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 2017 Annual Meeting. A business card will be required to enter the event.

COMPLETE DETAILED CANDIDATE INFORMATION AVAILABLE at [www.bmes.org/faculty](http://www.bmes.org/faculty).

**Specialty - Biomaterials**

<table>
<thead>
<tr>
<th>Joshua Doloff</th>
<th>Kevin McHugh</th>
<th>Jessica Weaver</th>
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<tr>
<td>Lina Fu</td>
<td>Molly Ogle</td>
<td>David Wilson</td>
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<td>Victor Hernandez-Gordillo</td>
<td>Jennifer Patterson</td>
<td>Saeid Zanganeh</td>
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<td>Hae Lin Jang</td>
<td>Varadraj Vernekar</td>
<td>Jonathan Zuidema</td>
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<td>Yamin Li</td>
<td>Karin Wang</td>
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**Specialty - Biomechanics**

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<tr>
<th>Brianne Connizzo</th>
<th>Dung Nguyen</th>
<th>Ryan Stowers</th>
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<tr>
<td>Elise Corbin</td>
<td>Hadi Nia</td>
<td>Andrew Voorhees</td>
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<td>Christopher Dillon</td>
<td>JinSeok Park</td>
<td>Colleen Witzenburg</td>
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<td>Jessica Fritz</td>
<td>Mary Kathryn Sewell-Loftin</td>
<td>Yue Xuan</td>
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<td>Soham Ghosh</td>
<td>Jack Staunton</td>
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**Specialty - Biomedical Imaging**

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<th>Yu Gan</th>
<th>Ying Hu</th>
<th>Junwei Li</th>
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**Specialty - BioMEMS**

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<tr>
<th>Umer Hassan</th>
<th>Young Bok (Abraham) Kang</th>
<th>Seung-min Park</th>
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**Specialty - Cardiovascular Engineering**

| Nesreen Alsmadi        | Rana Zakerzadeh           |                        |

See other side for more candidates
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<th>Specialty</th>
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<tr>
<td><strong>Cellular Engineering</strong></td>
<td>Allison Andrews</td>
<td>Alexander Buffone, Jr.</td>
<td>Colin Paul</td>
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<td></td>
<td>Francois Bordeleau</td>
<td>Kai-Yuan Chen</td>
<td>Sydney Shaffer</td>
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<td></td>
<td>Jonathan Brunger</td>
<td>Mahsa Dabagh</td>
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<td><strong>Device Engineering</strong></td>
<td>Suman Bose</td>
<td>Jinho Kim</td>
<td>Siwei Zhao</td>
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<tr>
<td>(Microfluidics, Electronics, Machine-Body interface)</td>
<td>Brian Johnson</td>
<td>Ioannis Zervantonakis</td>
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<td><strong>Drug Delivery</strong></td>
<td>Piyush Jain</td>
<td>Edgardo Rivera-Delgado</td>
<td>Sufeng Zhang</td>
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<td>Ryan Pearson</td>
<td>Aniket Wadajkar</td>
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<td><strong>Molecular Engineering/Biophysics</strong></td>
<td>Jerome Irianto</td>
<td>Hengameh Shams</td>
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<td><strong>Nanotechnology</strong></td>
<td>Katharina Maisel</td>
<td>Ryan Williams</td>
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<td><strong>Neural Engineering</strong></td>
<td>Courtney Dumont</td>
<td>Kihwan Han</td>
<td>Benjamin Schwartz</td>
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<td>Melanie Ecker</td>
<td>Samira Moorjani</td>
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<td>Evon Ereifej</td>
<td>Adam Rouse</td>
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<td><strong>Synthetic Biology</strong></td>
<td>Joe Decker</td>
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<td><strong>Tissue Engineering/Regenerative Medicine</strong></td>
<td>Maroof Adil</td>
<td>Bin Jiang</td>
<td>R.Tiruvannamalai Annamalai</td>
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<td>Stella Alimperti</td>
<td>Melissa Kinney</td>
<td>Joseph Uzarski</td>
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<td>Derfogail Delcassian</td>
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<td>Marcella Vaicik</td>
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<td>Megan Farrell</td>
<td>Dylan McCredy</td>
<td>Shue Wang</td>
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<td>Bailey Fearing</td>
<td>Rebecca Scott</td>
<td>Xiaoshan Yue</td>
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<td>Riccardo Gottardi</td>
<td>Lucas Smith</td>
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<td><strong>Not Specified</strong></td>
<td>Jessilyn Dunn</td>
<td>Claire Robertson</td>
<td>Wen-Han Yu</td>
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<td>Ali Jalali</td>
<td>Jason Yang</td>
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<td>Elizabeth Proctor</td>
<td>Sangpil Yoon</td>
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MAROOF ADIL, PhD
Chemical and Biomolecular Engineering, UC Berkeley, 278 Stanley Hall, Berkeley, CA, 94720 maroofadil@gmail.com

Research Overview:
My research niche is at the intersection of biomaterials, human pluripotent stem cells, single-cell RNA sequencing, and neurodegenerative disorders. Leveraging my interdisciplinary training in engineering and biology, I aim to develop a multifaceted approach to understand and treat neurodegenerative disorders using single-cell transcriptomics to guide biomaterial, gene, and cell-based therapies.

Education:
B.S., Chemical Engineering, Biology, MIT (2007)
Ph.D., Chemical Engineering and Materials Science, University of Minnesota (2013)

Research/Work Experience:
In my doctoral work with Prof. Efrosini Kokkoli, I developed biomaterial-based carriers for targeted gene delivery to cancer tissue, achieving high target specificity with minimum off-target effects in vitro and in vivo. Next, during my postdoctoral work with Prof. David Schaffer, I diversified my biomaterials skillset through integrating stem cell technologies. First, to help meet the high demand for transplantable cells for cell replacement therapy (CRT), I developed efficient, scalable methods to generate region-specific neurons from human pluripotent stem cells (hPSCs) using a biomaterial scaffold. In parallel, I developed cell-instructive biomaterial scaffolds to enhance survival, dispersion, and integration of transplanted neurons. These strategies significantly improved CRT treatment outcomes in rodent models of Parkinson’s disease and Huntington’s disease. Finally, as a step towards increasing control over the stem cell fate, I used cutting-edge RNA sequencing technology to investigate the effect of biomaterial culture platforms on stem cell behavior at the single-cell level.

Selected Publications:

Awards/Honors:
CIRM RT3 07800 (2015) (Helped PI)
Research Overview:
Chronic Kidney Disease (CKD) is considered the most fatal and expensive to treat disease since it leads to kidney failure and the only solution may be kidney transplantation. Thus, it is necessary to engineer methods for optimizing organ transplantation and for kidney therapeutics, which can be applied to personalized medical treatment based on individual physiological conditions of each patient. My past and current research interests focus on the development of new tools to identify new biological targets involved in vascular diseases. Vascular involvement is a primary cause for acute kidney injury (AKI) which can result in prolonged loss of kidney function and vascular perfusion. Therefore, a deeper understanding of the complex bidirectional and interdependent interactions between the vascular and renal compartments in pathophysiological conditions is needed. My long term vision is the integration of biomedical and technological approaches within a single framework for potential translational and therapeutic purposes of nephro-vascular diseases. Such a vision requires a multidisciplinary research program which encompasses: (i) Organ-on-a-chip technology to build multicellular functional units of kidney through micro-engineering approaches. This strategy will involve a functional biomimetic microfluidic unit that captures both the microvascular and renal tubular systems, where increasingly complex architectures with tunable biophysical and biochemical properties will be studied. This in vitro platform is ideal to mimic kidney filtration (GFR) and microvascular function (kidney-on-a-chip) and to identify novel drugs/targets involved in acute or chronic renal-vascular diseases. (ii) Engineering stem cell therapy technologies to model the appropriate cells involved in nephro-vascular diseases within the kidney-on-chip and establish such cells for regenerative applications. Engineering functional stem cells (IPS-driven cells) in combination with molecular biology strategies including CrispR technology will be used to investigate the genetic basis for AKI. Additionally, the differentiated functional cells can be applied for cell therapy purposes needed for personalized medical treatment of AKI. (iii) 3D printing technology to build functional organ for transplantation. Integration of organ-on-a-chip and stem cells technologies with 3D printing technologies will enable the 3D-printing autologous organ for transplantation in animal disease model. Aside from the exciting and challenging intellectual aspects of the technologies of organ-on-a-chip, stem cell therapy and 3D printing in treating nephron-vascular diseases, I view them as platforms to address hurdles in developing novel therapeutics for organ diseases and engineering whole organs.

Education:
Diploma (5 year degree), 2001-2006, Department of Chemical Engineering, National Technical University of Athens (NTUA), Athens, Greece
Doctor of Philosophy (Ph.D), 2007-2014, Department of Chemical and Biological Engineering, University at Buffalo, The State University of New York, NY, USA

Research/Work Experience:
Postdoctoral Research Associate, (2014-present), Wyss Institute for Biologically Inspired Engineering, Boston, MA, USA
Research Assistant/Collaborator, (2015-2016), Department of Tissue Regeneration and Fibrosis, Biogen, Boston, MA, USA
Research Assistant/Collaborator, (2011-2014), Department of Research and Development, Life Technologies, Invitrogen, Grand Island, NY, USA

Selected Publications:

Awards/Honors:
3. National Foundation of Scholarships Award for ranking in the top 1% of the class, 2003-2004, National Technical University of Athens, Greece.
4. Technical Chamber of Greece Award for ranking in the top 5% of class of 2006, National Technical University of Athens, Greece.
Research Overview:
For my PhD, I studied axonal regeneration in the peripheral nervous system. I developed a multi-luminal biosynthetic conduit that mimics the structure of a normal nerve. The conduit design incorporated microparticles encapsulating growth factors to bridge a 4cm gap defect in the perioneal nerve (experience gained during my masters degree). Although the results I acquired through my PhD training provided new technique to bridge a long gap deficit, it did not look at the cellular mechanisms. For my postdoctoral training, I decided to pursue an exciting new avenue of research in the microfluidic field to study cellular mechanisms and alternate cellular functions. My current research at UTD focuses on the immune system response to high shear utilizing microfluidic devices that mimic in vivo conditions such as severe stenosis and arteriosclerosis, as well as in blood contacting devices like VAD and hemodialysis machines. This work aims to determine the threshold of high shear that causes the activation of neutrophils and platelet prematurely. This knowledge should aid in redesigning blood contacting devices to minimize complications such as infection. My research interests lay at the interface of microfluidic, cellular behavior, and the immune system. Experiences gained during my PhD and Post doctoral research will lay the foundation of my long-term career goal and future research to model well-known autoimmune diseases in the nervous system i.e. myasthenia gravis (muscle weakness) in microfluidic devices to study prevention and therapeutic options.

Education:
- UT Arlington & UT Southwestern Medical Center, 2014, PhD, BME
- UT Arlington & UT Southwestern Medical Center, 2010, B.S Biology & M.S. BME

Research/Work Experience:
- UT Dallas & Southwestern Medical Center, 2015- present
  Research Associate, Biomedical Engineering; Advisor: David Schmidtke
- UT Arlington & UT Southwestern Medical Center, 2010-2014
  Graduate Research Assistant, Biomedical Engineering; Advisor: Mario Romero
- UT Arlington & UT Southwestern Medical Center, 2008-2010
  Undergraduate/Graduate Research Assistant, Biomedical Engineering;

Selected Publications:
- Nesreen Z. Alsmadi, Sarah J. Shapiro, Christopher S. Lewis, Vinit M. Sheth, et.al. Constricted Microfluidic Devices to Study the Effects of Transient High Shear Exposure on Platelets, Biomicrofluidics (2017)
- Eddie Shimp and Nesreen Z. Alsmadi*, Tiffany Cheng, Kevin Lam, Christopher Lewis, David W. Schmidtke, Effects of Shear Rate on Microfluidic Laminar Flow Patterning of P-Selectin, Biomicrofluidics, 10, 024128 (2016). * Both authors contributed equally

Honors and Awards
- Graduate Dean’s Dissertation Fellowship (2014)
- Best poster award (2nd Annual Symposium on Biomedical Technologies (2014)
- NASA/Texas Space Grant Consortium Fellowship (2010-2011)
ALLISON M. ANDREWS, PhD
Temple University, Temple University, 3500 N Broad St, MERB 880A, Philadelphia, PA, 19140 - allison.andrews@temple.edu

Research Overview:
As an independent biomedical engineering faculty, my research program will focus on utilizing microfluidic technology in the study of the blood-brain barrier (BBB) during cerebral vascular damage such as HIV infection, substance abuse, and mechanical injury. My research interests are based on my post and pre-doctoral training, which has centered on endothelial biology (lung, cardiovascular, blood-brain barrier). I currently have a F32 to study the effects of drugs of abuse and HIV on the release of extracellular microvesicles (eMVs) from the cerebral vasculature. Our central hypothesis is that as the BBB is damaged and becomes leaky in response to insult (mechanical injury, HIV/Cocaine/Methamphetamine) it corresponds to a release of eMVs containing brain endothelial specific proteins such as the tight junction proteins occludin and claudin-5. These eMVs are detectable in blood or culture media and offers the potential to monitor and diagnose the health of the cerebral vasculature before clinical manifestations. We have recently published on this work (see publication 4/5 below) in the context of mechanical injury and inflammation. Additionally, we have developed a methodology for the creation of primary human derived syngenic quad cultures of the BBB in a microfluidic device (see publication 1 below). I have a K01 application submitted, which extends my current work using this innovative microfluidic technique to study the importance of patrolling monocytes in cerebral vascular repair during cocaine and HIV. Other notable accomplishments from my research is a US patent on a unique, innovative device and methodology for real-time, direct, nitric oxide measurements from endothelial cells exposed to shear stress in vitro.

Education:
Ph.D. Biomedical Engineering 2012, Drexel University, Philadelphia, PA
B.S. Agricultural & Biological Engineering, 2006, University of Florida, Gainesville, FL

Research/Work Experience:
Post-Doctoral Fellow 2/14- present, Pathology/Blood Brain Barrier, Temple University, Advisor: Servio H. Ramirez, Ph.D.
Post-Doctoral Fellow 7/12-12/13, Cardiovascular Department, Temple University, Advisor: Victor Rizzo, Ph.D
Graduate Researcher 7/06-03/12, Biomedical Engineering, Drexel University, Advisor: Kenneth A. Barbee, Ph.D., Dov Jaron, Ph.D.
Undergrad Researcher 06/05-05/06, Mechanical Engineering, University of Florida, Advisor: Roger Tran-Son-Tay, Ph.D.

Selected Publications:

Awards/Honors:
NIDA Diversity Scholars Network Program, Mentee 2017
NIH/NIDA Ruth Kirschstein Fellow, (F32DA041282) 2016-2018
Fellow, Drugs of Abuse and Related Neuropeptides (T32DA007237) 2015-2016
U.S. patent no. 8,828,711 “Flow Chamber Analyte Detection Method” (Awarded 9/9/14)
Calhoun Graduate Fellowship 2006-2011
Graduated Magna Cum Laude, University of Florida, Gainesville, FL 2006
Research Overview:
My research develops microengineered material systems and immunomodulatory strategies to make cellular and molecular therapies effective in treating disease and trauma. Specifically, I combine biologically active polymeric materials, with immune cells and stem cells with the goal of providing desirable cues in a spatiotemporally-regulated manner to regulate cell and tissue function. My research interests span both basic and translational research areas. My unique interdisciplinary training, my mentorship team, and my education help me to develop novel approaches for engineering artificial tissues and regenerative therapies. My dissertation developed modular material systems to fabricate perfusable tissue constructs. I became proficient in designing perfusion bioreactors and manipulating flow dynamics for vascularization. Following completion of my Ph.D., I joined Dr. Jan Stegemann’s Lab at the University of Michigan in collaborations across the biomedical campus, where I extended my work on microfabrication and vascularization techniques and developed injectable scaffolds for bone and cartilage regeneration. I also developed a minimally-invasive approach for enabling vascularization of ischemic tissues. Recently, I have been working on immunomodulatory approaches for tissue regeneration and growth factor delivery. Specifically, I aim is to harness the osteogenic and vasculogenic potential of macrophages to support synergistic formation of new bone and new vessels. Part of my research attempts to characterize material properties especially viscoelasticity and stress relaxation and understand their influence on immunomodulation. Overall, I focus on both basic and applied research. My future research as an independent researcher will be distinct and revolve around immunological challenges and opportunities in regenerative medicine.

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.
• Research Intern: (Apr-Aug 2005) Tamilnadu Veterinary and Animal Sciences University, India.

Selected Publications:
• Annamalai RT, Rioja, Putnam and Stegemann. ACS Biomaterials Science & Engineering 2016. 2 (11), 1914-25 Vascular Network Formation by Microvascular Endothelial Cells in Modular Fibrin Microtissues.

Awards/Honors:
• Thomas C. Rumble Fellowship, 2011-2012, Wayne State University, USA
• Student Travel Award: 2010, 2012 : Biomedical Engineering National Society (BMES), USA
• Only student member of the Biomedical Engineering Department Chair Search Committee –Appointed by Dean of the College of Engineering (2012).
XIAOPING BAO, PhD
Department of Bioengineering, University of California-Berkeley, 278 Stanley Hall, Berkeley, CA 94803 xiaoping.bao@berkeley.edu

Research Overview:
My research at University of Wisconsin-Madison and University of California-Berkeley focuses on the genome editing, direct differentiation and biomanufacturing of human pluripotent stem cells (hPSCs) to treat heart and neural diseases. Engineers and scientists can now easily have access to human cardiovascular cells as well as in vitro human developmental and disease models as a result of my work. During my doctoral research, I identified Wnt signaling as a master regulator for the specification of various cardiovascular lineages from hPSCs, and thereafter developed chemically-defined and robust protocols to efficiently generate cardiomyocytes, epicardial cells, and endothelial cells from hPSCs. Furthermore, we used these in vitro models to study human heart development and identified an epicardial contribution to human cardiac endothelial cells. I also studied basic mechanisms of cardiac and epicardial development at a genome-wide level with RNA-seq analysis, and identified dozens of novel and interesting genes with similar expression patterns as key cardiac-specific genes. For my postdoctoral research, I applied genome editing tools, such as CRISPR/Cas9, lentivirus, AAV virus, to precisely engineer human genome and developed a robust platform to efficiently generate hPSC reporter cell lines (such as Olig2-eGFP, TH-mCherry et al.) for high-throughput live cell imaging in a microarray system. In addition, I also incorporated optogenetics into hPSCs to control their fate and function with light. These trainings lay the foundation of my long-term goal and future research to engineer cells and tissues for potential cell, gene and immune therapies.

Education:
• University of Wisconsin-Madison, May 2016. PhD, Chemical and Biological Engineering
• Tsinghua University, June 2011. BS, Chemical Engineering.

Research/Work Experience:
• University of California-Berkeley, 2016-present Post-doc Scholar, Department of Bioengineering; Advisors: David Schaffer & Douglas Clark, PhDs.
• University of Wisconsin-Madison, 2011-2016 Research Assistant, Chemical and Biological Engineering; Advisor: Sean P. Palecek, PhD
• Coyne Scientific, LLC and Stemgent Company, 2015, External Consultant
• BASF Shanghai, Summer 2010, Greater China Industrial Summer Course

Selected Publications:

Awards/Honors:
• 2016 ISSCR Annual Meeting Travel Award
• Chinese Government Award For Outstanding Students Overseas
• Student Research Travel Award (UW-Madison)
• Stem Cell & Regenerative Medicine Center (SCRMC) Fellowship (UW-Madison), 2014-2015.
• Graduate with Honor from Tsinghua University
• Hongkong and Shanghai Banking Corp. (the HSBC Group) Scholarship
• National Scholarship of China □ 2nd Poster Award at the 11th Annual Wisconsin Stem Cell Symposium
FRANCOIS BORDELEAU, PhD  
Biomedical Engineering, Vanderbilt University, 1225 Stevenson Ctr, Nashville, Tennessee, 37240  
francois.bordeleau@vanderbilt.edu

Research Overview:
My current research lies at the intersection of Physical Sciences and Oncology, studying tumor cell response to change in their mechanical microenvironment. I use a unique interdisciplinary and broad combination of techniques derived from physics, engineering and cell and molecular biology, which range from single cell in vitro to full scale in vivo animal models, and include clinical and patient oriented observations. During my PhD, I investigated the role of keratin, a cell type specific family of intermediate filaments cytoskeletal protein, in the regulation of simple epithelial cells mechanical activity, notably by using an optical tweezers tool developed during my master. My postdoctoral research focuses on cell adaptation to matrix stiffness, both in terms of signaling and gene expression. Most notably, I recently showed that matrix stiffness regulate alternative splicing, a fundamental process the give rise to protein diversity in cells. My research is complemented by tools and approaches to recreate and finely tune the cell ECM microenvironments in vitro and in vivo. The long term aim of my research is to understand how the interplay between cell mechanotransduction, ECM mechanics and cues from the microenvironment regulates alternative splicing. In line with my research aims, I have an interest in the regulation of mechanotransduction at the signaling level, principally through the involvement of cell type specific expression of intermediate filaments and their associated proteins, which remain widely understudied despite their. My future research will continue to bridge clinical and basic sciences at an interdisciplinary level to understand the connection between tissue mechanics and the cellular changes that drive disease progression and normal physiological processes.

Education:
· PhD, Cellular and Molecular Biology, Université Laval, June 2012
· MSc, Physics, Université Laval, June 2007
· BEng, Engineering Physics, Université Laval, January 2005

Research/Work Experience:
· Vanderbilt University, 2017-present  
  Postdoctoral Scholar, Department of Biomedical Engineering; Advisor: Cynthia Reinhart-King, PhD
· Cornell University, 2012-2016  
  Postdoctoral Associate, Meinig School of Biomedical Engineering; Advisor: Cynthia Reinhart-King, PhD
· Cornell University, 2012-2014, Invited Lecturer, Nanobiotechnology: Biomaterial characterization at micro-nano scales
· Université Laval, 2005-2012, Graduate Research, Cellular and Molecular Biology; Advisor: Normand Marceau, PhD
· Université Laval, 2005-2012, Graduate Research, Physics; Advisor: Yunlong Sheng, PhD
· Université Laval, 2006-2012, Laboratory Instructor in Biophotonics, Department of Physics, Engineering Physics and Optics

Selected Publications:

Awards/Honors:
· Pathway to Independence (PI) Award (K99/R00), NIH 2017-2022
· Scholarship for the Next Generation of Scientist, Cancer Research Society, 2016-2019
· AAAS/Science Program for Excellence in Science, 2014
· Reviewer Choice Award, BMES annual meeting, 2014
· Outstanding PhD thesis and oral defense, Dean’s honor list, Université Laval, 2012
· Presentation Award, Faculty of Medecine, Université Laval, 2007
Research Overview:
My research interest is in engineering integrated devices, and use them to study and manipulate biological systems at single cell level. During my graduate research at MIT, I developed two bio-inspired platform technologies that could be used for effective capture, analysis, and separation of immune cells, stem cells or CTCs from whole blood. I developed substrates carrying μ-patterns of adhesive ligands that could direct trajectories of rolling cells. Integrating these unique substrates within a microfluidic device allowed label-free separation of specific population of immune cells directly from whole blood. I also helped develop μ-fluidic devices with 3D DNA networks that allowed capture of CTCs from whole blood with ten-fold higher efficiency and sensitivity than other state-of-the-art devices. My postdoctoral research at the Anderson and Langer lab is aimed at developing devices for therapeutic and discovery applications. I am developing a microfabricated immune-isolating device that can allow transplantation of xenografts in animals for long-term without the need for immune suppression. Through an extensive screening process, I have developed a unique surface modification that reduces fibrosis on these devices allowing them to function over 6 months in rodents and non-human primates. In another project, I have been working with Prof. Phillips Sharp's lab to develop a novel droplet based microfluidic device that can allow profiling of microRNA and other non-coding RNAs of single cells. Working with clinicians at MGH, we are using this device to profile miRNA expressions in cancer cells from leukemia patients.

Education:
Ph.D in Mechanical Engineering (major in Bioengineering), 2014, Massachusetts Institute of Technology, USA
M.S. in Mechanical Engineering, 2009, Massachusetts Institute of Technology, USA
B.Tech in Mechanical Engineering, 2007, Indian Institute of Technology, India

Research/Work Experience:
2014-present: 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
2012: Clinical Preceptorship (Oncology/Immunology), Mentor: Dr. David Sloane, Dana-Farber Cancer Institute
2010-2012: Teaching Assistant (Thermal Engineering) at MIT MechE.

Selected Publications:

Awards/Honors:
Research Overview:
The goal of my research is to engineer predictably safe and robustly effective regenerative medicine strategies. By combining principles from synthetic biology, gene therapy, and functional tissue engineering, my work enables the coordination of cell-cell and cell-biomaterial interactions to restore function to pathologic tissues, even in the absence of cues normally required for cell-based repair. Working in the laboratories of Dr. Farshid Guilak and Dr. Charles Gersbach, I established that gene delivery vehicles incorporated into highly specialized tissue engineering scaffolds enabled the scaffold to guide stem cell differentiation. My focus then shifted from biomaterials toward cellular engineering. Using genome editing nucleases, we rewired endogenous signaling circuits in pluripotent cells for autoregulated, biologic drug production in stem cell-derived engineered tissues. As a postdoctoral fellow in Dr. Wendell Lim’s lab, I have designed and implemented synthetic sense and response platforms to allow cells to autonomously read and react to the spatial content of their microenvironments with pre-defined, engineered outputs. These experiences provide a springboard for my long-term goals of designing biomaterials and harnessing cellular computational machinery to guide neotissue assembly for repair of diseased or damaged tissues and organs.

Selected Publications:

Awards/Honors:
• Ruth L. Kirschstein National Research Service Award, April 2017
• New Investigator Recognition Award, Orthopaedic Research Society. March 2016
• Meritorious Achievement Travel Award, American Society of Gene and Cell Therapy. May 2015
• Student Travel Award, Biomedical Engineering Society Cellular and Molecular Bioengineering Special Interest Group. January 2015
ALEXANDER BUFFONE, Jr., PhD
Chemical and Biomolecular Engineering, University of Pennsylvania, 210 S 33rd Street, 540 Skirkanich Hall, Philadelphia, PA 19104
abuff@seas.upenn.edu

Research Overview:
The Buffone Lab: Genetic Engineering of Immune Cell Recruitment to Combat Inflammation
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 immuno-surveillance. My overall research program aspires to the overarching goal of translating basic 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 focuses on controlling three of the interrelated steps of the cascade 1) identifying the critical glycosyltransferases and ligands regulating selectin mediated adhesion; 2) perturbing chemokine mediated immune cell activation and function through glycan modification and 3) controlling the direction of integrin mediated migration in leukocytes 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:
• Research Associate, University of Pennsylvania (Philadelphia, PA), Department of Chemical and Biomolecular Engineering, September 2017-present, Advisor: Dr. Daniel Hammer.
• Postdoctoral Fellow, University of Pennsylvania (Philadelphia, PA), Department of Chemical and Biomolecular Engineering, September 2015-August 2017, 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, State University of New York at 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:
1) Buffone A Jr., Anderson NR, Hammer DA. “Migration against the direction of flow is LFA-1 dependent in human hematopoietic stem cells.” J Cell Sci (revise and resubmit)

Awards/Honors:
• Keynote Speaker SUNY Buffalo CBE Department Open House, 2011
• 2014 Society for Glycobiology Travel Award Recipient, 2014
KAI-YUAN CHEN, PhD
Biomedical Engineering, Duke University, Room 1427, FCIEMAS, Duke University, Durham, NC, 27708  kai.yuan.chen@duke.edu

Research Overview:
My research combines multi-scale computational modeling, Next-Generation Sequencing, CRISPR/Cas9/dCas9 gene editing, and organoids systems to reconstruct molecular and gene regulatory circuitries that govern the functions in stem cells and metastatic tumor disease.
During my PhD research in Cornell University, I mainly focused on stem cell niche control in intestine system. I developed a multiscale computational model mimicking the real intestine crypt dynamics including stochastic cell properties (e.g. cell growth, division, migration, and cell-cell signaling), and constructed mathematical models to investigate systems dynamics of inter-cellular patterning in intestine crypts. A novel Notch1 positive feedback motif in mouse and human intestine was discovered by analysis of ChIP-Seq data and binding motif discovery. CIRSPR/Cas9 editing system was designed to target on the novel motif in both mouse and human organoids, which significantly perturbs the stem cell niche patterning and tissue homeostasis. In this project, combining multidisciplinary approaches reveals that the positive feedback is a robust and bi-stable regulatory motif essential to intestine stem cell niche control.

After I received my PhD degree, I move to Department of Biomedical Engineering at Duke University to continue my Postdoc training. I am extending my research interests from bottom-up to top-down approaches to identify global regulatory elements across whole epigenome in both healthy and disease models. I am developing a whole-epigenome dCas9 screening platform on mouse intestine organoids combining NGS epigenomic sequencing to identify chromatin landscape and annotate the regulatory elements that are critical to control intestinal cell fates. Around ~1,000 stem-cell specific epigenomic regions are identified and a sgRNA library including ~10,000 sgRNAs are designed to target on these regions. In addition, I am also applying patient derived metastatic colorectal tumor organoids as a drug screening platform to establish personalized therapy via integration of high-throughput epigenomic and transcriptomic sequencing profiling drug response. A couple of chemo-resistance associated targets are identified and the druggable ones are selected to validate synergistic effects with conventional chemotherapy.

Education:
PhD Cornell University, 2016
MEng Cornell University, 2009
MS National Taiwan University, 2007
BS National Cheng Kung University, 2005

Research/Work Experience:
Postdoc BME, Duke University, 2016- present
Research Assistant ECE/BME, Cornell University, 2010-2016
Teaching Assistant, ECE, Cornell University, 2010-2013

Selected Publications:

Awards/Honors:
Irwin M. and Joan K. Jacobs Fellowship
Student Travel Prize, International Conference of Computational Cell Biology (ICCCB)
National Studying Abroad Scholarship, Ministry of Education, Taiwan
Stem Cell Program Travel Award, Cornell University
BioBricks Foundation SB5.0 Young Researcher Travel Award
BRIANNE CONNIZO, PhD
Biological Engineering, Massachusetts Institute of Technology, 77 Massachusetts Avenue, NE47-390, Cambridge, Massachusetts, 02139 connizzo@mit.edu

Research Overview:
My ultimate goal is to answer clinically-motivated questions at the interface of biology and engineering. Specifically, my focus is understanding how multiscale mechanical forces contribute to normal connective tissue physiology, as well as injury or disease, in the context of the intricate native tissue structure. During my doctoral training with Louis Soslowsky, Ph.D. at the University of Pennsylvania, I explored multi-scale structure-function relationships in tendon of a number of different model systems. I then successfully obtained an NIH-funded postdoctoral fellowship to study fluid flow and poroelasticity in tendon with Alan Grodzinsky, Sc.D. at the Massachusetts Institute of Technology. Now, I am developing several novel in vitro explant culture models, one of which is a new co-culture of tendon, muscle and bone, in order to explore the biological response to altered mechanical loading in a controllable and repeatable environment while preserving native structure and cell-cell junctions and processes. I believe that my use of sophisticated multi-scale mechanical evaluations along with novel explant culture model systems will allow me to investigate the response of tenocytes to loading within the context of the native tissue environment, which has the potential to transform the field of tendon mechanobiology.

Education:
Ph.D. Bioengineering, University of Pennsylvania, December 2015, Thesis Advisor: Louis J. Soslowsky, PhD
B.S. Engineering, Smith College, May 2010
Magna Cum Laude with Highest Honors in Engineering. Thesis Advisor: Borjana Mikic, PhD

Research/Work Experience:
Postdoctoral Research, Biological Engineering’s Continuum Electromechanics Laboratory
Massachusetts Institute of Technology, Cambridge, MA, January 2016 – Present, Advisor: Alan J. Grodzinsky
Graduate Research, McKay Orthopaedic Research Laboratory
Undergraduate Research, Mikic Laboratory
Smith College, Northampton, MA, September 2009 – May 2010, Advisor: Borjana Mikic

Selected Publications:
Connizzo BK, Sarver JJ, Han L, Soslowsky LJ. In Situ Fibril Stretch and Sliding is Location-Dependent in Mouse Supraspinatus Tendons. J Biomech 2014;57(16):3794-8.

Awards/Honors:
June 2015 PhD Competition Finalist, Characterization of Tissue Mechanics, SB3C 2015
June 2013 Best Poster in University of Pennsylvania Orthopaedic Annual Research Day
November 2012 1st Place Biomechanics, Penn Center for Musculoskeletal Disorders Symposium
June 2012 MS Competition Best Paper, Solids, Imaging and Orthopaedics, ASME SBC
ELISE A CORBIN, PhD
Cardiovascular Institute, University of Pennsylvania, 3400 Civic Center Blvd, STRC 11-194, Philadelphia, PA, 19104
elise.corbin@gmail.com

Research Overview:
My overall research focus is on the complex interactions of cells and biological tissue with their environment through the use of a new generation of dynamic materials and devices. In particular, interactions between physical forces, rheological properties, and biochemical cues regulate virtually all aspects of cell physiology. Acknowledging that biological tissue is dynamic, I consider time-varying loading to better elucidate the mechanisms that drive tissue organization, development, and the dynamic progression of disease states. The key to these studies is to mimic essential features of physiological and pathological conditions to maximize the potential for translating fundamental research to the clinic. My PhD research focused on measuring the profiles and signatures of individual breast cancer cell growth using a bio-MEMS resonant sensor optimized for long-term cell mass measurements. My postdoctoral research currently focuses on advancing an in vitro cardiovascular microtissue model to better mimic in vivo cardiac function and different disease states. Specifically, this work involves engineering dynamic microenvironments for control of mechanical stiffness and applied forces across the cardiac cycle. My expertise in the design and fabrication of micro system devices for biomechanical applications and cell/tissue manipulation schemes combines the mechanical engineering and bio/tissue engineering skills required to pioneer the diverse challenges and opportunities at these interfaces.

Education:
PhD Mechanical Engineering, 2013, University of Illinois at Urbana-Champaign
MS Mechanical Engineering, 2009, University of Illinois at Urbana-Champaign

Research/Work Experience:
Postdoctoral Research Fellow, Advisors: Kenneth Margulies, MD & Kevin Turner, PhD
University of Pennsylvania Perelman School of Medicine, October 2015 - Present
Postdoctoral Research Associate, Advisors: Rashid Bashir, PhD & John Rogers, PhD
University of Illinois at Urbana-Champaign, November 2013 - October 2015
NSF Cellular and Molecular Mechanics and BioNanotechnology IGERT Trainee, Advisor: Rashid Bashir, PhD
University of Illinois at Urbana-Champaign, January 2011 - October 2013
Visiting Research Scholar, Advisors: Michael Sheetz, PhD & Chwee Teck Lim, PhD
National University of Singapore, Mechanobiology Institute, September - October 2012
Graduate Research Assistant, Advisor: William King, PhD
University of Illinois at Urbana-Champaign, August 2007 - December 2010

Selected Publications:

Awards/Honors:
T32 Cardiovascular Institute NIH Fellowship, 2015-2018
Outstanding Service Award - Micro and Nanotechnology Laboratory, 2013-2014
Best Student Paper Award - IEEE Sensors Conference, 2010
CMMB-IGERT NSF Fellowship, 2010-2012
Best Student Poster Award - NSF-NSC Summer Institute on Biosensing and Bioactuation, 2010
MAHSA DABAGH, PhD
Department of Biomedical Engineering, Duke University, 140 Science Dr., Durham, NC 27708 mahsa.dabagh@duke.edu

Research overview:
My research in Duke University focuses on understanding the root cause of cancer metastasis and aneurysm. The main aim of my research has been to develop the ability to predict vascular regions where metastases are most likely to occur and introducing new criteria to predict aneurysm growth. My cancer research requires a fundamental knowledge on: 1) how the endothelium at certain organs becomes hyperpermeable for circulating cells; 2) what parameters are dominant in regulating the endothelium integrity; 3) how characteristics of circulating cells affect the transendothelial migration cascade. I integrated a unique in-house-massively parallel computational fluid dynamics (CFD) code with fluid solid interaction (FSI)-functionality, using the immersed boundary method to couple a finite element model for deformable cancer cells to the fluid model. I have studied the dynamic interactions that occur between circulating cells and the endothelial cells. My research on aneurysm has led to establish new criteria to predict aneurysm growth which can facilitate the differentiation of stable and growing aneurysms during pre-interventional planning. In my previous research, I focused on exploring the mechanisms underlying the initiation and progression of atherosclerosis. I have implemented computational models and in vitro experiments to study the responses of the endothelial cells lining the vessel wall to local hemodynamic forces (Mechanotransduction) in details. Furthermore, I have developed a multilayered model of the vascular wall to investigate the transport of macromolecules through the endothelium and subsequent layers of arterial wall. My findings suggest that endothelium lining the vessel wall actively adapt itself to assist the trans-endothelial migration process which is the main step in initiation of cardiovascular disease and cancer metastasis. These experiences establish the foundation for my long-term goal to develop a systematic tool for accurate prediction of transendothelial migration sites where: metastases are most likely to occur; atherosclerotic lesions preferentially are localized.

Education
• Lappeenranta University of Tech., Finland, November 2008. PhD, Biomedical Engineering.
• Sharif University of Technology, August 2002. MSc, Biomedical Engineering.
• Sharif University of Technology, June 2000. BSc, Chemical Engineering.

Research/ work Experience:
• Dept. Biomedical Eng., Duke Uni., 2016- present. Research Associate; Advisor: Amanda Randles, PhD.
• Massachusetts Institute of Technology (Jun-Nov.2014). Visiting scientist; Advisor: Peter So, PhD.
• Georgia Institute of Technology (Oct. 2012-Jan. 2013). Visiting scientist; Advisor: Hangjoong Jo, PhD.
• Lappeenranta Uni. Tech., Finland. Doctoral student; Advisors: Pertti Sarkomaa PhD, Yrjö T. Konttinen MD.
• Department of Biomaterial, Polymer and Petrochemical Institute, (2002-2004). R&D researcher.
• Dept. Biomedical Eng., Sharif Uni. Tech. Master student; Advisors: MJ Abdekhoodaie, MT Khorasani PhD.

Selected publications:

Awards/ Honors:
6. Outstanding scientist, Vascular Mechanobiology and Diseases lab, Georgia Institute of Technology, 2012.
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 for regulatory activity, 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
1MIT, Cambridge, MA, 2University of Nottingham, Nottingham, United Kingdom  ddelcass@mit.edu

Research Overview:
My research focuses on the design of biomaterials that control immune cell behaviour, with applications in Tissue Engineering and Regenerative Medicine, cancer, auto-immune therapeutics and gene delivery.

Research interest- Engineered biomaterial interfaces:
• Nanopatterned interfaces for controlled ligand presentation (application- controlled activation of T cells)
• Targeted delivery of genetic (mRNA, DNA) and soluble (cytokines, proteins) cues to cells (application- induced tolerance)
• Mechanically varied substrates for cell activation and control (application- controlled phenotypic differentiation)
• Transplant niche compartments for cell and organoid transplants (application- induced vascularisation, anti-fibrosis)
• Multi-component systems for directed cell behaviour (application- auto-immune therapeutics)

Education:
2005-2009: MChem, Chemistry with a Year in Industry, First Class (Hons)
Department of Chemistry, University of York
• Chemistry graduate with 12 month industrial placement at GlaxoSmithKline R&D
• Awarded Pfizer Undergraduate Excellence Sponsorship (4k GBP) and Robert Jackson Chemistry Prize (350 GBP)
2010-2014: PhD (advisors Dr. Iain Dunlop, Prof. Molly Stevens) and Doctoral Prize Fellowship (w. Dr. Iain Dunlop)
Department of Materials and Department of Bioengineering, Imperial College London
• Thesis titled "Biomimetic substrates for immune cell signalling"
• First lab member in Dr. Dunlop’s group, position involved lab set-up and day-to-day supervision of PhD/MSc students
• Teaching Assistant in Chemical Kinetics undergraduate course and Lecturer in Introductory Biomaterials MSc Course
• Published 3 first author papers and filed a patent application

Research/Work Experience:
2015-present: EPSRC E-TERM Fellowship (w. Prof. Kevin Shakesheff, Prof. Dan Anderson, Prof. Bob Langer)
• Co-advice 3 MSc students, direct 10 researchers/technicians in MIT diabetes sub-group
• Completed teaching (MIT Kauffman) and entrepreneurship programs (MIT/Harvard/Sloan Business School)
• Reviewer for the journals; ACS Nano, Expert Opinion on Biological Therapy, PLOS One
• Chair of ATREUM 2017 (UK National Conference) focused on TERM Early Career research and policy drafting

Selected Publications:
1. D. Delcassian#, et al, INTEGRATIVE BIOLOGY, 2017 (# co-corresponding author)

Patents: Application April 2013; Cell Culture, Applicant- Imperial Innovations. Inventors- I.E. Dunlop and D. Delcassian

Awards/Honors:
Grants Awarded (over 450k GBP (approx. $600k USD) to date):
• EPSRC E-TERM Landscape Fellowship (GBP250k)
• UKRMP Hub-to-Hub Acellular/Immunomodulation Grant (GBP50k)
• EPSRC E-TERM Immunomodulation in the Wound Niche Grant (GBP40k)
• Imperial College London Postdoctoral Prize Fellowship (GBP60k)
• Imperial College London PhD scholarship (GBP55k)

Other Awards:
• 2015 Biomaterials Gordon Research Conference, Best Poster and Oral Presentation Prize
• 2014 Future Investigators in Regenerative Medicine Travel Award (GBP800)
• 2014 Materials Research Symposium, Best Oral Presentation (USD250)
• 2006 University of York Robert Jackson Chemistry Prize (GBP350)
• 2005-2009 Pfizer Undergraduate Excellence Sponsorship (GBP4k)
CHRISTOPHER R. DILLON, PhD
Radiology and Imaging Sciences, University of Utah, 729 Arapeen Dr, Salt Lake City, Utah, 84108 christopher.dillon@utah.edu

Research Overview:
My research at the University of Utah focuses on improving biothermal models used to enhance treatment planning, improve treatment monitoring, and guide predictive controllers in magnetic resonance-guided focused ultrasound (MRgFUS) thermal therapies. When implemented effectively, these models make MRgFUS treatments more effective and time and cost efficient. However, accurate models presuppose accurate tissue properties. My specialty is the non-invasive determination of tissue properties that determine how ultrasound is absorbed by the body, how thermal energy dissipates once absorbed, and how blood flow affects the thermal buildup. As a graduate student, I developed a novel method that utilizes MR temperature data to improve ultrasound specific absorption rate (SAR) estimates by up to 90% when compared with the traditional method. The method also accurately determines tissue thermal diffusivity with improved precision. I established appropriate MR sampling characteristics for applying my method. As a postdoc, I extended the method to include estimates of Pennes blood perfusion parameter. I developed another technique that quantifies blood flow effects on MRgFUS temperatures. I am consistently seeking to translate my research methods to clinical use and am currently characterizing the role of MR, acoustic, and thermal properties in outcomes for uterine fibroid MRgFUS therapies. My growing experience in clinical applications of MRgFUS and my expertise in thermal modeling, image processing, and computational simulations provide the foundation for future research in biothermal model validation and improved MRgFUS treatment planning.

Education:
• University of Utah, August 2014. PhD, Bioengineering.
• Brigham Young University, April 2009. BS, Mechanical Engineering.

Research/Work Experience:
• Postdoctoral Research Associate, University of Utah, Radiology and Imaging Sciences, August 2014-Present. Advisor: Allison Payne, PhD.
• Co-Instructor, University of Utah, Bioengineering, BioEn 5480 & ECEn 5480-Ultrasound, August 2016-December 2016. Coinstructor: Douglas Christensen, PhD.
• Graduate Research Assistant, University of Utah, Bioengineering, August 2009-August 2014. Advisor: Robert Roemer, PhD.
• Research Assistant, Brigham Young University, Mechanical Engineering, May 2008-April 2009. Advisor: Matthew Jones, PhD.

Selected Publications:

Awards/Honors:
• F32 Kirschstein-NRSA Postdoctoral Fellowship, National Institutes of Health, 2015-Present.
• Outstanding Trainee Presentation Award, 28th Annual UCAIR Symposium, 2017.
• Higher Education Teaching Specialist, University of Utah, 2017.
• Vice President for Research Seed Grant, University of Utah, 2015-2016.
• Young Investigator Award, Focused Ultrasound Foundation, 2014.
• New Investigator Travel Award, Society for Thermal Medicine, 2014.
• Gordon B. Hinckley Presidential Scholarship, Brigham Young University, 2001-2007.
• National Merit Scholarship, Brigham Young University, 2001-2007.
Research Overview:
My undergraduate research at the University of Pennsylvania involved biomimetic, bioabsorbable calcium and phosphate biomaterial sol-gel scaffolds for bone matrix regeneration. At Boston University, I focused my PhD on host response to better understand what happens when deliverables are introduced into the body. Initial work involved engineering cancer-killing viral vectors and gene therapy strategies, with subsequent research on tailored chemotherapeutic administration (dose and schedule) to modulate anti-tumor immunity. My postdoc in the Langer/Anderson labs at MIT has merged these areas of expertise to elucidate interfering host response to nanotherapeutics and macroscale biomedical device implants. Systems biology approaches were utilized to break down complex immunologic response to identify targets for inhibition or modulation by next generation technologies, including biomaterial architecture, surface chemistry, and embedded controlled release systems. This work has allowed us to mitigate rejection and foreign body response for over 6-12 months in mice and non-human primates. It is my goal to continue advancing our understanding of complex host systems and how they affect interfering inflammatory or fibrotic response to engineer improved therapeutic platforms.

Education:
• Boston University, December 2010. PhD, Molecular/Cell Biology & Biochemistry (Genetic Eng./Cancer Immunology)
• University of Pennsylvania, May 2004. BSE, Bioengineering

Research/Work Experience:
• Koch Institute for Integrative Cancer Research/MIT & Children’s Hospital Boston, 11/2011-present
  Sr. JDRF Postdoctoral Fellow, Advisors: Robert Langer, ScD, and Daniel G. Anderson, PhD
• Boston University, Biology, Cancer Center, 9/2004-12/2010 (and 1/2011-10/2011)
  Graduate Student (and Postdoctoral Fellow), Advisor: David J. Waxman, PhD
  Research Assistant, Advisors: Shula Radin, PhD, and Paul Ducheyne, PhD
• University of Pennsylvania, Developmental Genetics, 9/2000-8/2002
  Research Assistant, Advisors: Randall Kerstetter, PhD, and Scott Poethig, PhD

Selected Publications:

Awards/Honors:
• Society for Biomaterials, 1st Place Prize, Immune Engineering SIG, 2017
• Juvenile Diabetes Research Foundation (JDRF) Postdoctoral Fellowship (3-yr), 2015
• Frank A. Belamarich Award, Boston University (only 1 per year, best doctoral dissertation, across all of Biology), 2011
• Boston University Provost and Technology Development Awards (only 1 per year each), 2009 and 2007, respectively
• Presidential Fellow, Boston University, 2004 • University of Pennsylvania, University Scholar, 2000
COURTNEY M. DUMONT, PhD
Neural Tissue Engineer
Biomedical Engineering, University of Michigan, 1600 Huron Parkway, Ann Arbor, MI, 48109  cdumont@umich.edu

Research Overview:
My research focuses on the integration of neural engineering with immune and vascular engineering, as recent studies have begun to demonstrate that these less well-studied extrinsic barriers to nerve regeneration synergize with the intrinsic barriers to prevent nerve repair. I have successfully integrated multi-channel bridges (post-doctoral work) to deliver neural progenitor cells (NPCs) (graduate work), with NPCs playing a prominent role in regeneration through biochemical remediation, neural repopulation, and modulating participation of extrinsic cells. NPCs delivered on the bridge achieved faster histological and locomotor improvements, including an increase in endogenous neurogenesis compared to bridges alone. The cross-talk between NPCs and immune cells will be a focus area to improve NPC delivery, as immunomodulatory capabilities observed in simplistic in vitro models do not correlate to increased survival after injury. My laboratory will employ microfluidic systems with tissue explants to enable mechanistic investigation into the NPC-immune interactions with a focus on enhancing NPC delivery following transplantation. My ongoing research studies of spinal cord injury are aimed at bolstering regenerative potential by enhancing the initial NPC survival through co-administration of immunomodulatory factors and builds upon my skills including NPC delivery, biomaterial development, and gene therapy from my post-doctoral research. Co-delivery of these factors may shift the immune cells towards an anti-inflammatory phenotype increasing NPC survival, but my laboratory will also target immune cell extravasation which can having last effects on phenotype. Immune cells infiltrate the nervous system through microvasculature that are primarily comprised of endothelial cells (ECs) and pericytes, and these cells provide critical signals that influence cell phenotype and ultimately regeneration. During my thesis, I developed platforms to understand how vascular hemodynamics regulate adult NPC fate as well as NPC-EC interactions. I acquired an appreciation for the importance of cytoarchitecture as well as the nuances in EC contributions to the niche that will provide unique insight into the immune extravasation and neuro-immune interactions. Ultimately, my goal is to cultivate myself as a leader in neural engineering focusing on bridging the gap between understanding neural interactions with extrinsic cells (vascular, immune) that interface following trauma, and to engineer biomaterial and cell-based therapies capitalizing on these interactions for improved regenerative outcomes.

Education:
Ph.D. in Biomedical Engineering, August 2014, Rensselaer Polytechnic Institute
M.S. in Biomedical Engineering, May 2011, Rensselaer Polytechnic Institute
B.S. in Biomedical Engineering, May 2009, Rensselaer Polytechnic Institute

Research/Work Experience:
--University of Michigan, Ann Arbor, Michigan-- 2015-present
Postdoctoral Research Associate, Biomedical Engineering, Advisor: Lonnie Shea
Developed multifactorial approaches for spinal cord repair through biomaterial development, stem cell delivery, & gene therapy.

--Rensselaer Polytechnic Institute, Troy, New York--
Doctoral Candidate, Biomedical Engineering, Advisor: Deanna Thompson 2009-2014
Investigated neural stem cell phenotype, survival, and fate in response to hemodynamically cultured endothelial cells.
Undergraduate Researcher, Biomedical Engineering, Neural Engineering/Cellular Biomechanics 2007-2009

Selected Publications:

Awards/Honors:
Principles & Practices for STEM ED certificate, Rensselaer Founders Award; Rensselaer BME Most Valuable Teaching Assistant
Research Overview:
My long-term research interests are to improve detection and treatment of complex cardiometabolic diseases by developing personalized digital biomarkers that leverage biomedical “big data” including omics, wearable devices, and electronic health records. My strong biomedical engineering background paired with my passion for complex disease research launched my successful cardiometabolic disease research endeavors. As an undergraduate student, I published two studies at Johns Hopkins University with Dr. Dan Berkowitz describing new mechanisms of age-related loss of blood vessel compliance due to decreased nitric oxide bioavailability (4,5). As a National Science Foundation Graduate Research Fellow at Georgia Tech and Emory University with Dr. Hanjoong Jo, I developed integrative omics approaches to analyze global gene expression and epigenetic signatures in atherosclerosis. My first author publication in the Journal of Clinical Investigation described a previously completely unknown epigenetic controller of atherosclerosis and was highlighted by the American Heart Association Science News and Science Translational Medicine Editor’s Choice (2). As an NIH Big Data to Knowledge (BD2K) Mobilize Postdoctoral Fellow at Stanford University, I work with Dr. Michael Snyder and Dr. Scott Delp. Our labs are internationally known for our work on “integrative personalized omics profiling” and biomedical data science applied to wearable sensor data. My recent co-first author study in PLOS Biology exemplified the utility of consumer wearable device data (heart rate, temperature, oxygen, activity, etc.) to understand health and detect acute and chronic illness (1). This work was internationally recognized and covered by media outlets from the NIH Director’s Blog to Wired, Time, and US News and World Report. My future research program will build upon my research experiences by integrating biomolecular omics, clinical, and wearable devices data to develop digital biomarkers for personalized risk classification and tailored, remote intervention strategies to diagnose and treat cardiometabolic diseases.

Education:
• Georgia Institute of Technology and Emory University, May 2015. PhD, Biomedical Engineering
• Johns Hopkins University, May 2010. BS, Biomedical Engineering

Research/Work Experience:
• Managing Editor, Journal of Biomedical and Health Informatics: 01/2017 – present
• Stanford University, 06/2015 – present; NIH BD2K Mobilize Distinguished Postdoctoral Fellow, Departments of Genetics and Bioengineering; Advisors: Dr. Michael Snyder, PhD and Dr. Scott Delp, PhD
• Georgia Tech and Emory University, 09/2010-05/2015; National Science Foundation Graduate Research Fellow, Biomedical Engineering; Advisor: Dr. Hanjoong Jo, PhD
• Centers for Disease Control and Prevention, 05/2014-09/2014; Molecular Biology and Bioinformatics Intern
• Johns Hopkins University, 09/2007-05/2010; Undergraduate Research Assistant, Advisor: Dr. Dan Berkowitz, MD
• Fundación Centro Nacional de Investigaciones Cardiovasculares Carlos III in Madrid, Spain, 06/2009-08/2009 Visiting Scientist in the Regenerative Cardiology Department
• Arginetix, Baltimore, MD. 04/2008-05/2009. Intern, Drug Discovery Research

Selected Publications:

Awards/Honors:
• California Preterm Birth Initiative Scholar: 2016-present
• Mobilize Distinguished Postdoctoral Fellowship: Stanford University: 2015-present.
• National Science Foundation Graduate Research Fellowship. 05/2012-05/2015.
• Bloomberg Scholar (2007-2008) and Vreedenburg Scholar (2009), Johns Hopkins University
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 on 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. For my future career, I want to focus my research on the enteric nervous system (ENS). Many gastro intestinal 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, PhD, 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:
4. M. Ecker and T. Pretsch, Durability of switchable QR code carriers under hydrolytic and photolytic conditions, Smart Mater. Struct., 2013, 22 (9), art. no. 094005.

Awards/Honors:
• ACS Postdoc to Faculty Workshop Scholar, 2017
EVON S. EREIFEJ, PhD

1Biomedical Engineering, Case Western Reserve University, 2071 MLK Drive, Wickenden Bldg., Cleveland, Ohio, 44106, 2APT Center, Veteran Affairs Medical Center, 10701 East Blvd, Cleveland, Ohio, 44106  eereifej@gmail.com

Research Overview:
My research interests lie in improving the state of biocompatibility, acceptance and functionality of neural implants into the native tissue to improve the understanding and treatment of neurological diseases, disorders and injuries. A major hurdle to the clinical deployment of neural microelectrode technologies is recording instability caused by the inability of the electrode to assimilate with the native tissue. My primary research endeavors are to alleviate the inflammatory response found at the implant-tissue interface of neural implants. My doctoral work studied the effects nanotopography has on reducing astrocyte reactivity and glial scarring. I demonstrated, utilizing several fabrication methods, that nano-sized features reduced astrocyte reactivity both in vitro and ex vivo compared to smooth surfaces. During my first postdoctoral training at Virginia Tech, I studied molecular mechanisms of neurotrauma to correlate the glial response following TBI with behavioral deficits using a rodent model. I continued postdoctoral training at the VAMC and CWRU studying the effects of inflammatory-mediated oxidative stress on both neuroinflammation and electrode decay. Specifically, I investigated the dosage frequency, concentration, and time course of anti-inflammatory therapeutics (i.e. resveratrol) on neural inflammation and implant functionality. I received a Career Development Award (CDA-1) through the VAMC in 05/2015 to evaluate therapeutic and topographical approaches for improved neural electrode biocompatibility. I have demonstrated that neural implants with topographical modifications show less neuroinflammation and increased neuronal viability over time, compared to non-surface modified controls, suggesting the modifications have a chronic effect on neuronal survivability. This encouraging data led to the submission of a CDA-2 to continue chronic studies and incorporate functional electrodes in order to study electrophysiology. As proof of concept, I have fabricated surface modifications onto one functional microelectrode, implanted it and currently conducting electrophysiological recordings. My research endeavors have allowed me to extensively study CNS injury, which aids with the design of neural electrode devices, by reducing the inflammatory response due to insertion related injury of the neural electrodes. These experiences lay the foundation of my ultimate career goal to continue studying diseases, injuries, and disorders of the nervous systems in order to establish therapeutic and medical device treatments to aid in improving patients’ lives.

Education:
• PhD/ Biomedical Engineering Wayne State University; Detroit, MI 5/2012
• M.S./Biomedical Engineering Wayne State University; Detroit, MI 5/2007
• B.S./Biological Sciences Wayne State University; Detroit, MI 8/2005

Research/Work Experience:
• Investigator – Biomedical Engineering; VAMC; Cleveland, OH; 5/2015 - present
• Post Doc – Biomedical Engineering; CWRU, Cleveland, OH; 5/2014 – present
• Post Doc – Biomedical Engineering; Virginia Tech; Blacksburg, VA; 5/2012 – 4/2014
• Adjunct Faculty – Biomedical Engineering; Wayne State University; Detroit, MI; 5/2011 – 5/2014
• Research Assistant – Biomedical Engineering; Wayne State University; Detroit, MI; 2009-5/2012
• Adjunct Faculty – Biology; Macomb Community College; Warren, MI; 2007 - 2008

Selected Publications:

Awards/Honors:
• Career Development Award 1 – Department of Veteran’s Affairs Rehabilitation R&D – Grant # A1664-M (5/2015 – 4/2017)
• Clinical and Translational Science Collaborative (CTSC) - National Institutes of Health (NIH) – (3/2016 – 9/2016)
• 2013 - BMES Innovation and Career Development Travel Award
• 2011 - Anthony and Joyce Danielski Kales Scholarship
MEGAN J. FARRELL, PhD
Bioengineering, University of Pennsylvania, 240 Skirkanich Hall, 210 South 33rd St., Philadelphia, PA, 19104
farrm@seas.upenn.edu

Research Overview:
My interests encompass the mechano-regulation of disease pathology in soft tissues in the context of tissue degeneration, subsequent repair or lack thereof, and the development of regenerative medicine strategies to enhance repair. I completed my dissertation research within a musculoskeletal tissue engineering and mechanobiology laboratory. My research focused on identifying the discrepancies that exist in the performance of chondrogenically induced bone marrow derived mesenchymal stem cells (MSCs) compared to chondrocytes in cell-laden engineered cartilage, thus leading to lower mechanical function of the engineered tissue. To this end, I used a multi-scale approach to investigate the impact of stressors found in the native joint environment. Furthermore, I investigated the role of stem cell heterogeneity on the formation of robust engineered cartilage. With clonal expansion of single mesenchymal stem cells from a single bone marrow isolate, I was able to demonstrate colony dependent chondrogenic differentiation potential and response to environmental stressors. However, single cell gene expression analyses via mRNA fluorescent in-situ hybridization informed us that high variability in chondrogenic genes within a single MSC clonal population remained, thus preventing the identification of a chondrogenic marker to enrich the stem cell populations. With an interest in model development to investigate skin mechanobiology in the wound healing process, I sought a postdoctoral position that facilitated an introduction to skin physiology and advanced in vitro organ models. My postdoctoral research efforts have been two-fold, [1] developing tissue engineering strategies for de novo hair follicle growth and [2] model development of a microfluidic ‘skin-on-a-chip’. In regards to the former, I am employing microfabrication strategies for the in vivo-like spatial patterning of cells of the hair follicle, optimizing culture conditions that translate to in vivo formation of de novo hair follicles post implantation. The goal of the project is to increase understanding in pathways involved in hair follicle development and alopecia. As it pertains to the ‘skin-on-a-chip’, I have developed a microfluidic skin model for the investigation of mechanoregulation in hypertrophic scarring and keloid formation. The microfluidic skin model achieves physiological spatial patterning of human epidermal keratinocytes and a vascularized ‘dermis.’ Integrated with a mechanical actuation system to mimic stretching of the skin, I am assessing cellular crosstalk and the mechanical response and dysregulation of keloid cells compared to non-diseased cells. With the platforms established, my long-term continued efforts will be to develop research strategies to study mechanical dysfunction and tissue repair as it pertains to soft tissue pathophysiology.

Education:
• PhD, Bioengineering, December 2013, University of Pennsylvania
• BS, Biomedical Engineering, May 2008, Rensselaer Polytechnic Institute

Research/Work Experience:
• University of Pennsylvania, 2014–present
  Postdoctoral Fellow, Primary Advisor: Dongeun Huh, PhD; Co-advisors: Dr. George Cotsarelis, MD, Dr. Susan W. Volk, VMD, PhD
• University of Pennsylvania, 2008 – 2013
  Graduate Research Assistant/Doctoral Candidate, Bioengineering; Advisor: Robert L. Mauck, PhD
• Rensselaer Polytechnic Institute, 2007 – 2008
  Undergraduate Research Assistant, Biomedical Engineering; Advisor: Jan P. Stegemann, PhD

Selected Publications:

Awards/Honors:
Ruth L. Kirschstein NRSA F32 Individual Postdoctoral Fellowship, NIH, 2016–2018
University of Pennsylvania Institute for Regenerative Medicine Postdoctoral Fellowship, 2015
University of Pennsylvania Department of Dermatology NRSA T32 Fellowship, 2014
BAILEY V. FEARING, PhD
Biomedical Engineering, Washington University in St. Louis, St. Louis, MO, 63130  baileyfearing@wustl.edu

Research Overview:
My doctoral research involved understanding the immunomodulatory abilities of a keratin-based biomaterial, and its ability to promote repair and regeneration following spinal cord injury. My findings showed that a keratin hydrogel can promote functional recovery following spinal cord hemisection in the rat through mechanisms that may include an ability for keratin to interact with immune responder cells to drive a more anti-inflammatory, regenerative phenotype to support repair. These studies indicate a keratin biomaterial is able to support repair due to its innate immunomodulatory abilities, that has left me interested to study how keratin and other naturally-derived biomaterials may regulate repair and regeneration in multiple tissues. My interest in spine and tissue regeneration led me to pursue postdoctoral research on studies of intervertebral disc (IVD) mechanobiology. My work focuses on elucidating mechanisms by which cell-matrix interactions regulate a healthy phenotype in nucleus pulposus (NP) cells of the human IVD. These studies implicate several mechano-sensitive transcription factors (TEAD, SRF) and their associated co-activators (YAP/TAZ, MRTF, respectively) in characterizing the interaction of NP cells with substrates of varying stiffness, that contribute to differences in NP cell phenotype and bioactivity. This research advances my interest in understanding the mechanisms that regulate how cells interact with biomaterials, and further reveals a novel use of biomaterials to maintain a healthy, juvenile NP cell or even revert a pathological cell type to a healthy one for IVD tissue regeneration.

Education:
Ph.D., Wake Forest University, May 2014, Molecular Medicine and Translational Science, “Keratin Biomaterial for Treatment Following Spinal Cord Hemisection Injury and Investigation of Secondary Damage Mechanisms”
B.S./B.S., Guilford College, May 2007, Biology/Health Sciences

Research/Work Experience:
Postdoctoral Scholar, Washington University in St. Louis, St. Louis, MO 2015-present
Postdoctoral Scholar, Duke University, Durham, NC, 2014-2015
Guest Lecturer, Mechanobiology of Cells and Matrices (MEMS/BME 5565), Washington University, St. Louis, MO Fall 2016
Program for Future Faculty in STEM, Washington University in St. Louis, St. Louis, MO, 2016-2017
Technology Transfer Intern, Wake Forest University, Winston-Salem, NC 2007-2008

Selected Publications:
Fearing BV, Jing L, Est SE, Buchowski JM, Zebala LP, Gupta MC, Setton LA. Mechanosensitive transcription factors regulate human nucleus pulposus cell phenotype. In preparation
Fearing BV, Hartley C, Dayton O, Sherwood G, Aboushwareb T, Van Dyke ME. Treatment of a spinal cord hemitranssection injury with keratin biomaterial hydrogel elicits recovery and tissue repair. ISRN Biomaterials; 2014

Awards/Honors:
Ruth L. Kirchstein NRSA Fellow (1F32AR070579-01A1; Impact score: 10; Percentile: 2.0), 2017-present
Best Poster Award – Spine Section, Orthopaedic Research Society, March 2017
Society for Biomaterials, Student STAR award honorable mention, April 2013.
1st Place Poster Award, Wake Forest University Graduate Student Research Day, March 2013
Teacher Recognition, WU-CIRTL Program for Future Faculty in STEM, May 2017
Research Overview:
My research in orthopaedic biomechanics spans injury biomechanics, motion analysis and finite element analysis. My unique graduate student and work research experiences have allowed me to develop expertise in a breadth of orthopaedic biomechanics areas. My MS project involved developing a finite element model of the femur for fracture risk assessment during ambulation of a child with osteogenesis imperfecta (OI) type I. After completing my MS degree, I continued to work in this research area as well as injury biomechanics and accident reconstruction. I acquired skills using MADYMO software alongside dynamics and biomechanics to determine injury likelihood in various scenarios. During 2011, I became manager of the motion analysis lab. I have developed and overseen a variety of motion analysis research projects, both upper and lower extremity, as well as testing of clinical gait analysis patients. In the midst of this, I decided to obtain my PhD while maintaining my full-time job. My PhD project built upon my previous research in OI. This research has elucidated the importance of considering the muscular forces of the gluteal muscles on femur stresses during walking for persons with OI. I also identified a delayed firing of the gluteus maximus muscle in a population of children with OI type I compared to their age- and gender-matched peers. My work additionally examined the use of CT scans for patient-specific finite element model development. This experience aligns with my career goals of using motion analysis and biomechanical modeling to improve mobility and reduce/prevent musculoskeletal injuries.

Education:
PhD, Biomedical Engineering 2016, Marquette University
MS, Biomedical Engineering, 2007, Marquette University
BSE, Biomedical Engineering, 2004, University of Iowa

Research/Work Experience:
- Research Assistant Professor, 2016-Present, Marquette University (MU)/The Medical College of Wisconsin (MCW), OREC/Department of Biomedical Engineering/Department of Orthopaedic Surgery
- Research Engineer, 2011-2016, MU/MCW, OREC and Department of Orthopaedic Surgery
- Senior Research Technician, 2008-2011, MU/MCW, OREC
- Graduate Research Assistant, 2007-2008, MU/MCW, OREC. Advisor: Gerald F. Harris, PhD, PE
- Graduate Teaching Assistant, 2005-2007, MU, Department of Biomedical Engineering

Selected Publications:

Awards/Honors:
Rare Diseases Clinical Research Network (RDCRN) Certificate Program, 2016-2017
Research Overview:
My research focuses on developing biomedical image analytic tools to characterize tissue for better healthcare. As a postdoc research fellow, my research involves in big data analysis on optical coherence tomography (OCT) and computed tomography (CT) images. In particular, I am working on characterization of human cardiac tissues and breast tissues using deep learning and identifying lung macroscopic patterns using Bayesian machine learning models. My doctoral dissertation addressed image analytic issues along three directions: i) developing compressed sensing tools to enhance and simplify OCT images and ultrasound images; ii) developing machine learning tools to identify suspicious regions in human heart and human breast; iii) developing visualization and informatics tools to analyze ultrastructure in heart and cervix. The image analytic tools work collaboratively to meet the unmet needs in guidance of the treatment of arrhythmias, the prevention of preterm birth, and early detection of breast cancer. To date, my research has resulted in 2 filed patents, 11 peer-reviewed journal papers (8 as the first or equally contributing first author), 7 refereed conference papers, and 27 conference presentations (16 talks and 11 posters) in the realms of biomedical image processing, bio-optics, biomechanics, and clinics.

Education:
Ph.D. in Electrical Engineering, Columbia University, Feb 2017
M.E. in Electrical Engineering, Stevens Institute of Technology, Dec 2013
M.E. in Communications and Information System, Chinese Academy of Sciences, July 2010
B.E. in Electrical Engineering, Nanjing Univ. of Sci. & Tech., July 2007

Research/Work Experience:
Postdoctoral Research Fellow, Structure Function Imaging Laboratory, Columbia University 2017 - Present
Research Assistant, Structure Function Imaging Laboratory, Columbia University 2013 - 2016
Research Assistant, Airborne Microwave Remote Sensing Laboratory, Chinese Academy of Science 2007 - 2010

Selected Publications:

Awards/Honors:
SPIE Student Travel Grant, 2017
BMES Student Travel Award, 2015
SPIE Optics & Photonics Education Scholarship, 2014
Wei foundation scholarship, 2013
Outstanding scholarship (0.1%) for undergraduate student, 2007
Meritorious Winner of mathematical contest in modeling (MCM), 2006
Research Overview:
My academic and research expertise is at the interface of biomechanics, biotransport, and nanotechnology. Specifically, I establish and harness biomechanical principles to predict and modulate physiological functions with applications in soft tissues. To accomplish that, I use image based biomechanics, molecular biological techniques, cell-micro/nanostructure interactions, and modeling. As a faculty, in my pre-tenure years, I shall commit to investigating a few emerging areas of systems mechanobiology particularly applied in musculoskeletal and neural systems for therapeutic and diagnostic purposes. Therefore, my proposed research has a fundamental science component as well as a clinical/translational element. As a long-term career vision, I would engage in multiscale biomechanics and resulting emergent behavior research with applications in several areas of bioengineering including early disease diagnostics and therapeutic interventions. I have the motivation, academic background, publication records and training to execute the proposed research. In my doctoral research, I investigated the poroelastic cell-interstitial fluid-extracellular matrix interaction in the native tissue microenvironment through developing new experimental techniques and I created predictive models for the design of tissue engineering/processing. In my postdoctoral research, I have established a new image based (any modality, any scale) spatiotemporal biomechanical measurement technique. I am applying that at micro scales such as cell and nucleus to understand mechanobiology of cardiomyopathy, skeletal muscle dystrophy, traumatic brain injury and epigenetic regulations. At larger scales, such as tissues and organs, I am applying the same technique for disease diagnostics and prediction with applications including osteoarthritis and degeneration of intervertebral discs. I am also developing new optical clearing based imaging techniques to investigate musculoskeletal pathophysiology at systems level that leads to new horizons of pathophysiological understanding, not possible to achieve using traditional reductionist approaches.

Education:
• Ph.D., December 2014, Mechanical Engineering, Purdue University
• M.Tech., Mechanical Engineering, 2010, Indian Institute of Technology, Madras, India
• B.E., Mechanical Engineering, 2008, Jadavpur University, India

Research/Work Experience:
• Postdoctoral Researcher (Advisor: Corey P Neu, Ph.D.), Dept. of Mechanical Engineering, CU Boulder, Aug 2015 - present
• Postdoctoral Researcher (Advisor: Corey P Neu, Ph.D.), Dept. of Biomedical Engineering, Purdue University, Jan-Jul 2015
• Graduate Researcher (Advisor: Bumsoo Han, Ph.D.), Dept. of Mechanical Engineering, Purdue University, Aug 2010-Dec 2014

Selected Publications:

Awards/Honors:
• Editors’ Choice Article, 2012, Measurement Science and Technology
• Ward A. Lambert Graduate Fellowship, Purdue University, 2014
• Travel Award, NSF Biomechanics and Mechanobiology program grant, ASME SBC 2013
• “Finalist Certificate” in Ph.D. level student paper competition at ASME SBC 2013
• Graduate Teaching Award, Purdue University Graduate School, 2014
• Magoon Award for outstanding teaching assistantship at Purdue University, 2013
RICCARDO GOTTARDI, PhD

1Orthopaedic Surgery, and Chemical Engineering, University of Pittsburgh, 450 Technology Drive, BSP II, Pittsburgh, PA, 15219,
2Ri.MED Foundation, Via Bandiera, 11, Palermo, PA, 90133, Italy
rig10@pitt.edu

Research Overview:
The Gottardi laboratory focuses on 3D organoid models to study musculoskeletal tissues crosstalk in health and disease with the longterm goal of developing new therapeutic approaches, advanced drug screening and predictive toxicology. I engineered a unique, patent-pending, in vitro microphysiological system that is the core technology of a CASIS-funded project to study bone loss in space and the protective effects of bisphosphonates against osteochondral damage in microgravity (role: Co-I, total funding: $364,190 for 1.5 years). In the future, I am particularly interested in leveraging mechanobiology and endocrine signals to protect and regenerate osteochondral tissue. Specifically, I received pilot NIH funding (Role: PI, funding $42,061) by the AR3T consortium to identify in vitro mechanically driven mechanisms of differentiation and integration of repair tissue with native cartilage and subchondral bone, and use these findings to improve in vivo rehabilitation regimens that promote long term cartilage repair. In a second project, I am exploring sex specific endocrine effects on cartilage and bone with the support of a Ri.MED Foundation grant (Role: PI, total funding $299,334 over 2 years), combining the exploratory in vitro screening of my tissue-on-chip platform with in vivo validation. Furthermore, in order to study drugs cross-system interactions and disease mechanisms, I am developing novel, 3D printing based micro-bioreactors for more rapid, real-time monitoring of cellular processes using cells with reporter genes. This is an emerging approach to drug screening and predictive toxicology and a priority for multiple funding agencies. Very recently, my unique in vitro model has been key to secure European Union funding for a large consortium that combines in vitro outcomes with clinical big data analysis to develop predictive approaches for the diagnosis and treatment of osteoarthritis (consortium funding: ~$5,879,000, role: co-PI, partner funding: ~$470,000). Finally, in the past 2 and a half years, I have recruited 6 foreign visiting graduate students whose work under my mentorship is resulting in 7 manuscripts either published, submitted, or in preparation.

Education:
• University of Genova, Italy, April 2007, Ph.D. Bioengineering and Nanotechnology. Advisor: Dr. Roberto Raiteri
• University of Pisa, Italy, October 2003, M.Sc. Applied Physics (Medical Physics), Advisor: Dr. Cesare Ascoli
• University of Pisa, Italy, January 2003, B.Sc. Physics, Advisor: Dr. Cesare Ascoli

Research/Work Experience:
• Research Assistant Professor, University of Pittsburgh, Pittsburgh, PA, January 2017 - present
• Postdoctoral Fellow, University of Pittsburgh, Pittsburgh, PA, May 2011 - December 2016
• Postdoctoral Fellow, University of Genova, Italy, April 2007 - May 2011

Selected Publications:
4. Conoscenti G, D’Urso G, Iannetti L, La Carrubba V, Brucato V, Tuan RS, Zunino P, Gottardi R. @ Dual fluidic bioreactor obtained by 3D printing, for osteochondral and other biphasic tissue constructs targeted at high throughput screening. Submitted to Lab on a Chip @corresponding author.

Awards/Honors:
2017 Young Investigator Award at the 2nd Fusion Conference on Musculoskeletal Development and Regeneration
2016 Iris Klarman Women’s Health Fellowship Award from the Foundation for Women’s Wellness
2016 Pitt Innovator Award
2011-2016 Ri.MED Foundation postdoctoral fellowship (Stipend + Research funding, total over 5 years: $625,000)
2015 First prize at the Penn Orthopaedics 2015 Cartilage Repair Symposium
2014 Fellowship for the AAOS/ORS Musculoskeletal Sex Differences Throughout the Lifespan Research Symposium
2014 Best Poster at the annual University of Pittsburgh Postdoctoral Association Symposium
Research Overview:
My research goal is to better understand neural systems of individuals with mild Traumatic Brain Injury (TBI), also known as Concussion, utilizing advanced Magnetic Resonance Imaging (MRI) such as functional MRI (fMRI) and Diffusion Tensor Imaging (DTI) with more reliable methodologies and mathematical models. 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. In 2010, 2.5 million emergency room (ER) visits, hospitalizations, or deaths were associated with TBI in the United States. Most of the TBI incidents are mild. Mild TBI are so subtle that Computed Tomography (CT) or conventional MRI often fail to detect abnormalities in the brain. Yet, mild TBI can introduce detrimental deficits to those individuals, which may last the rest of their lives. In contrast to such significant impact of TBI on society and individuals, much more TBI research should be conducted. In this context, the overarching goals of my TBI research are to (1) develop neuroimaging biomarkers for diagnosis of Mild TBI in a more reliable, objective fashion, (2) to characterize improvements of the brain network following rehabilitation in TBI, and (3) to mathematically model temporal dynamics of TBI.

Education:
1. PhD, 2011, Purdue University, School of Electrical and Computer Engineering
2. BE, 2002, Korea University, School of Electrical Engineering

Research/Work Experience:
1. Mar 2017-Present, Research Scientist, University of Texas at Dallas, Center for Brain Health, School of Behavioral and Brain Sciences
2. Jun 2013-Feb 2017, Postdoctoral Research Associate, University of Texas at Dallas, Center for Brain Health, School of Behavioral and Brain Sciences
3. Apr 2011-May 2013, Postdoctoral Research Associate, Washington University in St. Louis, Department of Neurology, School of Medicine
4. Jan 2007-May 2011, Research Assistant, Purdue University, School of Electrical and Computer Engineering
5. Summer 2000, Research Intern, Korea University, School of Electrical Engineering

Selected Publications:

Awards/Honors:
2. Friends of BrainHealth, 2015-2016, $25,000, Project: Brain-based Predictors of Rehabilitation Outcomes in Traumatic Brain Injury
3. Travel Grant Award, Jun, 2015, The Neurotrauma 2015 Symposium
4. ILJU Academic and Cultural Research Foundation Fellowship, 2006-2009
5. Valedictorian, Feb 2002, Korea University, College of Engineering
UMER HASSAN, PhD
Bioengineering, University of Illinois Urbana-Champaign, Urbana, IL, 61801  uhassan2@illinois.edu

Research Overview:
Translational Nano Molecular Technologies for Infectious Disease Theranostics
Infectious diseases remain the leading cause of mortality around the world. Infectious disease management consists of, (1) identifying the microbial cause(s) of an infection, (2) initiating antimicrobial therapy, and (3) controlling host immune response to infection. Sepsis (a potentially life-threatening complication of an infection) has the highest burden of death and cost about $24 billion to the U.S. healthcare system. More than 5 million patients are admitted annually to ICUs in the United States, of these, severe sepsis strikes to more than 1 million people. In response to infection, the pro and anti inflammation responses in patients can trigger a cascade of changes that can result in multiple organ failure and subsequent death. Personalized-theranostics for sepsis could drastically reduce the use the broad-based antibiotics, reduce the time to appropriate treatment, and dramatically increase survival rates. My research program will focus on the following challenges: (1). Immuno-Engineering: I will develop POC biosensors to monitor patients' immune system and develop therapeutic interventions for its precise control and modulation. (2). Precision Pharmacotherapy (Patient-specific antibiotic resistance and drug discovery). Antibiotic resistance is one of the emerging challenges and is critically important in septic patients. Finding out the patient resistance at PoC and determining the patient specific therapeutics is the key area to address this problem. (3). Real-time In-vivo Theranostics: In-vivo real-time immune response monitoring for disease theranostics is one of the grand-challenges. I will work towards developing a wearable, skin patch for long-term use that doesn’t trigger inflammation or necrosis.

Education:
M.S. Electrical and Computer Engineering, University of Illinois Urbana-Champaign (2011-13)

Research/Work Experience:
My graduate and postdoctoral research has been focused on developing translational biomedical devices for disease diagnosis. I have worked on HIV/AIDS and cancer chemotherapy management through blood cell counting. I developed a differential immunocapture technology for specific leukocyte enumeration from a drop of whole blood. In clinical studies biochip enumerated CD4 and CD8 T cells for HIV/AIDS diagnostics using HIV infected patient samples (Sci. Trans. Med., 2013). The clinical studies of AIDS biochip were done in collaboration with Champaign-Urbana Public Health District (Nat. Protoc., 2016). Currently, as a Research Scientist at University of Illinois and a research affiliate at Carle Foundation Hospital, I am actively involved in a project for sepsis stratification, a leading cause of death in the hospitals worldwide. Recently, I have developed a biosensor to quantify the CD64 expression on neutrophils from whole blood and completed clinical studies at Carle Hospital (Nat. Comm., 2017).

Selected Publications:

Awards/Honors:
1- Brandt Early Career Investigator Award in Precision Medicine (2017).
2- Postdoctoral Award to participate in Future of Bio-Science Graduate and Postdoctoral Training Conference, Denver, CO (2017).
3- Baxter Young Investigator Award by Baxter International Inc. (2016)
4- Emerging Engineer Award, Engineering Council, UIUC, (2015).
6- University Funded Research Cozad New Venture Competition Award, UIUC, (2014).
7- Our Common Future Fellowship by Volkswagen Foundation to work with Global Young Faculty at Essen, Germany, (2010).
8- Fellowship to participate in GEM4 summer school on cellular and molecular mechanics (NSF funded), (2009).
VICTOR HERNANDEZ-GORDILLO, PhD
MIT, MIT, 77 Massachusetts Av, 16-463, 16-463, Cambridge, Massachusetts, 02139 - vhermand@mit.edu

Research Overview:
Organoids have gained relevance in stem cell biology, drug discovery and disease modeling because they resemble aspect of the native organ. Organoids can be generated using patient-derived stem cells. Matrigel, a laminin-rich hydrogel, is the preferred substrate for these stem cells. However, Matrigel is ill-defined, varies from lot to lot, and contains numerous bioactive soluble proteins (EGF, etc) that affect stem cell proliferation and differentiation. Exactly how these soluble factors impact drug discovery (synergist or antagonist with the test drug), or stem cell morphogenesis, is unknown. This limits parsing the impact of the matrix and the soluble factors in stem cell morphogenesis. Further, the biophysical properties of Matrigel cannot be tailor to accommodate other applications beyond growing the organoids. Thus, there is a need to create a defined and reproducible matrix for organoid culture and in-vitro assays. My research focuses on integrating well-defined, easy-to-assemble, and reproducible semisynthetic matrices with stem cell biology concepts and applications. We use intestinal organoid as a model, however, the concepts and applications can be extended to other tissue/organs, either in homeostasis or disease. For decades, biomaterials have been built to understand how cells recognize cues from the extracellular matrix (ECM). My research builds upon this knowledge to engineering semisynthetic matrices with cues derived from natural polymers to guide the differentiation of intestinal stem cell into the various cell types found in vivo. Furthermore, the stromal cells (myofibroblast and immune cells) that are important in disease models such as intestinal fibrosis can also be incorporated into the synthetic matrix. These matrices can also be tailored in terms of stiffness, degradability, and geometry to generate tissue-like structures in 3D or 2.5D configurations. The resulting organotypic models of the intestine would be used to study basic cell-cell, and cell-ECM interactions. The concepts learned using the intestine could be transferred to build other organotypic models in which the ECM, stroma and epithelial cells are present and that are needed and sought after in the pharmaceutical industry.

Education:
Massachusetts Institute of Technology, Cambridge, MA. April 2014-to present. Postdoctoral Research Associate. Mentor: Linda Griffith, PhD
Purdue University, West Lafayette, IN. May 2013. PhD Biological Sciences. Mentor: Jean Chmielewski PhD
Oklahoma State University, May 2005. M.Sc. Plant Pathology, Advisor: Carol Bender PhD
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
2000-2002 Undergraduate research Assistant, Colegio de la Frontera Sur, Tapachula, Chiapas Mx

Selected Publications:

Awards/Honors:
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, Sigma Xi Purdue University poster competition
2011 Invited Speaker to the Gordon Collagen Research Seminar, NH
2002-2005 Fulbright Scholarship for Master Degree
MICHAEL R. HILL, PhD
Research Fellow, School of Mathematical Sciences, University of Nottingham, University Park, Nottingham NG7 2RD
michael.hill@nottingham.ac.uk

Research Overview: I am a biomechanical engineering passionate about applying mechanics principles to solve clinical problems. My work primarily focuses on characterizing the structural and mechanical properties of cardiovascular and pulmonary tissues, such as right ventricular myocardium, the cerebral artery wall, and lung airway wall. I have served as Principal Investigator on 4 fellowships and grants and co-authored 3 additional successfully funded applications, totaling $425k. I have published 12 academic papers, including first author of 3 journal articles and second author of a book chapter, with 3 recent submissions under review (1 first author). I have presented 9 academic conference talks and authored 27 additional abstracts for presentation at international meetings. I have over 10 years of medical research experience in leading engineering teams to develop custom electro-mechanical biomaterials testing devices. I have mentored or supervised 43 students, including a BMES award-winning undergraduate research team and 9 Mechanical Engineering Senior Design teams. I have guest lectured 3 courses on biodynamics and tissue growth and remodelling, and I have served as a teaching assistant for 4 semesters. My research focus has been on: * Computational modelling of soft tissue mechanics and growth and remodelling * Partnering with cross-functional teams of clinicians, scientists, and engineers on projects to improve patient welfare * Delivering custom mechanical and electronic devices and protocols for testing biological tissues and biomaterials * Leading cutting edge research projects to develop accurate, physiologically realistic biomechanical models of soft tissues * Exploiting new microscopic imaging techniques to determine the role of microstructure in the overall function of tissues and organs.

Education:
• University of Pittsburgh, December 2011. PhD, Bioengineering
• University of Alabama at Birmingham, May 2006. MS, Biomedical Engineering
• Mississippi State University, May 2004, BS, Biological Engineering

Research/Work Experience:
• University of Nottingham, UK, Research Fellow, School of Mathematical Sciences, 03/2015 - present
• University of Texas at Austin, Post-doctoral Fellow, Institute for Computational Engineering and Sciences, 03/2012 – 02/2015
• University of Pittsburgh, Research Engineer, Trauma Division, Department of Orthopaedic Surgery, 06/2011 – 03/2012 *
• University of Pittsburgh, Graduate Research Fellow, Department of Bioengineering, 08/2006 – 05/2011
• Tohoku University, Japan, Visiting Research Fellow, Department of Neuroendovascular Surgery, 06/2008 – 08/2008

Selected Publications:

Awards/Honors:
• UK Multi-Scale Biology Network Support for International Collaboration with the University of Missouri, 2017
• Ruth L. Kirschstein National Research Service Award (NRSA) [F32], 2013-2015, National Institutes of Health (NIH)
• Postdoctoral Fellowship, SouthWest Affiliate, 2013, American Heart Association (AHA)
• Finalist, PhD Competition, ASME Summer Bioengineering Conference, 2011, ASME Bioengineering Division
• Biomechanics in Regenerative Medicine (BIRM) Graduate Fellowship, 2006-2008, NIH/NIBIB
• Graduate Research Fellowship, 2006-2010, National Science Foundation
Jerome Irianto, PhD
School of Engineering and Applied Science, University of Pennsylvania, 129 Towne Building, 220 South 33rd Street, Philadelphia, PA, 19104 - iriantoj@seas.upenn.edu

Research Overview:
Mechanobiology has been the common theme throughout my research career. My graduate work looked at the consequence of osmotic challenge on chondrocytes. I discovered that alterations in osmolality leads to changes in chromosome condensation state that dictate nuclear enzymes accessibility and translates to changes in transcription as measured by microarray. For my postdoctoral work, still focusing on mechanobiology, I entered the cancer biology field by studying the consequence of constrictions in cancer cell migration. Here, we showed that constricted migration of an osteosarcoma line causes damages to the nucleus and DNA, followed by lasting and inheritable genomic, transcriptomic and phenotypic changes, which may contribute to the inter/intra tumor heterogeneity observed in the disease.

Education:
PhD in Medical Engineering, 2008 to 2013
Queen Mary, University of London, London, UK
“Nuclear Related Responses to Osmotic Challenge in Chondrocytes”
MEng in Medical Engineering (First class Hons.), 2004 to 2008
Queen Mary, University of London, London, UK
“Diffusivity of Heterogeneous Agarose Constructs” and “The Design and Testing of a Physiological Flow Generator”
A-level: Mathematics (A), Chemistry (A), Biology (B). AS-level: Physics (A), 2002 to 2004
St. Andrew’s Sixth Form College, Cambridge, UK.

Research/Work Experience:
Post-doctoral Research Assistant, May 2013 - present
School of Engineering and Applied Science, University of Pennsylvania, Philadelphia, PA.
Research on the consequence of confined cancer cell migration, which also involves extensive bioinformatics analysis from RNA and DNA sequencing experiments. Result in 8 research papers, a book chapter, 4 review papers and a coverage by dailymail.co.uk.
Post-doctoral Research Assistant, March 2013 - May 2013
Institute of Bioengineering, Queen Mary, University of London, London, UK.
Research on several different aspects in cartilage tissue engineering, mainly involve confocal imaging and extensive image processing with MATLAB. Result in 5 research papers (including the work done as a PhD candidate).
Market Researcher, 2005 - 2008
Language Recruitment Services, London, UK.
Representing various companies, perform primary market research for clients in Malaysia and Indonesia, in Indonesian and English.
Volunteer, 2005 - 2008
The Royal London Hospital, London, UK
Research Assistant, 2005
Université de Montréal, Montreal, Canada

Selected Publications:

Awards/Honors:
Trans-network PSOC, NCI/NIH (5U54 CA193417-03, US$ 95,000, 1 year) 2017
“Genetic tracing of cell migration with self-targeting CRISPR-Cas9 at a single-cell resolution”
QMUL College DTA studentship (£23,500 per annum, incl. tuition fees, 3 years) 2008
EPSRC and Human Frontier Science Program (3 years) 2008
Student poster prize (the Bioengineering11 meeting) 2011
Howard Kidman Prize (outstanding academic achievement) 2008
Anthony Gordon Pooley Memorial Prize (outstanding academic achievement) 2006
PIYUSH K. JAIN, PhD
Institute of Medical Engineering & Sciences, Massachusetts Institute of Technology, 77 Massachusetts Ave, Room 76-473, Cambridge, MA, 02139 - piyushj@mit.edu

Research Overview:
My research focuses on engineering new light-responsive tools to control biological processes and on developing nanotechnology-based platform to deliver large biomolecules for diagnostics and therapeutics. During my graduate research in Prof. Simon H. Friedman’s lab at UMKC, I developed a set of photochemical tools to achieve light activated RNA interference by modifying the ends of siRNA with photocleavable groups and applied the technology to pattern gene expression in cells using light. Later, I created a light activated insulin depot that can release insulin on demand for type I diabetics and reduce painful injections by developing a photocleavable crosslinker containing clickable functionality to link insulin and resin via photocleavable groups. As a part of my postdoctoral research in Prof. Sangeeta Bhatia’s lab at MIT, I have been interested in advancing the light-controllable systems for in vivo applications and in developing nanoparticle systems for the delivery of peptides, proteins, and nucleic acids. I developed a light-activatable CRISPR/Cas9 system using photocleavable oligonucleotide complements of sgRNAs and applied them to control genome editing of multiple genes concurrently using light with improved specificity. In another project, we developed a photoresponsive protease nanosensors carrying synthetic peptide substrates for more reliable detection of secreted protease activity in the tumor microenvironment in a mouse model of colorectal cancer in the urine. More recently, we have successfully developed an efficient targeted nanoparticle approach to deliver CRISPR/Cas9 in vivo. Given my experience with the delivery and modification of nucleic acids and proteins, including CRISPR/Cas9, I am interested in engineering new tools for genome editing as well as in improving the current tools and applying them for a range of applications including imaging, understanding biology, and treatment of diseases. My long-term goal is to translate these systems into patients for better disease diagnosis and treatment.

Education:
• PhD, 2013, University of Missouri-Kansas City, USA
• Bachelor of Pharmacy, 2006, Dr. H.S. Gour University, India

Research/Work Experience:
• Massachusetts Institute of Technology (MIT), Institute for Medical Engineering and Science, 2013-Present
  o Postdoctoral Associate, 2013-2017, Advisor: Prof. Sangeeta N. Bhatia, MD, PhD
• University of Missouri-Kansas City (UMKC), 2006-2013
  o Graduate Research Assistant, 2006-2013, Advisor: Prof. Simon H. Friedman, PhD
  o Graduate Teaching Assistant, 2007-2008, Medicinal Chemistry I & II
  o Guest Instructor, Fall 2009, Medicinal Chemistry I (as a part of the Preparing Future Faculty Fellowship)

Selected Publications:

Awards/Honors:
• Dissertation Research Fellowship– Awarded to only 4 PhD students in the University, UMKC (2011-2012)
• Preparing Future Faculty Fellowship– Awarded to only 5 PhD students in the University, UMKC (2008-2011)
• Best Poster Awards- Annual Health Sciences Research Summit, UMKC (2011, 2012 & 2013)
• American Chemical Society Travel Awards- ACS Division of Biological Chemistry (2009 & 2010)
ALI JALALI, PhD
Children's Hospital of Philadelphia, 74 Parkview Circle, Wayne, PA, 19087 - ali.jalali@villanova.edu

Research Overview:
A central theme of my research is the development of mathematical and computational models, tools, and technologies that enable the analysis of physiological variables and measurements as well as information in electronic health records for better understanding of complex diseases and prediction of patients' outcomes, with the goal of patient specific management, monitoring, and therapy. My research philosophy and vision revolves around the idea of integrating computational physics-based models, machine learning techniques and clinical expert opinion and knowledge in a single unified predictive algorithm framework. This framework is capable of combining different layers of information in order to reveal hidden patterns which exist in the data.

Education:
PhD in Engineering, 2015, Villanova University
MSc in Mechanical Engineering, 2008, K.N.Toosi University of Technology
BSc in Materials Engineering, 2005

Research/Work Experience:
Lead Data Scientist, Prime Technology Group, July 2016-Present
Adjunct Faculty, Teaching, Villanova University, Summer 2017
Postdoctoral Research Fellow, Children's Hospital of Philadelphia, Jan 2015- July 2016

Selected Publications:
3- A Jalali, E Buckley, J Lynch, P Schwab, DJ Licht, C Nataraj, Prediction of Periventricular Leukomalacia (PVL) Occurrence in Neonates After Neonatal Heart Surgery IEEE Journal of Health and Biomedical Informatics, (18) 1453 - 1460, 2014. (This paper has been cited in year book of International Medical Informatics Association as 1 of only 25 papers worth mentioning in the area of clinical decision support systems.)

Awards/Honors:
Best Graduate Student Award, Villanova University, 2015
Best Paper Award, Society for Technology in Anesthesia 2016
Best Paper Award, Computing in Cardiology 2007
HAE LIN JANG, PhD
1Instructor at Division of Engineering in Medicine, Harvard Medical School, 2Associate Bioengineer at the Division of Engineering in Medicine, Department of Medicine, Brigham and Women’s Hospital. Boston, MA 02139, USA
haelin@mit.edu, hjang@bwh.harvard.edu

Research Overview:
My research aim is to treat currently incurable musculoskeletal diseases. For this, I have received extensive training in the fields of biomaterials, nanotechnology, stem cell engineering, and tissue engineering. During my Ph.D., I developed a strong research background in material sciences and engineering, especially about the synthesis of nanoparticles and fabrication of hybrid biomaterials. Notably, I was the first to develop a facile synthetic method for whitlockite (Ca$_{13}$Mg$_2$(HPO$_4$)$_2$(PO$_4$)$_2$), which is the second most abundant mineral in bone, and demonstrated its superior biocompatibility compared to commercialized bone implant materials in vivo. In addition, I designed and built bioceramic scaffolds containing tree-like nanochannels to promote fluid and nutrient supply, while securing its mechanical strength. I also created several organic/inorganic hybrid materials for biomedical applications, including hydroxyapatite coated polyetheretherketone (PEEK) hybrid material to overcome inertness of PEEK to treat degenerative spine diseases. The technique for engineering spine implant was transferred to the Biotechnology start-up company. During my postdoc training period at Harvard Medical School, I extended my research experience on generating functional tissues by investigating complex interplays among bone minerals, cells/proteins, and other tissues, including blood vessel, nerve, and muscle tissues, to recapitulate their spatiotemporal organizations and functions. In 2016, my research idea about controlling composition and structure of 3D cell-laden bone implant at the nanoscale by using bioprinting was awarded from NIH as an R21 project.

Education:
• Seoul National University, Korea, February 2014. PhD, Materials Science and Engineering
• Seoul National University, Korea, February 2008. BS, Materials Science and Engineering

Research/Work Experience:
• 1Brigham and Women’s Hospital, Harvard Medical School, 2Harvard-MIT Division of Health Sciences and Technology, 3Wyss Institute for Biologically Inspired Engineering, Harvard University, 2015-2016 Post-Doctoral Researcher; Advisor: Ali Khademhosseini, PhD
• Seoul National University, Korea, 2010-2014 Graduate Research; Advisor: Kug Sun Hong, PhD & Jae Hyup Lee, MD, PhD

Selected Publications:
5. Hae Lin Jang, Kyoungsu Jin, Jae-hun Lee, Younghye Kim, Seung Hoon Nahm, Kug Sun Hong, and Ki Tae Nam* “Revisiting the whitlockite, the second most abundant biomimetic in bone: Nanocrystal synthesis in physiologically relevant condition and biocompatibility evaluation” ACS Nano 8: 634 (2013)

*A currently submitted three manuscripts and preparing six manuscripts as a last corresponding author.

Awards/Honors:
National Science and Technology Scholarship (2004-2007); Grand Prize for Thesis Research, Seoul National University (2007); Full Tuition Scholarship, Seoul National University (2008); Brain Korea 21 Fellowship (2008-2010); Lecture & Research Scholarship, Seoul National University, Korea (2010); Brain Korea 21 Fellowship (2012-2013); Honorable Mention for Young Chemist, Metrohm USA (2016)
Research Overview:
My current postdoctoral work at Northwestern University has been focused on the development of patient-specific vascular grafts for the treatment of peripheral arterial diseases (PAD). My research projects include 1) biomaterials design for polymer-ECM composite vascular grafts; 2) stem cell engineering and regenerative medicine to generate patient-specific vascular cells; and 3) non-invasive imaging techniques for monitoring of biomaterials and living cells in vascular repair and regeneration. My career goal is to become an independent researcher and educator in biomedical engineering, to build an internationally recognized research program, and to translate my research from the laboratory into clinical use for the benefits of patients with diabetic vascular diseases. Presently, I am searching for a tenure-track position in biomedical engineering, in the area of vascular bioengineering and regeneration. I have the training, expertise and motivation to establish an externally funded research program, which builds upon my prior work and extends to new scientific territory.

Education:
Ph.D. in Biomedical Engineering, 2013, Illinois Institute of Technology
B.S. in Bioengineering, 2008, Southeast University

Research/Work Experience:
Northwestern University, 2013-2017
Postdoctoral Fellow, Biomedical Engineering; Advisor: Guillermo Ameer, Sc.D.
Illinois Institute of Technology, 2008-2013
Graduate Research Assistant, Biomedical Engineering; Advisor: Eric Brey, Ph.D.
Edwards Hines Jr. VA Hospital, 2009-2013
Research Service; Advisor: Eric Brey, Ph.D.
KeyGentec Biotech Inc, 2008
Research Intern, Research and Development

Selected Publications:

Awards/Honors:
Tissue Engineering and Regenerative Medicine International Society (TERMIS) World Congress Travel Award (2015)
American Heart Association (AHA) Postdoctoral Fellowship (2014)
Chicago Biomedical Consortium (CBC) Postdoctoral Award (2014)
Sigma Xi Award for Excellence in Research and Scholarship (2013)
BRIAN P. JOHNSON, PhD  
Biomedical Engineering, University of Wisconsin, 1111 Highland Ave, 6009 WIMR, Madison, Wisconsin, 53705  
bpjohnson5@gmail.com

Research Overview:  
My career goal is to prevent birth defects and cancer by developing new approaches to identify chemicals that disrupt critical intercellular interactions not covered by current high-throughput screening assays. As a graduate student, I trained in both toxicology and cancer biology. My research projects involved teasing apart complex, cell type specific responses in mouse models and isolate these cell type specific effects ex vivo. These challenges led me to pursue postdoctoral training in biomedical engineering, where I could effectively develop the tools needed to disentangle human and animal tissues ex vivo and then reconstruct critical cell:cell interactions in vitro for controlled study. My current work involves developing advanced high-throughput screening platforms to identify chemicals that disrupt Hedgehog signaling and steroid homeostasis in human development and cancer progression. I've developed two novel multi-culture platforms that blur the lines between in vitro and in vivo for improved chemical screening. The first platform, dubbed the MICRO-MT was developed in response to the Transforming Toxicity Testing Challenge (challenge.gov) through the NIH and EPA. We were awarded a phase 1 prize (Role: PI) for developing a microtiter plate based co-culture system to add metabolic competence to high throughput screening (HTS) assays for use in drug development and toxicity screening (in contention for second stage prize). We were also awarded a SEED grant (Role: PI) to develop high-throughput cytotoxicity and endocrine disruption assays in the MICRO-MT. In another project, I conceptualized, designed, and manufactured an innovative organotypic screening platform to identify genetic and chemical insults to Hedgehog signalling that together lead to cleft lip and palate (SOT and Teratology Society best poster awards). Finally, to anchor the translational relevance of these platforms, I work with a urological surgeon, oncologist and pathologist to acquire live human prostate tissue samples for dissociation and downstream culture and functional analyses in microfluidic devices. This work has recently been funded through an observational DOD supported clinical trial to understand the molecular basis for therapeutic responsive and resistant tumor foci. My interdisciplinary training as a toxicologist, cancer biologist and biomedical engineer provide me with the unique skillset to develop transformative translational technologies that tackle persistent challenges in toxicological and clinical research with an eye toward disease prevention.

Education:  

Research/Work Experience:  
•Postdoctoral Fellow: University of Wisconsin - Madison (2014-present)  
•Member/Manager: Onexio Biosystems LLC, Madison WI (2016-present)

Selected Publications:  
•Morgan MM*, Johnson BP*, Livingston MK, Schuler LA, Alarid ET, Sung KE, Beebe DJ Personalized in vitro cancer models to predict therapeutic response: Challenges and a framework for improvement Pharm. & Therap., 2016 *co-1st 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:  
•Wisconsin State Economic Engagement and Development Grant (Role: PI, $150,000 direct costs)  
•NIH & EPA Transform Tox Testing Challenge Semi-finalist (Role: PI, $10,000 phase 1 prize May 2016, ongoing)  
•Howard Hughes Medical Institute Teaching Fellowship (2012)  
YOUNG BOK(ABRAHAM) KANG, PhD
Surgery, Massachusetts General Hospital, Harvard Medical School, and Shriners Hospitals for Children, 51 Blossom street, Shriners Hospitals for Children, Room 417, Boston, MA, 02114  heavenboki@gmail.com

Research Overview:
My research lies at the intersection between microfabrication/microfluidics and biotechnology/bioengineering. My graduate work at Seoul National University is associated with a biosynthesis of antibiotic precursor through combined enzymatic pathways. During my Ph.D. at Drexel University, I have developed the micro-engineered in-vitro liver model using microfluidic devices to mimic the liver sinusoid and investigated cell-cell/cell-substrate interaction. I also was involved in other research experiences related to applications of microfabrication and microfluidics (e.g. microdroplet generation, and flow-induced voltage generation over monolayer graphene). As a postdoctoral researcher in the Center for Engineering in Medicine, Harvard Medical School/Massachusetts General Hospital, I am studying the development of novel microfluidic platforms for actively controlled in-vitro liver zonation. The developed liver model has been used for liver zonation study and drug metabolism/toxicity. In addition, I am working on the development of hypoxia on a chip using oxygen sensor integrated on microfluidic devices. This in-vitro hypoxia model will be used for study in targeting hypoxia in cancer therapy, wound healing, and ischemia disease treatment. Furthermore, I am involved in other projects by using BioMEMS technology such as liver slices in perfusion culture and miRNAs in liver toxicity/disease. Moreover, I have an extensive experience in writing grant/fellowship proposals. My future research interests will include the development of 1) micro-/nanomanufacturing technologies, 2) bio-inspired engineering organ/disease models, 3) biomechanics studies, 4) healthcare diagnostic microfluidic devices, and 5) biosensors. With a unique set of skills including experimental microfabrication/ microfluidics and biomedical engineering, I am well suited to make important contributions in the interdisciplinary fields of bioengineering and MEMS.

Education:
Ph.D. 09/2011-09/2015, Mechanical Eng. and Mechanics, Drexel University, Philadelphia, USA.

Research/Work Experience:
Postdoctoral researcher, 12/2015-Present, Harvard Medical School/Massachusetts General Hospital/Shriners Hospitals for Children.
Teaching assistant, 09/2011-09/2015, Mechanical Eng. and Mechanics, Drexel University.

Selected Publications:
5) Y.B. Kang, J. Eo, H. Bai, M.L. Yarmush, and O.B. Usta, Actively controlled zonation of primary human hepatocytes in various liver metabolisms using a gradient microfluidic device, Under internal review for Journal submission

Awards/Honors:
04/2015, Leroy L Resser Endowed Fellowship Award at Drexel Univ.
2011-2015, Research Assistant Fellowship and Teaching Assistant Fellowship at Drexel Univ.
12/2014, Best presentation award in 2014 annual bioscience and engineering symposium at NIH-KSA.
04/2014, The Kling Lindquist Fellowship Award at Drexel Univ.
06/2013, Outstanding paper presentation nomination in 2013 Transducer Conference.
05/2011, Outstanding employee award in Celltrion Inc.
05/2003, Outstanding presentation award in the Korean Society of Industrial and Engineering Chemistry.
JINHO KIM, PhD
Biomedical Engineering Department, Columbia University, 622 W 168th Street, New York, NY, 10032  jk3185@columbia.edu

Research Overview:
The main objective of my research is to establish technologies that allow minimally invasive disease diagnosis and targeted therapeutic delivery for efficient and safe treatment of lung diseases such as acute lung injury, airway infection, and asthma. My work will increase treatment outcome of many lung diseases by offering accurate disease diagnosis and effective treatment options. During my doctoral study, my research primarily focused on developing BioMEMS devices for identification and quantification of target molecules, proteins, and cells using molecular reporters. In particular, I created a microfluidic chip for automated generation of oligonucleotides (i.e., aptamers) that could bind to specific biological or chemical targets. In the chip, all the essential processes required for aptamer generation was integrated resulting in greatly reduced operation time from several weeks to less than 10 hours with significantly reduced reagents needed. This device allowed low-cost and rapid aptamer generation for a wide range of applications including drug discovery, clinical diagnostics, and therapeutics. My postdoctoral research utilizes my technical backgrounds in medical device and imaging system development for treatment of respiratory diseases. My recent work has focused on creating an image-guided robotic device that can navigate within the complex airway tree and administer therapeutic materials at target regions with improved spatial resolution. This device can promote locally concentrated therapeutic effects at pathologic sites resulting in enhanced outcomes for lung disease treatment. In addition, I constructed a near-infrared imaging system that enables visualization of labeled molecules or cells administered into the lung for non-invasive and real-time assessment of lung disease treatment progress. My research experience in the past years has established a strong foundation for my future research aimed to enhance the treatment outcomes of various lung diseases using a multidisciplinary approach.

Education:
• PhD, Mechanical Engineering, Columbia University, New York, NY (10/2013)
• MPhil, Mechanical Engineering, Columbia University, New York, NY (10/2012)
• MS, Mechanical Engineering, Temple University, Philadelphia, PA (05/2009)
• BS, Mechanical Engineering, Temple University, Philadelphia, PA (05/2007)

Research/Work Experience:
• Postdoctoral Research Scientist, Biomedical Engineering Department, Columbia University (08/2013 – present), Advisor: Gordana Vunjak-Novakovic, PhD
• Research Assistant, Mechanical Engineering Department, Columbia University (09/2009 – 07/2013), Advisor: Qiao Lin, PhD
• Research Assistant, Mechanical Engineering Department, Temple University (09/2007 – 05/2009), Advisor: Jim Chen, PhD

Selected Publications:

Awards/Honors:
• Translational Fellows Award, Columbia University (2016 – 2017)
• Young Investigator Travel Grant Award, TERMIS Americas 2014 conference (2014)
• Recipient, Raymond & Beverly Sackler Pilot Research Grant (2013 – 2015)
• Outstanding Poster Paper Finalist, MEMS 2013 conference (2013)
• Finalist, 2007 Collegiate Inventors Competition (2007)
• Best Senior Design Project Award, Temple University (2007)
• President’s Scholar Award, Temple University (2007)
MELISSA KINNEY, PhD
1Stem Cell Program, Boston Children's Hospital, Boston, MA, 2Department of Biological Engineering, MIT, Cambridge, MA melissa.kinney@childrens.harvard.edu

Research Overview:
Stem cell-derived organoids promise broad translation potential for applications ranging from drug screening to transplantation. However, owing to a dearth of quantitative analyses, approaches generally lack the comprehensive understanding necessary to inform design parameters and judiciously perturb these complex systems. As an interdisciplinary bioengineer trained in both stem cell biology and computational systems biology, I aim to address this critical need within stem cell engineering while also contributing to advances in diverse multicellular systems (e.g., cancer, developmental biology, disease models) and bioengineering disciplines. Broadly, I plan to study how phenotypic heterogeneity, a long-recognized guiding principle of embryonic development, can be modeled and controlled to advance stem cell engineering. To accomplish this, my laboratory will integrate principles of: 1) stem cell dynamics, 2) tissue engineering and 3) systems biology to study how multicellular cues collectively dictate cell fate in engineered tissues. During my doctoral research with Todd McDevitt at Georgia Tech, I became intrigued by the interplay between extrinsic stimuli and cell intrinsic cues that direct patterning of pluripotent stem cells in three-dimensional spheroids. Focusing on the stem cell biophysical microenvironment, I established that very simple physical cues, such as bioreactor mixing conditions, profoundly influence stem cell biology, including the engagement of cell-cell adhesions, Wnt/B-catenin signaling, and ultimately cardiac cell fate. Reciprocally, I found that cell intrinsic morphogenesis, via cytoskeletal reorganization and ECM deposition, also induces biophysical changes. These studies highlight the interplay between the spheroid microenvironment and stem cell fate and highlight opportunities for continued synergy between tissue engineering and stem cell biology. Through collaborative endeavors, I also explored models of cell state dynamics and intercellular communication, both of which comprise fundamental tenets of my independent interests. While establishing a powerful platform for tissue modeling, my doctoral research exemplified the need for novel, quantitative approaches to advance the field of organoid biology. Thus, I continued my training with George Daley (Harvard) and Douglas Lauffenburger (MIT), with the objective of applying systems-level modeling to stem cell biology. I have analyzed microarray and next generation sequencing data to elucidate molecular processes driving advances in hematopoiesis, development and disease. This work has underscored the need to integrate a priori information and network analytics to make the jump from jumbled lists of genes to biologically meaningful pathways. In particular, through integrated bioinformatics analysis, I uncovered divergent, yet complimentary epigenetic mechanisms that define cell fate by cementing lineage specificity and restricting multipotency. In addition, I established a resource for the systems analysis of gene regulatory networks in hematopoietic specification and identified a novel signaling pathway implicated in terminal erythropoiesis. Together, this work provides a foundation for the utility of systems biology to define stem cell fate and establishes novel analytics upon which I will build models of multicellular systems.

Education:
2014, Ph.D., Biomedical Engineering, Georgia Institute of Technology & Emory University
2008, B.S., Biomedical Engineering, Boston University

Research/Work Experience:
2014-present, Postdoctoral Research Fellow, Boston Children’s Hospital, Harvard Medical School & MIT
2008-2014, Graduate Research Assistant, Georgia Institute of Technology

Selected Publications:

Awards/Honors:
Hematology Postdoctoral Training Grant (T32), Brigham & Women’s Hospital, 2014-2016
Ph.D. Thesis Award, Georgia Tech Sigma Xi, 2015
Predoctoral Fellowship, American Heart Association, 2012-2014
Young Investigator Award, Wake Forest Institute for Regenerative Medicine, 2013
F.L. Bud Suddath Research Award, Petit Institute for Bioscience and Bioengineering, 2013
Graduate Research Fellowship, National Science Foundation, 2009-2012
ESAK LEE, PhD
Wyss Institute for Biologically Inspired Engineering, Harvard University, 3 Blackfan Circle, Boston, MA, 02115
esak.lee@wyss.harvard.edu

Research Overview:
My research interest is to understand lymphatic and blood vessel morphogenesis, homeostasis and disease pathogenesis. Toward this end, I am working to develop novel 3D experimental systems, cellular and molecular tools and in vivo models to better understand the mechanisms by which cells regulate and respond to biological and mechanical cues. During my doctoral research in Aleksander Popel’s research group at Johns Hopkins University, I explored tumor-lymphatic/blood vessel interactions in cancer metastasis using a new in vivo mouse model for rapid onset of metastasis and biochemistry/cell biology tools. I also developed novel peptides to inhibit lymphangiogenesis and angiogenesis using bioinformatics-guided methods to treat breast cancer. As a postdoctoral fellow in Christopher Chen’s research group at Boston University and Harvard Wyss Institute, I am working to complement my expertise in lymphatic/blood vessels and cancer with organs-on-chip platforms to further extend the focus of my research to biomimetic 3D models of lympho-vascular and cancer biology. Currently, I am integrating novel 3D microfluidic platforms and cutting-edge molecular and cellular techniques with in vivo mouse models to develop a unique approach to investigating the mechanisms of lymphatic and vascular diseases and cancer. Specifically, I discovered a previously undescribed mechanism by which inflammation impairs lymphatic drainage by abnormally tightening lymphatic junctions. The molecular signaling pathway involved in this mechanism is known to be a master regulator of cell and matrix interaction. I am currently working to investigate this pathway as a mechanism by which inflammation contributes to lymphedema, a major lymphatic disorder, by employing relevant in vivo mouse lymphedema models. In addition, I am focusing on tumor cell and immune cell interaction to blood and lymphatic vasculatures. I studied how pancreatic tumor cells invade and displace blood endothelium for metastatic progression in the 3D pancreatic tumor- onchip and in mouse tumor models. Moreover, I revealed that inflammation-associated lymphatics hampered dendritic cells trafficking, which may explain why lymphatic dysfunction often deregulates immunity. In summary, this training and my scientific contributions have built a foundation for my long-term research goal of building new tools for investigating the effects of biochemical and physical cues on cell and tissue biology with the eventual goal of informing new and better treatments for lympho-vascular diseases and cancer.

Education:
- PhD, 2014, Johns Hopkins University, Baltimore, MD
- MS, 2008, Seoul National University, Seoul, Korea
- BS, 2006, Seoul National University, Seoul, Korea

Research/Work Experience:
- Wyss Institute at Harvard University, Postdoctoral Fellow (Advisor: Christopher S. Chen, MD, PhD), 2014 – present.
- Boston University, Visiting Postdoctoral Fellow, 2014 – present.
- Johns Hopkins University, Graduate Research Assistant (Advisor: Aleksander S. Popel, PhD), 2009 – 2014.

Selected Publications:

Awards/Honors:
- LE&RN Postdoctoral Fellowship ($94,536.00), Lymphatic Education & Research Network (LE&RN), 2016 – present.
- TL1 Postdoctoral Fellowship ($47,844.00), NIH/NHLBI, 2015 – 2016.
- MOGAM Science Scholarship ($10,000.00), Green Cross, 2013.
- Runner-up Award, Sidney Kimmel Comprehensive Cancer Center, Johns Hopkins University School of Medicine, 2012.
JUNWEI LI, PhD
Bioengineering department, University of Washington, 3720 15th Ave NE, Foege building N561, Seattle, WA, 98195
ljw1209@uw.edu

Research Overview:
1) In vitro tools for disease diagnosis
Discovered enzyme accelerated dopamine polymerization phenomena. Developed a simple, universal ‘add-on’ technology (dubbed EASE) that converts the ordinary sensitivities of common bioassays to extraordinary ones, and that can be directly plugged into the routine practices of current research and clinical laboratories. Demonstrated the adoption of EASE in both clinical diagnosis and scientific discovery, such as ultrasensitive HIV detection, direct visualization of the Zika virus in tissues, and of low-abundance biomarkers related to neurological diseases and cancer immunotherapy.

2) In vivo tools for disease imaging
Demonstrated the advantage of using conjugated/ conducting polymers for photoacoustic (PA) imaging, and applied this finding to enable a new magnetomotive PA (mmPA) imaging technique applicable for ultra-sensitive primary tumor diagnosis and clinical prognosis.

3) Stimulating tools for disease intervention
Developing non-invasive, transfection-free, nanoacoustic platforms to in vivo modulate of cellular signaling at currently unattainable levels of spatial and temporal resolution, accurately control neuron response, and brain functions. Fully-developed and –evaluated nanoacoustic technology promises to yield better therapies for brain diseases, such as Parkinson’s, Alzheimer’s, and depression.

Education:
University of Washington, August 2017. PhD, Department of Bioengineering & Material Science and Engineering

Research/Work Experience:
2012-2017 Department of Material Science and Engineering & Bioengineering, University of Washington
2014-2017 Howard Hughes Medical Institute (HHMI) student research fellow Graduate Research Assistant; Advisor, Xiaohu Gao, Matt O'Donnell and Larry Zweifel

Selected Publications:

Awards/Honors:
HHMI International Student Research Fellowship, 2015-current
Tom and Jeannette Delimitros Endowed Fellowship, 2012-2013
GSFEI Travel Awards (University of Washington), 2016
GPSS Travel Grants (University of Washington), 2016
Young Creative Undergraduate Talent Fellowship (Zhejiang, China), 2011-2012
Undergraduate Research Fellowship (Zhejiang, China), 2010-2011
Member of Chu Kochen Honor College (top 5% students in Zhejiang University), 2008
YAMIN LI, PhD
Biomedical Engineering, Tufts University, 4 Colby street, Medford, MA, 02143 - yamin.li@tufts.edu

Research Overview:
Dr. Li's research is focusing on nanomedicine and developing safe and efficient nanomaterials to deliver bio-active molecules (drug, protein, gene, etc.) for disease diagnosis and therapy.

Education:
09/2011 – 06/2016 Ph.D. in Polymer Chemistry and Physics, Advisor: Prof. Shiyong Liu
University of Science and Technology of China (USTC), Hefei National Laboratory for Physical Science at the Microscale (HFNL)
University of Science and Technology of China, Department of Polymer Science and Engineering

Research/Work Experience:
08/2016 – present Postdoctoral Scholar, Advisor: Prof. Qiaobing Xu
Tufts University, Department of Biomedical Engineering

Selected Publications:

Awards/Honors:
09/2016 Top 10 Reviewers for Biomaterials Science (Royal Society of Chemistry)
04/2016 Best Presentation Award (First Prize), 5th Annual Meeting of Chemistry, USTC
12/2015 Yuan Dong Scholarship Award (First Prize), USTC
11/2015 Best Presentation Award (Second Prize), 9th Annual Meeting of Science, HFNL
01/2015 Best Young Researcher, International Symposium on Transnational Nanomedicine, Guangzhou
12/2014 Yuan Dong Scholarship Award (First Prize), USTC
12/2013 Yuan Dong Scholarship Award (Second Prize), USTC
11/2013 Best Presentation Award (Second Prize), 7th Annual Meeting of Science, HFNL
04/2013 Best Presentation Award (First Prize), 2nd Annual Meeting of Chemistry, USTC
12/2012 National Scholarship, Ministry of
DYLAN McCREEDY, PhD
Laboratory Medicine, University of California, San Francisco, CA, 94158  dylan.mccreedy@gladstone.ucsf.edu

Research Overview:
I am a postdoctoral scholar working with Drs. Todd McDevitt, Cliff Lowell, Linda Noble, and Steve Rosen at the University of California in San Francisco. My long-term research goal is to elucidate the signaling events and pathways that drive the activation of immune cells and to develop novel therapies that reduce inflammatory damage following spinal cord injury. My current research focuses on L-selectin, an adhesion receptor on immune cells, and its role in inflammation. Under the guidance of Drs. Noble and Rosen, I have shown that L-selectin mediates neutrophil accumulation and activation acutely after spinal cord injury. This work has led to an NIH F32 postdoctoral fellowship and a manuscript that has been recently submitted.1 Earlier this year, Dr. Noble moved to the University of Texas and I have continued my research in Dr. Lowell’s lab, where I am performing in-depth analysis of immune cell activation mediated by L-selectin. Concurrent to my work on L-selectin, I initiated a collaboration between Drs. McDevitt and Noble, where I transplanted human stem cell-derived V2a interneurons into the murine spinal cord. In addition, I have developed novel methods in the McDevitt lab for visualizing immune cells and spinal cord circuitry in whole spinal cord tissues using tissue clearing techniques and lightsheet imaging.

As a postdoctoral fellow in Dr. Lonnie Shea’s lab at Northwestern University and the University of Michigan, my research focused on neural stem cell transplantation and novel methods for assessing axon regeneration in spinal cord bridges. For personal reasons, I moved to San Francisco after 18 months in Dr. Shea’s lab. I performed my graduate studies with Dr. Shelly Sakiyama-Elbert at Washington University in St. Louis, where I developed a simple and inexpensive method to generate high purity progenitor and postmitotic motoneuron populations for spinal cord injury repair.4,5 My research experiences have prepared me to lead interdisciplinary research that will elucidate inflammatory damage and develop robust therapies to limit paralysis after spinal cord injury.

Education:
2008-2013 Ph.D., Biomedical Engineering, Washington University in St. Louis, St. Louis, MO
2004-2008 B.S., Biomedical Engineering, University of Utah, Salt Lake City, UT

Research/Work Experience:
02/15-Present Post-Doctoral Fellow, University of California San Francisco and Gladstone Institutes
07/13-01/15 Post-Doctoral Fellow, University of Michigan
06/08-07/13 Graduate Research Assistant, Washington University in St. Louis
July 2009 Participant, Spinal Cord Injury Research Training Program, Ohio State University, Columbus, OH
2005-2008 Undergraduate Research Assistant, University of Utah, Salt Lake City, UT

Selected Publications:

Awards/Honors:
2016-present NIH F32 National Research Service Award - 1F32NS096883
2016* Craig H. Neilsen Foundation fellowship (*recommended for funding, withdrawn to accept NIH F32 Award)
2014 Best Mentor, Northwestern-Niles West Mentoring Program (MORE)
2010-2013 NSF Graduate Research Fellowship Program Award - DGE-1143954
KEVIN J. MCHUGH, PhD
Koch Institute for Integrative Cancer Research, Massachusetts Institute of Technology, 77 Massachusetts Ave, 76-637, Cambridge, MA, 02139 - kjmchugh@mit.edu

Research Overview:
My main research interest is in the design of biomaterials for drug delivery and tissue engineering. As a graduate student I developed a microfabrication-based method to produce tissue engineering scaffolds and demonstrated the ability of these scaffolds to promote the organization and function of a variety of epithelial and endothelial cell types. As a postdoc, my work has focused on developing a novel method to produce microparticles that exhibit long-term pulsatile release for single-injection vaccination. I am now seeking a tenure-track position at the assistant professor level where I plan to leverage my background in polymeric device design to pursue translational and platform technologies.

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

Research/Work Experience:
Postdoctoral Associate/Fellow under Robert S. Langer, Sc.D. (2014-Present)
David H. Koch Institute for Integrative Cancer Research
Massachusetts Institute of Technology
Ph.D. Student under Magali Saint-Geniez, Ph.D. (2010-2014)
Schepens Eye Research Institute
Harvard Medical School
Undergraduate Research Assistant under James M. Anderson, M.D., Ph.D. (2008-2009)
Departments of Biomedical Engineering, Pathology, & Macromolecular Science
Case Western Reserve University

Selected Publications:

Awards/Honors:
• Ruth L. Kirschstein (F32) Postdoctoral Fellowship, National Institutes of Health, 2017-2019
• National Institutes of Health LRP Award, 2016-2018
• Koch Institute Marlena Felter Bradford Research Travel Fellowship, 2016
• Controlled Release Society Foundation Allan Hoffman Student Travel Grant, 2016
• Biomedical Engineering Society Fall Meeting Travel Grant, (National Science Foundation, 2007; Case Alumni Association, 2008; BMES, 2012; BMES 2013)
• GEN TEN Award, Genetic Engineering and Biotechnology News, 2012
• Association for Research in Vision and Ophthalmology Travel Grant, National Eye Institute, 2012
SAMIRA MOORJANI, PhD  
Physiology & Biophysics, University of Washington, 1705 NE Pacific St., HSB G-424, Box 357290-0009, Seattle, WA, 98195  
moorjani@u.washington.edu

Research Overview:  
My research interests lie at the intersection of engineering and the neurosciences. Specifically, I am interested in the development and use of combinatorial strategies for enhancing motor plasticity and facilitating repair after motor injury. One of my research projects involves development and use of electrochemical neural interfaces for inducing motor plasticity in intact monkeys. Towards this goal, monkeys are trained on a wrist target-tracking task, then chronically implanted with metal microwires and microtubes. After implantation, neural signals are recorded and activity-dependent electrical stimulation is delivered to strengthen connections between motor-cortical sites. To induce long-lasting plasticity, we are exploring focal delivery of plasticity-enhancing neuromodulators, such as brain-derived neurotrophic factor, at the electrically-stimulated sites. A second project involves using similar hybrid approaches to facilitate forelimb motor recovery after cervical spinal-cord injury in rats.

Education:  
Ph.D., Biomedical Engineering, December 2010, The University of Texas at Austin (Overall GPA: 3.9/4.0)  
M.S., Bioengineering, August 2003, Pennsylvania State University, University Park  
B.E., Biomedical Engineering, July 2001, Thadomal Shahani Engineering College, University of Mumbai, India

Research/Work Experience:  
Senior Fellow, University of Washington, Seattle, 03/2014 – Present, With Dr. Eberhard E. Fetz and Dr. Steve I. Perlmutter  
Development and deployment of implantable electrochemical neural interfaces for promoting synaptic plasticity in the primate motor cortex and facilitating repair after spinal-cord injury in rats  
Senior Fellow, University of Washington, Seattle, 07/2011 – 01/2014, With Dr. Albert Folch  
Elucidation of axon-pathfinding mechanisms in the developing visual system by exposing embryonic-mice retinal explants to guidance-factor gradients generated using sophisticated microfluidic platforms  
Research Assistant, The University of Texas at Austin, 09/2005 – 07/2011, With Dr. Jason B. Shear  
Probing chemotaxis and axon-pathfinding mechanisms by focal stimulation of cell cultures using novel optofluidic technologies. Also, assisted in the development and commercialization of CellDose, a product offered by Minotaur Technologies, LLC  
Research Assistant, Pennsylvania State University, University Park, 08/2001 – 08/2003, With Dr. William O. Hancock  
Harnessing kinesin motor proteins and microtubules for microscale transport and assembly

Selected Publications:  

Awards/Honors:  
2016 – 2017 Seed Grant awarded by the NSF Center for Sensorimotor Neural Engineering at the University of Washington, Seattle  
2016 Travel Award by the NSF Center for Sensorimotor Neural Engineering at the University of Washington, Seattle  
2013 – 2015 Seed Grant awarded by the NSF Center for Sensorimotor Neural Engineering at the University of Washington, Seattle  
2010 – 2011 David Bruton, Jr. Graduate School Fellowship awarded by the University of Texas at Austin  
Student Travel Award for attending ASM Conference on Bio-, Micro-, and Nanosystems, New York, NY, 2003  
Associate Editor, Frontiers in Nanobiotechnology, November 2013 – Present  
Guest Review Editor, Neural Regeneration Research  
Guest Review Editor, Frontiers in Neural Circuits  
Vice-Chairperson, Engineering in Medicine and Biology Society of the IEEE student branch, Mumbai, India, 1999 – 2000
HADI T. NIA, PhD
Radiation Oncology, Harvard Medical School, 100 Blossom St. COX734, Boston, MA, 02169 - htnia@seele.mgh.harvard.edu

Research Overview:
Being trained as a biomechanician under the supervision of Profs. Alan Grodzinsky and Christine Ortiz at MIT, I have gained expertise and deep understanding of the fundamental concepts in nanomechanics of soft tissues. My Ph.D. research was focused on the origin of the molecular fluid-solid interaction in cartilage and its alteration in osteoarthritis. I am currently being trained as a postdoctoral researcher under the supervision of Dr. Rakesh Jain at Harvard Medical School. I have developed new experimental tools that in conjunction with mathematical modeling accurately estimate the solid stress (mechanical forces acting on solid components of the tumors) and visualize its 2-D spatial distribution in tumors and their residing host tissues (Nature Biomedical Engineering, 2017). Utilizing these tools, I have shown that solid stress levels are high in metastatic breast cancer in brain due to the confined anatomy of brain. It is not known how cancer cells survive these high levels of solid stress, which are debilitating to normal cells. Although the mechanisms by which cancer cells respond and develop resistance to “cell-physiologic stresses” (e.g., hypoxia) are well-described, the molecular machinery that cancer cells utilize to tolerate and evade solid stress, a “physical stress,” remains largely unknown. It is known that p53, the most mutated gene in breast cancers, plays a key role in developing resistance to cell-physiologic stresses. I am investigating whether breast cancer cells with inactivated p53 are more tolerant to solid stress, and can survive in a high solid stress microenvironment such as brain metastases.

Education:
• Ph.D. in Mechanical Engineering, 2013, Massachusetts Institute of Technology
• M.Sc. in Mechanical Engineering, 2010, Massachusetts Institute of Technology
• B.Sc. in Mechanical Engineering, 2003, Sharif University of Technology

Research/Work Experience:
• Harvard Medical School/Massachusetts General Hospital, Postdoctoral Associate, 2013-present
  Department of Radiation Oncology; Advisor: Rakesh Jain, Ph.D.
• Massachusetts Institute of Technology, Research Assistant, 2010-2013
  Center for Biomedical Engineering; Advisors: Alan Grodzinsky, Ph.D. and Christine Ortiz, Ph.D.
• Massachusetts Institute of Technology, Teaching Assistant, 2011
  Molecular, Cellular and Tissue Biomechanics; Instructors: Alan Grodzinsky, Ph.D. and Roger Kamm, Ph.D.

Selected Publications:
• G. Seano *, **H. T. Nia***, et. al., R.K. Jain “Solid stress from tumors impairs the surrounding brain vascular perfusion and neuronal function” submitted. *: equal contribution.
• **H. T. Nia**, et. al., A. Grodzinsky and C. Ortiz, “Aggrecan nanoscale solid-fluid interactions are a primary determinant of cartilage dynamic mechanical properties,” ACS Nano, 9 (3), 2614-2625, 2015.

Awards/Honors:
2017-2020 F32 Postdoctoral Award from NIH National Cancer Institute
2017 Best poster award (3rd place), Gordon Research Conference on Physical Sciences of Cancer
2016-2017 Tosteson Postdoctoral Fellowship Award
2016 MGPA Travel Award
2011-13 Whitaker Health Sciences Fellowship Award
2012 DeFlorez Travel Award
2008-11 Office of Naval Research (ONR) Special Fellowship Awards
2004-05 Japan Student Service Organization (JASSO) Fellowship Award
DUNG TRUNG NGUYEN, PhD
Aerospace and Mechanical Engineering, University of Notre Dame, 54717 Terrace Lane, South Bend, INDIANA, 46635
DungTrung.Nguyen.196@nd.edu

Research Overview:
In my final year of bachelor program at HCMUT, I started working in a research team for a project funded by the Vietnamese government. The aim of this project was to incorporate optimization algorithms with probability theory to calculate optimal dimensions of the cross section of steel beams. During this period, I significantly strengthened my knowledge and research skills such as mechanical design, programming, optimization algorithms, literature review, and problem solving. During my master program at the UM, I worked at the Centre of Product Design and Manufacture, on a research project to detect various defects of ball bearing using frequency domain. The defects were identified by comparing the frequencies of normal and defect bearings using experiments and numerical simulation. During my study and postdoctoral training at QUT, I worked on the Australian Research Council Future Fellowship project, which is a government funded project, investigating mechanical properties and behaviour of bone and cartilage cells using both experiments and computational modelling. In early 2016, I moved to the US to join Prof Pinar Zorlutuna’s research team as a Postdoctoral Research Associate at University of Notre Dame. I worked on a National Science Foundation funded project, using bio-nanoindentor and microfabrication techniques. As part of the project, I used the bio-nanoindentor, which operates on the same principles as an AFM, to investigate the mechanical behaviour of and propagation of mechanical signals within myocardial cells. As part of the work I also incorporated computational modelling to characterize mechanical properties and behaviour of the heart cells. I designed, optimized and completed the experimental work within six months.

Education:
Doctor of Philosophy, MAR 2015
Mechanical Engineering, Queensland University of Technology (QUT), Brisbane, QLD, Australia
Master of Engineering (1st Class Honours – GPA: 3.75/4.0), OCT 2010
Mechanical Engineering, University of Malaya (UM), Kuala Lumpur, Malaysia
Bachelor of Engineering (2nd Class Honours – GPA: 8.04/10.0; ranked 4th/415 students), FEB 2007
Mechanical Engineering, Ho Chi Minh City University of Technology (HCMUT), Vietnam

Research/Work Experience:
Postdoctoral Research Associate, FEB 2016 – current
Department of Aerospace and Mechanical Engineering, University of Notre Dame, Notre Dame, Indiana 46556, USA
Postdoctoral Research Fellow, APR 2015 – FEB 2016
School of Chemistry, Physics and Mechanical Engineering, QUT, Brisbane, QLD, Australia
Tutor, JUL 2013 – FEB 2016
School of Chemistry, Physics and Mechanical Engineering, QUT, Brisbane, QLD, Australia
Lecturer, JUN 2007 – FEB 2011
Department of Machine Design, Faculty of Mechanical Engineering, HCMUT, Vietnam

Selected Publications:

Awards/Honors:
• DEC 2013: Finalist for Young Investigator Award at 15th International Conference on Biomedical Engineering, Singapore
• FEB 2011 – MAR 2015: Postgraduate Research Scholarship, QUT, Australia
• JUL 2008 – JUL 2010: AUN/SEED-Net Master Degree Scholarship, JICA, Japan
MOLLY E. OGLE, PhD
Biomedical Engineering, Georgia Institute of Technology, 315 Ferst Drive, Biomedical Engineering, Atlanta, Georgia, 30332
molly.ogle@bme.gatech.edu

Research Overview:
My research explores strategies to promote expansion of microvascular networks for healing of musculoskeletal injuries through the control of recruitment, localization, and activity of endogenous immune cell populations. Biomaterial implants have tremendous power within the “injury niche,” a specialized injury microenvironment, to modulate the activities and recruitment dynamics of immune and progenitor cell populations through spatially localized presentation of bioactive signaling molecules, adhesive ligands, and structural elements. My studies not only strive to develop translational biomaterials to promote wound healing, but also to understand the complexities of the innate immune response to injury and how to best tune the immune response to improve healing particularly in the context of an implanted material. I have shown that recruitment of a distinct “anti-inflammatory” sub-set of monocytes through localized release of a bioactive lipid signaling molecule contributes to enhanced vascular remodeling in an inflammatory wound model. During the course of this work, I have developed methods and built expertise in intra-vital tracking of regenerative immune cell sub-populations to sites of injury, particularly within the dorsal skinfold window chamber model and more recently the mouse cranial defect model. My postdoctoral studies draw on my experience from my doctoral research in translating the endogenous protective cellular signaling networks of hypoxia in designing therapeutics for ischemic stroke and revascularization of neural tissues. Overall, my research has maintained a focus on understanding the mechanisms of fundamental endogenous repair processes in order to apply this knowledge to pathological systems and design criteria for novel biomaterials. My background in vascular remodeling, harnessing endogenous mechanisms of repair, cell signaling networks, intra-vital cell tracking, and immune cell phenotyping provide substantial expertise to lay a foundation for my long-term research goals in utilizing endogenous cellular protective pathways for translational therapeutic design.

Education:
- Emory University, Atlanta, GA - 2012, Ph.D - Biochemistry, Cell, and Developmental Biology
- University of Virginia, Charlottesville, VA – 2004, B.S. – Biology

Research/Work Experience:
- Georgia Institute of Technology, Department of Biomedical Engineering, 2012-present
  Post-doctoral Fellow, Mentor: Dr. Edward Botchwey
- Emory University, Biochemistry, Cell, and Developmental Biology, 2008-2012
  Graduate Research Assistant, Mentor: Dr. Ling Wei

Selected Publications:

Awards/Honors:
- BMES Annual Meeting Best Poster Award (2016)
- Research featured in NIH-NIAMS research spotlight (2016)
- Travel award, Biomaterials & Tissue Engineering Gordon Research Seminar (2015)
- Travel Award, Southeastern Regional Lipid Conference Research (2014)
- Georgia Tech Center for Enhancement of Teaching and Learning, Student-nominated Teaching Award (2014)
- Gandy-Diaz Senior Teaching Fellow (2012, 2013)
Research Overview:
Extracellular matrix (ECM), composing of cancer microenvironment, elicits various responses related to cancer metastasis. To investigate the role of ECM in these cancerous behaviors, I have applied nanofabricated surfaces, as in vitro models, replicating complicated in vivo ECM. With this delineated surface, my study aims at analyzing the migration behaviors relying on the combined effect of genetic or signaling states of various cancer cells on the degree of cell aggressiveness and surrounding microenvironment, specifically, ECM. For example, I have introduced that the interaction of metastatic cancers with ECM microenvironment leads the differential migration responses in the gradient of topographical ECM density and, thus determines not only the directional migration, but also dynamic patterns in cell migration trajectory. Additionally, I showed mechanical cues from topographically complex ECM can lead epithelial-mesenchymal transition dissociating cells from cell-mass, and, in turn, resulting in metastasis. In addition to applying as in vitro models to mimic cancer microenvironment, I have developed a screening tool with this nanofabricated surface based on cell migratory phenotype, the metastasis potentials, and have utilized this surface to identify metastasis-driving factors and evaluate their prognostic values.

Education:
2008-2014 Ph.D. in Biomedical Engineering The Johns Hopkins University, Baltimore, MD, USA
2001-2008 B.S. in Chemical and Biological Engineering Seoul National University, Seoul, Korea

Research/Work Experience:
2015-present Postdoctoral scholar (Advisor: Murat Gunel, MD) Department of Neurosurgery, Yale University, New Haven, CT, USA
2014-present Postdoctoral scholar (Advisor: Andre Levchenko, Ph.D.) Yale Systems Biology, Yale University, West Haven, CT, USA
2008-2014 Research Assistant (Advisor: Andre Levchenko, Ph.D.) The Johns Hopkins University, Baltimore, MD, USA
2007-2008 Research Assistant (Advisor: Tai-Hyun Park, Ph.D.) Seoul National University, Seoul, Korea

Selected Publications:

Awards/Honors:
2008-2013 Samsung Scholarship Study abroad scholarship
2007, 2001-2002 Superior Academic scholarship, Seoul National University
2008 Superior Academic scholarship, Kwanjeong Foundation
June 2012 2nd Place, SBE 6th ICBN Poster Award, Society for Biological Engineering
February 2008 Top 2 in class of 2008 (Summa Cum Laude), Dept. Of Chemical and Biological Eng. Seoul National University
October 2007 2nd Place, The 8th LG Life Engineering Contest, Korean Institute of Chemical Engineers
Research Overview:

Motivation

“A good battle plan that you act on today can be better than a perfect one tomorrow.” Reflecting on General George S. Patton’s (1885–1945) World War II quote, a common theme in medicine is that earlier interventions in the battle against disease are crucial for disease control and prevention. Classically, this theme is most often invoked in “the war against cancer,” wherein it is crucial to detect disease at its earliest possible malignant form or even in a pre-malignant form. Although recent advancements in conventional diagnostic strategies provide reasonable tools to identify certain diseases at earlier stages, we still witness difficulties, as illustrated by the marginal reduction in cancer death rates from 1950 to the present.

In general, diagnostic technologies have been underappreciated. According to a 2015 Institute of Medicine report, “The delivery of health care has proceeded for decades with a blind spot: Diagnostic errors — inaccurate or delayed diagnoses — persist throughout all settings of care and continue to harm an unacceptable number of patients.” Therefore, modern diagnostic modalities must address the urgency of early detection and the achievement of high sensitivity and specificity to enable individually tailored treatments in a cost-effective manner. In order to meet the current needs, the diagnostics field requires a paradigm shift. In this regard, the advance of nanotechnology provides the clinical and biomedical fields an unprecedented opportunity to build better detection strategies and weapons in the battle against disease. Therefore, I will place the rapidly evolving field of “nanodiagnostics” at the front line of the war on diseases.

Education:

Applied Physics, Ph.D., 2008, Cornell University
Physics, B.S., 2002, Seoul National University - South Korea

Research/Work Experience:

1. Senior Research Scientist, 2017-Present, Stanford University School of Medicine (Adviser, Prof. Sanjiv S. Gambhir)
2. Instructor, 2014-2017, Stanford University School of Medicine (Adviser, Prof. Sanjiv S. Gambhir)
5. Postdoctoral Scholar, 2008-2010, Cornell University (Adviser, Prof. Harold G. Craighead)

Selected Publications:


Awards/Honors:

3. Best Poster Award, NCI Alliance for Nanotechnology in Cancer Annual PIs’ Meeting (2016).
4. Best Poster Award, NCI Alliance for Nanotechnology in Cancer Annual PIs’ Meeting (2012).
5. Frameworks for Global Health Postdoctoral Fellowship (2011), UC Berkeley - UCSF.
JENNIFER PATTERSON, PhD
Department of Materials Engineering, KU Leuven, Kasteelpark Arenberg 44 - bus 2450, Leuven, Vlaams Brabant, 3001, Belgium
jennifer.patterson@kuleuven.be

Research Overview:
My research seeks to bridge materials science/engineering and biology to generate cutting edge solutions for current medical problems. The overall objective is to develop biomimetic and bioactive polymeric materials and controlled delivery systems. It is supported by three pillars: (i) developing novel biomaterials, specifically dynamic materials with spatially patterned bioactive factors, controlled release elements to create defined temporal profiles of biological molecules, and/or controlled degradation properties; (ii) developing novel manufacturing strategies for the creation of living implants or in vitro tissue mimetics with controlled spatial patterning, such as 3D printing/biofabrication and molecular self-assembly; and (iii) creating and characterizing cell/biomaterial constructs for a range of applications from tissue repair to in vitro cell expansion and tissue models. Specific examples include fibrillar hydrogels with independently controlled mechanical properties, peptide-functionalized hyperbranched polymers, composite scaffold designs incorporating nanotechnology, chondrogenic differentiation of progenitor cells in a 3D environment, cell-mediated mineralization of hydrogel scaffolds for bone repair, endothelial cell migration and sprouting for angiogenesis, and in vitro hematopoietic stem cell expansion and differentiation. This research program explores the materials-biology interface because these well-designed materials not only provide structural support for cells but they also help to enhance the efficacy of delivered biological molecules. I strongly believe that these materials will allow a paradigm shift in the field of biomaterials, moving from materials that simply replace damaged tissues or organs to materials that restore or regenerate tissue function.

Education:
Ph.D., Department of Bioengineering, University of Washington (UW), USA, 2001-2007
• Dissertation: Regenerative Matrices for Oriented Bone Growth in Craniofacial and Dental Repair
B.S.E., Department of Chemical Engineering, Princeton University, USA, 1994-1998
• Undergraduate Thesis: Characterization of De Novo Beta-Sheet Proteins by Electron Microscopy
• Certificate (minor) in the Program in Theatre and Dance

Research/Work Experience:
• Assistant Professor, Department of Materials Engineering, KU Leuven, Leuven, Belgium – 2011-2017
• Postdoctoral Fellow, Laboratory for Regenerative Medicine and Pharmacobiology, Institute for Bioengineering, Ecole Polytechnique Fédérale de Lausanne (Swiss Federal Institute of Technology), Lausanne, Switzerland – 2007-2011
• Graduate Research Associate, Department of Bioengineering, UW, Seattle, WA, USA – 2001-2007

Selected Publications:

Awards/Honors:
Research Overview:
My research focuses on understanding the mechanisms of early cancer metastasis and dormancy in the circulation and pre-metastatic niche. I believe that improved understanding of the rate-limiting steps in metastasis (e.g., cell arrest, extravasation, dormancy, cell growth) from imaging of the metastatic cascade at single-cell resolution in zebrafish models will help identify druggable targets in metastatic disease. We have recently demonstrated that extravasation differences lead to cell-specific organ targeting in the zebrafish model. Intravital work is supplemented by biologically-inspired in vitro models to explore key phenotypes and mechanisms. In particular, we have used microfabrication, microfluidics, and 3D cell culture tools to understand how cells navigate complex 3D environments and regulate gene expression in response to topographic cues.

In future projects, I propose to use real-time imaging of immune cells in vivo to motivate the next phase of cancer immunotherapies. Fluorescent labeling of innate immune cells in zebrafish enables observation of immune interactions with human or zebrafish cancer cells. Additionally, human immune cells and cancer cells can be co-injected in immunosuppressed zebrafish to study and observe human cancer cell-immune cell interactions in vivo. I am particularly interested in how immune cells interact with cancer cells during early metastatic dissemination and how they may be reprogrammed by exosomes secreted by the primary tumor to physically remodel and prime potential metastatic sites.

Education:
Ph.D. Chemical and Biomolecular Engineering, Johns Hopkins University (Baltimore, MD), November 2015

Research/Work Experience:

Tanner Lab, National Cancer Institute (December 2015-present)
My postdoctoral research has focused on real-time imaging of cancer metastatic organotropism in zebrafish. We are using transgenic zebrafish xenograft models to characterize the steps in cancer metastasis, from the bloodstream to organ colonization, at single-cell resolution. We have demonstrated that organ targeting of human cancer cells during metastasis can be recapitulated in the zebrafish and identified extravasation from the circulation (as opposed to cell arrest/adhesion and survival in the tissue parenchyma) as the key step leading to tropism in this model.

Konstantopoulos Lab, Johns Hopkins University (January 2011-November 2015)
My Ph.D. thesis focused on mechanisms of tumor cell migration in confined spaces. Microfabrication techniques were used to quantify cell contact guidance and traction force exertion during confined migration. Knockdown and/or pharmacological inhibition of cell contractility pathways affected force exertion and contact guidance in unconfined but not confined environments.

Selected Publications:

Awards/Honors:
• National Cancer Institute Innovation Award (2017)
• National Science Foundation Graduate Research Fellowship (May 2011-April 2014)
• Biomedical Engineering Society Graduate Design and Research Award (2013)
Research Overview:
My laboratory will develop strategies for treating dysregulated immune responses such as allergy, inflammation, and cancer through the intersection of two enabling disciplines, nanotechnology and immune engineering. At the University of Michigan, I used nanoparticles to induce antigen-specific immune tolerance and as vehicles to reprogram innate immune cell phenotypes and trafficking patterns to ameliorate inflammatory diseases. I designed a modular antigen-specific tolerance-inducing nanoparticle platform to enable functional relationships to be identified between dosing and antigen content requirements for tolerance induction. This nanoparticle platform was prepared using synthesized antigen-polymer conjugates, which allowed precise and tunable antigen loadings to be achieved that affected tolerogenic responses in vivo. In the second application, I demonstrated that nanoparticles display physicochemical property-dependent immunomodulatory properties and are useful for the treatment of sepsis and other inflammatory diseases. I have also been working with Cour Pharmaceuticals for the past two years to translate the Shea lab’s nanoparticle platform for treatment of celiac disease to a Phase 1 clinical trial. I specifically contributed to the project by designing the gliadin-encapsulating nanoparticle and working with contract manufacturers to develop scale-up procedures and a GMP product. My laboratory will be shaped by these experiences, as well as the nanoparticle synthesis and drug delivery that was the basis of my graduate research at the University of Illinois at Chicago. Here, I developed fundamental and functional relationships between nanomaterials and biological systems (i.e. nanobio interactions). I designed multiple libraries of amphiphilic copolymers with controlled molecular architectures to improve nanostructure formation by self-assembly and to precisely control cellular interactions. Relationships between micelle structural features and targeting efficiency were found to be dependent on ligand surface exposure, local poly(ethylene glycol) (PEG) density, and ligand mobility. The objectives of my independent research group will be multifaceted and include: (i) to utilize engineering approaches to develop biomaterials to precisely deliver therapeutic payloads by controlling nanobio interactions for the treatment of immunological disorders and cancer; and (ii) to develop immunomodulatory polymers to influence immune cell functions for use as novel anti-inflammatory materials and polymer-based vaccines. I believe that my multidisciplinary training in polymer chemistry, nanotechnology, and immune engineering uniquely position me to succeed in the highly competitive field of biomedical engineering.

Education:
- University of Illinois at Chicago, September 2014. PhD, Biopharmaceutical Sciences.
- University of Illinois at Chicago, December 2008. BS, Chemical Engineering.

Research/Work Experience:
- University of Michigan, 2016 – Current. Adj. Assist. Research Scientist, Biomedical Engineering; Advisor: Lonnie D. Shea, PhD.
- University of Michigan, 2014 – 2016. Research Fellow, Biomedical Engineering; Advisor: Lonnie D. Shea, PhD.
- University of Illinois at Chicago, 2009 – 2014. Grad. Research Assist., Biopharmaceutical Sciences; Advisor: Seungpyo Hong, PhD.

Selected Publications:

Awards/Honors:
- Nicholas A. Peppas Student Travel Grant Award. Controlled Release Society. 2015.
- Dean’s Scholar Award, Graduate College, UIC, 2013.
Research Overview:
My research focuses on the development of integrative multi-scale modeling tools with the power to combine molecular, cellular, and tissue level experiments with physiological and environmental data to identify complex biomarkers and uncover underappreciated pathologically-relevant pathways and novel therapeutic targets. In my graduate work at UNC Chapel Hill, I developed hybrid experimental and computational methods for molecular modeling and identification of drug-binding sites to engineer the stability and function of disease-relevant proteins and protein aggregates. In my postdoctoral work at MIT, I use multiplexing assays in combination with data from metabolic experiments to uncover immune cell communication networks implicated in disease and link them with metabolic function. These efforts have contributed to methodology development in interpreting complex results linking major systems of the body in the new field of immunometabolism. I have collaborated with clinical and medical science investigators in efforts bridging ex vivo (human) and in vivo (rodent) experiments with computational modeling to identify inflammatory molecular signatures that we target to control immune cell function by reengineering dysregulated signaling pathways. My ultimate aim is to develop and apply computational methodologies to establish low-cost and accessible diagnostic and risk-assessment tools, personalized preventative therapy, and effective treatments to halt and reverse disease.

Education:
PhD, Bioinformatics and Computational Biology, 2013, UNC Chapel Hill
BS, Honors Physics, 2008, Purdue University
BA, Honors Russian Language and Literature, 2008, Purdue University

Research/Work Experience:
Post-doctoral Research Associate, Massachusetts Institute of Technology, Department of Biological Engineering, Jan 2014-present, Advisor: Douglas A. Lauffenburger, PhD
Post-doctoral Fellow, Harvard Medical School, Molecular Pathology Unit, Jan 2014-Dec 2014, Advisor: Kevin M. Haigis, PhD
Graduate Research Fellow, University of North Carolina at Chapel Hill, Department of Biochemistry and Biophysics, Aug 2008-Dec 2013, Advisor: Nikolay V. Dokholyan, PhD
Undergraduate Researcher, Purdue University, Department of Biology, Mar 2007-Jun 2008, Advisor: William A. Cramer, PhD
Undergraduate Researcher, Purdue University, Department of Chemistry, Sept 2004-May 2006, Advisor: Jennifer S. Hovis, PhD
Ascarelli Fellow, Purdue University, Department of Physics, Jan 2004-May 2004, Advisor: Wei Cui, PhD

Selected Publications:

Awards/Honors:
Dean’s Distinguished Dissertation Award, UNC Chapel Hill, 2014
National Research Service Award Predoctoral Fellowship, NIH/NIA, 2010-2013
Director’s Award for top candidates, Biological and Biomedical Sciences Program, UNC Chapel Hill, 2008
EDGARDO RIVERA-DELGADO, PhD
Biomedical Engineering, Case Western Reserve University, 10900 Euclid Avenue, Cleveland, OH, 44106
edgardo.rivera@case.edu

Research Overview:
As a faculty candidate the aim of my future lab will be to manipulate host-guest molecular interactions to engineer therapeutics to treat osteoarthritis, tendon ruptures and other orthopaedic diseases. My goal is to develop an R01 caliber lab that produces clinically translatable orthopaedic solutions. My lab will be populated with a diverse set of trainees that will acquire expertise on computational modeling, polymer engineering and pharmacology. To achieve this research vision I plan to build upon my expertise on affinity characterization, polymer synthesis, and pre-clinical evaluation of drug delivery devices. As a graduate student I successfully applied these concepts for projects with relevance in the regeneration of urinary continence in women by codelivering bioactive proteins and stem cells [1], for the localized and sustained expression of transgene products by delivering clinically approved small molecules from cyclodextrin devices[2] and for the prevention of pathological blood vessel growth and cancer by screening a small library of antiangiogenic molecules[3-4]. As a postdoctoral fellow I reformulated the existing platform in the lab from an implantable polymeric disk to an injectable fluid polymer while retaining its affinity properties. To investigate the viability of my new formulation, I forged collaborations with other labs to develop a scientific portfolio in the repair of tendons and in the treatment of knee osteoarthritis.

Education:
M.S, Ph.D. in Biomedical Engineering, 2008, Case Western Reserve University, Cleveland, OH
B.Sc. in Industrial Biotechnology, 2008, University of Puerto Rico, Mayagüez, PR

Research/Work Experience:
2007 Fall, Research Internship at Universidad de Santiago de Compostela, Spain. “Effects of Triclosan and NaCl in the biogas production from an upflow anaerobic bioreactor” Supervisor: Juan M. Lema, Ph.D.
2006-2008, Research Assistant, Chemical Engineering Department University of Puerto Rico at Mayagüez. “Real time near infra red detection of protein production in E. coli in a bioreactor setting” Supervisor: Lorenzo Salicetti, Ph.D.
2005 Summer, Summer Internship, Amgen, Juncos Puerto Rico. “Applying statistical process control analysis in the production of biotherapeutics” Supervisor: Raquel Dompenciel, Ph.D.
2004 Summer, Math and Science mentor for under-represented high school students. Upward Bound Math Science (UBMS) Center, Buffalo, NY. Supervisor: Michelle Parente, UBMS Program Director

Selected Publications:

Awards/Honors:
2016, NSF ASSIST Travel Grant, SHPE National Conference, Seattle WA
2014, Future Faculty Workshop in Material Sciences at MIT, Boston MA
2008-2009, Medtronic Fellowship, Case Western Reserve University, Cleveland OH
2003-2008, Amgen Scholar, University of Puerto Rico at Mayagüez (UPRM)
Research Overview:
The extracellular matrix (ECM) in healthy tissues has a remarkable ability to induce normal biological function of cells even in the face of remarkable genomic abnormalities, and in turn, normal cell behavior promotes ECM homeostasis. In contrast, paired derangement of cell behavior and altered extracellular matrix typified cancers and many other disease conditions. Over the past nine years, I have addressed this problem of how cells and ECM regulate each other by assessing how cells transduce ECM configurations and developing new methods for mechanical testing in vivo and in vitro and quantitatively describing the microstructure and composition of ECM.

My lab will focus on predicting how cells remodel different ECM scenarios, determining what triggers the abnormalities in cell-ECM remodeling that mark cancers and other diseases, and developing therapies to manipulate remodeling in the context of breast development and cancer.

Education:
Postdoctoral Fellow: Cancer Biophysics/Imaging, Advisor: Mina J Bissell 2014-present
PhD: Biomedical Engineering, University of California Irvine, Advisor: Steven George 2013
MS: Biomedical Engineering, University of California Irvine, 2013
BS: Bioengineering and Applied Mathematics, University of California, San Diego 2007

Research/Work Experience:
Postdoctoral Fellow Mina J Bissell Lab, Lawrence Berkeley National Lab 2014-
• Discovered a new principle in developmental biology of extracellular matrix that cell motility could rapidly increase extracellular matrix density and biomechanics, resulting in early development of a basement membrane like layer
Graduate Student, Steven George Lab, University of California, Irvine 2008-2014
• Developed methods to describe and quantify collagen microstructure during fibroblast-mediated tissue remodeling resulting in 3 peer reviewed publications
Orthopedic Research Engineer, Rady Children’s Hospital, San Diego 2006-2008
• Managed mechanical testing projects evaluating orthopedic implants and techniques for both pure research projects and device design evaluation 4 projects (valued at $150K) resulting in 9 published papers and 2 510k regulatory applications

Selected Publications:
Selected from 19 publications and 1 in review:

Awards/Honors:
L’Oreal USA for Women in Science Postdoctoral Fellowship ($60K for 1yr) 2015
DOD Breast Cancer Postdoctoral Research Fellowship ($100k/yr for 3yrs) 2014-2017
Selected to attend the Annual Meeting of the Nobel Laureates 2011
Achievement Rewards for College Scholars ($10k/yr for 2yrs) 2011-2013
NSF Graduate Research Program Fellow ($45k/yr for 3yrs) 2010-2013
Three Best Poster Awards
ADAM G. ROUSE, MD, PhD
Neuroscience, University of Rochester, 601 Elmwood Ave., Box 603, Rochester, NY, 14642, Rochester, NY, 14620
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 brain-machine interfaces. Brain-machine interface (BMI) technology has made tremendous advances in recent years. However, current BMI 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 BMIs. Specifically, I’ve explored the integration of multi-joint hand movements and created one of the fastest, most precise BMIs replicating hand movements in a virtual hand. In the lab, I have helped analyze the neural dynamics of large populations of single neuron recordings and devised novel algorithms for decoding neural signals into BMI 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 varying the size of instructed targets to require precision in either reach direction or distance. The second aim tests whether a novel non-linear BMI decoder utilizing gain scheduling can improve upon classic fixed, linear decoders.

I have also recently started two technically focused projects to advance my research program. First, in collaboration with Dr. Tom Howard and the Robotics and Artificial Intelligence Laboratory at the University of Rochester, I am incorporating physical robotic arms into my brain-machine interface work. I will be presenting preliminary work from this collaboration at my BMES talk on Friday, Oct. 13 in Room 226B at 3:45PM. Second, in collaboration with Dr. Ben Hayden and his lab studying the neural basis of choice at the University of Minnesota, we are developing a wireless neural recording platform to allow for studying diverse motor behavior and cognitive decision making in free-ranging tasks.

Education:
Ph.D., Biomedical Engineering, May 2012, Washington University in St. Louis.
M.D., May 2012, Washington University in St. Louis.
B.S., Biomedical Engineering with 2nd Major in Economics, May 2004, Washington University in St. Louis.

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.
-Course lecturer, U. of Rochester
Two lectures to NSC 531 annually - Integrative and Systems Neuroscience, Spring 2016-Present.
One lecture to BME218–NeuroEngineering, Fall 2015.
-Teaching Assistant, Washington U., Department of Biomedical Engineering, Fall 2007. Course: Bioelectric Phenomena (BME 471)

Selected Publications:

Awards/Honors:
-NIH NINDS K99/R00 Pathway to Independence Award. 1K99NS101127. April 2017-Present.
-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.
Research Overview:
My research focuses on mathematical modeling of biomedical phenomena. As an undergraduate I designed a miniature portable mammalian cell culture incubator controlling for three variables: temperature, pH, and humidity. For my masters I worked in the Vermont Lung Center investigating the role that airway elasticity plays in lung mechanics under healthy and pathologic conditions. We found that functional evidence of the finite stiffness of the airway wall in mice with airways obstruction can sometimes be apparent in lung impedance below 20 Hz. For my PhD I investigated the use of magnetic resonance (MR) elastography as a means of non-invasively and non-destructively monitoring the growth and development of artificial cartilage. The cartilage is grown from stem cells that have been seeded onto a hydrogel scaffold. My work was to design, build, and test hydrogel phantoms that we’d use to perfect the imaging protocols. As a postdoc my work has focused on modeling electrically excitable tissue in a bidomain formulation, i.e. comprised of intra- and extra-cellular regions that occupy the same space as well as the membrane that divides them. We presented a model of neural tissue in a conductive medium stimulated by externally injected currents. The tissue is described as a conductively isotropic bidomain and the injection currents as a pair of source and sink points, solving the problem in three spatial dimensions in spherical coordinates \((r, \theta, \phi)\). These projects are unified by the fact that they all fall under the umbrella of biomedical engineering and that my contribution included a significant mathematics component. I have wanted to study blood in a mathematical, bioengineering context since all systems in physiology depend on haemodynamics in a non-trivial way. Moreover beside blood itself being connected to everything, it also connects otherwise disparate systems by e.g. carrying chemical signals. My work then will represent the confluence of two professional interests of mine: blood and mathematics.

Education:
PhD Bioengineering, University of Illinois at Chicago, August 2014
MS Bioengineering, University of Vermont, October 2009
BSE Bioengineering, Arizona State University, May 2006

Research/Work Experience:
Neuroelectricity Laboratory, Tempe, AZ, October 2014 – present
Diagnostic Systems NMR Lab, Chicago, IL, August 2010 – July 2014
Vermont Lung Center, Burlington, VT, August 2007 – August 2009

Selected Publications:

Awards/Honors:
Fellow, UIC Bioengineering Teaching Assistant, 2010 – 2014
Chief Editor: UIC Bioeng Student J, 2012 – 2013
Orchestral Cellist: UIC String Orchestra, UVM Symphony, ASU Lyric Opera (principal)
REBECCA SCOTT PhD

1Materials Science and Engineering, University of Delaware, 201 Dupont Hall, Newark, DE, 19716,
2Nemours - Alfred I. duPont Hospital for Children, 1600 Rockland Rd, Wilmington, DE, 19803
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
MARY KATHRYN SEWELL-LOFTIN, PhD
Biomedical Engineering, Washington University in St. Louis, Campus Box 1097, 1 Brookings Dr., St. Louis, MO, 63130
m.k.sewell-loftin@wustl.edu

Research Overview:
My research has been dedicated to understanding how biomechanical forces can be leveraged in tissue engineering, specifically through the development of novel biomaterial-based strategies to interrogate mechanobiology. With this in mind, I will focus my laboratory on answering questions related to the interplay of micromechanics in development and disease, discovering ways to manipulate these biomechanical factors to restore proper physiological function, treat or prevent tumor growth, and develop tools for the next generation of tissue engineering. My laboratory will initially focus on two major research areas pertaining to biomechanics in the tumor microenvironment: biomechanical regulation of angiogenesis and mechanobiology of metastatic processes. Specific areas of my interest are highlighted below: Angiogenesis—Vascular network growth in development and disease; Cell Mechanobiology—Cellular responses to mechanical stimuli; Micromechanical Tissue Properties—Tissue biomechanical remodeling in development and disease; Polymeric Biomaterials—Development of biomimetic scaffolds to direct cell growth; Epithelial to Mesenchymal Transition—Induction and control of EMT for tissue remodeling.

Education:
•Doctor of Philosophy, Biomedical Engineering, Vanderbilt University, 2014
  Dissertation: Mechanoregulation of Endocardial to Mesenchymal Transformation and Subsequent Remodeling During Heart Valve Development; Advisor: Dr. W. David Merryman
•Master of Science, Chemical Engineering, University of Alabama, 2009
  Thesis: The Localization and Behavior of Fluorescently-Tagged Magnetic Nanoparticles in Biological Systems; Advisor: Dr. Christopher S. Brazel
•Bachelor of Science, Chemical and Biological Engineering, University of Alabama, 2008
  Thesis: The Effect of Magnetic Nanoparticles on Heating and Drug Delivery in Hydrogels; Advisor: Dr. Christopher S. Brazel

Research/Work Experience:
Post-Doctoral Research Fellow, 2014-Present
Department of Biomedical Engineering, Washington University in St. Louis
Advisor: Dr. Steven C. George (2014-2017); Dr. Gregory D. Longmore (2017-Present)

Selected Publications:
•Sewell-Loftin MK, Bayer SVH, Crist EL, Hughes BT, Joison JM, Longmore GD, and George SC. “Cancer-associated fibroblasts support vascular growth through mechanical force”, Scientific Reports, In Revision.
•Sewell-Loftin MK*, Shiruie VS*, Lam S, Todd TD, Hwang PY, and George SC. "Tumor Organoids: Angiogenesis." Book Chapter, submitted Feb. 2016. Eds. Shoker S and Skarsdal A. *Authors contributed equally to this work

Awards/Honors:
•Ruth L. Kirshstein National Research Service Award Post-Doctoral Fellow (F32CA203284, 2016-2019)
•Winner Reviewers’ Choice Award—Poster Presentation, Biomedical Engineering Society Annual Meeting (2015)
•1st Place PhD Student Competition Cellular Mechanics Division, World Congress of Biomechanics (2014)
•Allan D. Callow Young Investigator Award, International Society for Applied Cardiovascular Biology (2014)
•American Heart Association Pre-Doctoral Fellow (12PRE12070154, 2012-2014)
•Provost Graduate Fellow, Vanderbilt University (2009-2014)
•Graduate Council Fellow, University of Alabama (2008-2009)
Research Overview:
My research has broadly focused on developing methods for molecular imaging and for studying single cell variability in cancer. In the lab of Arjun Raj, I first developed a method for rapid RNA fluorescence in situ hybridization (FISH) that enabled us to decrease the time to perform this assay from 6 hours to 5 minutes. This technological advance opened the possibility of using RNA FISH for point-of-care diagnostics. Thus, I next adapted this assay for detection of respiratory viruses and constructed a microfluidic chip to standardize the method and bring it to the point-of-care. My next area of research was on single cell heterogeneity in cancer therapy resistance. Specifically, I demonstrated that resistance in melanoma arises in single cells through a transient non-genetic cell state and that the application of therapy leads to a transcriptional reprogramming. These findings capture the complexity of cellular responses to therapy and ultimately suggest that alternative dosing strategies such as drug holidays or variability inhibitors could be effective modes of combating cancer plasticity. Going forward, I plan to combine my knowledge of medicine from MD training with my PhD research experience to develop molecular imaging technologies to answer questions in single cell biology and for applications in clinical pathology.

Education:
MD, anticipated May 2018, University of Pennsylvania, Perelman School of Medicine.
PhD in Bioengineering, 2017, University of Pennsylvania.
BS in Chemical and Biomolecular Engineering, 2010, Georgia Institute of Technology.

Research/Work Experience:
University of Pennsylvania, Department of Bioengineering, 2012 – 2016. Graduate Research Assistant; Advisor: Dr. Arjun Raj.
Department of Biomedical Engineering, Georgia Institute of Technology, 2006 – 2010. Undergraduate research Assistant; Advisor: Dr. Niren Murthy.

Selected Publications:

Awards/Honors:
F30 NRSA NIH Individual Predoctoral MD/PhD Fellowship from NIAID, 2015 – 2018.
First Place Oral Presentation at Penn Bioengineering Graduate Student Symposium, 2015.
Petit Undergraduate Research Scholar, Georgia Institute of Technology, 2009.
President’s Undergraduate Research Award, Georgia Institute of Technology, 2007.
HENGAMEH SHAMS, PhD
Bioengineering, UC Berkeley, 911 Lexington Ave., Apt.11, El Cerrito, California, 94530 - hengameh.shams@gmail.com

Research Overview:
Living cells sense and respond to mechanical stimuli through their adhesion sites. It is not yet clear how mechanical signals are converted to biochemical cascades inside the cell. My research has been focused on understanding how adhesion proteins transduce mechanical stimuli to biochemical signals. The current structure-based understanding of adhesion proteins’ function comes from experiments that provide static views of protein components and fall short in explaining how thermodynamic effects combined with environmental cues induce conformational changes necessary for protein function. Using molecular simulations and bioinformatics tools, we revealed the molecular basis of force-induced conformational changes in adhesion proteins both in isolation and within a complex. My other projects include studying drug delivery by carbon nanotubes, enhancing enzymatic efficiency for biofuel production, investigating ion channel activation and designing cyclotide-based integrin inhibitors for cancer treatment.

Education:
Ph.D., Applied Science, and Technology, University of California, Berkeley (5/2016)
M.S., Physics, Sharif University of Technology, Tehran (7/2010)
B.S., Physics, University of Tehran, Tehran (6/2007)

Research/Work Experience:
• University of California, Berkeley (06/2016-Present)
  Postdoctoral Fellow, Bioengineering
  Designed cyclic peptides for selectively inhibiting integrin receptors
  Determined underlying mechanism of force sensitivity of molecules based on Calponin-Homology Domains (Collaborative project with Dr. Daniel P. Fletcher’s lab at U.C. Berkeley).

  Compared the activation mechanisms of different types of integrin heterodimers
  Explored the role of alpha-actinin, an actin crosslinker, in focal adhesion formation and maturation.

• Lab Manager, Molecular Cell Biomechanics Laboratory (2014-2017)
  Research proposal development for National Energy Research Scientific Computing Center (NERSC) and Extreme Science and Engineering Discovery Environment (XSEDE) computational grants, both awarded for three consecutive rounds (2014-2017)
  Sharif University of Technology, Tehran (8/2008-12/2010)

• Research Assistant, Physics,
  Recognized a point mutation in myoglobin that changed the stability of CO association with the heme group.

• Research Scientist at Institute of Petroleum Engineering, Tehran (2008-2010)
  Examined small molecule and drug encapsulation inside carbon nanotubes.

Selected Publications:
• Shams H, Mofrad MRK. α-Actinin induces a kink in the transmembrane domain of β3 and impairs activation via talin, 2017, Biophysical Journal, 113(4): 948–956,
• Shams H, Soheilypour M, Peyro M, Moussavi-Baygi R, Mofrad MRK. Looking “under the hood” of cellular mechanotransduction with multiscale computational tools: A systems biomechanics approach, 2017, ACS Biomaterials and Science & Engineering, Special Issue
• Shams H, Golji J, Mofrad MRK. Molecular trajectory of α-actinin activation, 2012, Biophysical Journal, 103(10): 2050-2059

Awards/Honors:
Berkeley Postdoctoral Association Professional Development Award (2017)
Biophysical Society Committee on Diversity and Inclusion Travel Award (2016)
Engaged Leader Award from the National Society of The UC Dissertation Fellowship (9/2015-5/2016)
Chancellor’s Fellowship (9/2011-9/2013)
LUCAS R. SMITH, PhD
Chemical and Biochemical Engineering, University of Pennsylvania, 129 Towne Building, Philadelphia, PA, 19104
smithlu@upenn.edu

Research Overview:
As an independent investigator I will develop a mechanistic understanding of how the altered mechanics of fibrosis impair tissue function and stem cell fate. Vast amounts of research have investigated a cell’s ability to recognize specific molecules, however the mechanical sensitivity of cells is increasingly being appreciated, with many cell types requiring a specific mechanical environment for optimal function. A cell’s mechanical environment is largely determined by the extracellular matrix (ECM), which is disrupted in fibrosis. Fibrosis is particularly critical in muscle as the ECM serves not only as a cell scaffold, but to transmit the contractile forces of muscle cells to the skeleton. My studies have shown mechanically stiff tissues are observed in fibrosis, but the increased stiffness is not simply a function of the increased ECM material. A mechanical description of fibrosis necessitates the study of collagen as the primary load bearing element within the ECM. Fibrotic tissue not only impairs mechanics, but also disrupts mechanosensitive muscle stem cells’ ability to regenerate. My research will identify therapeutic architectural properties, which influence collagen degradation and offer the potential of decreased side effects and scar formation. My background investigating fibrotic muscle diseases, studying muscle regeneration, and training in biomechanics uniquely qualifies me to tackle these questions. Specifically, I will determine: (1) how disorganized collagen in fibrosis impacts matrix biomechanics, (2) how the altered collagen organization of fibrosis impacts stem cell-matrix interactions to inhibit muscle regeneration, and (3) how targeting architectural properties can produce therapeutic antifibrotics to enhance muscle function and regeneration in fibrotic diseases.

Education:
Ph.D. Bioengineering 2011, University of California, San Diego
B.S. Bioengineering, 2003, University of Washington

Research/Work Experience:
• Investigating the effect on regeneration of muscle stem cell motility through fibrotic environment causing DNA damage.
Postdoctoral Research: University of Pennsylvania (2011-2016): Department of Medicine, Adviser: Rebecca Wells, M.D.
• Discovered critical components of collagen architecture to long-range force transmission in liver fibrosis.
Department of Anatomy & Cell Biology, Adviser: Elisabeth Barton, Ph.D.
• Demonstrated collagen content doesn’t determine stiffness and exposed role of collagenase in myoblast migration.
Doctoral Research: University of California, San Diego (2006-2011), Department of Orthopaedics, Adviser: Richard Lieber, Ph.D.
• Found that stiffness in muscle contractures of children in cerebral palsy is due to fibrosis and increased in vivo strain.
Undergraduate Research: University of Washington (2002-2004), Department of Bioengineering, Advisers: Michael Regnier, Ph.D.
• Investigated how thin cooperativity impacts cardiac muscle mechanics through manipulation of myosin cross-bridge kinetics.

Selected Publications:
Smith LR, Hammers DW, Sleeper MM, Sweeney HL, Barton ER. Increased collagen cross-linking is a signature of muscles from Duchenne Muscular Dystrophy models. Muscle Nerve. 2016 Jun;54(1):71-8. PMC5067682
Smith LR and Barton ER. Collagen content does not alter the passive mechanical properties of fibrotic skeletal muscle in mdx mice. Am J Physiol Cell Physiol. 2014 May 5;306(10):C889-98. PMC4024713

Awards/Honors:
• K99/R00 Pathway to Independence, Principal Investigator, NIAMS (2016-present)
• T32 Fellowship, Pennsylvania Muscle Institute, NIAMS (2011-2013)
• Med-into-Grad Fellowship, Howard Hughes Medical Institute (2008-2009)
• Air Force Type-I Reserve Officer Training Corps Scholarship (1999-2003)
JACK RORY STAUNTON, PhD
Laboratory of Cell Biology, NIH/NCI Center for Cancer Research, 37 Convent Dr, Bldg 37, Rm 2132B, Bethesda, Maryland, 20892
jack.staunton@nih.gov

Research Overview:
How do cell and tissue mechanical properties regulate physiological and pathological processes? My vision centers around the interrogation of mechanical and biophysical aspects of cell motility, migration and proliferation in the contexts of cancer initiation, metastasis, development and aging. My research is rooted in applying advanced force spectroscopy and microscopy techniques to mechanically quantify biological systems at length, force and time scales relevant to cellular behavior. To date, I have developed and studied model systems including in vivo zebrafish animal models, ex vivo mouse animal models, and 3D biomimetic in vitro platforms including tunable ECM hydrogels. Working in teams on diverse projects and national and international collaborations has afforded me the experience to identify the experimental methods and analytical models best suited to address the biological problem at hand, and interact productively with colleagues. My postdoctoral work has focused on development of an optical trap based active micro rheology technique enabling measurement of microscale cell and tissue viscoelasticity within living organisms (zebrafish), tumor explants (mouse), and engineered 3D microenvironments. This approach enables spatial mapping of mechanical properties including nonlinear stress-strain response over a broad frequency band, opening a window into the world of forces felt and exerted by the cell. Obtaining better understanding of these complex interactions promises to present new avenues for targeted anti-metastatic therapies. In the future, I am interested in developing multimodal platforms combining modern imaging and mechanical manipulation in vivo for simultaneous visualization and force measurement within tissues of living organisms. One long-term interest is to elucidate the role of mechanical feedback in determining whether Beta-catenin translocates to the nucleus, where it regulates canonical WNT signalling, or whether beta-catenin is recruited to adherens junctions, where it participates in the control of epithelial cell growth and adhesion. My lifelong passion for discovery, learning and teaching propels me to pursue an academic career at a research university.

Education:
• National Institutes of Health, Bethesda, MD, Feb. 2015 to Present, Postdoctoral training, Mentor: Kandice Tanner, PhD.
• Arizona State University, Tempe, AZ, Dec. 2015, Ph.D. – Physics, Advisor: Robert Ros, PhD.
• Arizona State University, Tempe, AZ, Dec. 2015, M.S. – Physics, Advisor: Robert Ros, PhD.
• North Carolina State University, Raleigh, NC, May 2009, B.S. – Physics, Advisor: Robert Riehn, PhD.
• North Carolina State University, Raleigh, NC, May 2009, B.S. – Philosophy.
• Wake Technical Community College, Raleigh, NC, May 2006, A.S.

Research/Work Experience:
• Postdoctoral Fellow, National Institutes of Health, Bethesda, MD, Feb. 2015 to Present
• Graduate Research Associate, Arizona State University, Tempe, AZ, Dec.
• Undergraduate Research Assistant, North Carolina State University, Raleigh, NC, Oct. 2006 – May 2008

Selected Publications:
• Staunton JR, Vieira WD, King LF, Tanner, K. Mechanical Properties of the Tumor Stromal Microenvironment Probed In Vitro and Ex Vivo by In Situ-Calibrated Optical Trap-Based Active Microrheology. Cellular and Molecular Bioengineering. 2016;9(3).
• Blehm BH, Devine A, Staunton JR, Tanner K. In Vivo Tissue has Non-linear Rheological Behavior Distinct from 3D Biomimetic Hydrogels as Determined by AMOTIV Microscopy. Biomaterials. 2015; 83.

Awards/Honors:
• National Science Foundation Graduate Research Fellowship, Honorable Mention, 2011
• Outstanding Paper Award, ASME Global Congress on Nano Engineering for Medicine and Biology, 2013
• Poster Award, 4th Annual NCI Physical Sciences – Oncology Centers Network Investigators’ Meeting, 2013
• Poster Award, 1st Annual NCI Physical Sciences – Oncology Centers Network Investigators’ Meeting, 2011
• Scholarship, U.S. Dept. of Education GAANN Fellowship, 2009
• Scholarship, U.S. Dept. of Education SMART Scholarship, 2006
• Scholarship, North Carolina State University Academic Enhancement Scholarship, 2006
RYAN STOWERS, PhD
Mechanical Engineering, Stanford University, 418 Panama Mall, 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, fiber architecture, and stress relaxation 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 similar 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 epigenetic alterations. I have also been highly involved in a collaboration to develop a hyaluronic acid (HA) based hydrogel with dynamic covalent crosslinks that allow for stress relaxation. I have generated interpenetrating networks of this dynamic HA and collagen I to form 3D hydrogels with fibrillar architecture and tunable viscoelasticity and demonstrated that mesenchymal stem cell 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 epigenetic state.

Education:
Ph.D. Biomedical Engineering, 2014, The University of Texas at Austin
B.S. 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
NSF REU Fellow, Department of Bioengineering, University of Washington, Summer 2008

Selected Publications:

Awards/Honors:
• NIH NRSA F32 Fellowship – 2017 - Present
• Gordon Research Conference Poster Award - 2016
• MRS Best Symposium Presentation Award - 2013
• SFB Biomaterials Day Poster Competition – 3rd place 2013
• Cockrell School of Engineering Doctoral Fellow 2009- 2013
Research Overview:
Transplantation is the clinically preferred renal replacement therapy for patients suffering from chronic kidney disease, but the severe shortage of transplantable donor kidneys forces wait-listed patients to undergo dialysis, dramatically increasing their risk of mortality. My research intends to address the chronic donor shortage through perfusion decellularization and recellularization technologies used to generate patient-customized kidney tissue de novo. Strategically, I utilize natural extracellular matrix (ECM)-based kidney scaffolds, which I derive from donor (rodent/porcine) kidneys through chemical decellularization, as 3D templates to augment pluripotent stem cell-mediated tissue development and integration with the recipient vasculature. I design scalable perfusion bioreactor systems to repopulate decellularized matrices with nephron progenitor cells differentiated from human pluripotent stem cells, and use these bioreactors to support their growth and maturation into functional nephrons. For the past four years, I have received postdoctoral training in Transplant Surgery at Northwestern University. My NIDDK-funded NRSA F32 fellowship (2015-2018) is dedicated to delineating the cell/matrix interactions that contribute to kidney tubule formation ex vivo, and understanding how fibrotic microenvironments dysregulate proper tubulogenesis. Building on this work, I am interested in understanding how the precise proteomic arrangement of the renal ECM dictates cellular behavior during kidney development and following acute kidney injury (AKI). My main scientific interest driving my proposed research is in the biology of ECM deposition and structural remodeling. Specifically, my research aims to (1) elucidate how the composition of the renal ECM changes over the course of embryonic development and into adulthood, and (2) define the innate renal repair mechanisms activated in response to AKI that may present therapeutic targets to promote healthy regeneration and mitigate the pathophysiology of fibrosis leading to renal dysfunction. My goal is to develop biologically inspired therapies to improve the functionality of, and host response to, bioengineered kidney tissues.

Education:
• PhD, Biomedical Engineering. University of Florida, May 2013.
• BS, Biomedical Engineering. Michigan Technological University, May 2008.

Research/Work Experience:
• Northwestern University Feinberg School of Medicine, Jul. 2013 – present
  NRSA Postdoctoral Fellow, Department of Surgery. PI: Jason A. Wertheim, MD, PhD
• University of Florida, Jan. 2010 - Jun. 2013
  Ph.D. Candidate. J. Crayton Pruitt Department of Biomedical Engineering. PI: Peter S. McFetridge, PhD
  Graduate Research Assistant, Department of Chemical, Biological, and Materials Engineering. PI: Peter S. McFetridge, PhD
• Michigan Technological University, May 2006 - Aug. 2008
  Undergraduate Research Assistant, Department of Biomedical Engineering. PI: Jeremy Goldman, PhD

Selected Publications:

Awards/Honors:
• Kellogg Business for Scientists Executive Education Course Certificate (2017)
• NIH Ruth L. Kirchstein National Research Service Award, F32 (2015-2018)
• Baxter Young Investigator Award, First-Tier Winner (2015)
• Chicago Biomedical Consortium Postdoctoral Research Award (2015-2016)
MARCELLA K. VAICIK, PhD
1Department of Biomedical Engineering, Illinois Institute of Technology, 3255 S Dearborn St, Wishnick Hall 314, Chicago, IL, 60616, 2 Research Service, Department of Veteran Affairs, Hines, IL - mvaicik@iit.edu

Research Overview:
My research interests are focused on understanding the role of the extracellular matrix (ECM) in cell and tissue function. My research projects include 1) developing bio-inspired hydrogels that mimic aspects of the physiological microenvironment; 2) how the basement membrane affects cell behavior; 3) clinical evaluation of failing heart ECM. My research spans biomedical engineering, chemical engineering, and materials science with the goal of developing novel ECM based therapeutic approaches.

Education:
• Ph.D. Biomedical Engineering, Illinois Institute of Technology (Chicago, IL), July 2015
• M.S. Bioengineering, University of Illinois at Chicago (Chicago, IL), December 2009
• B.S. Chemical Engineering, Purdue University (West Lafayette, IN), May 2004

Research/Work Experience:
Illinois Institute of Technology (Chicago, IL) 2009-Present
Adjunct Assistant Professor, Biomedical Engineering; 2017-Present
Postdoctoral Researcher, Biomedical Engineering; Advisor: Eric Brey, Ph.D. 2015-2017
Research Assistant, Biomedical Engineering; Advisor: Eric Brey, Ph.D. 2009-2015
Department of Veterans Affairs (VA) (Hines, IL) 2009-Present
Health Science Specialist, Research Service; Advisor: Eric Brey, Ph.D. 2014 - Present
Without Compensation Researcher, Research Service; Advisor: Eric Brey, Ph.D. 2009-2014
National Science Foundation East Asian Pacific Summer Institute Fellow, (Taoyuan, Taiwan) 2011
Reconstructive Microsurgery, Chang Gung Hospital; Host: Ming-Huei Cheng, M.D.
University of Illinois at Chicago (Chicago, IL) Graduate Assistant, WISEST Program; 2007-2009
Flint Hills Resources, Optimization Engineer, Waste Treatment, (Joliet, IL); 2006-2007
PPG Industries, Inc 2003-2006
Technical Service Engineer, Calcium Hypochlorite, (Monroeville, PA); 2005-2006
Chlorine Production Unit Supervisor, Chlorine, (Lake Charles, LA); 2004-2005
Engineering Intern, Environmental, Health, & Safety, (Allison Park, PA); 2003

Selected Publications:

Awards/Honors:
• Academic Leadership for Women in Engineering Travel Award (2016)
• Scholar Award Midwest Region American Federation for Medical Research (2015)
• Society of Women Engineers Technical Poster Competition Finalist (2013)
• National Science Foundation East Asia Pacific Summer Institute Fellowship (2011)
• Illinois Institute of Technology Research Scholar (2009-2010)
• Honor Society of Phi Kappa Phi (2009)
Research Overview:
Injury and wound healing are an integral part of repair and regeneration. Despite significant developments in the fields of biomaterials and tissue engineering, post-injury repair of soft and interfacial tissues such as the nerve, tendon, and ligament is very challenging. Understanding the injury microenvironment and subsequent wound healing and tissue-repair processes is key to therapeutic biomaterial design. During my doctoral work, I optimized a 3-D neural culture model to study traumatic injury. I characterized the structural and functional development of neural tissue in this model, and applied it to study the effects of different modes and degrees of injury on cell fate. During my postdoctoral work, I worked on developing a biomaterials-based wound healing system to control immune cell migration, inflammation, and promote angiogenesis. Presently, I am leading an industry-academia collaboration to develop a biomaterial-based growth factor delivery platform for tendon repair and regeneration. Moving forward, I am interested in investigating and engineering the processes involved in soft tissue wound healing and repair using “instructive” biomaterials that carry cues to interact with and direct cell behavior.

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

Research/Work Experience:
• University Postdoctoral Fellow, UConn Health, Farmington, CT, Apr. 2015 – Present
  Advisor: Cato Laurencin, M.D., Ph.D.
  Advisor: Monty Reichert, Ph.D.
• Graduate Research and Teaching Assistant, Georgia Tech, Atlanta, GA, Aug. 2002 – May 2010
  Advisor: Michelle LaPlaca, Ph.D.
• Technological Innovations: Generating Economic Results Business Associate, National Science Foundation sponsored graduate program, Georgia Tech, Atlanta, GA, Aug. 2004 – Aug. 2005
• Graduate Research and Teaching Assistant, Clemson University, Clemson, SC, Aug. 1999 – Aug. 2002
  Advisor: Robert Latour, Jr., Ph.D.

Selected Publications:

Awards/Honors:
• In the top 4 postdocs at Duke University selected for the Emerging Leaders Institute, Jan. 2014
• 1st graduate student at Georgia Tech selected for the LeaderShape Institute, Aug. 2003
ANDREW P. VOORHEES, PhD
Ophthalmology, The University of Pittsburgh, 203 Lothrop St, Eye and Ear Institute, Room 930, Pittsburgh, PA, 15213
Andrew.Voorhees@pitt.edu

Research Overview:
I am an engineer with training and interests in biology and solid mechanics. My research addresses problems in both basic science and translational medicine. At the core of my work is the desire to understand the dynamic interactions between cells, the extracellular matrix and mechanical stimuli and how these interactions change with aging, disease and injury. Examples of my past and ongoing projects include:
• Biomechanical stimulation of stem cells to enhance engineered corneal tissue
• Multiscale mechanical modeling of the optic nerve head and lamina cribrosa
• Experimental characterization of cardiac mechanics and ventricular remodeling post-myocardial infarction using transgenic mice. As an independent investigator, my focus will be on bridging the gaps between the fields of biomechanics and cell biology. Topics I will pursue include: 1) The role of mechanical signaling in the development and aging of soft tissues. 2) The mechanobiology of the innate immune system and its contributions to chronic inflammatory diseases and wound healing. 3) The development of therapeutic strategies to reduce adverse tissue remodeling and promote functional tissue restoration.

Education:
• PhD Biomedical Engineering, 2014, The University of Texas at San Antonio.
• MS Mechanical Engineering, 2009, The University of Texas at San Antonio.
• BS Biology, 2006, Harvey Mudd College, Claremont, CA.

Research/Work Experience:
05/2015 to Present - Post Doctoral Associate
Laboratory of Ocular Biomechanics, The University of Pittsburgh School of Medicine, Department of Ophthalmology
Mentor: Ian Sigal
01/2011 to 04/2015 - Postdoctoral Fellow (Previously Graduate Research Assistant)
Cardiovascular Biomechanics Lab, The University of Texas at San Antonio, Department of Mechanical Engineering
Mentor: Hai-Chao Han
08/2007 to 05/2009 Graduate Research Assistant
Computational Reliability Lab, The University of Texas at San Antonio, Department of Mechanical Engineering
Mentors: Harry Millwater and Ronald Bagley

Selected Publications:

Awards/Honors:
• T32 Training Fellowship, University of Pittsburgh, Department of Ophthalmology, 2015-2017.
• Travel Award to the ISER / BrightFocus Glaucoma Symposium, 2017.
• Knights Templar Foundation Grant for Travel to ARVO Conference, 2016.
• Valero Student Travel Award, 2013.
• College of Engineering 30th Anniversary PhD Student Excellence Award, 2012.
• Graduated with Distinction, Harvey Mudd College, 2006.
• W.A. Brandenburg Prize for Promise in the Field of Biology, Harvey Mudd College, 2005.
ANIKET S. WADAJKAR, PhD
University of Maryland School of Medicine, 655 W Baltimore St, BRB 8-010, Baltimore, MD, 21201 aniketwadajkar@gmail.com

Research Overview:
My graduate research involved development of polymer-iron oxide-based theranostic nanoparticles as imaging probes and drug carriers for prostate cancer. The development of these theranostic nanoparticles addresses the concerns in dual-imaging nanoparticles where photobleaching organic dyes and cytotoxic quantum dots are usually adopted. Further, I designed and developed magnetic-based multi-layer microparticles for stem cell-based therapy applications, which earned me AHA Predoctoral Fellowship. During my time in industry, I extended my prior experiences towards new applications in anti-counterfeiting products, for which I designed encapsulations to protect DNA and fluorophores from harsh environments. Currently as a T32 postdoctoral fellow, I am exploring new drug delivery strategies for brain and breast cancers based on my previous training in biomaterials and nanomedicine. I have developed and evaluated biodegradable nanoparticles with tissue-penetration capability to deliver therapeutic payload in a controlled and sustained fashion to the wider area of tumor tissue. The integration of nanotechnology with the biomedical and materials sciences will lead to major advances in molecular diagnostics, therapeutics, and functional materials. Based on my previous experience, I seek to work at the interface of nanotechnology, biomedical engineering and materials science in order to develop a dynamic research program that tackles problems related to disease management and functional materials development.

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

Research/Work Experience:
• University of Maryland School of Medicine, 2015 – present
  NIH-T32 Postdoctoral Fellow, Department of Neurosurgery; Advisors: Anthony Kim and Graeme Woodworth
• University of Texas at Arlington, 2014 – 2015. Faculty Associate Researcher, Department of Bioengineering
• University of Texas at Arlington, 2006 – 2008 and 2009 – 2012
  Graduate Research Assistant and Lab Manager, Department of Bioengineering; Advisor: Kytai T. Nguyen
• Antibody Research Corp, 2008 – 2009. Research Associate, Upstream and Downstream processing

Selected Publications:

Awards/Honors:
• 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
KARIN WANG, PhD
Dept. of Environmental Health, Prog. in Molecular and Integrative Physiological Sciences, Harvard University, 665 Huntington Avenue, Boston, MA, 02115  kwang@hsph.harvard.edu

Research Overview:
[My research will incorporate biophysical tools and techniques to investigate the early mechanobiological events that drive collective cellular migration and matrix remodeling leading to breast cancer metastasis.] Breast cancer dissemination and metastasis is suggested to occur during early stages of tumorigenesis, rather than after a cascade of malignant events. Early tumorigenesis events involve both collective cellular migration and extracellular matrix remodeling for the pathological reshaping and expansion of the tumor boundary. However, these early mechanobiological changes that occur at the tumor boundary and their role in driving breast cancer dissemination are not well understood. Models orchestrating these early tumorigenesis stages have been developed to address 3 gaps pertaining to how: (i) breast epithelial cells physically unjam to collectively migrate, (ii) cytokines alter the mechanobiological signaling of breast epithelial cells, and (iii) dysregulated matrix mechanobiological signaling drives collective cellular migration.

Education:
Ph.D. in Biomedical Engineering, August 2015, Cornell University, Ithaca, NY
B.E. & M.S. in Biomedical Engineering, B.S. in Applied Math and Statistics, May 2010, Stony Brook University, Stony Brook, NY

Research/Work Experience:
2015 - present: Harvard University, Boston, MA (NIH NCI Ruth L Kirschstein Postdoctoral Fellow)
Research: Collective cellular migration, cellular unjamming, and matrix adhesion in breast cancer model systems
Advisor: Dr. Jeffrey J Fredberg (Bioengineering and Physiology)
2010 - 2015: Cornell University, Ithaca, NY (PhD in Biomedical Engineering)
Dissertation: Extracellular Matrix Mechanobiology of Breast Tumor Stroma
Advisor: Dr. Delphine Gourdon (MSE, BME), Co-advisor: Dr. Claudia Fischbach-Teschl (BME, CBE)
2005 - 2010: Stony Brook University, Stony Brook, NY (BE & MS in Biomedical Engineering, BS in Applied Math & Statistics)
Project 1: Electrospinning nanofibers for tissue engineering purposes, Project 2: Optimizing smart gels for pain management
Advisor: Dr. Benjamin Hsiao (CHE, MSE), Co-advisor: Dr. Michael Hadjiargyrou (BME)

Selected Publications:

Awards/Honors:
1. 2018 Gordon Research Seminar Chair: Signaling by Adhesion Receptors
2. 2017 BMES journal award: CMBE Most Downloaded Article Award for “K Wang, BR Seo, C Fischbach, D Gourdon. Fibronectin mechanobiology regulates tumorigenesis. Cellular and Molecular Bioengineering. (2016)."
3. 2017 Cellular and Molecular Bioengineering Rising Star Travel Award
4. 2016 NIH NCI Ruth L. Kirschstein NRSA F32 Individual Postdoctoral Fellowship
5. 2016 ETS Trainee Award, 10th World Biomaterials Congress
6. 2015 NextProf Invited Participant, University of Michigan
7. 2015 Purdue Prospective Faculty Workshop Invited Participant, Purdue University
8. 2014 GRS Invited Speaker, Signal Transduction by Engineered Extracellular Matrices
SHUE WANG, PhD  
Mechanical Engineering, University of Michigan, 2350 Hayward Street, Ann Arbor, MI, United States, Ann Arbor, MI, 48109  
shuewang@umich.edu

Research Overview:
My research interests focus on the fundamental understanding of the molecular and cellular regulatory mechanisms underlying developmental disease, cardiovascular disease and cancer metastasis. My academic training and research experience have provided me with an excellent background in multiple biological disciplines including biophysics, molecular cell biology, and cell mechanics. For my postdoctoral training, my current research project focuses on synthetic biology, on which I seek to engineer therapeutic and diagnostic genetic circuits that interface with cellular context to sense and regulate the cell fate based on the integration of multiple biomarker (microRNA, mRNA, protein) sensors. During my graduate study at the University of Arizona, my research focused on mechanoregulation of vascular network formation during the early stage of retina development. I designed and developed a single cell nanobiosensor for dynamic gene expression profiling in native tissue microenvironment. The single cell nanobiosensor was also applied to study the spatiotemporal mRNA and protein expression dynamics in collective cell migration, mice lung cancer, wounded corneal tissue repair, and liver tissue. In summary, the single cell analysis capability of this nanobiosensor enables researchers to adopt a unique approach to study the tissue regenerative processes during normal development and diseases, and this will have a profound impact on regenerative medicine and diseases treatment in future. My long-lasting career goal is to lead a cutting-edge interdisciplinary research team, with the objective to make significant contributions to the field of synthetic biology, developmental disease, cardiovascular disease and cancer metastasis. Specifically, my research team will drive in advanced manufacturing strategies for elucidating the transcriptional and translational regulation of cell fate.

Education:  
• University of Arizona, Aug 2015. PhD, Mechanical Engineering  
• Chinese Academy of Science, Jan 2012. PhD, Mechatronics Engineering  
• Liaoning Technical University, Jan 2009, MS, Electrical and Computer Engineering  
• Liaoning Technical University, Aug 2006, BS, Electrical and Computer Engineering

Research/Work Experience:  
• University of Michigan, 2015.9 – present, Ann Arbor, MI  
  Research Fellow, Laboratory of cellular and molecular biology; Advisor: Prof. Allen Liu, PhD  
• University of Arizona, 2012.1 – 2015.8, Tucson, AZ  
  Graduate Research Assistant, Biomedical Engineering; Advisor: Prof. Pak Kin Wong, PhD  
• Chinese Academy of Science, 2009.1 – 2012.1, China  
  Graduate Research Assistant, The State Key Laboratory of Robotics; Advisor: Prof. Wen Jung Li, PhD

Selected Publications:  

Awards/Honors:  
• Helmsley Scholarship. Synthetic Biology, Cold Spring Harbor Laboratory, 2016.  
• The JALA Top 10. The top 10 technological breakthroughs across a spectrum of fields, 2015.  
• Tony B. Grant Award. SLAS 2014, San Diego, USA, 2014.  
• Best Conference Video Award. IEEE-ROBIO 2011, Phuket, Thailand, 2011.
Research Overview:
My research lies at the interface of biomaterials, drug delivery, and tissue and immune engineering to develop translatable cell therapies. While my research has leveraged these strategies in islet transplantation for the treatment of Type 1 Diabetes, these techniques can be applied to the expanding field of cell therapies for the treatment of many varied disorders. As systemic immunosuppression remains one of the primary limitations in the application of cell-based therapies for the treatment of chronic diseases, the main thrust of my research has been to develop novel, functional materials and strategies for translatable cell therapy in the absence of systemic immunosuppression. The development of translatable and effective approaches to eliminate this barrier would vastly widen the applicability of cell-based therapies to diseases such as diabetes and end-stage renal and hepatic diseases.

Education:
University of Miami, Miami, Florida
Ph.D. in Biomedical Engineering 2013
University of Miami, Miami, Florida
B.S. in Biomedical Engineering 2009

Research/Work Experience:
Postdoctoral Research – Petit Institute for Bioengineering and Bioscience, Georgia Institute of Technology – Research Advisor: Dr. Andrés J. García
Projects summary: Development of immunomodulatory and biomaterials-based strategies to enhance islet survival, engraftment, and function in an extrahepatic transplant site. (1) Design and characterization of an alternative, extrahepatic transplant site for encapsulated islets using vasculogenic, biodegradable hydrogels and a minimal islet mass. (2) Engineered vasculized macroencapsulation hydrogel devices for use with localized oxygen generator to preserve islet viability in extrahepatic transplant site. (3) Developed localized anti-inflammatory drug delivery method for extrahepatic islet transplantation using polypropylene sulfide (PPS) microparticles. (4) Developed strategies for delivery and localization of immunomodulatory signals to the islet transplant site, with the goal of eliminating systemic immunosuppression in islet transplantation. (5) In collaboration with Dr. Chong Shin at Georgia Institute of Technology, developed in vitro and in vivo strategies to assess novel drug targets for beta cell proliferation in primary islets.
Doctoral Research – Department of Biomedical Engineering, University of Miami – Research Advisor: Dr. Cherie L. Stabler

Selected Publications:

Awards/Honors:
Best Poster Oral Presentation and Travel Award, Biomaterials and Tissue Engineering Gordon Research Conference, 2017
Young Investigator Award Presentation, Hilton Head Regenerative Medicine Workshop, 2017
Juvenile Diabetes Research Foundation Postdoctoral Fellowship (3 years funding), 2017-present
WBC 2016 Trainee Award, World Biomaterials Congress, 2016
ILET2 Postdoctoral Fellowship (NIH T90-DK097787), 2013-2016
RYAN M. WILLIAMS, PhD
Molecular Pharmacology, Memorial Sloan Kettering Cancer Center, 1275 York Ave., New York, NY, 10065 williar5@mskcc.org

Research Overview:
My research experience has focused on materials development and validation of specific therapeutics and sensors. At MSKCC, I developed an implantable sensor that reports concentrations of an ovarian cancer protein biomarker in orthotopic disease models of mice at the site of tumor development. This work utilizes the unique optical properties of single-walled carbon nanotubes (SWCNT) coupled with antibody specificity to quantify and report the amount of biomarker present in vivo. I also developed a novel renal-targeted therapeutic mesoscale nanoparticle (MNP) delivery system. This nanoparticle system targets the kidneys with 26-fold selectivity compared to other organs and is therapeutically efficacious against acute kidney injury. My graduate work focused on diagnostic and therapeutic applications of molecular recognition and nanomaterials. I screened a yeast-displayed library screening to obtain an antibody fragment that specifically binds to androgen-dependent prostate cancer cells. I also used the selective evolution of ligands by exponential enrichment (SELEX) to obtain aptamers that bind to and detect the presence of small molecules. Finally, I studied phenomena at the interface of SWCNT and biological systems, with applications in materials purification and sensor development. These experiences ensure the success of my long-term research goals that bridge the fields of nanomaterials, biomolecular recognition, and specific disease biology. I am committed to the translationally-focused development of novel diagnostic and therapeutic tools in oncology and nephrology.

Education:
• Ph.D., 2013, West Virginia University, Pharmaceutical and Pharmacological Sciences
• B.A., 2008, University of Virginia, Biology

Research/Work Experience:
• Memorial Sloan Kettering Cancer Center, May 2013-Present
  Postdoctoral Research Fellow, Mentor: Daniel Heller, Ph.D., Molecular Pharmacology Program
• West Virginia University, August 2008-April 2013
  Graduate Research Assistant, Mentor: Letha J. Sooter, Ph.D., Basic Pharmaceutical Sciences Department
• University of Virginia, September 2006-May 2008
  Undergraduate Research Assistant, Mentor: Edmund Brodie III, Ph.D., Department of Biology

Selected Publications:

Selected Awards/Honors:
• American Heart Association Postdoctoral Fellowship, 2017-2019
• American Association of Pharmaceutical Scientists Postdoctoral Fellow Award, 2017
• Ovarian Cancer Research Fund Ann Schreiber Mentored Investigator Award, 2016-2018
• American Foundation for Pharmaceutical Education Pre-Doctoral Fellowship in the Pharmaceutical Sciences, 2011-2013
• WVNano/NanoSAFE Graduate Fellowship Program (NSF Cooperative Agreement), 2011-2013
SCOTT WILSON, PhD  
Molecular Engineering, University of Chicago, 5640 S Ellis Ave, Chicago, IL, 60637  dsw@uchicago.edu

Research Overview:  
As a postdoc in Dr. Jeff Hubbell’s Lab at l’École polytechnique fédérale de Lausanne and the University of Chicago, my research has focused on the development of biomaterials that target antigens to specific antigen presenting cells (APCs) for the induction of immunological tolerance or cellular and humoral immunity. To this end, I have developed a platform based on synthetic glycolpolymers that when tethered to antigens via an intracellular self-immolate linker, target APCs via endocytic receptors and release antigens in their unmolded form, thus optimizing antigen uptake and presentation by APCs. Autoimmune disorders are driven by aberrant auto-reactive T cell responses. For this reason, therapies that specifically ablate autoreactive T cells, unlike current therapies that induce global immune suppression, would represent a major step forward in the treatment of autoimmunity. When synthesized from monomers composed of NAc-glucosamine, our glycopolymer-antigen conjugates target antigens to hepatic APCs, which naturally induce tolerogenic T cell responses upon antigen uptake and presentation. Antigen-poly(NAc-glucosamine) conjugates ablate antigen-specific T cell responses and expand functional antigen-specific regulatory cells. Using a murine model of diabetes, we show that cell antigen-poly(NAc-glucosamine) conjugates prohibit the onset of diabetes by knocking out auto-reactive T cells and induce regulatory T cells that provide long-term protection from diabetes onset. In the context of immunity, prevention of complex viral and parasitic infections requires vaccine platforms that initiate neutralizing antibodies (i.e. humoral immunity), as well as CD8+ T cell responses (i.e. cellular immunity). By modifying antigens with a random copolymer composed of mannose- and Toll-like receptor 7 (TLR7) agonist-modified monomers, we are able to 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. When conjugated to a malaria antigen and delivered via subcutaneous injection, antigen-poly(mannose-TLR7) conjugates, and not the most clinically advanced malaria vaccine adjuvant, induce robust CD8+ T cell response and muster antibodies that efficiently prevent malaria infection in human hepatocytes. My lab will focus on the development of immuno-modulatory biomaterials that are capable of inducing immunity to infectious disease and malignancy. In addition, my lab will pioneer bioengineering based strategies that use cells and cell products from tissue donors to induce tolerance in transplant recipients and eliminate the need for a lifetime of immune suppressive therapies.

Education:  
Ph.D.: Bioengineering, 2011, Georgia Institute of Technology, School of Chemical & Biomolecular Engineering  
Master of Science: Chemical Engineering, 2004, University of Oklahoma: School of Chemical, Biological & Materials Engineering  
Bachelor of Science: Chemical Engineering, 2004, University of Oklahoma: School of Chemical, Biological & Materials Engineering

Research/Work Experience:  
2012-present: Post Doc Research, Immuno-regulation via Glycopolymer-mediated Antigen Delivery, Dr. Jeff Hubbell, EPFL, University of Chicago  
2005-2012: Graduate Research, Biomaterials for the treatment of inflammation, Dr. Niren Murthy, Georgia Tech  
2004-2005: Solo Math Teacher, Florida State University  
2001-2004: Graduate Research, Molecular Thermodynamics, Dr. Lloyd L. Lee, University of Oklahoma

Selected Publications:  

Awards/Honors:  
2012-2014 Whitaker International Program Scholar  
2011 Top PhD Thesis, School of Chemical & Biomolecular Engineering, Georgia Tech  
2011 Annual Award for Outstanding Achievement in Bioengineering, Georgia Tech  
2010 Controlled Release Society Annual Meeting: Outstanding Oral Delivery Paper
COLLEEN M. WITZENBURG, PhD  
Biomedical Engineering, University of Virginia, Charlottesville, Virginia, 22911  cw3kd@virginia.edu

Research Overview:
Cardiovascular soft tissues serve critical mechanical functions within the body. Pathologic changes to these tissues often alter their material properties causing disruption or reduction in function. This loss can be sudden, such as the rupture of a myocardial infarct, aortic aneurysm or valve leaflet, or it can be gradual, such as ventricular hypertrophy and heart failure, aneurysm dilation, or valve calcification. Prediction of both progressive and catastrophic functional losses are important clinically both for anticipatory management and the development of novel treatments. During my graduate work I developed experiments and analysis techniques for determining the heterogeneous properties and directional failure behavior of soft tissues. In particular, we were concerned with areas within a tissue where material properties change rapidly, locations susceptible to rupture and dysfunction. I developed a computational tool to identify and analyze regions within an intact whole tissue specimen that utilizes jumps in the deformation gradient tensor with graph theory and the concept of betweenness. Next, we directly solve the spatially varying inverse problem to determine the material properties of each region. From this information we can predict both regions where properties change rapidly as well as those with more gradual changes. While rupture is often viewed clinically as a sudden event many cardiovascular tissues undergo cyclic loading, thus in the future I also plan to apply these tools to predict subfailure events. Seeking to understand how growth and remodeling can alter tissue structure and mechanics, my postdoctoral work involves developing and employing computational models to predict cardiac growth and remodeling under various conditions (pressure overload, volume overload, myocardial infarction, congenital heart disease, etc.). Specifically, we coupled a compartmental circulatory model with a model of myocyte growth to predict changes in ventricular dimensions and hemodynamics over time. As part of this work I investigated the possible mechanical drivers of ventricular growth, comparing the ability of published relations to replicate prototypical growth patterns. Additionally, I probed the role of circulatory hemodynamic interactions with the ventricle during growth. Finally, the model was utilized to assess how individual variability in the acute response to infarction could lead to different levels of ventricular dilation creating animal specific predictions. My future work will continue to focus predicting the loss of mechanical function both in the chronic and acute contexts combining experimental and computational approaches to applications like aneurysm dilation and rupture, myocardial infarct rupture, valve disease, and congenital heart disease.

Education:
• PhD, Mechanical Engineering | October 2014, University of Minnesota, Twin Cities
• MS, Mechanical Engineering | May 2011, University of Minnesota, Twin Cities
• BS, Mechanical Engineering | May 2009, Iowa State University, Ames (summa cum laude)

Research/Work Experience:
• Postdoctoral Research Fellow | 2014 – Present, University of Virginia, BME, Advisor: Jeff Holmes, MD, PhD
• Graduate Research Assistant | 2010 – 2014, University of Minnesota, BME, Advisor: Victor H. Barocas, PhD
• Tissue Characterization Specialist | 2013, Tendyne (Acquired by Abbott in 2015)

Selected Publications:

Awards/Honors:
• American Heart Association Postdoctoral Fellowship (2017 – present) – percentile score 8.72%.
• Hartwell Foundation Postdoctoral Fellowship (2014 – 2017)
• Louise T. Dosdall Fellowship, University of Minnesota (2012 – 2013)
• McFarland Fellowship, University of Minnesota (2009)
YUE XUAN, PhD  
Surgery, University of California San Francisco, San Francisco, CA - melodyyxuan@gmail.com

Research Overview:
Dr. Xuan has been working on the Cardiac biomechanics projects including the biomechanical understanding of the ascending thoracic aortic aneurysm, remodeling of pulmonary autograft after Ross procedure, and the durability study of transcatheter aortic valve replacement. Dr. Xuan was awarded the American Heart Association Postdoc Fellowship from 2016 to 2018.

Education:
B. S. Naval Architecture and Offshore Engineering, Tianjin University 9/2001-6/2005

Research/Work Experience:
Staff Research Associate III 5/2015-present  
Cardiac Biomechanics Lab, University of California San Francisco, NCIRE and San Francisco VA Medical Center  
Analyzed stress/strain distribution on multiple generations of TAV products.  
Simulated patient-specific computational remodeling and virtual surgery of Ross procedure.  
Reconstructed 3D geometry of ascending thoracic aortic aneurysm from 3T MRI and MicroCT scan.  
Carried out biaxial stretching and failure testing of explanted aneurysm.  
Tested transcatheter aortic valve and surgical valves using pulse duplicator and accelerated wear tester.  
Postdoctoral Scholar 2/2012~7/2013  
Dept. Head and Neck Surgery, School of Medicine, University of California Los Angeles  
Optimized the microstructure of vocal folds model for vibration pattern and acoustics.  
Investigated structure-property relationship using 3D high speed camera and image processing.  
Prototyped in situ medical device with Matlab and Labview coding for experimental control.  
Mechanical Engineering, Southern Methodist University  
Characterized large deformation and anisotropy of soft materials using Digital Image Correlation Method.  
Built constitutive models using finite element method to simulate hyperelasticity and anisotropy.  
Designed and built an indentation testing system with Labview control.

Selected Publications:

Awards/Honors:
Best presentation, Inter-University Symposium, ASM International North Texas Chapter, 2011.  
JASON H. YANG, PhD
Biological Engineering, MIT, Broad Institute, Cambridge, MA  jasonhy@mit.edu

Research Overview:
Recent advances in high-throughput experimental technologies and machine learning now enable unprecedented observation, quantification and association of biological signals with human disease; the future of clinical care is precision medicine. Current efforts to realize precision medicine primarily focus on the important tasks of scaling/standardizing human measurements and leveraging data-driven approaches to identify diagnostic/predictive markers to optimize selection of existing therapeutics. However, these activities alone are insufficient for gaining the mechanistic insights into human disease processes necessary for developing next-generation therapies. My long-term research interest is to develop network-based approaches for identifying the mechanistic drivers of complex human disease and the context-dependence basis of drug efficacy. During my graduate training, I investigated mechanisms underlying context-dependence in the β-adrenergic signaling pathway in cardiac myocytes. During my postdoctoral training, I investigated mechanisms underlying context-dependence in antibiotic efficacy. I have (1) integrated mechanistic mathematical modeling with quantitative live-cell imaging to understand how network topologies and sub-cellular compartmentation constrain cell signaling dynamics; (2) integrated gene-reporter, microarray and metabolomics experiments to understand the contribution of oxidative stress to antibiotic lethality; (3) integrated chemical screens, genome-scale metabolic modeling and machine learning to identify metabolic pathways involved in antibiotic lethality; (4) performed targeted metabolomics on ex vivo samples to understand how host metabolism impacts antibiotic efficacy; and (5) designed and constructed a bioreactor to investigate mechanisms underlying antibiotic resistance by experimental evolution. These experiences have prepared me to build a multi-disciplinary research program, which as a junior faculty will focus on 3 objectives: I will (1) develop network modeling and machine learning approaches for identifying mechanisms underlying context-dependence for human therapeutics; (2) develop a continuous-culture experimental evolution system for engineering next-generation peptide therapeutics; and (3) develop integrated chemical biology and machine learning approaches for investigating the mechanistic basis by which microbiome-derived small molecules affect human cell physiology. Such work will reveal the design principles underlying drug efficacy and enable the rational design of next-generation therapeutics for precision medicine. This work will, in part, be funded by a NIH K99/R00 Pathway to Independence Award.

Education:
2012 | Ph.D., Biomedical Engineering – University of Virginia
2005 | B.S., Biomedical Engineering, Electrical Engineering – Johns Hopkins University

Research/Work Experience:
2014 – Present | Postdoctoral Associate, Biological Engineering – MIT, Broad Institute (Mentor: James J. Collins)
2012 – 2014 | Postdoctoral Fellow, Biomedical Engineering – Boston University, HHMI (Mentor: James J. Collins)
2006 – 2012 | Graduate Research Assistant, Biomedical Engineering – University of Virginia (Mentor: Jeffrey J. Saucerman)
2011 | Visiting Scientist, Discovery Sciences – AstraZeneca Pharmaceuticals (Team Leader: Jane McPheat)
2003 – 2006 | Lab Technician, Biomedical Engineering – Johns Hopkins University (Mentor: Raimond L. Winslow)

Selected Publications:
(From 12 on NCBI My Bibliography, h-index: 9, 1 in press, 1 in review, 2 in preparation, * denotes equal contribution)

Awards/Honors:
2016 – 2021 | NIH K99/R00 Pathway to Independence Award
2016 | Travel Award, GRS Microbial Stress Response
2014 | Poster Award, Systems Biology of Infectious Disease Conference
2013 | Robert M. Berne Cardiovascular Research Center Outstanding Predoctoral Trainee Award
2012 | Jill E. Hungerford Biomedical Sciences Prize
2012 | UVA Biomedical Engineering Outstanding Graduate Student Award
2012 | Poster Award, GRC Cardiac Regulatory Mechanisms
2011 | UVA All-University Graduate Teaching Assistant Award
2007 – 2009 | American Heart Association Predoctoral Fellowship
SANGPIL YOON, PhD
Department of Biomedical Engineering, University of Southern California, 1042 Downey Way, Los Angeles, California, 90089
sp.yoon@gmail.com

Research Overview:
My interests lie in adapting my expertise in engineering to overcome difficulties in clinical practice and cellular and molecular biology. I see ultrasound—safe, noninvasive, and controllable—as the best tool with which to investigate important problems in biology. Ultrasound allows for manipulation at both the single cell (micrometer) and deep tissue or organ (millimeter) level. In this sense, ultrasound can be used to diagnose a disease, understand critical cues of physiological phenomena and pathological disorders, administer treatment, and monitor subsequent progress. Throughout my entire career, developing and utilizing novel tools to visualize and modulate important issues in biology has been my research goal.

My long-term goal is to develop and establish diagnostic and therapeutic techniques to treat critical diseases such as neurodegenerative disorders and coronary artery-related diseases by using a combination of engineering and biological tools to modulate and control cell function. My long-term goal will be achieved through three short-term goals: I will develop 1) ultrasound-based neuromodulation device and study mechanotransduction ion channels; 2) patient-specific and iPSC-based therapeutic strategies to cure degenerative diseases by directly delivering non-genetic reprogramming factors into cells using acoustic-transfection; and 3) an IVUS imaging system. As a postdoctoral scholar, I have mastered the intricate skills needed for the development of ultrasonic transducers and learned about important topics in molecular and cellular biology from world-renowned scientists (Prof. Kirk Shung at USC and Prof. Yingxiao Wang at UCSD). This multidisciplinary expertise in engineering and molecular and cellular biology field will have a tremendous impact on my future research.

Education:
• University of Texas at Austin, TX Ph.D., Mechanical Engineering 2008 – 2012
• Georgia Institute of Technology, GA M.S., Aerospace Engineering 2002 – 2004
• Yonsei University, Seoul, South Korea B.S., Mechanical Engineering 1995 – 2002 (3 years in military service)

Research/Work Experience:
Research Associate, University of Southern California, Los Angeles, CA
Department of Biomedical Engineering 2013 – present
• Develop acoustic-transfection technique for intracellular delivery of macromolecules.
• Develop neuromodulation ultrasound system at cell level.
• Develop intravascular ultrasound (IVUS) imaging transducers and system.
  Advisor: K. Kirk Shung
Visiting Scholar, University of California at San Diego, San Diego, CA
Department of Bioengineering 2015 – 2016
• Developed FRET-based Src and Ca2+ biosensors with new fluorophore pairs.
• Developed F-actin targeted CRISPR-Cas9 donor repair template.
  Advisor: Yingxiao Wang

Selected Publications:

Awards/Honors:
NIH Pathway to Independence Award (K99/R00) - NIH/NIGMS : 05/01/2017 – 04/30/2022
"Acoustic-transfection using high frequency ultrasound for intracellular delivery of macromolecules into targeted single cells"
Role: Principal Investigator
Research Overview:

1. HIV vaccine design: Glycoengineering HIV immunogens to enhance bNAb binding landscape

   Once referred to as a shield, mounting evidence suggests that glycans contribute critically to antigenicity of the HIV envelope glycoprotein and represent critical antigenic determinants for many broadly neutralizing antibodies (bNAbs). While many studies have focused on defining the role of individual or groups of proximal glycans in bNAb binding, less is known about the effects of changes in the overall glycan landscape in modulating antibody access and Env antigenicity. Here, we developed a systems glycobiology approach to reverse engineer the complexity of the HIV glycan shield heterogeneity to guide antigenicity-based de novo immunogen design. This approach provides an innovative design strategy to predictively modulate antigenicity via the alteration of glycan topography aimed at focusing the humoral immune response on sites of viral vulnerability for HIV and beyond.

2. Defining the immunological correlates of HIV vaccine-induced protection to infer the underlying protective mechanism

   Over the years, several HIV vaccine candidates have shown protection against SIV/SHIV infection in monkey models. The immunological correlates of protection have often been identified, however divergent between the studies, due to differences in vaccine design. Thus a major hurdle in the HIV vaccine field is the inability to define the common correlates of protection that may advance vaccine design. Thus, here we used a “Systems Serology” approach, aimed at comprehensively profiling humoral immune response following vaccination across multiple trials. We developed a supervised multivariate model to identify cooperative correlates associated with vaccine protection in each study. Moreover, a common thread signature across multiple HIV trials was identified for the first time, potentially pointing to mechanistic correlates of protective immunity against HIV. Taken together, this predictive model provides the first framework to define robust correlates of protection aimed at improving future human HIV vaccine trials and beyond.

Education:

Ph.D in Bioinformatics, 2013, Boston University
M.Sc. in Microbiology, 2004, National Taiwan University
B.Sc. in Bioinformatics, 2002, National Taiwan University

Research/Work Experience:

Postdoctoral Fellow, 2014-current, MIT & Ragon Institute
PhD Student/Research Assistant, 2010-2013, Boston University
Research Fellow, 2008-2010, The Forsyth Institute

Selected Publications:

* denotes co-first authors


Awards/Honors:

1. Harvard University Center for AIDS Research (CFAR) developmental award, 2017
XIAOSHAN YUE, PhD
Aerospace and Mechanical Engineering, University of Notre Dame, 224 Multidisciplinary Research Building, University of Notre Dame, Notre Dame, IN, 46556  xyue@nd.edu

Research Overview:
My research at University of Notre Dame focuses on developing photocrosslinkable hydrogel-based microfabricated platforms for modeling tissue microenvironment (TME). TME contains essential factors for controlling cell fate in multicellular organs. However, the diversity of TME such as the stiffness and composition of extracellular matrices (ECM), as well as the involvement of stromal cells and other cell types, make it extremely difficult to mimic TME in vitro. In my research, I developed hydrogel-based microfabricated platform with tunable stiffness and diverse ECM components, for 3D culturing of breast cancer cell lines and mammary tissues. This system is flexible to be modified to model microenvironment of other organs, and can potentially be applied for culturing patient tissue pieces thus provide patient specific diagnostic and drug screening platforms for patient specific disease treatment. For determining ECM protein profiles for specific organs of specific patient, I developed proteomic/phosphoproteomic methodologies, and developed pipelines for in-depth data mining. I also synthesized artificial ECM with biomolecular engineering techniques for maintaining embryonic and induced pluripotent stem cells, and inducing their differentiation with high efficiency and purity, as a supplementary source for patient tissues. These research experiences have established the foundation for my independent research to fabricate organ-specific and patient-specific TME models for assisting drug screening and patient-specific disease treatment.

Education:
· Tokyo Institute of Technology, September 2010. PhD, Biomolecular Engineering
· Tsinghua University, August 2004. BS, Biological Science

Research/Work Experience:
· 2015.10-Present Research Scientist, Biomedical Engineering; Advisor: Professor Pinar Zorlutuna
  Department of Aerospace and Mechanical Engineering, University of Notre Dame, Indiana, USA
· 2010.11-2015.9 Postdoctoral Research Associate, Analytical Chemistry and Proteomics; Advisor: Professor Amanda Hummon
  Department of Chemistry and Biochemistry, University of Notre Dame, Indiana, USA
· 2007.10-2010.9 International Program Associate, Nano Medical Engineering; Advisor: Dr. Yoshihiro Ito
  Nano Medical Engineering Laboratory, RIKEN Advanced Science Institute, Saitama, Japan
· 2005.4-2010.9 Master and Graduate Research Assistant, Bioengineering; Advisor: Professor Akaike Toshihiro
  Department of Biomolecular Engineering, Tokyo Institute of Technology, Tokyo, Japan
· 2003.9-2007.9 Undergraduate and Master Research Assistant, Biology; Advisor: Professor Zhao Wang
  School of Medicine, Tsinghua University, Beijing, China

Selected Publications:

Awards/Honors:
2017-present Walther Cancer Foundation Cancer Cure Ventures (CCV) Grant
2012 - 2015 DoD CDMRP-PRCRP Visionary Postdoctoral Fellowship Award (W81XWH-12-1-0412)
2008 - 2010 Global Centers of Excellence (G-COE) Fellowship
2008 - 2010 International Program Associate (IPA) Fellowship, Tokyo Tech - Riken International School
2008 G-COE Young Investigator Award (SH41900002)
RANA ZAKERZADEH, PhD, ICES Postdoctoral Fellow
University of Texas at Austin, University of Texas at Austin, Austin, TX, 78731 - zakerzadeh.rana@gmail.com

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).

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:
• Zakerzadeh, R., Zunino, P. “A Computational Framework for Fluid Porous Structure Interaction with Large Structural Deformation”, (In review)
• Zakerzadeh, R., Hsu, M.C Sacks, M. “Computational Methods in Heart Valve Therapy”, (In review)

Awards/Honors:
- UT Austin ICES Peter O’Donnell, Jr. Postdoctoral Fellowship (2016-2018)
SAEID ZANGANEH, PhD
Radiology, Memorial Sloan Kettering Cancer Center, 67 Prospect Avenue, APT 9C, hewlett, NY, 11557  zanganes@mskcc.org

Research Overview:
My research goals are directed toward developing Clinical Translational nanoscale technologies with particular emphasis on developing nanoscale biomaterials and immunoengineering systems for cancer immunotherapy, drug delivery, and molecular/cellular imaging. My goal is to link the fields of nanotechnology, immunotherapy, cellular biology, and medical imaging towards more efficient and accurate diagnosis, personalized therapies and ultimately improving treatment outcomes and patient quality of life.

Education:
-PhD in Biomedical Engineering. University of Connecticut, US. 2010-2014
-Masters in Materials Science and Engineering. K.N.Toosi University of Technology, Iran. 2005-2009
-Bachelors in Materials Science and Engineering. Azad University, Iran. 2000-2005

Research/Work Experience:

Selected Publications:
-Iron oxide nanoparticles inhibit tumour growth by inducing pro-inflammatory macrophage polarization in tumour tissues. NATURE NANOTECHNOLOGY

-Tumor Associated Macrophages, Nanomedicine, and Imaging: The Axis of Success in the Future of Cancer Immunotherapy. IMMUNOTHERAPY
Saeid Zanganeh, et al, 2017, Accepted

-Protein Corona: Opportunities and Challenges. THE INTERNATIONAL JOURNAL OF BIOCHEMISTRY $ CELL BIOLOGY
Saeid Zanganeh, et al. 75 (1), 143-147, 2016

-Fluorescence Imaging of Vascular Endothelial Growth Factor in Mice Tumors using Targeted Liposome ICG Probe. JOURNAL OF BIOMEDICAL OPTICS

-Photoacoustic Imaging of Tumor Margins Enhanced by ICG Conjugated Single Wall Carbon Nanotubes. JOURNAL OF BIOMEDICAL OPTICS

Awards/Honors:
NIH T32 Postdoctoral Fellowship, The Molecular Imaging Program at Stanford (MIPS), Stanford University 2014-2016
Travel Award for ISMRM Workshop on MRI Cell Tracking for Visualizing Cellular Therapeutics & Inflammation, San Diego, USA, 2015
University of Connecticut, Department of Biomedical Engineering Fellowship Award, 2013-2014
Doctoral Dissertation Fellowship Award, 2013
Travel Award for SPIE Photonics West 2013. San Francisco, CA, USA, 2013
University of Connecticut, Department of Biomedical Engineering Fellowship Award, 2013
1st Place, Crow Innovation Prize, Award, 2012
University of Connecticut, Department of Biomedical Engineering Fellowship Award, 2011
IOANNIS ZERVANTONAKIS, PhD
Harvard Medical School, 111 Perkins St., Apt 151, Boston, MA, 02130  ioannis_zervantonakis@hms.harvard.edu

Research Overview:
- Drug resistance and cancer metastasis in breast and ovarian cancer
- Systems biology: predicting tumor cell phenotypes using proteomics
- Microfluidic and microfabricated assays to model the tumor microenvironment
- Tumor heterogeneity: single cell phenotypic decision
- Endothelial permeability regulation: role of immune cells, shear stress and hypoxia
- Cell migration and intravasation: Role of biomechanical factors and cell-cell interactions

Education:
PhD, Mechanical Engineering, 2012, Massachusetts Institute of Technology (MIT)
MSc. Mechanical Engineering, 2006, Technical University of Munich (TUM)
BSc. Mechanical Engineering, 2006, National Technical University of Athens (NTUA)

Research/Work Experience:
2004-2005 Undergraduate Research Assistant, Bavarian Center for Energy Research, Munich, Germany
2005 Undergraduate Research Assistant, GE Global Research Center, Munich, Germany
2006-2007 Graduate Research Assistant, Department of Biomedical Engineering, Columbia University, NY
2007-2012 Graduate Research Assistant, Department of Mechanical and Biological Engineering Massachusetts Institute of Technology, Boston, MA
2013- Postdoctoral Fellow, Department of Cell Biology, Harvard Medical School, Boston, MA

Selected Publications:

Awards/Honors:
- NCI/NIH Pathway to Independence (K99/R00), 2017-2022, pending advisory council review, Harvard Medical School
- AACR-Scholar-in-Training-Award, 2016, AACR EPSO Meeting, Boston, MA
- Department of Defense (DoD) Breast Cancer Postdoctoral Fellowship, 2014 – 2017, Harvard Medical School
- Doctoral Thesis Achievement Award of Circle of Hellenic Academics, January 2015, MIT
- Alexander S. Onassis Fellowship for graduate studies, 2007 – 2012, MIT
- National Foundation of Scholarships Award for ranking in the top 1% of the class, 2001-2006, NTUA, Greece
SUFENG ZHANG, PhD
Koch Institute for Integrative Cancer Research, Massachusetts Institute of Technology, 77 Massachusetts Avenue, Cambridge, Massachusetts, 02139   sfzhang@mit.edu

Research Overview:
I work at the interface of biomedical engineering, material science, chemical engineering, and immunological research, seeking innovative solutions for safe and effective treatment of skeletal and gastrointestinal disorders. I am highly interested in understanding the biological changes associated with disease types and disease states, and how to apply these pathophysiological features as cues for drug delivery designs and tissue regeneration. During my Ph.D. studies, I developed approaches delivering therapeutic proteins specifically to bone to stimulate bone regeneration and reduce extraskeletal side effects. I demonstrated that bone-seeking bisphosphonates could impart mineral affinity to proteins through bioconjugation. I also formulated polymeric nanoparticles for prolonged and targeted local delivery of bone morphogenetic protein-2 (BMP-2) to augment osteoinduction in rodent models. My postdoctoral research at the Massachusetts Institute of Technology focuses on systems for treatment of inflammation-associated diseases, including multiple myeloma in bone marrow and inflammatory bowel disease in the gastrointestinal tract. Particularly, I developed hydrogel microfibers using “Generally Recognized as Safe” (GRAS) materials, which selectively target inflamed epithelium in the large intestine for local drug delivery in ulcerative colitis. Based on my experiences in nano/micro-formulation, protein conjugation, mucosal immunology, and animal models, my future research will focus on effective transport of therapeutics across biological barriers by leveraging physiological changes in the diseased microenvironment for the treatment of inflammation, cancer and beyond. I will also explore the connection between skeletal and gastrointestinal disorders through microbiome modulation. My long-term goal is to translate biological findings into therapies through engineering strategies, and provide clinically relevant solutions for medical applications.

Education:
• University of Alberta, November 2008. PhD, Chemical Engineering
• Tianjin University, March 2003. MSc, Pharmaceutical Chemistry; June 2000. BE, Fine Chemical Engineering

Research/Work Experience:
• Massachusetts Institute of Technology, 01/2014 – present.
  Senior Postdoctoral Fellow, Koch Institute; Advisors: Robert Langer, ScD and Giovanni Traverso, PhD, MD.
• Massachusetts Institute of Technology, Brigham and Women’s Hospital, 07/2010 – 12/2013.
  Postdoctoral Fellow, Chemical Engineering; Advisors: Robert Langer, ScD and Jeffrey Karp, PhD.
• University of Alberta, 05/2009 – 08/2009. Lecturer, Chemical and Materials Engineering.
• University of Alberta, 09/2003 – 11/2008. Graduate student, Chemical Engineering; Advisor: Hasan Uludag, PhD.

Selected Publications:

Awards/Honors:
• Mary Louise Imrie Graduate Student Award at the University of Alberta, 2007.
SIWEI ZHAO, PhD
Biomedical Engineering, Tufts University, 200 Boston Ave., Suite 2600, Medford, MA, 02155 - siwei.zhao@tufts.edu

Research Overview:
My current research is primarily focused on the development of novel biomaterial-based hydrogel microfluidics and their wearable and implantable biomedical applications.

In one project, I have developed a bio-friendly fabrication process for constructing silk hydrogel-based scaffolds with embedded 3D microchannel networks. Functional and active biomolecules, such as enzymes and growth factors have been encapsulated in the scaffolds during the fabrication to provide bio-functionalities. Human umbilical vein endothelial cells and human foreskin fibroblast cells have been successfully cultured along the microchannels and in the bulk of the silk hydrogel scaffolds, respectively, which mimics the structure and functions of human vascular tissues. The silk hydrogel microfluidics establish a strong foundation upon which more physiologically relevant and functional tissue constructs can be potentially created for both transplantation and drug testing needs.

In another project, we demonstrated a hydrogel ionic circuit based on salt/polyethylene glycol (PEG) aqueous two-phase systems (ATPS), which is optically transparent and stretchable. Highly conductive salt solution patterns were encapsulated in PEG hydrogels thanks to the PEG/salt phase separation in ATPS, which can be used to deliver ionic currents in aqueous environments. The salt solution patterns, thus the circuit design could be altered in response to external mechanical stimulation after the device is fabricated. We have demonstrated the utility of these hydrogel ionic circuits for delivering localized ionic current in cell culture environment and live animals for neuron and muscle stimulation. Importantly, our hydrogel ionic circuits allowed more efficient heat dissipation and pH buffering due to their high water content and the use of pH-stabilizing salt solutions, thus electrical stimulations with high current density or long durations can be safely administered.

Education:
Ph.D., Biomedical Engineering (2013), University of California at Davis

Research/Work Experience:
I received multidisciplinary academic trainings, including B.S. in Microelectronics (Peking University) and Ph.D. in Biomedical Engineering (UC Davis). My past research focused on the development of facile fabrication methods for bio-compatible microfluidic systems and their biomedical and clinical applications. Furthermore, I have been particularly interested in the study of cellular responses to electrical stimulations, because of my undergraduate background in electrical engineering. I have developed high throughput experimental platforms to evaluate the effects of electric field on cell migration and to identify the genes that mediated this process. I received Howard Hughes Medical institute Integrating Medicine into Basic Science fellowship with focus on cardiovascular diseases in 2008. With this fellowship, I learned the fundamental mechanisms of various cardiovascular diseases and was exposed to the clinical research in this field, which not only prepared my knowledge bases, but also sparked my interests in cardiovascular tissue engineering. More recently, my research at Tufts University is focusing on the development of silk hydrogel-based tissue scaffolds with embedded microchannel networks for medium perfusion. I have published over 12 peer reviewed papers and edited three book chapters.

Selected Publications:
5. Wei Wang*, Siwei Zhao* and Tingrui Pan, Lab-on-a-print: from a single polymer film to three-dimensional integrated microfluidics, Lab Chip, 2009, 9, 1133 – 1137. *: equal contribution

Awards/Honors:
1. Chinese Governmental Fellowship for self-financed students studying abroad, Apr. 5th, 2013
2. BMEGG (UC Davis biomedical engineering graduate group) Outstanding Graduate Student Award, May 31st, 2012
3. Distinguished oral presentation first place award, 10th annual UC Systemwide bioengineering symposium, June 21st, 2009
4. Howard Hughes Medical institute Integrating Medicine into Basic Science fellowship, July 2008 to June 2009
Research Overview:
The overarching motivation for my research is to develop innovative biomaterials for nervous system repair. In my research career, I have created many new technologies in this field. As an undergraduate at Michigan Tech, I created tunable polysaccharide hydrogel blends as injectable treatments for neural repair. During my PhD, I began researching electrospun fiber technologies, and I published the first study to demonstrate that poly-L-lactic acid (PLLA) microfibers increase the uptake of glutamate by rat astrocytes (Zuidema et al., Biomaterials, 2014), the excess of which can lead to neuronal death following nervous system injury. I then developed a solvent ablation technique to create isotropic-to-anisotropic PLLA fiber scaffolds (Zuidema et al. Biomaterials, 2015). This method was used to create a model of the cellular alignment changes following spinal cord injury. I also developed composite PLLA/iron oxide nanoparticles for nerve growth factor (NGF) release (Zuidema et al., ACS Chem Neuro, 2015). These nanoparticles can be manipulating externally by a magnetic field and release NGF at desired locations to promote neurite extension. Following my Ph.D., I began working in Prof. Michael Sailor’s lab at UCSD. My current research focuses on applying porous silicon nanotechnologies to nervous system repair. I developed porous silicon nanoparticles for protein delivery, and the protein loading technique was shown to protect protein activity following surface modification of the nanoparticles (Kim, Zuidema, Kang et al., JACS, 2016). Following these findings, I have been developing composite nanofibers fabricated from porous silicon nanoparticles and synthetic polymers (polycaprolactone, poly(lactic-co-glycolic acid, etc.). These tissue-engineering scaffolds have potential in nerve repair due to their inherent photoluminescence (Kim et al., Advanced Materials, 2017), the ease of delivery of sensitive therapeutics, and their biodegradability. At UCSD, I developed the research and wrote an NSF proposal along with Prof. Sailor for the silicon nanoparticle/polycaprolactone composite nanofibers that has funded my research in the Sailor Lab (CBET 1603177). My main goal as an independent researcher is to utilize the materials development knowledge that I have gained to design innovative nanobiomaterials to foster nervous system repair using nanoparticle delivery and tissue engineering scaffolds.

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:
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 (Also with Prof. Rupak Rajachar)

Selected Publications:

Awards/Honors:
2014 Zelda and David G. Gisser Thesis Research Award in Biomedical Engineering
2014 Top Presentation-Neural Engineering Track, Biomedical Engineering Society
2012 Honorable Mention NSF Graduate Fellowship
2011 Podium Presentation Excellence Award, Biomaterials Section NEBEC