develop cyborg insect based bio-robots employing the braincomputer interface (BCI) rules derived from neural computations used in olfactory coding.

My postdoctoral work at the Biomedical Engineering Department at Washington University in St. Louis focused on uncovering the rules of neural computations that determine associative learning and odor identification in complex natural environments. One of my research studies uncovered neural coding schemes behind background-invariant chemical recognition in a multi-stimulus environment. In another study, I have shown how opposing neural dynamics mediate divergent behavior to actively mediate sensing and ‘unsensing’ of sensory stimuli. In one of my recent works, I have identified a flexible neural coding scheme that is ideal for odor identification in a multi-stimulus environment. My current research focuses on applying the design and computing principles of the insect olfaction towards creating bio-robots for chemical sensing purposes. I have recently developed a cyborg insect preparation where the olfactory brain can be implanted with microelectrode arrays while the insect respond behaviorally to various chemosensory cues. I have combined this neural recording technique with miniaturized data acquisition and pattern recognition algorithms to design a control-and-guidance system for the bio-robots. I plan to implement this forward engineering approach of chemical sensing in my future research program towards developing bio-robots that have potential applications in medical sciences, homeland security, and environmental studies.

Another aspect of my research involves developing and implementing nano-neuroscience approaches for neural and behavioral controls. In summation, my research background and future plans integrate neuroengineering, systems neuroscience, and bio-nanoscience approaches to investigate the neural bases of behavior and facilitate its applications towards development of bio-engineered devices for therapeutic and biosensing applications.

Education:
• Washington University in St. Louis, PhD, Physics/Neurophysics, December 2010
• Indian Institute of Technology (IIT) Bombay, MSc, Engineering Physics, June 2004
• Jadavpur University India, BSc, Physics, June 2002

Research/Work Experience:
• Washington University in St. Louis, Biomedical Engineering, 2017 – Present
  Research Scientist, Advisor: Baranidharan Raman, PhD
• Washington University in St. Louis, Biomedical Engineering, 2011 – 2017
  Postdoctoral Research Associate, Advisor: Baranidharan Raman, PhD
• Washington University in St. Louis, Physics, 2004 – 2010 Graduate Research Assistant, Advisor: Ralf Wessel, PhD

Selected Publications:

Awards/Honors:
• IEEE Donald G. Fink Award, 2016
• Postdoctoral fellowship award, McDonnell Center for Cellular and Molecular Neurobiology, 2015
EIJI SAITO, PhD
Biomedical Engineering, University of Michigan, 1600 Huron Parkway, Ann Arbor, MI, 48105
esaito@umich.edu

Research Overview:
My research laboratory will focus on the intersection of immune-engineering and regenerative medicine. Trauma or disease (e.g. autoimmunity) are typically associated inflammation, with immune cells infiltrating to damage the tissue. A therapy must overcome both the immune environment and also regenerate the damaged tissue. Immune cells associated with tissue destruction include monocytes, neutrophils and T-cells for which I aim to develop immunomodulatory nanoparticles based on my previous experience in order to attenuate the immune response. Subsequently, my laboratory will develop bioactive porous scaffolds to create a space that supports and promotes tissue regeneration. Importantly, the nanotherapies and biomaterial scaffolds provide tools to modulate immune responses and tissue regeneration, which my research will exploit to investigate the mechanisms relating immunomodulation and tissue regeneration.

Nanoparticles for immunomodulation: In Prof. Lonnie Shea’s lab, I am currently developing biodegradable nanoparticles for treatment of innate inflammation and autoimmune disease using mouse models, including spinal cord injury (SCI) and experimental autoimmune encephalomyelitis (EAE). For mitigating innate inflammation, I have developed nanoparticles that, without any active ingredient, modulate inflammatory monocytes and neutrophils phenotype, redirecting them to the spleen or liver rather than the primary site of inflammation. The nanoparticle design profoundly affects the immune response and has the potential to ameliorate the disease (Oral presentation #903). I have also formulated that nanoparticles of antigen specific treatment of EAE. My particles reduce the expression of the costimulatory molecules on APCs, which leads to deactivation of CD4+ T-cells (Poster presentation #949).

3D printed porous scaffolds for tissue regeneration: In my previous research in Prof. Scott Hollister’s lab, the focus of my work was the development of biodegradable porous scaffolds for orthopaedic application using computational design and 3D printing. I investigated the effect of scaffold materials, architecture, and surface coating on tissue formation and scaffold degradation to fill bone defects. My research showed that scaffold architectures determined in vivo degradation of scaffolds. I also demonstrated that scaffold materials influenced in vivo tissue regeneration on and into porous scaffolds.

Education:
PhD, University of Michigan-Ann Arbor, Biomedical Engineering, December 2011, Advisor: Scott J. Hollister, PhD BS, Kanazawa University, Japan, Mechanical Engineering

Research/Work Experience:
• University of Michigan, Ann Arbor, MI, 2014-Present, Postdoctoral Research Fellow, Advisor: Lonnie D. Shea, PhD
• Northwestern University, Chicago, IL, 2013-2014, Postdoctoral Research Fellow, Advisor: Lonnie D. Shea, PhD
• University of Michigan, Ann Arbor, MI, 2012-2013, Postdoctoral Researcher, Advisor: Scott J. Hollister, PhD
• University of Michigan, Ann Arbor, MI, 2003-2011, Graduate Student Research Assistant, Advisor: Scott J. Hollister, PhD

Selected Publications:
1. **Eiji Saito**, Robert Kuo, Ryan M. Person, Nishant Gohel, Brandon Cheung, Nikolas J.C. King, Stephen D. Miller, Lonnie D. Shea, “Poly (lactide-co-glycolide) particle association with neutrophils and monocytes to ameliorate inflammation” (Submitted)

Awards/Honors:
University of Michigan Rackham Graduate Student Research Grant (2011)
MARCO SANTORO, PhD
Department of Bioengineering, University of Maryland, 8278 Paint Branch Dr, College Park, MD, 20742
msantoro@umd.edu

Research Overview:
My research interest is focused on understanding the interplay between structure, mechanics, and functions in cancers both at a macroscopic (tissue) and a microscopic (single cell) level.

My doctoral research focused on the effects of fluid-derived mechanical stimulation on bone tumor cells. We demonstrated that tumor cells exhibit a shear stress-dependent drug response and that fluid-derived shear stress impacted tumor stroma and ultimately resulted in acquired drug resistance in the tumor cells. Overall, this work improved our knowledge of tumor mechanobiology and provided an explanation for the development of resistance to biologically targeted therapies in a subset of patients.

My postdoctoral research is now focused on two different projects. The first project is focused on investigating the crosstalk between endothelial and stem cells within 3D printed scaffolds for tissue neovascularization. The second involves the use of multi-photon laser lithography to study cell-microenvironment interactions on a microscopic level. Despite the different approaches and goals, both projects seek to elucidate the role of mechanical stimuli on fundamental biological processes in both normal (vasculature) and diseased (tumor) tissues.

Nevertheless, many aspects of tumor biology remain to be studied so that mechanistic findings, rather than phenomenological studies, may guide the development of new strategies for cancer drug treatment. By combining engineering principles, molecular biology and additive manufacturing techniques, the long-term objective of my work is (1) to elucidate the fundamental mechanisms governing tumor biology and (2) to develop effective therapeutic strategies for cancer treatment.

Education:
2016: Ph.D., Chemical and Biomolecular Engineering, Rice University
2009: M.S., Chemical Engineering, Politecnico di Milano, Italy
2007: B.S., Chemical Engineering, Politecnico di Milano, Italy

Research/Work Experience:
2016-current: Postdoctoral Associate and Lecturer, Department of Bioengineering, The University of Maryland, College Park, Maryland (mentor: John P. Fisher)
• Development of tissue-engineered vascularized scaffolds
• Micro-bioprinting for cancer and stem cell mechanobiology

2011-2016: Research and Teaching Assistant, Department of Chemical and Biomolecular Engineering, Rice University, Houston, Texas (advisors: Antonios G. Mikos, Joseph A. Ludwig)
• Development of High-Throughput 3D Tumor Model for Bone Sarcomas

2010-2011: Research Assistant, Department of Chemistry, Materials and Chemical Engineering, Politecnico di Milano, Italy
• Development of Biodegradable Hydrogels for Spinal Cord Injury Repair

Selected Publications:

Awards/Honors:
2016-2018: Postdoctoral Fellowship, Maryland Stem Cell Research Fund (Columbia, MD)
2015: Collaborative Shared Prize from the Institute of Biosciences and Bioengineering, Rice University (Houston, TX) 2014: Dean’s Teaching Assistant Award, Rice University (Houston, TX)
ANIRUDDH SARKAR, PhD
Ragon Institute of MGH, MIT and Harvard, Harvard Medical School, 400 Technology Square, Cambridge, MA, 02139
Electrical Engineering and Computer Science, Massachusetts Institute of Technology, 50 Vassar Street, Cambridge, MA, 02139
asarkar@mgh.harvard.edu

Research Overview:
My research interests are at the intersection of electrical engineering, biology and medicine. The current focus of my work is on exploiting micro- and nano-technology and electronics to build tools to further the prevention, diagnosis and therapy of human diseases - especially emerging and re-emerging infectious diseases.

My recent postdoctoral work has focused on:
· Discovery of novel antibody glycosylation based biomarkers for the accurate diagnosis and stratification of tuberculosis (TB)
· Development of an integrated electronic biosensor for the point-of-care detection of glycan biomarkers enabling inexpensive yet accurate diagnosis of TB.
· Development of a method for high-throughput characterization of the biophysical basis of antibody function
· Development of an inexpensive, field-portable yet highly efficient inertia-magnetic microfluidic cell sorter, which enables antibody discovery for emerging infectious diseases.

Earlier, in my graduate work, I developed:
· Microfabricated tools for in-situ single cell proteomics for linking single-cell functional phenotype to the intracellular kinome regulating it.
· A method for highly efficient selective electrical delivery of macromolecules to single cells for gene therapy and genetic engineering.

Education:
Ph.D. (Electrical Engineering & Computer Science with a minor in Biology), Massachusetts Institute of Technology, 2013

Research/Work Experience:
Postdoctoral Research Fellow, Ragon Institute of MGH, MIT and Harvard, Harvard Medical School, May 2013 onwards
Visiting Scientist, Research Laboratory of Electronics, Massachusetts Institute of Technology, December 2013 onwards
Teaching Assistant, Department of Biological Engineering, Massachusetts Institute of Technology, Spring 2008 and Spring 2009

Selected Publications:
1. A. Sarkar , S. Kolitz, D.A. Lauffenburger, J. Han, “Microfluidic probe for single cell analysis in adherent tissue culture”, Nature Communications, 5, Article number: 3421, DOI: 10.1038/ncomms4421, 2014
2. A. Sarkar , H.W. Hou, A.E. Mahan, J. Han, G. Alter, “Multiplexed affinity-based separation of proteins and cells using inertial microfluidics”, Scientific Reports, 6, 23589, 2016
3. A. Sarkar and J. Han, “Non-linear and linear enhancement of enzymatic reaction kinetics using a nanofluidic biomolecule concentrator”, Lab on a Chip, 11(15), 2569-2576, 2011

Awards/Honors:
Co-wrote 2 SBIR Phase 1 grant applications to NSF and NIH which were both funded
Wrote NIH grant application (competitive supplement to U19) which was funded
1st prize for Innocentive Crowdsourcing Challenge ‘Identifying Best-in-Class Support Services for Patients with Diabetes’
1st prize for Best MEMS Design Project Award, MIT
DIBYENDU KUMAR SASMAL, PhD
Institute for Molecular Engineering, The University of Chicago, 5640 S Ellis Ave, Chicago, IL, 60637
dasalmnp@gmail.com

Research Overview:
T-cell receptors (TCRs) detect specifically and sensitively a small number of agonist peptide-major histocompatibility complexes (pMHCs) from an ocean of structurally similar self-pMHCs and trigger antigen-specific adaptive immune responses. Despite intense efforts, the mechanism underlying TCR ligand discrimination remains a major unanswered question in immunology. Here we show that a TCR discriminates between closely related peptides by forming TCR-pMHC bonds with different lengths, which precisely control the accessibility of CD3-zeta immunoreceptor tyrosine-based activation motifs (ITAMs) for signal initiation. Using in situ fluorescence resonance energy transfer (FRET), we measured the intermolecular length of single TCR-pMHC bonds and the intramolecular distance of individual TCR-CD3-zeta complexes at the membrane of live primary T cells. We found that the an agonist forms a short TCR-pMHC bond to pull the otherwise sequestered CD3-61562; off the inner leaflet of the plasma membrane, leading to full exposure of its ITAMs for strong phosphorylation. By contrast, a structurally similar weaker peptide forms a longer bond with the TCR, resulting in partial dissociation of CD3-zeta from the membrane and weak phosphorylation. Furthermore, we found that TCR-pMHC bond length determines 2D TCR binding kinetics and affinity, T-cell calcium signaling and T-cell proliferation, governing the entire process of signal reception, transduction and regulation. Thus, our data reveal the fundamental mechanism by which a TCR decipher the structural differences between foreign antigens and self-peptides via TCR-pMHC bond length to initiate different TCR signaling for ligand discrimination. Previously, I have worked on ion channel conformation dynamics by single molecule imaging.

Education:
Indian Association for the Cultivation of Science, India, Dec 2012. PhD, Biophysical Chemistry
Vidyasagar University, Nov 2007. MSc in Physical Chemistry
Vidyasagar University, Jun 2005. BSc Honours in Chemistry

Research/Work Experience:
• Argonne National Laboratory, Aug-2018 to Present, Postdoc Fellow, Center for Nano Materials, Advisor: Tijana Rajh
• The University of Chicago, July-2015 to Aug-2018, Postdoc Scholar, Institute for Molecular Engineering, Advisor: Jun Huang
• Bowling Green State University, Jan-2013 to Jun-2015, Postdoc Scholar, Department of Chemistry, Advisor: H Peter Lu
• Indian Association for the Cultivation of Science, India. Nov-2007 to Dec-2012, Research Fellow, Department of Physical Chemistry, Advisor: Prof. Kankan Bhattacharyya
• RIKEN, Japan, Aug-2011 to Sept-2011, Intern Fellow, Molecular Spectroscopy Lab, Advisor: Tahei Tahara

Selected Publications:

Awards/Honors:
2011: Best oral presentation award in 6th CRSI-RSC conference by Royal Society of Chemistry, UK
Intern fellowship from RIKEN, Japan
2012: Senior Research Fellowship (SRF), India
2007: Junior Research Fellowship (JRF), India
NICHOLAS J. SCHAUB, PhD
Department of Neurology, University of Michigan, 2215 Fuller Road, Ann Arbor, MI, 48105
nicholas.j.schaub@gmail.com

Research Overview:
The primary focus of my research experience to date is neural tissue engineering using biomaterials, imaging, and artificial intelligence. As a graduate student in Dr. Ryan Gilbert's laboratory, I developed and characterized a variety of materials for nerve regeneration ranging from electrospun fibers to hydrogels. This work resulted in 12 publications, 8 of which I was the first author. After receiving my Ph.D., I won a competitive award from National Research Council to work at the National Institute of Standards and Technology (NIST) under the supervision of Carl Simon. At NIST, I developed a rigorous imaging (Poster #50) and artificial intelligence algorithms (Poster #1209) that used bright-field microscopy to predict cell function. I used this technology in Dr. Kapil Bharti's laboratory at the National Eye Institute at NIH to non-invasively predict retinal pigment epithelial cell function. This technology is included as a part of the IND proposal Dr. Bharti's laboratory has submitted for treatment of age related macular degeneration. After NIST, I joined Dr. Joseph Corey's Nanoscale Neurology laboratory at the University of Michigan after receiving a T32 award, where I am using my background in imaging, artificial intelligence, and materials science to study neurite extension and drug delivery (Poster #1184). In addition to this work, I am using the imaging platform I developed at NIST to generate data driven hypotheses for cerebrovascular disease (Poster #1190).

My career goal is to be a tenure track faculty member with a laboratory that focuses on new, interdisciplinary approaches to diagnosing and treating diseases that affect the central nervous system, with a specific focus on nerve regeneration. In the short term the primary focus of my laboratory would be the development of high throughput imaging and artificial intelligence analysis to optimize the rate of neurite extension. In particular I would use electrospun fibers and hydrogels to construct nerve guidance scaffolds that release optimal concentrations of therapeutic agents to maximize the rate of neurite extension. In pursuing this goal, I will continue to develop the imaging and analysis platform I created at NIST. In the long term, my laboratory will pursue translational approaches to rapid nerve regeneration.

Education:
(2015) Ph.D. Biomedical Engineering, Rensselaer Polytechnic Institute, Adviser: Ryan J. Gilbert
(2011) B.S./B.A. Biomedical Engineering, Michigan Technological University (Magna Cum Laude)

Research/Work Experience:
(2017-Present) University of Michigan, Department of Neurology, PI: Joseph Corey
Materials Measurement Laboratory, Biosystems and Biomaterials Group
(2017) Catholic University of America, Course Taught: Neural Tissue Engineering

Selected Publications:

Awards/Honors:
(2017-2019) TEAM T32 Tissue Engineering Postdoctoral Fellowship – University of Michigan
(2014) Ajit Prabhu ’98 Fellowship for creativity, innovation, and accomplishment
(2014) RPI Founders Award of Excellence for creativity, discovery, leadership and pride at RPI
(2014) BMES 2014 Travel Award for accomplishment, contribution, and service
(2012) Honorable Mention – National Science Foundation Graduate Research Fellowship
REBECCA SCOTT, PhD
Materials Science and Engineering, University of Delaware, 201 Dupont Hall, Newark, DE, 19715
scottra@udel.edu

Research Overview:
I am interested in understanding how cells interpret physical and biochemical microenvironmental cues, in order to create improved cell-based therapies and disease models. During my doctoral studies, I developed biologically inspired therapeutics to improve outcomes of injured blood vessels following revascularization procedures, elucidating the mechanism of these proteoglycan mimics on vascular cell behavior and inflammatory cues in both in vitro and in vivo vascular disease models. During my postdoctoral training, I have focused on developing cell instructive biomaterials, dividing my time between the synthesis of soft polymeric biomaterials and the biological characterization of these materials. I am actively investigating mechanisms to regulate the phenotype of immune, vascular, and stem cell phenotype via biomaterials design strategies. Simultaneously, I am performing in vivo vascular grafting studies with polymeric therapeutic interventions. Moving forward, I plan to combine my interests and develop a multidisciplinary research program, where biologically-inspired materials and polymer-based hydrogels are applied to create better cell-instructive therapies and disease models.

Education:
Ph.D. Biomedical Engineering | Purdue University | 2014
B.S. Biomedical Engineering | Saint Louis University | 2010

Research/Work Experience:
Postdoctoral Research Fellow (2014 – present)
University of Delaware | Department of Materials Science and Engineering | Advisor: Prof. Kristi L. Kiick
Nemours – Alfred I. duPont Hospital for Children | Biomedical Research | Advisor: Robert E. Akins, PhD

Graduate Research Assistant (2010-2014)
Purdue University | Weldon School of Biomedical Engineering | Advisor: Prof. Alyssa Panitch

Undergraduate Research Assistant (2007-2010)
Saint Louis University | Department of Biomedical Engineering | Advisor: Prof. Rebecca Kuntz Willits

Selected Publications:
(Out of 15 manuscripts)

Awards/Honors:
2016 | Ruth L. Kirschstein National Research Service Award | National Institutes of Health (1F32HL127983)
2013 | College of Engineering Outstanding Service Award | Purdue University
2013 | Emily M. Wadsworth Graduate Mentoring Award | Purdue University
2010 | Purdue Doctoral Fellowship | Purdue University
2010 | National Science Foundation Graduate Research Fellowship | National Science Foundation
2010 | Undergraduate Student Award for Outstanding Research | Society for Biomaterials
DENA SHAHRIARI, PhD
Research Laboratory of Electronics, Massachusetts Institute of Technology, 77 Massachusetts Ave., 8-410, Cambridge, MA, 02139
sdena@mit.edu

Research Overview:
Nerve repair may require a holistic approach involving biomaterials, tissue engineering, drug delivery and neural engineering. Over the years, I have acquired education and experience in these different fields and aim to establish a laboratory that combines all these approaches to find cure for some of the most debilitating medical conditions. In graduate school, I worked on layer-by-layer drug delivery systems for local and sustained release of growth factors. I also developed nerve guidance scaffolds with unprecedented open volume structures with minimum inflammatory response both in transected rodent spinal cords and rodent and minipig sciatic nerves. The scaffold technology has been awarded by the University of Michigan translation project to engage clinicians and biomedical companies to help translate the scaffolds to the clinic. At MIT, I have further advanced this technology by combining a thermal drawing process with 3D fuse-printing to produce porous microchannel constructs at large scale with complex outer structures and optional bifurcation that match the native structure of a nerve imaged via for example MRI. I have also developed optoelectronic probes that enable the delivery of light for optical stimulation while recording electrophysiological activity in transected nerves in rodents. Optical stimulation has become a powerful and common tool in neuroscience and provides a unique opportunity to excite a particular group of neural cells and study nerve growth. Our group at MIT is one of the few laboratories in the world that is now exploring this technique to regenerate neurons. I also use electrical recording via the same implanted neural probes to monitor nerve growth in vivo without the need for experiment termination and post-mortem tissue analysis in case of animal models. Having multidisciplinary research interests and ideas, I will continue many of my previous and current collaborations and look forward to building many new collaborations with clinicians and other scientists.

Education:
- University of Michigan, Ann Arbor, 2016. PhD, Macromolecular Science and Engineering.
- Michigan State University. 2014. MS, Chemical Engineering.
- University of California Berkeley. 2010. BS, Bioengineering.

Research/Work Experience:
- Postdoctoral Fellow, Massachusetts Institute of Technology. 2016-present. Advisor: Polina Anikeeva.

Selected Publications:
- D. Shahriari, Z. Loke, I. Tafel, P. Chiang, Y. Fink, P. Anikeeva. “Microchannel scaffolds with complex geometries and controlled porosity produced at large scale”. In submission.

Awards/Honors:
2010 NSF Graduate Student Fellowship
2014 University of Michigan/Michigan State University Chemical Eng. Best Poster Award
2015 University of Michigan Best Poster Award in Polymer Eng.
2016 Biomaterials Innovation Res. Center Award for Scientific Excellence- First Place, Cambridge, MA
2017 MIT Materials Day Best Poster Award
2018 Craig Neilson Foundation Spinal Cord Injury Postdoctoral Fellowship
OR A. SHEMESH, PhD
MIT Media Lab and the McGovern Institute for Brain Research, MIT, 20 Ames Street, Cambridge, Massachusetts, 02143.
orshemesh@gmail.com

Research Overview: Disease engineering - creating new tools to study brain disease.
The cutting edge tools to study the healthy brain can also be applied to study the diseased brain. In particular, physiological tools, such as optogenetic molecules, either stimulate or report activity of neurons of interest. However, as powerful and important as these tools are, in their current form they are mostly suited to study disease after its onset. Therefore most existing tools at the disposal of biomedical investigators are not sufficient to discover the etiology of disease: how does a disease come to pass? While the community that studies the intact brain has seen an abundance of tools that pushed research forward over the past decade, the community that studies brain disease is vastly underserved. To create tools for disease, it would be beneficial to understand the biology of pathology as well as the governing principles of engineering. Since as a PhD student I focused on diseases of the nervous system (working on Alzheimer’s disease), and as a postdoctoral fellow devoted myself to developing tools for research of the brain (working on single neuron resolution readout and control), I will start a first-of-its-kind research field dedicated to creating tools for the study of brain disease: disease engineering. Among these tools will be sensors for the viability states of cells (is a cell healthy, necrotic or apoptotic?), actuators that will switch neurons and brain regions from healthy to a diseased state and back, novel animal models for basic research and drug screening, and devices for interfacing with the nervous system and repairing it. I will combine my experience in protein engineering, nanotechnology, molecular cloning, cell biology and electrical engineering with the unique philosophy for tool building I learned at MIT. This will result in the production of a new set of tools that will enable the community to study disease and develop therapeutics more efficiently. The tools that my group will create will also be relevant to other research fields such as cancer, immunology and infectious or cardiovascular diseases.

Education:
2004 | BSc Biology (honors program); BSc Psychology, 2004, The Hebrew University of Jerusalem.

Research/Work Experience:
2013-Present | Postdoctoral Fellow: Neroengineering; MIT Media lab and the McGovern Institute for Brain Research; MIT; Advisor: Ed Boyden.
2008-2011 | Graduate Student; Neurobiology; Department of Neurobiology; The Hebrew University of Jerusalem. Advisor: Micha Spira.
2008-2011 | Teaching assistant; Chief TA in Courses in Physiology and Neurobiology. The Hebrew University of Jerusalem.
2004 | Research fellow; Neuro-inflammation and animal behavior; The Hebrew University of Jerusalem. Advisor: Raz Yirmiya.

Selected Publications:


Awards/Honors:
2017 - Present | MIT Translational Fellow.
2014-2016 | Simons Foundation Postdoctoral Fellow for Autism Research.
2013 | Edmund and Lily Safra (ELSC) Postdoctoral Fellowship.
2008| Dimitris N. Chorafas Prize 2008, for outstanding work in selected fields in the engineering sciences and medicine.
ANDREW SHOFFSTALL, PhD
Biomedical Engineering, Case Western Reserve University, 2071 MLK Jr. Drive, Cleveland, OH, 44106 ajs215@case.edu

Research Overview:
Dr. Shoffstall is currently developing an independent research program focused on the application of Biomaterials to develop Neural Interface technologies that address some of the challenges recognized in the field today: chronic stability, minimally invasive delivery, and translational/commercialization potential. Dr. Shoffstall is currently an Adjunct Assistant Professor at Case Western Reserve University and a Post-Doc at the VA Medical Center in Cleveland, OH, working with Jeff Capadona on various approaches to minimize the neuroinflammatory response to implanted intracortical recording microelectrodes. His PhD dissertation focused on the development of synthetic platelets to reduce bleeding after major trauma, including penetrating battlefield injuries, blast trauma, traumatic brain injury and spinal cord injury. Dr. Shoffstall recently returned to academia after a brief stint in industry as a Healthcare Strategy Consultant at the firm Health Advances (Boston, MA), where he worked on a wide range of commercial issues including: market forecasting, reimbursement & pricing, and mergers & acquisitions due-diligence.

Education:
-- Ph.D., Biomedical Engineering, Thesis on Synthetic Platelets to Augment Hemostasis, May 2013 Case Western Reserve University, Cleveland, OH
-- B.S., Biological & Environmental Engineering, Minor in Biomedical Engineering, May 2008 Cornell University, College of Engineering, Ithaca, NY

Research/Work Experience:
-- Chief Scientific Officer at Neuronoff, Inc., a medical device startup company focused on the treatment of neuropathic pain with a novel minimally invasive neural stimulation implant. We are currently in preclinical studies and raising a Seed Round with Angel Investors.
-- Adjunct Assistant Professor and Biomedical Engineer at Case Western Reserve University and the Cleveland VA, working with Jeff Capadona to develop and test next-generation materials and technology solutions for brain-machine interface applications.
-- Healthcare Strategy Consultant, at the Senior Analyst level, at Health Advances LLC for two years with leading medical device and pharmaceutical manufacturers on a broad range of technical and business challenges, including product analysis, competitive analysis, reimbursement strategy, sales and marketing strategy, indication screening, M&A diligence and market sizing.
-- Ph.D. Graduate in Biomedical Engineering, with expertise in novel polymer-based pharmaceuticals, including intravenous hemostats, targeted drug delivery, sustained release formulations. Co-Inventor on patent for contributions relating to the manufacturing and scale-up of the materials.

Selected Publications:

Awards/Honors:
Phi Beta Kappa “Most Influential Educator” Award, Strongsville, OH High School, 2018
Poster Award, Polymers Initiative Northeast Ohio, 2012
Alpha Epsilon/Biological Engineer honor society, 2007
Biomedical Engineering Society STAR Award, 2006
SOUMIK SIDDHANTA, PhD
Johns Hopkins University, 3400 N Charles St., 217 Latrobe Hall, Baltimore, Maryland, 21218
ssiddha1@jhu.edu

Research Overview:
Strongly grounded in the principles of light-matter interaction, my research has been directed towards the early stage diagnosis of diseases and studying the mechanism of disease progression by employing the highly sensitive optical tool known as plasmonenhanced vibrational spectroscopy. As an illustrative example, I have developed a new osmolyte-mediated route for improved nanoparticle transport through mucus and in the cellular milieu through a non-functionalized route. Such an approach can facilitate label-free interrogation of live cells and tissues and can be used to study cellular pathways. Additionally, I have also implemented surface-enhanced Raman spectroscopy (SERS) in conjunction with chemometric methods to characterize biomolecules in a label-free manner. I have applied these principles for quality control of on-site biotherapeutics and detection of drugs of abuse. I have also developed highly sensitive plasmonic nanosensing devices comprising of flexible and large area paper-based plasmonic microfluidic platform for the detection of biomarkers responsible for Heparin-Induced Thrombocytopenia (HIT). Previously, during my doctoral research, I had studied small molecule inhibition of the oncogenic Aurora Kinases using SERS. This was the first time SERS was employed to probe the interaction of protein-drug complex with plasmonic nanoparticles and predict the surface binding sites of the molecules, directly differentiating between competitive and non-competitive binding modes. These experiences lay the foundation of my future research goals of translating the optical effects of the plasmonic probes for applications in optobiology for actuating signal transduction in cells which will help in understanding the mechanistic underpinnings of complex pathologies such as cancer.

Education:
• Jawaharlal Nehru Centre for Advanced Scientific Research, India. July 2014, Integrated MS-Ph. D. in Materials Science
• University of Delhi, India, July 2007, B. Sc., Chemistry

Research/Work Experience:
• Johns Hopkins University, Baltimore, USA, 2015 - present
  Postdoctoral Researcher
• Jawaharlal Nehru Centre for Advanced Scientific Research, India, 2014- ‘15
  Visiting Research Scientist
• Purdue University, West Lafayette, Indiana, USA, July 2014 – December 2014
  Visiting Student Researcher, Birck Nanotechnology Centre
• Jawaharlal Nehru University, India, Summer 2006
  Summer Research Student, School of Life Sciences

Selected Publications:
4. Soumik Siddhanta, Maciej S Wróbel and Ishan Barman, “Integration of protein tethering in a rapid and label-free SERS screening platform for drugs of abuse”, Chemical Communications, 2016, 52, 9016-9019. (Selected as Backside Cover Page Article)

Awards/Honors:
• American Society for Laser Surgery & Medicine (ASLMS) Research Grant, 2016–’17
• Indo-US Science and Technology Forum (IUSSTF) Student Research Fellowship, 2014
• Best poster award at 7th International Conference on Materials for Advanced Technologies, Singapore, 2013
• Membership of European Talent Pool (ETP), BASF SE, 2011- present.
• Best paper award at “Walkway of Discovery”, Bangalore India Bio, 2010.
Research Overview:
I seek to develop new bio-nanotechnology that can interact with immune cells and modulate innate and adaptive immune responses for applications in cancer and autoimmune disease. During my PhD, I developed new biomaterials to delivery therapeutic genes that are responsive to intra- and extracellular stimuli and can target specific diseases, mainly cancer. During my postdoctoral training at KIST, I developed new ultrasound technologies in combination with echogenic nanobubbles to overcome tumor microenvironment, leading to deep tumor tissue penetration by nanoparticle. Currently, drawn by the vast potentials of immunotherapy in numerous diseases, I have applied my expertise in materials design to develop new immunotherapies in combination with other therapeutic modalities, including RNAi therapeutics, chemotherapy, photothermal therapy (PTT) and ultrasound technology. My diverse research background in materials science, biotechnology, and immunology focuses on the preclinical evaluation of novel nano-biomaterials for applications in immunoengineering. On this foundation, I plan to establish a unique research program, aiming to develop new therapeutics and diagnostics with applications in various diseases including cancer and autoimmune disease. Briefly, I propose to develop nanovaccines that can elicit anti-tumor therapeutic efficacy or immune tolerance by using mRNA, peptide, and protein as an antigen. In addition, I plan to develop nanoparticle-mediated immune cell targeting strategy to reprogram immune suppressive tumor microenvironment to be immunotherapy-sensitive tumors by delivering RNAi therapeutics. I also plan to develop potent immune adjuvants to modulate immunity for application in cancer and autoimmunity. These studies will not only broaden our understanding of immunology and cancer biology, but also may lead to new immunotherapeutics.

Education:
2001-2006  BS, Applied Chemistry and Biotechnology, Ajou University, South Korea
2006-2008  MS, Molecular Science and Technology, Ajou University, South Korea
2008-2012  PhD, Chemistry, Pohang University of Science and Technology (POSTECH), South Korea

Research/Work Experience:
2012-2014  Postdoctoral Fellow, Korea Institute of Science and Technology (KIST), (Advisor: Dr. Ick Chan Kwon)
2014-2017  Postdoctoral Fellow, Harvard Medical School/Brigham Women's Hospital, (Advisor: Omid. C. Farokhzad)
2017-  Assistant Research Scientist, University of Michigan, (Advisor: James Moon)

Selected Publications:
(> 31 publications, first and co-first author in 16 publications, > 1400 Google Scholar Citations, h-index = 20)
https://scholar.google.com/citations?hl=en&user=kDli0S8AAAAJ&view_op=list_works&sortby=pubdate

Awards/Honors:
2012  Best dissertation award, POSTECH
2012-2014  Star postdoctoral fellowship, KIST
2013  Young Scientist Award, Korean-Japan Society for Biomaterials
2018  BMES Career Development Award, Biomedical Engineering Society, USA
YOUNG HYE SONG, PhD
Biomedical Engineering, University of Florida, 1275 Center Drive, Gainesville, FL, 32611
ysong@bme.ufl.edu

Research Overview:
My faculty research program will incorporate multidisciplinary strategies to engineer therapeutic scaffolds and test beds that will advance our understanding and treatment of various pathological conditions. The rationale behind my goals stems from the fact that cell-extracellular matrix (ECM) interactions are critical drivers behind health and disease, as evidenced by ECM alterations that contribute to various pathogenesis such as cancer, spinal cord injury and pulmonary fibrosis. This increased appreciation of cell-ECM crosstalk has led to widespread use of 3D cell cultures in biomedical research. However, most tissue engineering approaches still do not incorporate the complete tissue-specific ECM profile and therefore do not fully recapitulate the native tissue microenvironment. This lack of physiologically relevant culture models accounts for limited clinical translatability of successful preclinical studies. To this end, I aim to engineer translatable therapeutic scaffolds and physiologically relevant test beds by utilizing i) decellularization techniques to obtain comprehensive base materials and ii) adipose-derived stem cells (ASCs) to provide proregenerative physicochemical cues. My research agenda is divided into three main areas: 1) creating pro-angiogenic and proaxonogenic scaffolds by exploiting proteolytic ECM remodeling by ASCs, 2) generating in vitro test beds of perineural invasion using decellularized nerve ECM, and 3) developing cancer bioinks from acellular tumor matrices as novel cancer test beds. Proteomic analysis will further elucidate a complete ECM profile of healthy and diseased tissues. Alongside research, I have gained extensive experiences in mentoring students and submitting grant proposals. I am therefore confident that I will successfully establish and run an interdisciplinary, stimulating and long-lasting biomedical engineering research program.

Education:
-Ph.D. in Biomedical Engineering, 2016, Cornell University
-M.S. in Biomedical Engineering, 2013, Cornell University
-B.S. in Chemical Engineering with Additional Major in Biomedical Engineering, 2010, Carnegie Mellon University

Research/Work Experience:
-Postdoctoral Associate (Advisor: Dr. Christine Schmidt). Biomedical Engineering, University of Florida, Gainesville, FL.
-Graduate Researcher (Advisor: Dr. Claudia Fischbach-Teschl). Biomedical Engineering, Cornell University, Ithaca, NY.
-Summer Immersion Student (Advisor: Dr. Linda Vahdat). Weill Cornell Medical College, New York, NY.
-Undergraduate Researcher (Advisor: Dr. Jeffrey Hollinger). Bone Tissue Engineering Center, Carnegie Mellon University, Pittsburgh, PA.

Selected Publications:

Awards/Honors:
-Mogam Institute for Biomedical Research Fellowship
-Swanson Graduate Fellow in Biomedical Engineering, Cornell University
-Cornell University Stem Cell Club Travel Award
-Tau Beta Pi, Engineering Honors Society, Carnegie Mellon Gamma Chapter
-Charlemagne Scholar for RWTH Aachen Undergraduate Research Opportunities Program
KAITLYN SADTLER, PhD
Massachusetts Institute of Technology, 500 Main Street, Building 76-687, Cambridge, Massachusetts, 02142
ksadtl@mit.edu

Research Overview:
My research experience began in molecular biology during my internship at JHUAPL, and continued into cellular and molecular immunology under Dr. Ronald Schwartz at NIH/NIAID where I worked on cross-inhibition of common gamma chain cytokines and dynamics of T cell receptor microclusters and formation of supra-molecular activation clusters during T cell activation. During my Ph.D., I researched the role of the adaptive immune system in biomaterial-mediated muscle regeneration. There, I applied immunologic techniques learned during my postbaccalaureate work to tissue engineering, including high-color flow cytometry. We were able to create a detailed description of the immune cells and proteins that are recruited to implanted materials, for which we coined the phrase “scaffold immune microenvironment.” Through these studies we identified key players in the pro-regenerative immune response, such as T cells. More specifically, CD4+ helper T cells dependent upon the mTORC2 signaling pathway and the IL-4 effector cytokine. I am currently a postdoctoral fellow working in the lab of Dr. Robert Langer analyzing the role of secondary diabetic symptoms (hyperlipidemia) on immune responses to materials used for cell therapies of type-1 diabetes and identifying novel target for anti-fibrotic agents. In addition, I am developing a high-throughput array for ex vivo screening of anti-fouling materials.

Education:
- Postdoc: Massachusetts Institute of Technology, Chemical Engineering (Biomaterials & Tissue Engineering)
- Ph.D.: Johns Hopkins University School of Medicine, Cellular and Molecular Medicine (Immunology & Regenerative Medicine)
- B.S.: University of Maryland Baltimore County, Biological Sciences (Cell & Molecular Biology)

Research/Work Experience:
- MIT, Dept. of Chemical Engineering (01/2017 – Present) Postdoc, Lab of Dr. Daniel Anderson and Dr. Robert Langer
- Johns Hopkins Univ. School of Med., Dept. of Biomedical Engineering, Cellular and Molecular Medicine Program (08/2012 – 03/2016 Grad. Student 03/2016 – 12/2016 Postdoc) Thesis Advisor: Dr. Jennifer Elisseeff; Thesis Committee Chair: Dr. Drew Pardoll
- NIH, National Institute of Allergy and Infectious Disease, Laboratory of Cellular and Molecular Immunology (05/2011-08/2012) Postbac IRTA, Lab of Dr. Ronald Schwartz; Group Leader: Dr. Rajat Varma

Selected Publications:
- Sadtler K* et. al. “Proteomic composition and immunomodulatory properties of urinary bladder matrix scaffolds in homeostasis and injury.” Seminars in Immunology 2017
- Gonnord P, Angermann BR, Sadtler K, Gombos E, Chappert P, Meier-Schellersheim M, Varma R. “IL-7 receptor ligation limits the availability of the common gamma chain to other cytokines receptors.” Science Signaling. 2018

Awards/Honors:
- NIH NIBIB Ruth L Kirschstein NRSA F32 Postdoctoral Fellowship (NOA pending as of 08/30/18, expected by 09/30/18)
- GRS Immunobiology & Immunochemistry Chair (2018) || TERMIS-AM Student Co-Chair – Immunoenengineering Section (2014)
- MIT Convergence Competition Third Prize: Engineering Pro-Regenerative Immunotherapies (2016)
- NIH NIAID Postbaccaulaureate Intramural Research Training Award (IRTA Postbac Fellowship)
- UMBC Honors: Summa Cum Laude (GPA>3.95), Outstanding Graduating Senior in Biological Sci., PKP honors society (2011)
- Completed Ph.D. in <4yrs with first author Science paper (109 citations as of 08/30) and co-first Nature Methods (48 citations)
- Given 14 Oral Presentations nationally and internationally since 2014 || Patents/Applications: #62111815, #62202537
BO RI SEO, PhD
School of Engineering and Applied Sciences, Harvard University, 58 Oxford street, Cambridge, Massachusetts, 02176
Wyss Institute for Biologically Inspired Engineering, Cambridge, Massachusetts, 02176
bseo@g.harvard.edu

Research Overview:
As a biomedical engineer, my work has focused on designing pre-clinical models of traumatic and pathological microenvironments using multidisciplinary strategies in order to understand the influence of these microenvironments on tissue regeneration and disease progression. My future research will focus on developing engineering strategies to understand and cure pathologies with chronic inflammation. I have three long-term research goals. I) Develop engineered model systems of obesity or aging-associated bone marrow microenvironments to study their roles in innate immune systems and cancer metastasis. II) Utilize interdisciplinary approaches to reverse disrupted bone marrow microenvironments for tissue repair. III) Engineer polymeric systems to study the roles of immunological microenvironments on single cell polarity and fate decision of hematopoietic stem cells and cancer stem cells. My previous and current training has prepared me to pursue this research which will require strategies combining biomaterials, immunoengineering, tumor microenvironment engineering, and regenerative medicine.

Education:
Ph.D. in Biomedical Engineering (BME), Cornell University, Ithaca, NY, 2014,
M.S. in Biomedical Engineering (BME), Cornell University, Ithaca, NY, 2011,
B.S. in Food Sciences, Life Sciences and Biotechnology, Korea University, 2007

Research/Work Experience:
Postdoctoral Fellow in SEAS, Harvard University, Wyss Institute (2016 – Present)
Research: Immuno-modulatory mechanotherapy in skeletal muscle regeneration
Advisor: David J. Mooney, Professor of Bioengineering at Harvard University and Wyss Institute
Graduate Research Assistant/Postdoctoral Researcher, BME, Cornell University (2008 – 2015)
Research: Engineering tumor microenvironment to study tumor-stroma interaction in cancer pathogenesis Advisor: Claudia Fischbach, Associate Professor of BME, Cornell University

Selected Publications:

Awards/Honors:
1. Pilot grant, Alliance for Regenerative Rehabilitation Research & Training funding, PA, 2018
2. Caroline Coffey Travel Award, College of Veterinary Medicine, Cornell University, 2013
3. 1st place Graduate Poster Presentation Award, 2013 GRC
4. Selected Oral Presentation, 2012 GRC
5. Mogam Science Scholarship Foundation Annual Student Award, S. Korea, 2010
6. Graduate Student Leadership Award, Cornell University, 2010
7. Presidential Life Science Fellowship, Cornell University, 2007 - 2008
8. Honors Scholarships, Korea University, 2003-2006
RYAN STOWERS, PhD
Stanford University, 418 Panama Mall, Room 206, Stanford, CA, 94305
rstowers@stanford.edu

Research Overview:
The primary focus of my research is to understand how cells interact with and are influenced by their environment. Specifically, I develop and utilize advanced biomaterials systems for 3D culture in order to probe fundamental questions about how physical properties like stiffness, stress relaxation, and fiber architecture influence phenotype. In my doctoral research, I developed a 3D culture platform that could be dynamically stiffened or softened via a light-based trigger over the course of several weeks. I then employed this system to mimic the stiffening that occurs in a tumor ECM during cancer progression, and showed that quiescent, noninvasive mammary acini grown in soft gels become invasive and proliferative upon matrix stiffening. The primary aim of my postdoctoral research has been to elucidate how ECM mechanical properties regulate phenotype through changes to the epigenetic landscape. I have adapted a high-throughput, genome-wide sequencing assay for chromatin accessibility (ATAC-seq) to a 3D model of breast cancer, where the malignant phenotype is induced by elevated matrix stiffness. I have found that matrix stiffness induces changes in chromatin accessibility and lamina-associated heterochromatin formation. Using bioinformatics tools to predict regulatory candidates from sequencing data, I have identified key transcription factors and chromatin modifiers that are necessary for these epigenomic alterations. I am also investigating the effect of volume regulation on osteogenesis of MSCs using tunable stress relaxing matrices or by modulating osmotic stress around the cells. Through this work, we have elucidated a key regulatory pathway of osteogenic differentiation in 3D matrices; TRPV4-mediated volume expansion. I was highly involved in a collaboration to develop a hyaluronic acid (HA) based hydrogel with dynamic covalent crosslinks that allow for stress relaxation. I generated interpenetrating networks of this dynamic HA and collagen I to form 3D hydrogels with fibrillar architecture and tunable viscoelasticity and demonstrated that MSC spreading and focal adhesion formation is dependent upon both fibrillarity and viscoelasticity. In the future, my lab will develop novel hydrogels to better model and gain deeper insight into physiological processes, with particular emphasis on microenvironmental regulation of the epigenome.

Education:
Ph.D. Biomedical Engineering, 2014, The University of Texas at Austin
Bioengineering, 2009, Clemson University

Research/Work Experience:
Postdoctoral Fellow, Department of Mechanical Engineering, Stanford University 2015-Present Advisor: Ovijit Chaudhuri
Graduate Research Assistant, Department of Biomedical Engineering, The University of Texas at Austin 2009-2014 Advisor: Laura Suggs

Selected Publications:

Awards/Honors:
• Gordon Research Seminar Best Presentation Award - 2018
• NIH NRSA Fellowship – 2017 - Present
• Gordon Research Conference Poster Award - 2016
• MRS Best Symposium Presentation Award - 2013
• SFB Biomaterials Day Poster Competition – 3rd place 2013
TENG SU, PhD
Biomedical Engineering, The University of North Carolina at Chapel Hill and North Carolina State University, Comparative Medicine Institute, 4305 Engineering Building III, Raleigh, NC, 27695
tsu2@ncsu.edu

Research Overview:
My research focuses on the interdisciplinary frontier of materials chemistry and bioengineering. I seek to integrate the governing principles of rational design with the expertise in microfluidics, biology, materials science, chemistry, and nanotechnology to conceptualize, create, and exploit cutting-edge therapeutic platforms for the treatment of cardiovascular disease, bone and cartilage disorders, and cancer. My research focuses on leveraging micro- and nano-bioengineering technologies to manipulate and integrate spatiotemporal cues into therapeutic platforms that can alter pathological tissue environments and promote tissue repair and regeneration. Specific research topics include:
- Platelet-inspired engineering of live and synthetic stem cells for targeted repair of heart injury
- Microfabricated biomimetic blood vessels for cardiovascular regenerative medicine
- New enzyme-mediated radical polymerization (EMRP) platform for facile and green fabrication of bioactive hydrogels with various sizes, compositions, and functionalities
- Bio-inspired tough hydrogels as extracellular matrix mimics for cartilage and bone tissue engineering

Education:
PhD, Materials Science, 2008, East China University of Science and Technology
MSc, Environmental Engineering, 2002, East China University of Science and Technology
BSc, Corrosion and Protection, 1999, East China University of Science and Technology

Research/Work Experience:
The University of North Carolina at Chapel Hill and North Carolina State University, 11/2015 – present
Postdoctoral Research Associate, Biomedical Engineering; Advisors: Frances Ligler, DPhil, DSc and Ke Cheng, PhD Tongji University, 01/2015 – 11/2015
Associate Professor, Department of Chemistry, Advanced Research Institute Tongji University, June 2012 – January 2015
Postdoctoral Research Associate, Department of Chemistry, Advanced Research Institute East China University of Science and Technology, September 2005 – June 2012 Assistant Research Fellow, School of Materials Science and Engineering

Selected Publications:

Awards/Honors:
National Natural Science Foundation of China (NSFC) Research Award (No. 81571017), PI, 2016 – 2019
Fundamental Research Fund for the Central Universities of China (No. 1380219148), PI, 2015 – 2016
Fundamental Research Fund for the Central Universities of China, Co-PI, 2015 – 2016
National Natural Science Foundation of China (NSFC) Research Award (No. 81470715), Co-I, 2015 – 2018
Postdoctoral Award for Research Excellence, Tongji University, 2015
Excellent Doctoral Dissertation Award, East China University of Science and Technology, 2011
Outstanding Teacher Award, East China University of Science and Technology, 2003, 2005, 2007 General Electric (GE) Fellowship, 2005
JERZY SZABLOWSKI, PhD
Chemical Engineering, Caltech, 1200 E. California Blvd, MC 210-41, Pasadena, California, 91125
jszab@caltech.edu

Research Overview:
The Laboratory for Noninvasive Neuroengineering – engineering a molecular portal to the brain

Accessing the brain by modulating and recording cell activity is vital to our understanding of neuroscience. Currently, many existing methods for gaining access to the brain require invasive procedures that result in tissue damage making control of large numbers of brain regions impossible. The Szablowski lab will engineer methods for noninvasively accessing the brain and use molecular engineering to control and monitor brain cells. We will achieve these goals through unique engineering strategies aimed at achieving noninvasive gene delivery with ultrasound and allowing for control of specific brain cells through molecular engineering. Ultrasound can be used to deliver molecules locally to tissues with millimeter precision, and we will use this to achieve spatially selective, noninvasive, and time-dependent access to the brain circuits. By combining ultrasound-enhanced transport across tissue boundaries with biomolecular engineering, we will achieve a noninvasive control of neural circuits and be able to record their activity with cell-level resolution. In our work, we will utilize ultrasound biophysics, genetic engineering, protein engineering, and next-generation sequencing (NGS) to establish new engineering principles and yield new discoveries in basic science, particularly systems neuroscience. Successful development of our neuromodulation technologies could also yield translational applications.

Education:
Postdoctoral in Chemical Engineering,(06/2015-present), California Institute of Technology (Caltech), Advisor: Mikhail G. Shapiro
Ph.D. in Bioengineering (2015), California Institute of Technology (Caltech), Advisor: Peter B. Dervan B.Sc.
in Biological Engineering (2009), MIT

Research/Work Experience:
Postdoctoral: (Shapiro Lab, Caltech) (1) Initiated a new area of research, Acoustically Targeted Chemogenetics (ATAC, Ref. 1), to allow noninvasive modulation of neural circuits. (2) Established use of new research techniques in the lab: ultrasound BBB opening, intracranial EEG, 3D printing, next-generation sequencing (NGS), (3) Developed surgery protocols for intracranial administration of mechanically labile erasable MRI contrast agents (Ref. 3). (4) Wrote/co-wrote several funded grants. (5) Mentored 3 students.
Graduate: (Dervan Lab, Caltech) Programmable DNA-binding therapeutics for oncology; Undergraduate: (Langer and Jasanoff labs, MIT), Protein-based MRI contrast agents; (Ed Boyden's lab, MIT) Light-activated GPCRs; iGEM 2009 (UPV, Spain);

Selected Publications:
• Szablowski JO, Raskatov JA, Dervan PB. An HRE-binding Py-Im polyamide impairs hypoxic signal-ing in tumors. Mol. Cancer Ther. 15 (4), 608-617 (2016) [selected as a research highlight]

Awards/Honors:
2018 NARSAD Young Investigator grant awardee, Brain and Behavior Research Foundation
2018 2nd Annual Imaging Elevated: Utah Symposium for Emerging Investigators, invited speaker
2018 World Molecular Imaging Congress student travel award
2009-10 Henry and Grazyna Bauer Fellowship for graduate studies
2009 3rd place worldwide, Best New Application area and Best Experimental Measurement awards; International Genetic Engineering Machines competition (iGEM).
2008 BE-BMES/Johnson&Johnson Prize for Excellence in Biomedical Research
2002 Finalist of Physics Olympiad for Secondary School students (Poland)
HALIL TEKIN, PhD
Broad Institute of MIT and Harvard, Cambridge, MA
halil@alum.mit.edu

Research Overview:
My research focuses on developing engineered biomaterials templated stem-cell based biomimetic in vitro tissues to model neuronal diseases and damage and discover therapeutic targets and strategies to restore healthy function of diseased/damaged neurons. Recreating complex cellular associations in vitro can be highly useful for fabricating biomimetic tissues for regenerative medicine and disease models for drug discovery. In my PhD research, I focused on developing microscale technologies for spatial and geometrical control of multicellular organizations. I developed dynamic microstructures by utilizing a thermoresponsive polymer. These microscale templates enabled to spatially arrange same or different cell types in different compartments of microgels or directly in microwells without an encapsulating material. This controlled cell organization can lead to complex cell-cell and cell-matrix interactions for better recapitulating native tissues. For my postdoctoral studies, I developed engineered neural tissues composed of brain-related cells derived from human stem cells and adapted encapsulating hydrogel materials to replicate complex brain-related associations in culture. I conceived a method of differentiating human glial cells, an abundant cell-type in the brain, directly from stem cells and then engineered material properties enveloping the neurons and glia in a 3D structure. Based on the transcriptome profile of these neural tissues, I investigated how tailoring hydrogel material properties changed the RNA-signature and maturity of neural tissues through comparisons to human brain transcriptome data. Using single-cell sequencing, I demonstrated 3D tissues I developed reflect transcriptional patterns of cell types in the human brain. I also exploited CRISPR-Cas technologies via viral gene delivery tools to interrogate neurological disease-associated genes in neurons within a 3D matrix. As I establish my own research program, I will build on the full spectrum of my training experience to develop leading technologies to replicate brain diseases in vitro and search for therapeutic targets that restore the health of the brain.

Education:
• PhD, 2013, Massachusetts Institute of Technology, Electrical Engineering and Computer Science, (minor in Medical Engineering)
• MS, 2007, Istanbul Technical University, Faculty of Electrical and Electronics Engineering, Control Engineering
• BS, 2005, Istanbul Technical University, Faculty of Electrical and Electronics Engineering, Control Engineering

Research/Work Experience:
• Broad Institute of MIT and Harvard, October-2013 to August-2018, Postdoctoral Associate, Advisor: Feng Zhang, PhD
• Massachusetts Institute of Technology, January-2013 to September 2013, Postdoctoral Associate, Advisor: Robert S. Langer, ScD
• Massachusetts Institute of Technology, July 2007 to December 2012, Graduate Research Assistant, Advisors: Ali Khademhosseini, PhD and Robert S. Langer, ScD

Selected Publications:
* Denotes corresponding author(s).

Awards/Honors:
2013, JALA Ten Award (The Top 10 Technological Breakthroughs Selected by The Journal of Laboratory Automation)
2012, MIT’s Outstanding Undergraduate Research Mentor Award (Graduate Mentor of the Year)
2011, Materials Research Society Best Student Oral Presentation Award
2011, Bioanalysis Highly Commended Young Investigator Award
2005, Werner von Siemens Excellence Award
VARADRAJ N. VERNEKAR, PhD
UConn Health, 263 Farmington Avenue, Farmington, CT, 06030
varadraj.vernekar@gmail.com

Research Overview:
Past Experience: I investigated protein-biomaterial surface interactions, which influence cellular response to implanted biomaterials during my master’s research at Clemson University [6]. I built in complexity and studied cell-biomaterial, cell-extracellular matrix, and cell-cell interactions by developing a 3-D functional neural-network that served as a brain surrogate for the in vitro investigation of cellular tolerance to traumatic injury during my doctoral work at Georgia Tech [2, 5]. I moved for my postdoctoral work to Duke University, where I specialized in the oriented active-site-accessible presentation and gradient-patterning of cell adhesion molecules and chemokines on biomaterial surfaces to direct immune cell migration and vascular network assembly for promoting wound healing [4]. Currently, at UConn Health as advanced postdoctoral fellow, I am leading an industry collaboration to engineer regeneration in complex tissues such as the rotator cuff using controlled delivery/presentation of development-associated morphogens and stem cells [1, 3]. Proposed Agenda: As carrier platforms for the spatio-temporally localized presentation of bioactive signals, adhesive ligands, and structural elements, biomaterials can provide tremendous leverage to modulate the recruitment dynamics and activities of reparative cells at the injury site. Converging my research experience, which has touched multiple-levels in injury mechanisms, biomaterials-mediated wound healing, and tissue repair and regeneration, I plan to investigate and develop strategies for the healing of soft and complex tissue injuries through the modulation of endogenous reparative cell activity. I intend to develop cue-based “cell instructive” biomaterials for the regeneration of tendinous, muscular, and nervous tissues and their interfaces using biomaterials functionalized with cytokines, morphogens, and cells, and micro- and nano-fabrication techniques. My independent research program will pursue the following areas: (A) Tissue-mimetic 3-D cell culture-based in vitro modeling of injury and regeneration that allow controlled and repeatable assessments while preserving native structure (fundamental). (B) Engineering tissue regeneration via the in vivo implantation of biomaterials that present cues to direct regenerative cell behavior (translational).

Education:
• Ph.D. in Bioengineering, Chemical Engineering minor, 2010, Georgia Tech, Atlanta, GA
• M.S. in Bioengineering, Biochemistry minor, 2002, Clemson University, Clemson, SC
• B.E. in Chemical Engineering, 1997, University of Pune, Pune, India

Research/Work Experience:
• University Postdoctoral Fellow, 2015–Present, UConn Health, Mentor: Cato Laurencin, M.D., Ph.D.
• Postdoctoral Associate, 2012–2014, Duke University, Mentor: Monty Reichert, Ph.D.
• Scientific Officer, 2010–2012, microPerfusions, Inc.
• Graduate Research and Teaching Assistant, 2002–2010, Georgia Tech, Mentor: Michelle LaPlaca, Ph.D.
• Graduate Research and Teaching Assistant, 1999–2002, Clemson University, Mentor: Robert LaTour, Ph.D.

Selected Publications:
1. Vernekar VN et al. “Rotator Cuff Repair Augmentation via an Engineered Growth Factor Delivery Scaffold,” 1:30 PM to 1:45 PM, Thursday, October 18, 2018, Musculoskeletal Tissue Engineering I, A304, Georgia World Congress Center

Awards/Honors:
• 1st Prize at Postdoc Research Day presentation talks, 2017, UConn Health
• In the top 4 postdocs selected for the Emerging Leaders Institute, 2014, Duke University
• 1st graduate student selected for the LeaderShape Institute, 2003, Georgia Tech
OLAIA F. VILA, PhD
Biomedical Engineering, Columbia University, 622 west 168th VC12-201, New York, NY, 10032
ofvila@gmail.com

Research Overview:
My research goal is to develop in vitro patient-specific tissue models to study diseases in a personalized manner, and to integrate these models with non-invasive imaging and optical tools for automated analysis. Specifically, I am interested in studying the neuromuscular synapse in both genetic and autoimmune diseases using tissue-engineered systems. During my postdoctoral years in Prof. Vunjak-Novakovic’s laboratory, I developed a patient-specific tissue-engineered model of human neuromuscular junctions (NMJ) incorporating optogenetics. This system, combined with an optical platform and custom video processing software, allows for the automated evaluation of the neuromuscular connectivity in a quantitative manner. Using this system, we were able to measure changes in the NMJ functionality as it matured. Furthermore, through a collaboration with neurologist from Columbia University we were able to obtain serum from patients with myasthenia gravis, which contain antibodies that inhibit the NMJ, and measure the functional consequences of antibody exposure in our tissue-engineered NMJs.

My current focus is to move forward in my research with tissue-engineered models, with a special focus on disease models and personalized medicine. I believe that incorporating novel molecular tools such as optogenetics and CRISPR will allow for the development of precisely controlled systems that will lead to better understanding of cell-to-cell interactions in both healthy and diseased tissues. In order to do so, I was recently funded by the DoD to study spinal muscular atrophy in a human tissue-engineered system, using both patient-derived and CRISPR interference lines.

Education:
B.S. Chemical Engineering, Autonomous University of Barcelona (B.S. Special Award) (2003-2013).

Research/Work Experience:
Associate/Postdoctoral Research Scientist, Department of Biomedical Engineering, Columbia University (2014-Present). Researcher, Catalonian Institute for Advanced Chemistry (IQAC-CSIC), Barcelona (2008-2014).

Selected Publications:
1. Olaia F. Vila, Sebastien Uzel, Stephen P. Ma, Damian Williams, Roger D. Kamm, Gordana Vunjak-Novakovic, Maturation and Disease of Human Neuromuscular Connectivity Revealed through Optogenetics. Theranostics (under review).

Awards/Honors:
1. Department of Defense, Peer Reviewed Medical Research Program (PRMRP) Discovery Award (DoD-W81XWH1810095: A Three Dimensional Optogenetic Human Neuromuscular Junction Model of Spinal Muscular Atrophy) (Principal Investigator).
4. Outstanding Chemical Engineering B.S Award (2008) from the Autonomous University of Barcelona.
MAX M. VILLA, PhD
Molecular Genetics & Microbiology, Duke University, 101 Science Drive, CIEMAS, Durham, NC, 27708
max.villa@duke.edu

Research Overview:
The human microbiome encodes a vast ‘second genome’ that dwarfs our own, and plays critical roles in human health, development, and disease. For instance, microbes in our guts modulate the immune system, provide protection from pathogen colonization, and allow us to extract more energy from our diet. Furthermore, gut microbes have been leveraged therapeutically in the treatment of antibiotic resistant C. difficile and can modify pharmaceutical compounds, tightly linking gut microbes to how we already treat disease. Yet the mechanistic insight required for next generation therapies is lacking in part since the tools for microbial culture were developed hundreds of years prior and the diversity of the human microbiome is staggeringly vast. I have developed new tools for dealing with the incredible diversity of the microbiome that examine function with strain level resolution. My research will use and build on these tools to investigate how the microbiome shapes human health and disease outcomes.

Education:
· Ph.D. Materials Science & Engineering, 2014, University of Connecticut
· M.S. Mechanical Engineering, 2009, University of Connecticut
· B.S. Mechanical Engineering, 2007, University of Connecticut

Research/Work Experience:
· Burroughs Wellcome PDEP Fellow, 2015-Present, Center for Genomic and Computational Biology, Department of Molecular Genetics and Microbiology, Duke University, Durham, NC
· GAANN Predoctoral Fellow, 2010-2014, Center for Regenerative Medicine and Skeletal Development, University of Connecticut of Connecticut Health Center, Farmington, CT and Department of Materials Science and Engineering, University of Connecticut, Storrs, CT
· Associate Scientist, 2009-2010, Surgical Devices R&D, Covidien, North Haven, CT
· Graduate Student, 2007-2009
  Department of Mechanical Engineering, University of Connecticut, Storrs, CT

Selected Publications:

Awards/Honors:
· Burroughs Wellcome Fund Postdoctoral Enrichment Program, 2016-2019 ($60,000)
· NIH Research Supplement to Promote Diversity in Health-Related Research, Optimization of cell delivery to 3D scaffolds for in vivo osteogenesis, 2013-2014 ($43,000)
· Department of Education Graduate Assistantship in Areas of National Need (GAANN) Predoctoral Fellowship: Biomaterials for Tissue Regeneration, 2010-2013 ($60,000)
ANIKET WADAJKAR, PhD
University of Maryland School of Medicine, 655 W Baltimore St, BRB 8-055, Baltimore, MD
aniketwadajkar@gmail.com

Research Overview:
• As a graduate student, I have developed iron oxide-polymer based theranostic nanoparticles as imaging probes and drug carriers for prostate cancers. The development of these particles addresses the concerns in dual-imaging nanoparticles where photobleaching organic dyes and cytotoxic quantum dots are usually adopted.
• As an AHA Predoctoral Fellow, I have designed and developed magnetic-based multi-layer microparticles to isolate, enrich and detach stem cells for cell-based therapies.
• During my time in industry, I extended my prior experiences towards new applications. For anti-counterfeiting products, I developed encapsulations and dispersants to protect proprietary DNA and fluorophores from harsh environments of printing inks.
• As a NIH-T32 fellow and ACS-IRG fellow in my current postdoctoral work, I have been focusing on new drug delivery strategies for the most lethal form of adult brain cancer (glioblastoma) as well as triple negative breast cancer. I have developed and evaluated biodegradable nanoparticles with decreased non-specific adhesivity and increased receptor-specific targeting ability for a controlled and sustained drug release at the target site. I am also utilizing these particles in a project to alter the glioblastoma tumor microenvironment to aid in the normal immune response.
• I seek to work at the interface of nanotechnology, bioscience and materials science in order to develop a dynamic research program that tackles problems related to cancers, cardiovascular diseases and wound healing.

Education:
• PhD, 2012, Biomedical Engineering, U of Texas at Arlington and U of Texas Southwestern Medical Center
• MS, 2008, Biomedical Engineering, U of Texas at Arlington and U of Texas Southwestern Medical Center
• BE, 2005, Instrumentation & Control Engineering, U of Pune, India

Research/Work Experience:
• U of Maryland School of Medicine, 2015 – present. Postdoctoral Fellow, Department of Neurosurgery
• U of Texas at Arlington, 2006 – 2008 and 2009 – 2012. Graduate Research Assistant, Department of Bioengineering
• Antibody Research Corp, 2008 – 2009. Research Associate, Upstream and Downstream processing

Selected Publications:

Awards/Honors:
• American Cancer Society Institutional Grant (ACS-IRG) Fellowship, 2017 - 2018
• UMGCCC Research Day Award for Best Poster Presentation, 2017
• NIH-T32 Postdoctoral Fellowship, 2016 – present
• I Engage Mentoring Program Fellowship, 2012–2012
• Alfred R. and Janet H. Potvin Outstanding Bioengineering Student Award, 2012
• AHA Predoctoral Fellowship, 2011–2012
• Grad School Honorable Mention Award for Best Oral Presentation, 2010
• Bioengineering STEM Doctoral Fellowship, 2009–2012
• Graduate Dean Doctoral Fellowship, 2009–2012
• Grad School Provost’s Award for Best Poster Presentation, 2008
ALEXANDRA WALSH, PhD  
Morgridge Institute for Research, Madison, WI, University of Wisconsin-Madison, Madison, WI  
ajwalsh4@wisc.edu  

Research Overview:  
Many diseases, particularly cancer, develop and progress in a manner unique to each individual patient due to genetic, phenotypic, and environmental factors. Therefore, a one-drug-treats-all approach inevitably fails to cure many patients, thus underscoring the importance of individualized approaches to treatment. Unfortunately, implementation of personalized medicine approaches are limited by a lack of biological understanding of disease heterogeneity and a lack of prognostic biomarkers. My research is the development and application of functional optical imaging techniques for precision medicine applications in cancer, neuroscience, and immunology. During my graduate work, I developed optical imaging of the fluorescence lifetimes of NADH and FAD, coenzymes of metabolism, as biomarkers for predicting anti-cancer drug response. To maximize patient benefit, I combined this technique, “optical metabolic imaging,” with patient derived primary organoids as a predictive screen for individualized patient cancer treatment. My work modeling cellular population dynamics revealed inherent and drug induced heterogeneity, providing a unique identification method of drug resistant and cancer stem-cell-like cells. During this work, I realized that advancements in imaging methods and data analysis tools are necessary to increase throughput of image quantification at the single cell level. Therefore, as a post-doctoral fellow at the Air Force Research Lab, I developed a method for fast fluorescence lifetime imaging to study the mechanism by which infrared light excites and inhibits action potentials in primary hippocampal neurons. Currently, as an Assistant Scientist at Morgridge Institute for Research (UW-Madison), I am using NADH and FAD autofluorescence of immune cells to develop endogenous optical signals as biomarkers of immune cell function. While still a developing project, the results thus far have confirmed inter- and intra- patient heterogeneity in T cell functional states, which highlights the need for tools to study immune cell heterogeneity to understand immunotherapy resistance. This technology applies both to quality control of biomanufactured T cells (e.g. CAR T cell therapies) and the study of immune cells in vivo. To bolster the overarching success and implementation of these tools, I work with interdisciplinary teams including engineers, biologists, immunologists, and clinicians. My future research will continue to advance functional optical imaging and quantitative image analysis to enhance our understanding of inter- and intra-patient heterogeneity and ultimately develop tools and biomarkers of prognostic screens for personalized medical care.

Education:  
2015 Ph.D., Biomedical Engineering, Vanderbilt University  
2012 M.S. Biomedical Engineering, Vanderbilt University  
2010 B.E. Biomedical Engineering, Vanderbilt University

Research/Work Experience:  
2017-present Assistant Scientist, Morgridge Institute for Research, University of Wisconsin-Madison  
Graduate Research Assistant, Vanderbilt University

Selected Publications:  

Awards/Honors:  
Alavi-Mandell Publication Award, Society of Nuclear Medicine and Molecular Imaging, 2018  
Postdoctoral Fellowship, National Research Council, 2015-2017  
Graduate Research Fellowship, National Science Foundation, 2012-2015  
American Delegate (ORAU Nominee) of the 64th Lindau Nobel Laureate Meeting, Lindau, Germany, 2014  
JenLab Young Investigator Award (best presentation at SPIE Photonics West, Conference on Multiphoton Microscopy), 2013
HUA WANG, PhD
John A. Paulson School of Engineering and Applied Sciences, Harvard University, 58 Oxford Street ESL 415,
Cambridge, MA, 02138
huawang@g.harvard.edu

Research Overview:
Cancer is still one of the leading causes of human deaths worldwide, and the development of effective and safe cancer therapies remains a significant challenge. My research interest has evolved from troubleshooting the delivery issues of chemotherapeutics to understanding the immunoevasion mechanisms of tumors and developing cancer immunotherapies. One of my general interest in the field of cancer research is to understand whether cancer cells or immune cells can be manipulated from the single cell level, in order to improve and innovate cancer therapies. For example, cancer cells can actively metabolize unnatural monosaccharides bearing functional groups and express them on the cell surface in the form of glycoproteins. The cell-surface chemical tags, coupled with bioorthogonal and efficient chemistries, allow for conjugation of any molecule of interest to monitor or manipulate cancer cells. Similarly, unnatural sugars can be utilized to metabolically label and regulate immune cells. Another intriguing research direction for me is the development of potent immunotherapies or combination therapies for poorly-immunogenic solid tumors. These solid tumors, characterized by a highly immunosuppressive tumor microenvironment and minimal infiltration of immune cells, are generally resistant to current immunotherapies including checkpoint blockade therapies, adoptive T cell therapies, and cancer vaccines. Biomaterial approaches that can reshape the tumor microenvironment and improve tumoral infiltration of immune cells can potentially result in potent cancer therapies, and are important to pursue.

Education:
08/2012-06/2016, Ph.D., Materials Science & Engineering, University of Illinois at Urbana-Champaign, Urbana, IL, USA
08/2008-06/2012, B.S., Polymer Science & Engineering, University of Science & Technology of China, Hefei, China

Research/Work Experience:
07/2016-Present, Postdoctoral Fellow, Harvard University
Advisor: David J. Mooney
Research direction: Immunoengineering & Cancer immunotherapy
08/2012-06/2016, Research Assistant, University of Illinois at Urbana-Champaign
Advisor: Jianjun Cheng
Research direction: Metabolic sugar labeling & Nanomedicines

Selected Publications:

Awards/Honors:
2017   Wyss Technology Development Fellow, A PI-level, $240,000 award providing salary and reagent support for three years of independent research to enable translational research.
2015   Howard Hughes Medical Institute International Student Research Fellowship
2012   Outstanding Graduates Scholarship
2011   Rili Scholarship
2011   National Inspirational Scholarship
2010   Outstanding Student Scholarship
2010   National Undergraduate Innovative Research Program Funding
2010   Scholarship of Dalian Institute of Physics and Chemistry
2009   Outstanding Student Scholarship
2009   National Inspirational Scholarship
2008   Outstanding Freshmen Scholarship
**KUEI-CHUN (MARK) WANG, PhD**  
Institute of Engineering in Medicine, University of California San Diego, 9500 Gilman Drive, La Jolla, California, 92093-0435  
k9wang@ucsd.edu

**Research Overview:**
My professional goal is to enhance our fundamental understanding of cardiovascular disease (CVD) and apply innovative methods to accelerate the translation of such discoveries into more effective therapies. My multidisciplinary training and experience in cardiovascular physiology, bioengineering, mechanobiology, and gene and drug delivery have uniquely positioned me to be able to perform mechanistic studies of CVD and then implement findings towards the development of therapy. The focuses of my research are 1) mechanobiology in cardiovascular pathophysiology and atherosclerosis, and 2) biomimetic nanomedicine targeting CVD. I employ an integrated approach, incorporating bioengineered platforms and tools, genome-wide analyses, cell and molecular biology techniques, as well as animal models, to study how biophysical factors in the arterial microenvironments, including blood flow disturbance and vascular stiffening, control signaling pathways, transcriptomic and epigenetic regulations, and functional consequences, to identify novel therapeutic targets for vascular dysfunction and atherosclerosis. My interests also lie in developing new technologies to locally reverse the gene dysregulation and promote atherosclerosis regression. By employing such an approach in conjunction with cutting-edge genome engineering tools and theranostic probes, I will advance the cardiovascular medicine to detect, treat, and ultimately prevent diseases.

**Education:**
Ph.D. in Bioengineering, University of California, San Diego, 2012

**Research/Work Experience:**
Assistant Project Scientist, Institute of Engineering in Medicine, University of California, San Diego (2017–Present)  
Postdoctoral Researcher, Institute of Engineering in Medicine, University of California, San Diego (2012–2016)

**Selected Publications:**

**Awards/Honors:**
♦ NIH K99/R00 Pathway-to-Independence Award (2017 – 2021)
♦ Scientist Development Grant Award, American Heart Association (2016)
♦ Postdoctoral Fellowship, Frontier Innovation of Scholarship Program, UCSD (2015 – 2016)
♦ Predoctoral Fellowship, American Heart Association (2010-2011)
♦ Taiwan Merit Scholarship for Study Abroad, The Ministry of Science and Technology, Taiwan (2006-2009)
YING WANG, PhD
Biomedical Engineering, Cornell University, Kimball Hall room 390, Ithaca, NY, 14853
ying.wang@cornell.edu

Research Overview:
My research interests focus on creating functional living human tissues or biomimetic systems for disease modeling, drug development and regenerative medicine. To this end, I have been working to develop novel microfluidic tissue culture platforms, 3D cell assembly technologies, and in situ biosensors to precisely control cell microenvironment, recreate tissue architecture and monitor cell responses. During my doctoral research in Scott Simon’s group at University of California at Davis, I developed a vascular mimetic system emulating the dynamic interactions among vascular endothelial cells, monocytes and dietary lipids under blood flow to model inflammation and early events in atherosclerosis. I used the model to assay the metabolic perturbations and inflammation of human aortic endothelial cells in response to subjects’ triglyceride-rich lipoproteins (TGRL) and identified a regulatory mechanism of endothelial inflammation by TGRL. As a postdoctoral fellow in Michael Shuler’s research group at Cornell University, I am combining my expertise in cell biology and flow dynamics with cutting-edge stem cell and organ-on-a-chip technologies to develop in vitro microphysiological systems for drug development. Specifically, I have developed a microfluidic blood-brain barrier model that achieves barrier tightness closest to the in vivo levels among current microfluidic models. I also invented a novel microfluidic platform (“UniChip”) that facilitates integration of the vasculature and circulating cells (e.g. immune cells) into a multi-organ microphysiological system. As a future faculty member, my research will focus on establishing 3D multicellular neurovascular systems for brain disease modeling and drug development, developing automated biofabrication of vascularized human tissue and organs, and creating personalized tissue constructs for regenerative medicine.

Education:
Ph.D., Biomedical Engineering, 2013, University of California at Davis
M.Sc., Biomedical Engineering, 2007, Zhejiang University
B.Sc., Biomedical Engineering, 2005, Zhejiang University

Research/Work Experience:
2014-present, Postdoctoral Research Fellow, Advisor: Prof. Michael L. Shuler (co-advisor: Prof. Harold Craighead);
School of Biomedical Engineering, School of Applied & Engineering Physics, Cornell University, Ithaca, NY
2008-2013, Graduate Research Assistant, Advisor: Prof. Scott I. Simon (co-advisor: Prof. Anthony Passerini)
Inflammation &Biomechanics Lab, Department of Biomedical Engineering, University of California at Davis, Davis, CA
2007-2008, Graduate Research Assistant, Advisor: Prof. Alexander Revzin;
Microsystem Lab, Department of Biomedical Engineering, University of California at Davis, Davis, CA
2004-2007, Undergraduate and Graduate Research Assistant, Advisor: Prof. Xiaoxiang Zheng;
Cell physiology Lab, Department of Biomedical Engineering, Zhejiang University, Hangzhou, China

Selected Publications:

Awards/Honors:
BMES 2011 Graduate Student Award, 2011
Howard Hughes Medical institute Integrating Medicine into Basic Science fellowship, 2009-2010
Outstanding Graduate Student Award, Zhejiang University, 2007
KATHERYNE E. WILSON, PhD
Radiology, Stanford University, 3155 Porter Drive, Palo Alto, CA, 94304
wilsonk2@stanford.edu

Research Overview:
My research interest focuses on the intersection of medical imaging, in particular molecular imaging, with computer-assisted image analysis methods and nanotechnology and biomolecule chemistry for the detection, diagnosis, and treatment of early disease. My proposed research program will begin with two highly achievable projects. First, I will utilize clinically relevant molecular imaging probes for multimodality imaging for intraoperative guidance of tumor resection and margin analysis. Second, I will improve sensitivity and signal to noise ratios of spectroscopic photoacoustic (sPA) imaging of exogenous contrast agent in murine breast cancer by developing a novel spectral recognition algorithm using machine learning. These projects build on my solid foundation in photoacoustic and ultrasound molecular imaging and contrast agent development to initiate my career.

During my graduate research, I developed a nanoscale, dual contrast agent for combined ultrasound (US) and photoacoustic (PA) imaging. The developed agent, entitled photoacoustic nanodroplets, consisted of nanoscale droplets of perfluorocarbon with a protein shell into which plasmonic gold nanoparticles were encapsulated. This agent proved to be truly innovative as it was the first to allow PA imaging through the use of biologically safe vaporization. My graduate research focused on bench-top development; therefore, I chose postdoctoral research with clinical focus. My postdoctoral research has focused on the clinical translation of PA molecular imaging using both multivariate spectroscopic classification of malignant and premalignant lesions in a transgenic mouse model and clinically-translatable antibody dye contrast agents. Next, we developed anti-B7-H3 antibody-indocyanine green (ICG) dye conjugate (B7-H3-ICG) to label a novel human marker of breast cancer we have explored extensively in human patient samples. Using B7-H3ICG combined with sPA and fluorescence molecular imaging, it was possible to differentiate between normal and cancerous glands and monitor tumor-cell specific uptake of B7-H3-ICG by monitoring endocytosis-specific changes in the absorption spectrum. Using B7-H3-ICG agents for PA molecular imaging was also compared to US molecular imaging using B7-H3-targeted microbubbles.

Education:
The University of Texas at Austin M.S.E., Ph.D., Biomedical Engineering -2010, 2012, Certificate: Nanoscience and Nanotechnology University of Washington B.S., Bioengineering -2008

Research/Work Experience:
Instructor Molecular Imaging Program at Stanford 2017 – Present, Department of Radiology, School of Medicine, Stanford University, Palo Alto, CA
Postdoctoral Fellow Stanford Molecular Imaging Scholar 2012 - 2017, Department of Radiology, School of Medicine, Stanford University, Palo Alto, CA
Graduate Research Assistant Department of Biomedical Engineering 2008 - 2012, University of Texas at Austin, Austin, TX
UG Research Assistant Department of Bioengineering 2006 - 2008, University of Washington, Seattle, WA

Selected Publications:

Awards/Honors:
1. K99/R00 Transition to Independence Award, NIH NIBIB 2017-22
2. Molecular Imaging Young Investigator Award, Stanford University, 2017
3. Loan Repayment Program Grant, National Institute of Health, 2013-15
4. Postdoctoral Fellowship, Stanford Molecular Imaging Scholars Program, Stanford University, 2012-15
5. Young Investigator Award Winner, World Molecular Imaging Congress, San Diego CA. 2011
SCOTT WILSON, PhD
Institute for Molecular Engineering, University of Chicago, Chicago, IL
dsw@uchicago.edu

Research Overview:
My laboratory focuses on the development of patient-specific immunotherapies that raise tumor-eradicating immunity or establish immunological tolerance as treatments for autoimmunity and transplant rejection. Current protein sub-unit cancer vaccine and tolerogenic inverse vaccine strategies attempt to modulate antigen-specific T cell activity via the delivery of immunomodulatory signals in combination with recombinantly expressed antigen(s). However, tumor-, auto-, and donor antigens are patient-specific and, often, the result of mutations, making a priori antigen selection problematic. My lab will utilize patient- and donor-derived antigens, and deliver them via bespoke biomaterial platforms that are inherently immune-stimulatory or suppressive to initiate tumor-specific T cell activation or antigen-specific T cell tolerance. In addition to generating novel immunotherapies, my research will result in new tools that can help elucidate the etiology of autoimmunity and cancer. My future research will build upon my previous experiences in the synthesis of novel biomaterials, immunology, and cancer. While working in Dr. Jeff Hubbell’s Lab at the University of Chicago, I synthesized and validated the in vivo efficacy of synthetic glycopolymers that, when conjugated to antigens, target antigens to specific antigen presenting cells for the induction of immunological tolerance or immunity. When synthesized from monomers composed of NAc-glucosamine, our glycopolymymer-antigen conjugates target antigens to hepatic APCs, which naturally induce tolerogenic T cell responses upon antigen presentation. Antigen-poly(NAc-glucosamine) conjugates ablate antigen-specific T cell responses and expand functional regulatory T cells (Tregs). Using a murine model of diabetes, we show that cell autoantigen-poly(NAc-glucosamine) conjugates prohibit diabetes by knocking out auto-reactive T cells and induce Tregs that provide long-term protection from diabetes onset. In the context of immunity, we modified antigens with a random co-glycopolymer composed of mannose- and toll-like receptor 7 (TLR7)-agonist-monomers. Our antigen-poly(Mannose-TLR7) conjugates efficiently target antigens to and activate the dendritic cells responsible for CD4+ and CD8+ T cell activation, and thus generate robust cellular and humoral immune responses. Using the malaria antigen CPS, we show that CSP-poly(mannose-TLR7) conjugates generate a more robust protective humoral and cellular immune response than CSP formulated with the most clinically-advanced malaria vaccine adjuvant.

Education:
Ph.D.: Bioengineering, 2011, Georgia Institute of Technology: School of Chemical & Biomolecular Engineering
M.S.: Chemical Engineering, 2004, University of Oklahoma: School of Chemical, Biological & Materials Engineering
B.S.: Chemical Engineering, 2001, University of Oklahoma: School of Chemical, Biological & Materials Engineering

Research/Work Experience:
2012-present: Post Doc Research, Glycopolymer-mediated antigen delivery, Dr. Jeff Hubbell, EPFL & University of Chicago
2015-present: Consultant, Anokion A.S. & Kanyos Bio, Boston, MA
2005-2011: Graduate Research, Biomaterials for the treatment of inflammatory diseases, Dr. Niren Murthy, Georgia Tech
2004-2005: Solo Math Instructor, Florida State University, Tallahassee, FL
2001-2004: Graduate Research, Molecular Thermodynamics, Dr. Lloyd L. Lee, University of Oklahoma

Selected Publications:

Awards/Honors:
• Whitaker International Program Scholar, 2012 - 2014
• Top PhD Thesis, School of Chemical & Biomolecular Engineering, Georgia Tech, 2011
• Annual Award for Outstanding Achievement in Bioengineering, Georgia Tech, 2011
• Controlled Release Society Annual Meeting: Outstanding Oral Delivery Paper, 2010
MENGXI WU, PhD
Engineering, Pennsylvania State University, 212 EES University Park, State College, PA, 16801, Duke University, Duke University, 308 Research Drive, Room B341, Levine Science Research Complex, Durham, NC, 27707
ytwumengxi@gmail.com

Research Overview:
Integrating acoustics and microfluidics, I have developed a series of acoustofluidic technologies that are able to manipulate biological micro and nanoparticles. Due to the advantages of high biocompatibility, ease of manipulation, high flexibility and controllability, and low power consumption, the acoustofluidic technologies that I have developed are invaluable in many microfluidic applications. My research were highlighted by National Science Foundation (three times) and over 300 public media. Four of my papers were ranked top 5% of all research outputs scored by Altmetric and top 3% High Attention Score compared to outputs of the same age.

• Isolation and phenotyping of circulating tumor cells. I developed a platform by integrating acoustics and microfluidics to isolate CTCs from peripheral blood in high throughput while preserving their structural, biological and functional integrity.
• Isolation of exosomes from whole blood. I developed a prototype device provides a gentle, automated, point-of-care system that allows single-step, on-chip isolation of exosomes from whole blood with a high rate of purity and yield.
• Separation and enrichment of nanoparticles, lipoproteins, extracellular vesicles, blood components and other biological objects. I developed a series of acoustic based techniques that are label-free, contact-free and gentle.
• Prototype development for on-chip cell electroporation apparatus. I developed a series of electroporation chips for massive, continuous transfection of various cell types.

Education:
• Ph.D in Engineering Science and Mechanics, Aug 2018, Pennsylvania State University
• M.S in Micro Electro Mechanical Systems, Jul 2013, Peking University
• B.S in Microelectronics, Jul 2010, Peking University

Research/Work Experience:
• Duke University, 08/2016 – 08/2018
  Research Assistant at Department of Mechanical Engineering and Materials Science
    (advisor: Professor Tony Jun Huang)
• Pennsylvania State University, 08/2014 – 05/2018
  Research Assistant in Engineering Sciences and Mechanics (advisor: Professor Tony Jun Huang)
• Etta Biotech Co. Ltd, Suzhou, China, 07/2013 – 07/2014
  Research & development engineer
• Peking University, China, 09/2010 – 06/2013
  Research Assistant in Micro Electro Mechanical Systems (advisor: Prof. Zhihong Li)

Selected Publications:

Awards/Honors:
• Thomas and June Beaver Fund Award, 2018, Pennsylvania State University
• COE Grad Excellence Fellowship, 2014 - 2017, Pennsylvania State University
• Internal Scholarship EG, 2015 - 2017, Pennsylvania State University
• IEEE MEMS Best Paper Award Finalist
• IEEE conference on Micro Electro Mechanical Systems, San Francisco, CA, USA, 2014
YAOYING WU, PhD
Biomedical Engineering, Duke University, Durham, North Carolina, 27708
yw195@duke.edu

Research Overview:
My research will seek to advance our understanding of biomaterial interactions with the immune system with a focus on designing polymeric adjuvant platforms for antigen delivery. My PhD research focused on designing cationic polymers to efficiently deliver nucleic acids by enhancing cellular membrane interactions. To this end, I developed a series of glucose-derived cationic glycopolymers that form very stable complexes with plasmid DNA in the presence of serum. These glycopolymers also specifically engage asialoglycoprotein receptors on hepatocytes, leading to elevated cellular uptake and transfection efficiency. Seeking to understand immunogenic aspects of biomaterials, I joined Dr. Joel Collier’s lab as a postdoctoral scholar and developed a novel α-helical self-assembling nanofiber vaccine delivery platform (Coil29). This platform elicits strong cellular and humoral immune responses without provoking significant inflammatory reactions. Utilizing this nanofiber platform, we raised strong CD8+ T cell responses against the tumor-specific Trp2 epitope, and IgG antibody responses against tumor-specific epidermal growth factor variant III (EGFRvIII), in collaboration with Dr. John Sampson at Duke University. We also discovered T cell epitopes within the Coil29 peptide sequence, which promote enhanced humoral responses by driving T follicular helper cell differentiation. The unique assembly mechanism of the α-helical Coil29 peptide also allows tuning of the morphology and stability of the assembled nanofiber. We were awarded an international patent for this technology. My doctoral training in polymer design, combined with my recent focus on understanding the complex interactions between biomaterials and the immune systems, makes me uniquely qualified to design polymeric adjuvant systems. Through the engagement of defined immunological pathways, these platforms will fill the growing clinical need for targeted therapies to a range of conditions, from infectious diseases to cancer.

Education:
PhD, Chemistry, University of Minnesota, Twin Cities, 2014
M.S. Polymer Chemistry and Physics, Beijing University of Chemical Technology, 2009
B.E. Materials Science and Engineering, Tianjin University, 2006

Research/Work Experience:
2016-present Postdoc Scholar, Duke University, Advisor: Joel Collier, PhD
2014-2016, Postdoc Scholar, University of Chicago, Advisor: Joel Collier, PhD
2011-2014, Graduate Research Assistant, University of Minnesota, Twin Cities, Advisor: Theresa Reineke, PhD
2009-2011, Graduate Research Assistant, Virginia Tech, Advisor: Theresa Reineke, PhD
2006-2009, Graduate Research Assistant, Beijing University of Chemical Technology, Advisor: Zhifeng Fu, PhD

Selected Publications:
Wu, Y., Smith, A.E., Reineke, T.M., Lipophilic polycation vehicles display high plasmid DNA delivery to multiple cell types, Bioconjugate Chemistry 2017, 28(8), 2035
Wu, Y., Collier, J.H., α-Helical coiled coil peptide materials for biomedical applications, WIREs Nanomedicine and Nanobiotechnology, 2017, 9(2), e1424

Awards/Honors:
2018, Duke Biomedical Engineering Kewaunee Poster Award
2014, American Chemical Society Excellence in Graduate Polymer Research Award
2014, The Center for Genome Engineering of University of Minnesota Travel Award
2014, American Chemical Society Graduate Student Travel Grant, Minnesota Section
Research Overview:

My research life has intertwining threads of materials, nanoscience, and biology. As a graduate student working on intracellular delivery, I created a platform to manipulate cells, which I used for applications from ion clamps, to transfection, to microinjection. As a postdoc working on single cell analysis, I have seen that cell behavior is distributed across the molecules of biology, including proteins and transcripts. We created a method to simultaneously measure proteins and transcripts in single cells while preserving the optimal measurement medium for both. I’ve learned to both precisely perturb and measure cells which leads me to my research vision: to apply intracellular delivery to single cell analysis by delivering constructs into cells to transmit intracellular information and perform multi-dimensional single cell analysis. Cell biology consists of the coordinated action of different biomolecules, which varies widely cell-by-cell. My group will use probes directly delivered into cells to analyze their contents. Next, by using molecular indexing, nanofabrication, and microfluidics to combine these analyses with single cell transcriptomics, we will have access to unique combinations of cellular information to unveil the coordinated activity of different biomolecules, all in single cells. My research program will push the cutting edge of single cell analysis, facilitate discoveries in heterogeneous systems like cancer, and enable my collaborators’ research in biology.

Education:

- Stanford University, August 2015. PhD, Materials Science and Engineering
- MIT, June 2010. BS, Mathematics and Materials Science and Engineering

Research Experience:

- Institute for Systems Biology, 2018 - present. Postdoctoral fellow; Advisor: James Heath
- California Institute of Technology, 2015 - 2018. Postdoctoral fellow; Advisor: James Heath
- Stanford University, 2010 - 2015. Graduate student; Advisor: Nicholas Melosh
- Harvard University, 2010. Research fellow; Advisor: Irene Chen
- MIT, 2006 - 2010. Undergraduate researcher; Advisors: Forest White, Angela Belcher
- Argonne National Laboratory, 2008-2009. Research intern; Advisor: Jeff Elam

Selected Publications:


Awards:

- NIH F32 Ruth L Kirschstein Postdoctoral Fellow (2017)
- NSF Graduate Research Fellow (2010)
- NDSEG Graduate Fellowship (2010)
ALIREZA YAZDANI, PhD
Brown University, 170 Hope Street, Room 310, Providence, RI, 02906
alireza_yazdani@brown.edu

Research Overview:
I am broadly interested in multiscale/multiphysics modeling of complex biological processes in biomedical applications with special interest in physiology and pathophysiology of the human circulatory system, where physical and chemical processes are inherently multiscale in nature. I joined the Division of Applied Mathematics at Brown University in 2013 as a postdoctoral research associate and I am currently working as an assistant professor (research). My main area of research, which is primarily funded by NIH, has been the study soft biological systems such as blood clots and thrombus bio-chemomechanics in the vasculature, especially in the aneurysms and aortic dissections. My research focus is high performance computing and multiscale modeling of biophysical processes in pathophysiologic conditions such as aneurysms and blood clotting. I also have a strong background and interest in immersive methods (e.g., the immersed boundary method) for fluid-structure interaction problems, and in particle-based modeling of soft matter and biofluids using Dissipative Particle Dynamics. My research plans revolve around multiscale modeling strategies that bridge the wide range of spatio-temporal scales involved in these complex interdisciplinary processes.

Education:
Doctorate of Philosophy, Mechanical & Aerospace Engineering, Rutgers University, New Brunswick, NJ, USA, October 2012

Research/Work Experience:
The problem of aortic dissection and thrombus biomechanics have been the subject of my research at Brown and in one of the leading groups in numerical modeling and scientific computing throughout the country. I have been leading the computational group at Brown, where we focused on multiscale and multiphysics modeling of thrombus biomechanics in thoracic aortic aneurysms and dissections.

Jul 2016 - Current Assistant Professor (Research)
Brown University - Division of Applied Mathematics, Providence, RI
• Developed physics informed learning machines that encode the underlying conservation laws into deep neural networks to infer hidden quantities of interest such as pressure and velocity fields, drag and wall shear stresses in different biological and industrial applications.
• Developed a coupled multiscale computational framework to model thrombus formation in different flow conditions and modeled the long-time thrombus remodeling using a recently-developed in-house multiphasic continuum solver.

Jul 2013 - Jul 2016 Postdoctoral Research Associate
Brown University - Division of Applied Mathematics, Providence, RI
• Studied blood coagulation and thrombus bio-chemomechanics in the vasculature especially in aneurysms and aortic dissections.
• Performed large-scale parallel computing to address complex fluid and solid mechanics at different spatio-temporal scales.
• Extended the existing Dissipative Particle Dynamics Method to model reactive transport of chemical species and utilized it to address biochemistry of blood clotting in complex geometries.

Selected Publications:

Awards/Honors:
2014-2018 NSF-XSEDE computational resources award for the project: “Multiscale Modeling of Thrombus Biomechanics in Aortic Dissection”. (Single PI total award equivalent to $200; 000)
KEVIN YEHL, PhD  
Biological Engineering and Synthetic Biology Center, Massachusetts Institute of Technology, Cambridge, MA, 02139  
kyehl@mit.edu

Research Overview:  
I am broadly interested in studying microbial pathogenesis and developing alternative therapies for treating infectious diseases, with a major focus on treating multi-drug resistant (MDR) infections. In particular, I want to develop a new class of dynamic phage-based and nano-based antimicrobials that overcome the many limitations currently restricting phage therapy. In addition, I want to engineer viral vectors as a gene delivery platform for modulating the immune system and for vaccine development with the overall goal of countering AMR. I believe that my broad research background makes me distinctively qualified to carry out this ambitious research program and to pioneer a new field at the intersection of synthetic biology and nanotechnology.

I have substantial experience at synthesizing and characterizing nanomaterials with the purpose of improving human health. I received my PhD in Chemistry from Emory University under the mentorship of Prof. Khalid Salaita, where I studied fundamental properties of surface confined enzymes. This work led to three high impact first author papers in the field of DNA-nanotechnology, where I synthesized nanomaterials for gene regulation (ACS Nano 2012 and Biomaterials 2016) and for powering autonomous, motion-based sensors (Nat. Nanotech. 2016). For my postdoctoral studies, I wanted to expand my nanotechnology expertise and develop alternative therapies for treating MDR infections using synthetic biology. Therefore, I joined the synthetic biology lab of Professor Timothy Lu at MIT, where I am engineering phage to improve its antimicrobial properties by suppressing bacterial resistance to phage therapy (Cell, in review). I am also exploring how to engineer bacteria as a “living” material using recombinase-based genetic circuits that program bacteria to grow into spatially defined patterns starting from a single progenitor cell (manuscript in preparation). This project aims to model cellular differentiation with hopes of better understanding resistance development and disease progression during tissue growth.

Education:  
• Post Doctoral, Biological Engineering and Synthetic Biology, Massachusetts Institute of Technology, Cambridge, MA (Advisor: Timothy Lu, MD, PhD) 2016-present.
• Ph.D., Chemistry, Emory University, Atlanta, GA (Advisor: Khalid Salaita, PhD) 2015

Research/Work Experience:  
• Postdoctoral Researcher at MIT 2016-present
• Graduate Research Assistant at Emory University 2009-2015
• NSF EAPSI Fellow, National University of Singapore 6/2013-8/2013
• Assistant Chemist at Invista, SC 2008-2009
• ACS RISE Fellow, University of Kaiserslautern, Germany 5/2007-8/2007
• Undergraduate Research Assistant at University of South Carolina 2006-2008

Selected Publications:  
• Lemire*, S.; Yehl, K.*; Ando, H.; and Lu, T. Tail Fiber Diversification in Synthetic Phagebodies Enables Long-Term Suppression of Bacterial Resistance. In Revision at Cell. (*Co-first authors)
• Somasuntharam*, I.; Yehl, K.*; Carroll, S.; Maxwell, J.; Martinez, M.; Che, P.; Brown, M.; Salaita, K.; and Davis, M. In Vivo Knockdown of TNFα by DNAzyme Gold Nanoparticles for Myocardial Infarction Therapy. Biomaterials, 2016, 83, 12-22. (*Co-first authors)

Awards/Honors:  
RANA ZAKERZADEH, PhD
University of Texas at Austin, Austin, TX
rana.zakerzadeh@utexas.edu

Research Overview:
My research is about developing a computational framework that is suitable for integration of the fluid-structure interaction analysis of bioprosthetic heart valves and fatigue damage models. My research interests include:
- Fluid-structure interaction
- Cardiovascular mechanics
- Parallel algorithms
- Numerical analysis

Education:
- Postdoctoral Fellow, Institute for Computational Engineering and Sciences, University of Texas at Austin, Austin, Texas, United States. (September 2016-present).
- PhD in Computational Modeling & Simulation, University of Pittsburgh, Pittsburgh, Pennsylvania, United States (August 2012-July 2016).
- M.Sc. in Biomedical Engineering, Biomechanics, Amirkabir University of Technology (Tehran Polytechnic), Tehran, Iran (2009-2011).
- B.Sc. in Biomedical Engineering, Biomechanics, Amirkabir University of Technology (Tehran Polytechnic), Tehran, Iran (2005-2009).

Research/Work Experience:
1- Dynamic Simulation of Bioprosthetic Heart Valves (BHV).
2- An advanced numerical model for interaction of an incompressible fluid with a poroviscoelastic structure; with application to the human arteries.
3- Design and Fabrication of a Novel Surgical Instrument Applicable for Ear Surgery
4- Computational Modeling of Heat Transfer Analysis within the Human Eye

Selected Publications:


Awards/Honors:
-2018 Biomedical Engineering Society (BMES) Career Development Award
-Travel award from 13th World Congress on Computational Mechanics
-UT Austin ICES Peter O’Donnell, Jr. Postdoctoral Fellowship (2016-2018)
**Research Overview:**

Organoids hold great promise as in vitro model systems that could vastly advance our understanding of human-specific aspects of disease and development. However, the inherent inhomogeneity that arises from reliance on spontaneous morphogenesis hinders the successful translation of these models. Therefore, my long-term research goal is to engineer technologies that elucidate mechanisms and pathways that guide organization and patterning of stem cells within these 3D organoid cultures. In doing so, I aim to improve the homogeneity and reproducibility of these tissue models and ultimately allow for scale-up and application of this technology for drug screening, disease modeling, and tissue engineering applications. My initial interest in developing 3D tissue models stems from my doctoral research with Dr. Todd McDevitt at Georgia Tech and the Gladstone Institute. Through my doctoral work, I established that simply transitioning mesenchymal stem cells (MSCs) from 2D, tissue-culture plastic to 3D spheroids imparts vast biological changes in these cells, in particular the paracrine activity of MSCs. Key paracrine factors critical for MSC immunosuppression are upregulated in 3D spheroids which increases MSC suppression of inflammatory macrophages. Through RNA-sequencing and transcriptome analysis, I elucidated key pathways regulating MSC paracrine activity in 3D cultures. Finally, by designing biomaterials for controlled delivery of specific cytokines, I was able to temporally control MSC immunosuppression in spheroids to enhance MSC suppression of T-cell activation. These studies highlight the importance of 3D cultures as both a model platform as well as a means of modulating stem cell behavior and has major implications for the clinical application of MSCs for treatment of inflammatory and immune diseases. For my postdoctoral training, my objective was to further advance my expertise in stem cell engineering and genome editing to develop methods for precise control of stem cell differentiation and morphogenesis. In Dr. David Schaffer’s lab, I have developed a central nervous system organoid platform with a focus on increasing the homogeneity of these organoids through precise control of stem cell aggregation and the use of defined, synthetic biomaterials. I aim to utilize these engineered materials and this organoid platform to understand the role extrinsic matrix cues play in the emergence of higher-order tissue structures and cell patterning in organoid cultures. Furthermore, I have been applying cell engineering techniques to spatiotemporally control developmental signaling pathways to elucidate mechanisms of spatial patterning and to better control these processes. Finally, in collaboration with Dr. Douglas Clark’s lab, I have been working with high-throughput screening platforms to rapidly investigate the effects of hundreds of independent culture conditions on differentiation of oligodendrocyte precursors from pluripotent stem cells. Through this collective training, my experiences in stem cell biology, biomaterials, and cell engineering have laid a strong foundation for future independent research investigating the mechanisms that guide emergence of stem cell patterning and morphogenesis in organoid models.

**Education:**

2011-2016: Ph.D., Biomedical Engineering, Georgia Institute of Technology & Emory University
2006-2011: B.S./M.S., Biomedical Engineering, Case Western Reserve University

**Research/Work Experience:**

2017-Present: Postdoctoral Scholar, University of California, Berkeley
2011-2017: Graduate Research Assistant, Georgia Institute of Technology and Gladstone Institute

**Selected Publications:**


**Awards/Honors:**

National Science Foundation Graduate Research Fellowship, 2012-2016
Stem Cell Biomanufacturing IGERT, Georgia Institute of Technology, 2011-2013
JONATHAN M. ZUIDEMA, PhD
Chemistry and Biochemistry, University of California San Diego, 9500 Gilman Dr., La Jolla, CA, 92093
jzuidema@ucsd.edu

Research Overview:
The overarching motivation for my independent research is to expand upon my background in materials chemistry, nanotechnology, biomaterial design, and sciatic nerve injury to develop nanotechnology-enhanced tissue engineering hybrids for nervous system repair. I will implement co- and tri-axial electrospinning in order to develop aligned, hybrid polymer fiber scaffolds that spatio-temporally release self-assembling DNA hydrogels, which present ECM peptides, while concurrently releasing pro-regenerative factors to increase the rate of axon regeneration. My Ph.D. research demonstrated that aligned polymer fibers both guide glial migration and elongation while altering glial protein expression profiles towards support of neurons (Zuidema et al. Biomaterials, 2014, Zuidema et al. Biomaterials, 2015). For my postdoctoral research, I brought my neural biomaterials experience to Prof. Michael Sailor’s lab to utilize silicon nanotechnologies in nervous system applications. My first research study focused on surface chemistry-modified porous silicon nanoparticles for protein delivery (Kim, Zuidema et al., JACS, 2016). I used the findings in this study to write a successful NSF proposal (CBET 1603177, MJS) to fund the development of composite nanofibers composed of porous silicon nanoparticles and biodegradable polymers (polycaprolactone, poly(lactic-co-glycolic acid), etc.). These nanofiber composites are fabricated using an airbrush technique and allow for active protein release up to 60 days (Zuidema et al. Advanced Materials 2018). Expanding on these findings, I loaded DNA into silicon nanoparticles to incorporate and release functional DNA molecular beacons from composite nanofiber scaffolds (Zuidema et al. Submitted ACS Nano 2018). Furthermore, I have recently demonstrated that hydrophilic small molecules, RNA aptamers, and growth factors can be released from composite nanofibers to increase neurite extension from cultured DRG (Zuidema et al. Submitted ACS Nano 2018). These findings led to a collaboration with MarkTuszynski’s neural repair laboratory at UCSD and Jeff Sakamoto’s engineering laboratory at the University of Michigan. This study aims to develop growth factor releasing tissue engineering scaffolds to repair the rat sciatic nerve following transection injury. Using this expertise in DNA nanotechnology, silicon nanotechnology, materials chemistry, and neuroscience, my independent research will design nanotechnology hybrids for applications in the nervous system. My laboratory will develop hybrid tissue engineering scaffolds for tunable drug release and repair, utilize DNA nanotechnologies for tissue engineering strategies, and design nanoparticles for nervous system applications.

Education:
Rensselaer Polytechnic Institute, Troy, NY- Ph.D., Biomedical Engineering, May 2014
Michigan Technological University, Houghton, MI- B.S., Biomedical Engineering, May 2010

Research/Work Experience:
Member, Editorial Advisory Board, Cells Tissues Organs- August 2018-Present
University of California, San Diego- July 2014-Present
Postdoctoral Researcher with Prof. Michael Sailor, Department of Chemistry and Biochemistry
Rensselaer Polytechnic Institute, 2010-2014
Graduate Student Researcher in Biomedical Engineering, Advisor: Prof. Ryan Gilbert
Michigan Technological University, 2008-2010 Undergraduate Student Researcher, Advisor: Prof. Ryan Gilbert

Selected Publications:

Awards/Honors:
• Zelda and David G. Gisser Thesis Research Award in Biomedical Engineering 2014
• Top Presentation-Neural Engineering Track, Biomedical Engineering Society 2014