News Stories

Michael McAlpine & Colleagues Issued Patent for 3D Printing Method that Could Lead to Medical Technology Innovation
Dr. Michael C. McAlpine, Benjamin Mayhugh Associate Professor of Mechanical Engineering and IEM Member, and colleagues at Princeton University and the University of Utah, have been issued a patent, named “3D printed active electronic materials and devices,” for the 3D printing of semiconductors and semiconducting devices. According to the patent statement, this method could lead to innovations in medical devices by enhancing their functionality via the introduction of a direct 3D printing process of components such as sensors, transistors, solar cells, fuel cells and light-emitting diodes. “This opens up the possibility of incorporating smart electronics into biomedical devices such as brain interfaces for communicating with neurons or optogenetic devices such as 3D printed LEDs and photodiodes to stimulate them, sensor tattoos which can directly printed onto the body, cardiac devices which can regulate beating at low power, and ‘bionic’ human augmentation devices,” says Dr. McAlpine. This Patented 3D Printing Method Could Boost Medical Device Innovation >

Christy Haynes Awarded Guggenheim Fellowship
Dr. Christy L. Haynes, Vice Chair and Professor in the Department of Chemistry and Theme Co-Chair, Medical Devices of the IEM Executive Committee, was among three University of Minnesota professors to be awarded the John Simon Guggenheim Memorial Foundation Guggenheim Fellowship. Dr. Haynes’ project for the Fellowship is: “Characterization of the Molecular Corona Acquired by Technologically Relevant Engineered Nanoparticles in Environmental Matrices,” focuses on nanotoxicology research she will conduct during the 2018-2019 academic year at the Universitat Politècnica de València in Valencia, Spain. Dr. Haynes was one of 173 awardees chosen from nearly 3,000 applicants for the Guggenheim Fellowship. Three University of Minnesota Professors Awarded Prestigious Guggenheim Fellowships >
Theresa Reineke Co-Authors Study on How to Make Oral Medicines Work More Effectively

IEM Member Dr. Theresa M. Reineke, Professor of Chemistry, co-authored a study, with colleagues at the University of Chicago and The Dow Chemical Company, on how oral pharmaceuticals could be made more effective by improving their absorbability. The research involved the examination of dozens of publications on previous efforts to achieve this objective. “In this article, we survey the latest techniques, materials, and formulations for developing molecularly customized excipients that could greatly improve the future of how oral medications are developed,” says Dr. Reineke. “This information will be helpful in future research in both industry and academia that could help millions of people worldwide.” The study, “Advances in Polymer Design for Enhancing Oral Drug Solubility and Delivery,” was published in the American Chemical Society’s journal Bioconjugate Chemistry.

Sean Elliott is Principal Investigator of Feasibility Trial for Locally-Developed Urologic Device

IEM Member Dr. Sean Elliott, Professor, Vice Chairman, Director of Reconstructive Urology, is the Principal Investigator of a US-based phase 2 study titled ROBUST III for a drug-coated balloon named Optilume to treat urethral stricture, a condition that results in weak stream and pain, primarily in men older than 55. The balloon, developed by Urotronic, based in Plymouth, inflates to open up the urethral canal to allow urine to more easily flow through it, and its drug coating is intended to prevent the canal from re-closing. The device could potentially be an alternative to standard minimally-invasive treatments that often lead to reoccurrence and invasive open urethroplasty. “It’s exciting to see investment to treat this disease and to see a new product being offered for really the first time in history,” says Dr. Elliott. FDA Approves Second U.S. Study of Therapy Aimed at Better Treating Urethral Strictures | Device for Weak Stream Tested

Douglas Yee Discusses with Star Tribune New Cancer Care Consortium Led by the University of Minnesota

IEM Member Dr. Douglas Yee, Professor of Medicine and Pharmacology and Director of the Masonic Cancer Center, discussed with the Star Tribune a new $8 Million statewide consortium, funded by the Minnesota State Legislature and led by the University of Minnesota to provide cancer patients throughout Minnesota with access to leading-edge treatment protocols, experimental medications and prevention programs, including clinical trials, which will be available at 18 sites. According to Dr. Yee, Minnesota has a strong need for this access. “We are geographically a pretty big state, even though we’re small in population,” says Dr. Yee. “There are a lot of patients in greater Minnesota who don’t have access to the things we’re doing here at the Mayo Clinic.” According to the American Cancer Society, more than 30,000 Minnesotans will be diagnosed with cancer and more than 10,000 will die from various forms of the disease in 2018. Consortium to Spread Cancer Research Across Minnesota

John Bischof and Erik Finger Awarded R01 Grant for Organ Banking Research

Dr. John C. Bischof, IEM Interim Director and Professor of Mechanical and Biomedical Engineering, and his clinical colleague Dr. Erik B. Finger, Assistant Professor of Surgery, have been awarded an NIH R01 grant for a project entitled “Organ banking for transplant—kidney cryopreservation by vitrification and novel nanowarming technology.” This $2.3 million grant funds a 4-year project, which has the long-term goal of developing a method for cryopreserving kidneys for stable cryogenic storage, follows by warming using a novel nanoparticle enabled approach directly prior to transplant, which provides a new alternative to previous attempts to cryopreserve organs, which have failed due to cellular and structural damage from the formation of ice crystals.
This research builds upon Dr. Bischof’s previous efforts and success at cryopreserving small samples of tissue and is complimentary to another collaborative R01 grant with Dr. Finger that is developing a similar approach in the heart. Both R01s and the area are supported by a multi-investigator group of IEM faculty including Professors Michael Garwood, Christy Haynes, Alena Talkachova, Paul Iaizzo, Tim Pruett and Alex Fok. The long-term goal of the collaborative effort is to cryopreserve entire human organs for transplant, which would help to address a shortage of viable organs for patients who need them. NIH Notice of Award

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**Gwen Fischer Discusses Why Pediatric Device Innovation Consortium Thrives in Minnesota**

IEM Member Dr. Gwenyth Fischer, Assistant Professor of Pediatrics, discussed with Medical Design & Outsourcing how the Pediatric Device Innovation Consortium (PDIC), an organization she founded 7 years ago, and continues to direct, has successfully evolved and thrived in Minnesota. According to Dr. Fischer, two big factors that have led to its success have been support from the Clinical and Translational Science Institute (CTSI), and from the region’s strong medical technology companies. “I think our group has a little bit more of an industry approach than some of the academic-based ones. We understand that academics have a lot of strong skill sets, but getting a device to market in those later stages is not what a lot of academic centers have the ability to do,” says Dr. Fischer. That industry expertise and guidance has been passed along to the PDIC through the strong individual relationships that PDIC members have with people within the medical technology community. “It’s a huge medical device community, but it’s sort of a small person community in that I have gotten so much individual help and assistance and people connecting me to other people,” says Dr. Fischer. “Everybody knows everybody in this town, which I think is a major resource. People are very willing to help. There’s not that cutthroat attitude you see on the coasts.” How Minnesota Got a Pediatric Device Innovation Consortium | The Pediatric Device Innovation Consortium

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**Newly-Released Documentary on the History of Cardiac Surgery Features Visible Heart Lab**

A new film, “The Magical Muscle,” features the IEM-affiliated Visible Heart Lab (VHL). This documentary, by German filmmaker Berndt Welz, is being billed as “the worldwide first documentary about the history of cardiovascular surgery,” and chronicles that heritage from when it first evolved in 1896 to 1952 when an open heart surgery was first performed to later milestones, including the first heart transplant. The film’s trailer opens with a scene in which a reanimated heart is beating in the VHL’s isolated heart apparatus, a system that allows researchers to study functional cardiac anatomy, and commentary from Dr. Paul A. Iaizzo, Professor of Surgery, IEM Associate Director for Education and Outreach, and Principal Investigator of the VHL. Magical Muscle 2017

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**Announcements**

Registration Open for Inaugural AABME Connect One-Day Workshop “Modeling and Simulation: Transforming the Future of Healthcare” on May 14th

AABME CONNECT is a one-day workshop designed to bring together key stakeholders in the bioengineering community—from biologists to engineers and everyone in between—so they can network, highlight innovations, and discuss how to bridge the gap between basic and applied research. By attending AABME CONNECT, you will be able to:

- Expand your network with other key stakeholders in the bioengineering community.
- Embrace new technology and learn how you can benefit from the latest innovations.
- Elevate your leadership skills and knowledge of standards application.
- Explore the barriers that may inhibit standardization and learn how to reduce or eliminate them.

https://aabmeconnect.asme.org
Registration Open for First Annual Nanomedicine Short Course, June 13-14 at Physics and Nanotechnology Building

Nanotechnology offers devices, materials, and approaches that are increasingly being applied to the life sciences. These applications require broader interdisciplinary collaboration to exploit nanotechnology in the fields of medicine, dentistry, veterinary science, and pharmaceutics, as well as other bioscience areas such as plant science and bioengineering. To support these collaborations and further the spread of nanoscience techniques into the life sciences, the Minnesota Nano Center is offering the first annual Nanomedicine Short Course. The course will take place June 13-14, 2018, and will be held in room 110 of the Physics and Nanotechnology Building on the East Bank Campus. The Nanomedicine Short Course offers attendees a two-part introduction to the world of nanomedicine. The first day of the course features presenters from a variety of institutions and academic backgrounds, describing their work in applying nanoscience to the life sciences. During the second day, registered attendees will take part in a hands-on laboratory session to learn more about the techniques used in the field. Preregistration is required for the lab session. For registration and more information: Contact Jim Marti, Senior Scientist and Outreach Coordinator for the Nano Center: jmarti@umn.edu; 612-626-0732.

New Carlson School of Management Medical Industry Leadership Institute (MILI) Course Offerings (Open to Undergraduate Engineering Students)

MILI 5585 Healthcare Marketplace
Professor Pinar Karaca-Mandic | 2 Credits

**Description:** The healthcare marketplace constitutes nearly three trillion dollars in the United States and several trillion spent throughout the world. With growing demand for medical technology and the aging of the population, the scale and complexity of the healthcare supply chain is expected to dramatically increase over the next two decades. The healthcare sector is comprised of several markets for goods and services, including physician services, hospital services, insurance, pharmaceuticals and medical devices, and information technology. This course aims to provide a survey of the health sector to understand the scale, market opportunities, as well as barriers to this expanding and global industry.

**Objectives:**
- To identify the key actors in the healthcare sector and their market roles.
- To understand how the interactions of the actors influence particular markets.
- To understand the market opportunities offered by different sectors of the health economy.
- To understand the interrelationships between the markets.

**Offered/Prerequisites:** Fall 2018 A-Term Open to all majors | T/TH 11:50 am – 1:30 pm

MILI 5589 Medical Technology Evaluation in Action
Professor Pinar Karaca-Mandic | 2 Credits

**Description:** Innovations in medical technologies are one of the leading areas of economic growth in the world. Whether new technologies take the form of pharmaceutical, medical device, biotechnology, information technology or some combination of these innovations, the opportunities for both private enterprise and social welfare are substantial. However, these innovations are not without cost and require reimbursement from either a privately or publicly financed healthcare delivery system. Thus, the demand for the evaluation of new medical technologies continues to grow as new treatments are developed and healthcare costs continue to rise. This active, experiential learning course aims to provide knowledge of the skills, data, and methodology required to critically evaluate new medical technologies in order to meet financial investment as well as regulatory compliance objectives, such as FDA approval.

**Objectives:**
- Understand the role of government and regulatory agencies in the development and use of new medical technologies.
- Understand the reimbursement systems financing medical technology use.
- Identify a population to be served by a medical technology.
- Identify sources of data to evaluate a medical technology.

**Offered/Prerequisites:** Spring 2019 A-Term Open to all majors | T/TH 11:50 am – 1:30 pm