Dear Attendee,

We welcome you to the 6th Annual Institute for Engineering in Medicine (IEM) Conference and Retreat. As you know IEM is an interdisciplinary research organization aimed at advancing engineering solutions to medical and health problems by fostering collaborations between engineering and biomedical faculty at the University of Minnesota, and between University faculty and industrial colleagues. The mission of IEM is to seek innovative engineering solutions to tomorrow’s medicine and health care needs, through organized interdisciplinary and multidisciplinary research.

We have the privilege to represent more than 250 IEM faculty members from 63 academic departments on campus. Here at the conference and retreat we have over 250 registrants representing research efforts from these faculty members, their students and collaborators. These efforts are broken into five thematic or focus areas including: (1) Cancer, (2) Cardiovascular, (3) Neural, (4) Regenerative Medicine and Transplantation, and (5) Medical Devices.

The event opens with plenary talks by nationally recognized leaders, followed by an induction of new IEM Industrial Fellows and lunch discussions to stimulate networking among participants. The IEM Director will discuss the future of IEM during a luncheon talk. In the afternoon, collaborative activities are scheduled for faculty and Industry Fellows to discuss research collaborations particularly relating to building larger faculty initiatives and centers within our thematic areas. There will also be a young investigator and student breakout to explore translational opportunities and start-ups. To complete the event we will have a poster session highlighting research of IEM members and other University faculty, consisting of close to 100 poster presentations.

Throughout the day, the event is designed to offer rich opportunities to learn about cutting edge research, develop collaborations, and also learn more about how to responsively apply for IEM seed and group grants and other internal funding and support mechanisms at the University of Minnesota. We hope that you enjoy the event and look forward to your continued interest and support. Please contact us at iem@umn.edu with ideas that can improve what we do. Together, we will make a difference in tomorrow’s medicine and healthcare through engineering innovation.

John Bischof, Ph.D.
Director, Institute for Engineering in Medicine

David Odde, Ph.D.
Associate Director for Development, Institute for Engineering in Medicine
ABOUT IEM

The Institute for Engineering in Medicine is an interdisciplinary organization that creates and supports research collaborations between engineers, scientists, and medical professionals at the University of Minnesota, and provides research and partnership opportunities to the wider medical industry. With over 263 affiliated researchers representing 63 departments across the Twin Cities campus, seven affiliated research centers, and laboratories, IEM provides University faculty, students, and external partners with world-class resources to drive innovation in medicine and to find solutions for the great medical challenges.

ORGANIZATION

IEM hosts several research centers and organizes its members’ research into five themes. Most IEM members are from departments in the University’s Academic Health Center, including the Medical School and the College of Science and Engineering. As an organization dedicated to building partnerships with a wide variety of medical, clinical, and engineering professionals, IEM highly values the involvement of scientific and industrial advisors from outside the University.
8:30 - 9:00 am  Networking (Coffee and Muffins provided)

9:00 - 9:10 am  Welcome Remarks
Tucker W. LeBien, PhD
Professor of Laboratory Medicine & Pathology
Vice Dean for Research, Medical School
Associate Vice President for Research, Academic Health Center
Director, Office of Discovery and Translation
Ellen Longmire, PhD
Professor, Aerospace Engineering & Mechanics
Associate Dean for Academic Affairs, College of Science and Engineering

9:10 - 9:45 am  Distinguished Plenary Talk
Photoadaptable hydrogels for studying crypt formation in intestinal organoids
Kristi Anseth, Ph.D.
Distinguished Professor and Tisone Professor of Chemical and Biological Engineering
University of Colorado, Boulder
Member, National Academy of Engineering, Sciences and Medicine
Member of the National Academy of Inventors
Moderator: Mark Distefano, Ph.D.
Professor, Department of Chemistry

9:45 - 10:20 am  Distinguished Plenary Talk
The Cell-Met ERC For Cardiac Tissue Engineering
David Bishop, Ph.D.
Professor, Head of the Division of Materials Science & Engineering
Director of the CELL-MET Engineering Research Center
Boston University
Moderator: Alena Talkachova, Ph.D.
Associate Professor, Department of Biomedical Engineering

10:20 - 10:40 am  Coffee Break

10:40 - 11:15 am  Distinguished Plenary Talk
Human Organs Chips for Drug Development, Disease Modeling, and More...
Kevin Healy, Ph.D.
Professor, Bioengineering and Materials Science & Engineering
Former Chair, Department of Bioengineering
University of California, Berkeley
Moderator: David McKenna, Ph.D.
Professor and American Red Cross Chair in Transfusion Medicine
11:15 - 11:50 am  Distinguished Plenary Talk
Genetic barriers to tumor formation and physical barriers to drug delivery in peripheral nerve sheath tumors
David Largaespada, Ph.D.
Professor, Department of Pediatrics, Department of Genetics, Cell Biology and Development
Director, Brain Tumor Program, Masonic Cancer Center
University of Minnesota
Moderator: David Odde, Ph.D.
Associate Director for Development, Institute for Engineering in Medicine

11:45 - 12:00 pm  IEM Industrial Fellows Award Ceremony
Moderator: Paul Iaizzo, Ph.D.
Associate Director for Professional Education and Outreach, Institute for Engineering in Medicine

12:00 - 1:00 pm  Networking Lunch

12:30 - 1:00 pm  Luncheon Presentation - Future of IEM
John C. Bischof, Ph.D.
Director, Institute for Engineering in Medicine

1:00 - 2:20 pm  Student and Young Investigator Panel: Start-Up and SBIRs career paths
Karen Kaehler, MBA
Senior Technology Portfolio Manager, Biomedical/Biotechnology Office for Technology Commercialization | University of Minnesota

1:00 - 3:00 pm  Collaborative Activities In Areas of Thematic Strengths

1:00 - 3:00 pm  Break-out Sessions

Cancer Bioengineering (Heritage Gallery)
Paolo Provenzano, Ph.D.
Director, Laboratory for Engineering in Oncology
David Largaespada, Ph.D.
Professor, Departments of Genetics, Cell Biology and Development and Pediatrics
Kaylee Schwertfeger, Ph.D.
Associate Professor, Department of Laboratory Medicine and Pathology

(Continued on Next Page)
AGENDA

1:00 - 3:00 pm
Break-out Sessions (Continued)

Cardiovascular Engineering (Minnesota)
Paul Iaizzo, Ph.D., FHRS
Professor, Department of Surgery, Director, Visible Heart Laboratory
Alena Talkachova, Ph.D.
Associate Professor, Department of Biomedical Engineering

Medical Devices (Thomas Swain Room)
Art Erdman, Ph.D.
Director, Earl E. Bakken Medical Devices Center
Theresa Reineke, Ph.D.
Distinguished McKnight University Professor of Chemistry
Andy Grande, Ph.D.
Assistant Professor, Department of Neurosurgery

Neural Engineering (Ski-U-Mah)
Tay Netoff, Ph.D.
Professor of Biomedical Engineering, Director, Center for Neuroengineering
Greg Molnar, Ph.D.
Associate Professor, Department of Neurology

Regenerative Medicine & Transplantation (Johnson Great Room)
Erik Finger, M.D., Ph.D.
Assistant Professor, Department of Surgery
Angela Panoskaltsis-Mortari, Ph.D.
Vice Chair for Research and Professor, Department of Pediatrics

3:00 - 5:00 pm
Student Poster Session and Networking

Session 1: Cancer
Session 2: Cardiovascular
Session 3: Medical Devices
Session 4: Neural
Session 5: Regenerative Medicine & Transplantation
Session 6: Frontier & Emerging Areas

5:00 - 5:30 pm
Poster Award Announcements

David Odde, Ph.D.
Associate Director for Development, Institute for Engineering in Medicine
GENERAL INFORMATION

CONNECTING TO FREE WIRELESS NETWORK

Network Name: U of M Guest
(For access and to connect to the wireless network, please enter your email address)

THE MCNAMARA ALUMNI CENTER

200 SE Oak St, Minneapolis, MN 55455
KRISTI ANSETH, PH.D.

Distinguished Professor and Tisone Professor of Chemical and Biological Engineering
University of Colorado, Boulder
Member, National Academy of Engineering, Sciences and Medicine
Member of the National Academy of Inventors

Professor Kristi Anseth and her research group pioneer the development of biomaterials to serve as synthetic extracellular matrix (ECM) analogs that capture key features of the biochemical and biophysical aspects of a cell’s niche - an environment that is not only tissue specific, but can be strikingly heterogeneous and dynamic. Unique to her approach is the ability to create cell-laden matrices in three-dimensional space in which the matrix properties can be changed on demand - so-called 4D biology. Ultimately, Dr. Anseth and her group seek to understand how cells sense, store, and exchange information with the ECM and then use this knowledge to engineer biomaterial niches as cell delivery vehicles for tissue regeneration, in vitro models of disease, and physiologically-relevant models for drug discovery and screening. Her materials-first approach provides tools to perform unique cell biology experiments and address major hurdles in regenerative medicine.

DAVID BISHOP, PH.D.

Professor, Head of the Division of Materials Science & Engineering
Director of the CELL-MET Engineering Research Center
Boston University

Professor Bishop’s interests lie in nanotechnology, low temperature physics, mechanical properties of materials at low temperatures, MEMS (microelectromechanical systems) and NEMS (nanoelectromechanical systems), MEMS in lightwave networks, all-optical switching, superconductivity and superfluidity, magnetic vortices in superconductors and their phase transitions, the Casimir effect and Casimir oscillators, energy efficient networking, electron coherence effects in metallic nanostructures at low temperatures, and cybersecurity and protecting critical infrastructure.
KEVIN HEALY, PH.D.
Professor, Bioengineering and Materials Science & Engineering
Former Chair, Department of Bioengineering
University of California, Berkeley

Human Organs Chips for Drug Development, Disease Modeling, and More...
Our work has emphasized creating both healthy and diseased model organ systems, we call microphysiological systems or ‘organ chips’, to address the costly and inefficient drug discovery process. The average time to develop and launch a new drug is 10-15 years, and costs ~ $5-3b. The poor efficiency and high failure rates are attributed to the heavy reliance on non-human animal models employed during safety and efficacy testing that poorly reflect human disease states. With the discovery of human induced pluripotent stem cells, we can now develop organ chips to be used for high content drug screening, disease modelling, and numerous other applications. While organ chips are poised to disrupt the drug development process and significantly reduce the cost of bringing a new drug candidate to market, organ chip technology is much more robust and creates a whole new paradigm in how to conduct biological science, and advances medicine in revolutionary ways. While chips featuring single organs can be of great use for both pharmaceutical testing and basic organ-level studies, the huge potential of organ chip technology is revealed by connecting multiple organs on a single chip to create a scalable integrated human system for mechanistic biological studies and devising therapies for common, rare, and difficult to study diseases. Ultimately, the vision is to reduce or eliminate the use of animals in drug discovery, and conduct ‘clinical trials’ in patient-specific organ chips that can accommodate variations in genetics, environment, and lifestyle.

DAVID LARGAESPAD, PH.D.

David Largaespada, Ph.D.
Professor, Department of Pediatrics, Department of Genetics, Cell Biology and Development
Director, Brain Tumor Program, Masonic Cancer Center
University of Minnesota

Dr. David Largaespada, Ph.D., is a Full Professor in the Departments of Pediatrics and Genetics, Cell Biology and Development and the Associate Director for Basic Research in the Masonic Cancer Center at University of Minnesota. He is an authority on mouse genetics, gene modification and cancer genes. He received his B.S. in Genetics and Cell Biology from the University of Minnesota, Twin Cities in 1987 and his Ph.D. in Molecular Biology with Dr. Rex Risser at the University of Wisconsin-Madison in 1992. He did a postdoctoral fellowship at the National Cancer Institute working with world-renowned geneticists Dr. Nancy Jenkins and Dr. Neal Copeland, where the Leukemia and Lymphoma Society of America awarded him a postdoctoral fellowship. He joined the faculty of the University of Minnesota in late 1996. Dr. Largaespada currently holds the Hedberg Family/Children’s Cancer Research Fund Chair in Brain Tumor Research. He was awarded the American Cancer Society Research Professor Award in 2013, the highest award given by the ACS.
CA1

Updated Motor Clutch Model For Cell Traction Recapitulates Dynamics Observed In Single-molecule Fret-based Force Sensors
Sarah Anderson1, Steven Tan2, Alex Dunn2, David J. Odde1
(1) Department of Biomedical Engineering, University of Minnesota
(2) Department of Chemical Engineering, Stanford University

CA2

In Vitro Elucidation of the Role of Pericellular Matrix in Metastatic Extravasation and Invasion of Breast Cancer Carcinoma Cells
Marie-Elena Brett, Heather E. Bomberger, Geneva R. Doak, Matthew A. Price, James B. McCarthy,
and David K. Wood
University of Minnesota

CA3

Novel Design And Development Of A 3d-printed Conformal Superficial Brachytherapy Device For The Treatment Of Non-melanoma Skin Cancer And Keloids
Jennifer Chmura*1, Art Erdman2, Eric Ehler3, Jessica Lawrencea, Christopher T. Wilke3, Brent Rogers3, Clara Ferreira3
Biomedical Engineering Department, University of Minnesota, Minneapolis, MN, USA. 2Medical Devices Center, University of Minnesota, Minneapolis, MN, USA. 3Department of Radiation Oncology, University of Minnesota Medical School, Minneapolis, MN, USA.

CA4

Collagen Microtissues For High-throughput Tissue Remodeling Studies
Katherine Cummins
Department of Biomedical Engineering, University of Minnesota

CA5

Brownian Dynamics Modeling Of The Role Of Heterogeneity On Glioblastoma Progression
Nima Ghaderi*, David J. Odde*
* UMN Department of Mechanical Engineering, * UMN Physical Sciences in Oncology Center (PS-OC)

CA6

Parameter Analysis Of The Cell Migration Simulator 1.0 With An Efficient Computational Method
Jay C. Hout1, Liam Tyler2, Brian T. Castle1, Victor H. Barocast, Daniel F. Keefez, and David J. Oddet
1- Department of Biomedical Engineering, University of Minnesota, 2- Department of Computer Science and Engineering, University of Minnesota

CA7

Silica gel encapsulation as a potential tool to identify dormant and drug-resistant cell populations in ovarian cancer
Tiffany Lam1, Hak Rae Leet1, Melissa A. Geller2, Alptekin Aksan3, and Samira Azarin*
1Department of Chemical Engineering and Materials Science, University of Minnesota, Minneapolis, MN 55455, USA, 2Department of Obstetrics, Gynecology and Women’s Health, University of Minnesota, Minneapolis, MN 55455, USA, 3Department of Biomedical Engineering, University of Minnesota, Minneapolis, MN 55455, USA

CA8

Perturbation Of The Hyaluronan-rich Nerve Sheath Tumor Microenvironment To Improve Drug Efficacy And Delivery
Bryant Keller B.S., Adrienne L. Watson Ph.D., Kyle Williams Ph.D., Steve Scully Ph.D., Rory Williams B.S., Leah Anderson B.S., Marjorie Carlson B.S., Justin Knight B.S., Colleen Forster B.S., Kwangmin Choi B.S., Nancy Ratner Ph.D., Co-senior: Paolo P. Provenzano Ph.D., Co-senior: David A. Largaespada Ph.D.
Department of Molecular, Cellular, Developmental Biology, and Genetics, University of Minnesota

CA9

Bispecific Chemically Self-assembling Nanorings (Csans) With Engineered Fibronectins For Immunotherapy
Ozgun Kilic
Department of Medicinal Chemistry, University of Minnesota

CA10

Mechanism Of Glioma Cell Migration In Confined Microfabricated Channels
Louis S. Prahlia, Maria R. Stanislasia, Pablo Vargab, Matthieu Pielb, and David J. Odde
aDepartment of Biomedical Engineering and Physical Sciences-Oncology Center, University of Minnesota – Twin Cities, Minneapolis, MN 55455, BCNRIS UMR 144, Institut Curie, and Institut Pierre-Gille de Gennes, PSL Research University F-75005, Paris, France

CA11

Mechanical parameterization of patient glioma cells
Mariah McMahon
Department of Biomedical Engineering, University of Minnesota

CA12

Microfluidic-assisted coating of cells to allow recovery from dormancy-inducing matrix
Julian Preciado
Department of Mechanical Engineering, University of Minnesota

CA13

Glioma Mouse Models Reveal Subtype Specific Cell Dynamics
Ghaidan Shamsan, Chao Liu, Brooke Braman, Susan Rathe, Rebecca Klank, Barbara Tschida, Joey Mcfarren, Brent Clark, Steven Rosenfeld, David Largaespada, and David Odde
Department of Biomedical Engineering, University of Minnesota
Development and Use of an Image Processing Algorithm to Analyze Glioma Cell Protrusion Dynamics
Tutku Tazegul
Department of Biomedical Engineering, University of Minnesota

Magnetic isolation of exomes using Fe/Au nanowires: towards an improved early detection of cancer
Nemati, Zohreh1,2; Gage, Thomas1; Zamani Kouhpanji, Mohammad Reza1; Shore, Daniel1; Um, Joseph1, Subramanian, Subree4,5; Franklin, Rhonda1; Modiano, Jaime2,3,5; Stadler, Bethanie1
1 Department of Electrical and Computer Engineering, Minneapolis, MN; 2Animal Cancer Care and Research Program, University of Minnesota, St. Paul, MN; 3Department of Veterinary Clinical Sciences, College of Veterinary Medicine, University of Minnesota, St. Paul, MN; 4Department of Surgery, University of Minnesota Medical School, Minneapolis, MN; 5Masonic Cancer Center, University of Minnesota, Minneapolis, MN

CARDIOVASCULAR ENGINEERING

Bioinstructive materials for cardiac regeneration
Jeanette M. Caronia1, Daniel Sorensen2, Hope M. Leslie3, Jop van Berlo4, Samira M. Azarin3
1Department of Biomedical Engineering, University of Minnesota, Minneapolis, Minnesota; 2Department of Genetics, Cell Biology and Development, University of Minnesota, Minneapolis, Minnesota; 3Department of Chemical Engineering and Materials Science, University of Minnesota, Minneapolis, Minnesota; 4Department of Medicine/Cardiology, University of Minnesota, Minneapolis, Minnesota

Rheological Implications Of Increased Hemoglobin Oxygen Affinity In Sickle Cell Disease
Scott Hansen
Department of Biomedical Engineering, University of Minnesota

Detecting Lead Attachments To The Svc For Lead Extraction Procedures
Mikayle Holm, Department of Biomedical Engineering, University of Minnesota

Effect of Sodium-Calcium Exchanger strength on bistable behavior in constant DI paced cardiac cells
Preethy Parthiban, Department of Biomedical Engineering, University of Minnesota

Optimization of signal processing techniques for analysis of intracardiac electrograms from patients with AF
Xiangzhen Kong1, Vasanth Ravikumar1, Dr. Siva K Mulpuru2, Dr. Henri Roukoz3, Alena Talkachova4
Department of Electrical Engineering, University of Minnesota

Novel mapping techniques for rotor identification in simulated intracardiac electrograms
Vasanth Ravikumar1, Elizabeth Annoni2, Preethy Parthiban2, Sharon Zlochiver3, Alena Talkachova2
Department of Electrical Engineering, University of Minnesota

Quantifying the proximities of the tricuspid valve annulus to the right coronary artery and coronary sinus: Implications for transcatheter tricuspid annuloplasty therapies
Jorge D Zhingre Sanchez 1, Marinna R Smallidge 1, Erik N Gaasedelen 2, Michael G Bateman 1, Paul A Iaizzo 1,2
1 Department of Biomedical Engineering and Department of Surgery, University of Minnesota; 2 Bioinformatics and Computational Biology, University of Minnesota

Fixation Apparatus For The Closure Of The Atrioventricular Valves
Emma Schinstock
Department of Surgery/Department of Mechanical Engineering

Analysis And Comparison Of Bifurcation Stenting In Ex Vivo Swine Hearts Using Post Procedural 3d Imaging
Thomas Valenzuela
Department of Biomedical Engineering, University of Minnesota

MEDICAL DEVICES

Polymer-modified Electrolyte-Gated Transistor Platform for Food Allergen Detection
Jiayi He
Department of Chemistry, University of Minnesota

Non-invasive Ultrasound Modulation of the Immune System through Targeted Stimulation of the Spleen
Abigail Heiller, Claire Kaiser
Department of Biomedical Engineering, University of Minnesota

Validation Of Biplane Fluoroscopy System For Lumbar Spine Kinematics Using An Automated Shape-matching Algorithm
Craig C Kage, 2Mohsen Akbari-Shandiz, Mary H Polsz, 1Rebekah L Lawrence, 1Taycia Brandon, 1Eric Twohey, and 1Arin M Ellingson
1 University of Minnesota, Minneapolis, MN, USA; 2 Mayo Clinic, Rochester, MN, USA
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<td>Three-dimensional Micro-scale Metamaterials For Ultrasensitive Biomedical Sensing</td>
<td>Chao Liu, Jeong-hyun Cho</td>
<td>Department of Electrical Engineering, University of Minnesota</td>
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<td>D5</td>
<td>Thermal and State Dependency of Ultrasound Neuromodulation Outcomes in a Tractable Invertebrate Model System</td>
<td>Newhoff Mi, Ebbini E2, Mesce KAI</td>
<td>1 Graduate Program in Neuroscience, University of Minnesota; 2 Department of Electrical and Computer Engineering, University of Minnesota</td>
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<td>D6</td>
<td>Photoacoustic Lifetime Imaging For Oxygen Measurement</td>
<td>Joshua Punnoose</td>
<td>Department of Biomedical Engineering, University of Minnesota</td>
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<td>D7</td>
<td>Principles Of Computer Numerical Controlled Machining Applied To Microsurgical Procedures</td>
<td>Matthew Rynes</td>
<td>Department of Biomedical Engineering, University of Minnesota</td>
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<td>D8</td>
<td>A Handheld Platform Based on Wash-Free Magnetic Bioassays for the Early Diagnosis of Influenza A Virus</td>
<td>Diqing Sui, Kai Wu, Venkatramana D. Krishna3, and Jian-Ping Wang1,2,*</td>
<td>1 Department of Chemical Engineering and Materials Science, University of Minnesota, Minneapolis, Minnesota 55455, USA; 2 Department of Electrical and Computer Engineering, University of Minnesota, Minneapolis, Minnesota 55455, USA; 3 Department of Veterinary Population Medicine, University of Minnesota, St. Paul, Minnesota 55108, USA</td>
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<td>D9</td>
<td>A Microfluidic Platform For Characterization Of Sickle Cell Disease Blood Flow</td>
<td>José M. Valdez, Biomedical Engineering, University of Minnesota</td>
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<td>D10</td>
<td>Thermal Contrast Amplification Reader Improves Clinical Group A Streptococcus Detection</td>
<td>Yiru Wang, Erin Louwagiet, Daniel Larkin2, Stephanie Sankey2, David R. Boulware3, and John C. Bischofi* 1Department of Mechanical Engineering, University of Minnesota – Twin Cities, Minneapolis, MN. 2HealthEast Grand Avenue Clinic, St. Paul, MN. 3Infectious Diseases and International Medicine, Department of Medicine, University of Minnesota – Twin Cities, Minneapolis, MN.</td>
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<td>D11</td>
<td>Development Of New Antenna Concept (Mono-dipole Array) For Human Head Imaging At 10.5t</td>
<td>Myung Kyun Woo, Lance DelaBarret, Russell L Lagoret, Andrea Grantt, Yigitcan Eryamant, Jerahmie Raddert, Xiaoping Wut, Pierre Francois Vande Moortele, Edward Auerbach, Greg Metzger, Kamil Ugrubilt and Gregor Adriany! 1Center for Magnetic Resonance Research (CMRR), University of Minnesota, Minneapolis, MN, United States</td>
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**EMERGING AND FRONTIER**

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<td>EF1</td>
<td>Three-dimensional Graphene Nanotubes For Plasmon Enhanced Optofluidic Sensing</td>
<td>Kriti Agarwal, Chunhui Dai, Prof. Jeong-hyun Cho</td>
<td>Department of Electrical and Computer Engineering, University of Minnesota</td>
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<td>EF2</td>
<td>Afferent Renal Nerves Mediate Hypertension And Renal Cystogenesis In A Preclinical Model Of Polycystic Kidney Disease</td>
<td>Christopher T Banek, Madeline M Gauthier, and John W Osborn</td>
<td>Department of Integrative Biology and Physiology, University of Minnesota</td>
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<td>EF3</td>
<td>A Balance Cascade of Deep Neural Networks for CT Renal Segmentation</td>
<td>Paul Blake, Joel Rosenberg</td>
<td>Department of Urology, University of Minnesota</td>
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<td>Celeste Blum, David S. Nedrelow, Victor H. Barocas, Robert T. Tranquillo</td>
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<td>EF5</td>
<td>Imperfect Segmentation Labels: How Much Do They Matter?</td>
<td>Nicholas Heller, Joshua Dean, And Nikolaos Papanikolopoulos</td>
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<td>Characterization Of Antigen Presentation And T Cell Response Under Different Focal Therapeutic Conditions</td>
<td>Minhan Jiang</td>
<td>Department of Biomedical Engineering, University of Minnesota</td>
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<td>EF7</td>
<td>Tracing Cancer Journeys in an Online Health Community</td>
<td>Zachary Levonian</td>
<td>Department of Computer Science and Engineering, University of Minnesota</td>
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Induction of Immune Tolerance towards the Human HexM Enzyme following Intravenous Gene Transfer in b-hexosaminidase Knock-out Mice
Shalini Kot3, John G. Keimel1,2, Zhilin Chen5, Steven J. Gray4, William F. Kaemmerer2, Jagdeep S. Walla3,5,6
1Department of Biomedical Engineering, University of Minnesota, Minneapolis, MN; 2 New Hope Research Foundation, North Oaks, MN; 3Department of Biomedical and Molecular Sciences, Queen’s University, Kingston, ON; 4Department of Pediatrics, University of Texas Southwestern Medical Center, Texas, TX; 5Medical Genetics/Department of Pediatrics, Queen’s University, Kingston, ON, Canada; 6Centre for Neuroscience Studies, Queen’s University, Kingston, ON, Canada

Contrast-enhanced Serial Optical Coherence Scanner Reveals Vasculature And White Matter Organization Of Whole Mouse Brain
Tianqi Li, Chao J. Liu, Taner Akkin
Department of Biomedical Engineering, University of Minnesota

Remodeling of Multiphasic Biological Fiber Networks
Ryan Mahulga
Department of Biomedical Engineering, University of Minnesota

Metabolic Pathway Engineering In Mammalian Cells Through Kinetic Model Optimization
Conor O’brien, Andrew Allman, Prodromos Daoutidis, Wei-shou Hu
Department of Chemical Engineering and Materials Science, University of Minnesota

Integrated Analysis Of Genomic And Epigenomic Instability For Cho Cell Line Engineering
Sofie O’Brien1, Arpan Bandyopadhaya2, Conor O’Brien2, Lee2, Wei-shou Hu2,
1Department of Biomedical Engineering, University of Minnesota, 2Department of Chemical Engineering and Materials Science, University of Minnesota

Elucidating the mechanisms underlying the effect of K562 stimulation on NK cell expansion
Jennifer One
Department of Biomedical Engineering, University of Minnesota

Systems Engineering N-glycans Of Recombinant Therapeutic Proteins
Meghan McCann, Chemical Engineering and Materials Science, University of Minnesota, Minneapolis, MN, USA, Christopher S. Stach, Biochemistry, Molecular Biology & Biophysics, University of Minnesota, Minneapolis, MN, USA, Tung Le, Chemical Engineering and Materials Science, University of Minnesota, Minneapolis, MN, USA
Xinning Chen, State Key Laboratory of Bioreactor Engineering, East China University of Science & Technology, Shanghai, China, Liang Zhao, State Key Laboratory of Bioreactor Engineering, East China University of Science & Technology, Shanghai, China, Nikunj Somia, Genetics, Cell Biology, and Development, University of Minnesota, Minneapolis, MN, USA, Michael Smanski, Biochemistry, Molecular Biology & Biophysics, University of Minnesota, Minneapolis, MN, USA, Wei-Shou Hu, Chemical Engineering and Materials Science, University of Minnesota, Minneapolis, MN, USA

Monitoring metabolic profile of tissue-engineered tubular heart valves during culture.
Abrielle L. Prunty
Department of Biomedical Engineering, University of Minnesota

Utilizing A High-throughput Protein Protease Stability Assay For Antimicrobial Peptide And Protein Scaffold Engineering
Seth Ritter, Alexander Golinski, Benjamin Hackel
Department of Chemical Engineering and Materials Science, University of Minnesota

Exploring the effects of chloroquine and quinine on platelets using electrochemical techniques
Kang Xiong-hang, Jiayi He, Kaila Kementz-ness, Christy L. Haynes
Department of Chemistry, University of Minnesota

Study Of Factors That Influence The Ferromagnetic Resonance Response In Magnetic Nanowire Biolabeling Application
Yali Zhang, Joseph Um, Wen Zhou, Zohreh Nemati Porshokouh, Bethanie Stadler And Rhonda Franklin
Department of Electrical and Computer Engineering, University of Minnesota

Malic Acid Carbon Dots: From Super-resolution Live-cell Imaging To Highly Efficient Separation
Bo Zhi, Department of Chemistry, University of Minnesota
**NEURAL ENGINEERING**

**N1**
Translational Non-invasive Brain Stimulation From Mouse To Monkey To Human Model
Ivan Alekseichuk, Kathleen Mantell, Sina Shirinpour, Alexander Opitz
Department of Biomedical Engineering, University of Minnesota

**N2**
A Preclinical Model of Deep Brain Stimulation for Essential Tremor
Edward Bello II, Department of Biomedical Engineering, University of Minnesota

**N3**
In Vitro Model for Tauopathy and Traumatic Brain Injury
Nick Braun
Department of Biomedical Engineering, University of Minnesota

**N4**
The impact of deep brain stimulation electrode-tissue interface dynamics on local field potential recordings in the subthalamic nucleus
A.K. Brinda1, A.M. Doyle2, L.K. Wilmerding3, J. Krieg4, M.D. Johnson5
1. Dept. of Biomedical Engineering, 2. Dept. of Neuroscience, University of Minnesota, Minneapolis, MN, USA
Using Brain Stimulation To Modify A Brain Network That Supports Abstinence During Alcohol Use Disorder Recovery
Camchong Ji1, Roy At2, Gilmore C2,3, Thao M1, Katzynski M1, Fiecas M5, Mueller BA6, MacDonald AW7, Lim KO1 and Kushner M1
1University of Minnesota, Department of Psychiatry; 2Defense and Veterans Brain Injury Center; 3Minneapolis VA Health Care System; 4University of Minnesota, Medical School; 5University of Minnesota, School of Public Health; 6University of Minnesota, Department of Psychology; 7University of Minnesota, Department of Neuroscience

**N5**
Using Brain Stimulation To Modify A Brain Network That Supports Abstinence During Alcohol Use Disorder Recovery
Camchong Ji1, Roy At2, Gilmore C2,3, Thao M1, Katzynski M1, Fiecas M5, Mueller BA6, MacDonald AW7, Lim KO1 and Kushner M1
1University of Minnesota, Department of Psychiatry; 2Defense and Veterans Brain Injury Center; 3Minneapolis VA Health Care System; 4University of Minnesota, Medical School; 5University of Minnesota, School of Public Health; 6University of Minnesota, Department of Psychology; 7University of Minnesota, Department of Neuroscience

**N6**
Cortex Wide, Multi-modal, Cellular Resolution Neural Interfacing Via Transparent Polymer Prostheses
Leila Ghanbari
Department of Mechanical Engineering, University of Minnesota

**N7**
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Mojgan Goftari1, Edgar Peñatia, Simeng Zhang1, Matthew D. Johnson1
1Department of Biomedical Engineering, University of Minnesota, Minneapolis, MN, USA

**N8**
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Mahya Hemmat
Department of Mechanical Engineering, University of Minnesota

**N9**
3D Printed Stem-Cell Derived Neural Progenitors Generate Spinal Cord Scaffolds
Department of Mechanical Engineering, Stem Cell Institute, Department of Neurosurgery, Department of Genetics, Cell Biology and Development, University of Minnesota

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Craig C. Kage, Nathaniel E. Helwig, Benjamin Hyatt, Jessica Blaisdell, Kayla Mabamba, Lisa Nguyen, Zachary Eitel, Mary H. Foltz, Arin M. Ellington

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Sanaz Khosravani, Jeffrey Buchanan, Matthew Johnson2, Jürgen Konczak1
1 School of Kinesiology, University of Minnesota; 2 Department of Biomedical Engineering, University of Minnesota

**N12**
Label-free Optical Imaging Reveals Gray Matter And White Matter Atrophy In Scat Mouse +Models
Chao J. Liu1, Orion Rainwater2,3, H. Brent Clark3, Harry T. Orr2,3, Tane Akin1
1 Department of Biomedical Engineering, 2 Institute of Translational Neuroscience, 3 Department of Laboratory Medicine and Pathology, University of Minnesota, Minneapolis, Minnesota 55455, USA
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|  Oligomerization By FRET-based High-throughput Screening  
|  Chih Hung Lo1, Colin Kin-Wye Lim1, Zhipeng Ding1, David D. Thomas2,3, and Jonathan N. Sachs1  
|  1Department of Biomedical Engineering, 2Department of Biochemistry, Molecular Biology and Biophysics, University of Minnesota, Minneapolis, MN 55455, USA, 3Photonic Pharma LLC, Minneapolis, MN 55410  

N14  |  Collaborative Noninvasive Neuromodulation Modeling for Psychiatry and Rehabilitation Medicine  
|  Kathleen E Mantell1, Timothy Hendrickson2, Samuel T Nemanich3, Christine Conelea4, Bernadette T Gillick3, Kelvin Lim4, Alexander Opitz1  
|  1Department of Biomedical Engineering, University of Minnesota, Minneapolis  
|  2University of Minnesota Informatics Institute, Minneapolis  
|  3Department of Rehabilitation Medicine, University of Minnesota, Minneapolis  
|  4Department of Psychiatry, University of Minnesota, Minneapolis  

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|  Gerardo Rodriguez Orellana  
|  Department of Biomedical Engineering, University of Minnesota  

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|  Julia P. Slopesema, Lauri J. Lehto1, Yiğitcan Eryaman2, Naoharu Kobayashi1, Hoon-Ki Min3, Kendall H. Lee4, Silvia Mangia2, Shalom Michaeli2, and Matthew D. Johnson1  
|  1Department of Biomedical Engineering, University of Minnesota, Minneapolis, MN, USA  
|  2Department of Radiology, Center for Magnetic Resonance Research, University of Minnesota, Minneapolis, MN, USA  
|  3Department of Radiology, Mayo Clinic, Rochester, MN, USA  
|  4Department of Neurosurgery, Mayo Clinic, Rochester, MN, USA  

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|  Rls Summers, M Chen, C Mackinnon, Tj Kimberley  
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|  Nader Tavaf(A), Russell Lagore, Sean Moen, Kamil Ugurbil, Gregor Adriany, Pierre-francois Van De Moortele  
|  Department of Biomedical Engineering, University of Minnesota  

REGENERATIVE MEDICINE  

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|  Nicholas G. Fischert, Devaveena Dey2, Mehdi Belkhodja2, Thomas A. Davis2, Joan E. Bechtold3,4, Jonathan A. Forsberg2, Conrado Apariciot  
|  1Minnesota Dental Research Center for Biomaterials and Biomechanics (MDRCBB), 2Uniformed Services University of the Health Sciences - Walter Reed National Military Medical Center, 3Hennepin County Medical Center, 4Department of Orthopaedic Surgery  

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|  Zachary Galliger, Jennifer Day, Angela Panoskaltsis-mortari Phd  
|  Department of Biomedical Engineering/Pediatrics, University of Minnesota  

RM3  |  Silica coated iron Oxide nanoparticles for cryopreserved biological sample rewarming: impact of silica coating on heating and magnetism  
|  Zhe Gao, Hattie Ring, Bat-erdene Namsrai, Aniruddh Sharma, Erik Finger, Mike Garwood, Christy Haynes, John Bischof  
|  Department of Mechanical Engineering, University of Minnesota  

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|  Shuang-zhuang Guo, Kaiyan Qiu, Fanben Meng, Sung Hyun Park, And Michael Mcalpine  
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|  Zonghu Han1, Zhe Gao1,3, Navid Manuchehrabadi4, K. G. M. Brockbank4, C. L. Haynes3, J. Bischof12  
|  1Department of Mechanical Engineering, University of Minnesota, Minneapolis, MN 55455, USA, 2Department of Biomedical Engineering, University of Minnesota, Minneapolis, MN 55455, USA, 3Department of Chemistry, University of Minnesota, Minneapolis, MN 55455, USA, 4Department of Bioengineering, Clemson University, Clemson, SC 29634, USA, 5Tissue Testing Technologies LLC, North Charleston, SC 29406, USA, 6AngioDynamics Inc, Latham, NY 12110, USA  

RM6  |  Mucoadhesive Polymer Wafers For Sublingual Delivery Of Protein And Dna Vaccines  
|  Samuel M. Hanson1, Leah Novik1, Noah Nathani, Shailbala Singh2, Jagannadha K. Sastry2, Michael Barry3, Chun Wang1  
|  1Department of Biomedical Engineering, University of Minnesota, Minneapolis, MN; 2MD Anderson Cancer Center, Houston, TX; 3Mayo Clinic, Rochester, MN;
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<td>Kathylyn Hornberger, Department of Biomedical Engineering, University of Minnesota</td>
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<td>Harish Jain, Krutika; Hao Hou, Helen; Siegel, Ronald A.</td>
<td>Department of Pharmaceutics, University of Minnesota</td>
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<td>Kanav Khoslaa, Li Zhana, Aditya Bhatia, Aiden Carley-Cloptona, Mary Hagedornb,c,d, John Bischof,a,*</td>
<td>aDepartment of Mechanical Engineering, University of Minnesota-Twin Cities, Minneapolis, Minnesota 55408; bDepartment of Reproductive Sciences, Smithsonian Conservation Biology Institute, Smithsonian National Zoological Park, Washington DC 20008; cCenter for Species Survival, Smithsonian Conservation Biology Institute, Smithsonian National Zoological Park, Washington DC 20008; dHawaii Institute of Marine Biology, University of Hawaii, 46-007 Lilipuna Road, Kaneohe, Hawaii 96744; eDepartment of Biomedical Engineering, University of Minnesota-Twin Cities, Minneapolis, MN 55408</td>
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<td>Hak Rae Lee, Francisco Pelaez, Abby Silbaugh, Faith Leslie, And Samira M. Azarin</td>
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<td>Department of Mechanical Engineering, University of Minnesota, Minneapolis, MN 55455, USA. 2Nanocomposix, 4878 Ronson Court Suite K, San Diego, CA 92111, USA 3Department of Biomedical Engineering, University of Minnesota, Minneapolis, MN 55455, USA.</td>
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<td>David Ramirez</td>
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<td>Davin Rautiola, Joel L. Updyke, Kathryn M. Nelson, James C. Cloyd, and Ronald A. Siegel</td>
<td>Department of Pharmaceutics, 2Institute for Therapeutics Discovery &amp; Development, 3Department of Medicinal Chemistry, 4Center for Orphan Drug Research, 5Department of Experimental and Clinical Pharmacology, 6Department of Biomedical Engineering, University of Minnesota, Minneapolis, MN 55455</td>
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<td>Hannah S. Seo, Catherine A.A. Lee, Anibal G. Armien, Frank S. Bate, Jakub Tolara, Samira M. Azarin</td>
<td>Department of Chemical Engineering and Materials Science, 2Department of Genetics and Cell Development, 3Ultrastructural Pathology Unit, Veterinary Diagnostic Laboratory, College of Veterinary Medicine, 4Department of Pediatrics, Division of Blood and Marrow Transplantation, University of Minnesota - Twin Cities</td>
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