CLEMSON®

BIOENGINEERING

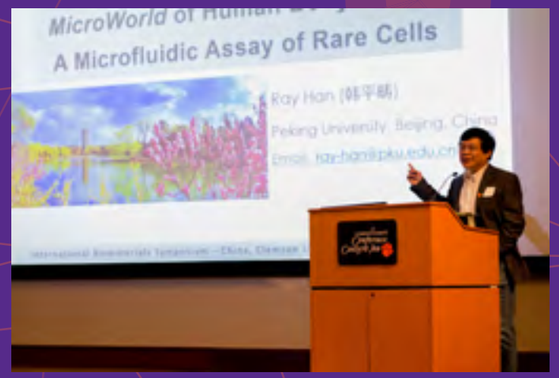
Educating Thinkers, Leaders, and Entrepreneurs

BIO-E NEWS

Spring 2017

International Biomaterials Symposium—China Held at Clemson University, April 9-11, 2017

The Symposium brought to Clemson distinguished Chinese scholars and entrepreneurs in biomaterials, who presented their advanced research and translational work, explored collaborations with faculty and fellow attendees, and brainstormed opportunities for building unique global partnerships in education and innovation. Among those featured were two Clemson Award winners: Professor Xingdong Zhang of Sichuan University, President of the International Union of Societies of Biomaterials Science and Engineering, member of China's National Academy of Engineering and associate member of the US National Academy of Engineering, who made opening remarks, and Professor Kam Leong of Columbia University, a member of the National Academy of Engineering, who gave a plenary talk.



Program Chair: Guigen Zhang guigen@clemson.edu

http://www.clemson.edu/cecas/departments/bioe/news-events/ibs.html

CONTENTS

A publication of the Department of Bioengineering at Clemson University

Department Chair
Martine LaBerge

Editor
Jenny Bourne

Content Contributors
Paul Alongi
Ken Scar
Sarah Helms
Maggie Masterson
Clemson Creative Services

Graphic Design
Sarah Helms

Dr. Will Richardson Awarded American Heart Association Scientist Development Grant to Study Mechano-Adaptive Cell Signaling Related to Cardiac Healing

Dr. William Richardson and his lab were recently awarded a Scientist Development Grant from the American Heart Association to support highly promising beginning scientists in cardiovascular and stroke research. The $231,000 grant will support investigation of mechano-adaptive cell signaling related to cardiac healing after a heart attack. According to Dr. Richardson, “Our lab is using a computer model of scar healing to test the effects of potential drugs that could allow us to control, based on local mechanical forces, where, when, and how much scar is deposited. Such a drug would improve cardiac function after a heart attack. Furthermore, we will continue developing the computer model as a tool to predict effects of numerous drugs and devices on long-term scar structure.”

Dr. Hai Yao Appointed Ernest R. Norville Endowed Chair in Biomedical Engineering

A Clemson University professor who plays a key role in bringing together some of South Carolina’s leading minds for bioengineering research is the new Ernest R. Norville Endowed Chair in Biomedical Engineering. Hai Yao’s appointment comes as the result of a $1.5-million gift from Mitch and Carla Norville. Mitch Norville received a bachelor’s degree in mechanical engineering from Clemson in 1980, and the endowed chair is named after his father.

Yao oversees the Clemson-MUSC Bioengineering Program as associate chair of the department of bioengineering. The six Clemson bioengineers who take part in the program are based at the Medical University of South Carolina in Charleston and collaborate with MUSC scientists and clinicians on a wide range of research projects.

Mitch Norville said that Yao’s leadership and team spirit made him a perfect fit for the endowed chair appointment. “Both are key ingredients in success, whether it’s in business or at a university,” he said. “Carla and I are glad to be able to help advance the collaboration that Dr. Yao has been so instrumental in building. It’s an honor to play a role in research that will have a positive impact on people’s health.”

Yao is one of two engineering faculty members who will receive medallions Tuesday as part of a ceremony honoring them as endowed chairs. Amy Landis, whose appointment was announced last April, is the Thomas F. Hash ‘69 SmartState Endowed Chair in Sustainable Development. Yao is an expert in disorders of the jaw’s temporomandibular joint, commonly known as TMJ. He and his team create computer models that predict dynamic changes within the jaw, helping answer critical questions about its pathophysiology for developing new diagnosis and treatment strategies.

“Thank you to Mitch and Carla Norville for their generous support. The appointment acknowledges the uniqueness of the Clemson-MUSC joint program. Clemson University sees the future in biomedical and bioengineering research. The collaboration with MUSC is going to bring Clemson tremendous opportunities.”
- Dr. Hai Yao

Yao is now using his expertise to create computer models of various organ systems that will serve as virtual clinical trials for new drugs and medical devices. The work he is doing would apply to middle- and late-stage testing and would be especially useful for drugs and devices treating musculoskeletal diseases, such as osteoarthritis, osteoporosis and back pain, he said. Animal and human trials would still be needed. But virtual clinical trials show promise for reducing the time and cost it takes to get products to market, Yao said. The trials could also be tailored to individuals. Yao is doing the research as leader of the group South Carolina Translational Research Improving Musculoskeletal Health, or SC-TRIMH. The group brings together Clemson and MUSC researchers with Greenville Health System clinicians.

Yao said that to create the models for virtual clinical trials, the group is working to better understand the human body and developing mathematical tools. Researchers are also working to validate the models, he said.“One person cannot do all of that,” Yao said. “Only SC-TRIMH and Clemson can do it. We have the resources. Clemson’s bioengineering department plays a pivotal role. We have the main campus in Clemson, we have CUBEInC at Greenville Health System’s Patewood campus and we have a significant presence at MUSC through the Clemson-MUSC Bioengineering Program. These three components are perfect for SC-TRIMH and virtual human trials.”

While Yao is a Clemson faculty member, his office and lab are in the bioengineering building that opened in 2012 at MUSC as part of the $120-million James E. Clyburn Research Center. He has been based out of Charleston for 10 years. Martine LaBerge, chair of the bioengineering department, congratulated Yao on his appointment to the endowed chair. “This honor is a reflection of Dr. Yao’s hard work, creativity and team building,” she said. “Clemson has a strong history in bioengineering that goes back more than 50 years, and Dr. Yao’s efforts are helping ensure that the future is just as bright. I would like to thank Mitch and Carla Norville for helping make this possible.”

Anand Gramopadhye, dean of the College of Engineering, Computing and Applied Sciences, said the endowed chair program helps Clemson attract and retain top talent critical to economic development. “Dr. Yao is richly deserving of the Ernest R. Norville Endowed Chair in Biomedical Engineering,” Gramopadhye said. “He is playing a key role in creating opportunities for innovation and collaboration that is putting South Carolina at the forefront of bioengineering and biomedical research. Thank you to Mitch and Carla Norville for their support of this important initiative.”

Dr. Sarah Harcum is Clemson PI on $70M Department of Commerce Biopharmaceutical Institute

A team of researchers at Clemson University is part of a new national institute aimed at advancing the United States' leadership in the biopharmaceutical industry.

The National Institute for Innovation in Manufacturing Biopharmaceuticals (NIIMBL), joins 11 other institutes in the Manufacturing USA network and is the first institute with a focus area proposed by industry and funded by the U.S. Department of Commerce. Secretary of Commerce Penny Pritzker announced this week that her agency awarded $70 million to the institute.

Clemson bioengineering professor Sarah W. Harcum is the Clemson site director for this initiative. She is joined on the Clemson team by: Co-site Director Ken R. Marcus, chemistry; Mark Blenner, chemical and biomolecular engineering; Terry Bruce of the Clemson Light Imaging Facility; Richard Groff, electrical and computer engineering; Scott Husson, chemical and biomolecular engineering; Jeong-Soo Lee, bioengineering; Laine M. Mears of the automotive engineering department at the Clemson University International Center for Automotive Resarch; Christopher Saski of the Clemson University Computational and Genomics Laboratory; Nishanth Tharayil, agricultural and environmental sciences; and Pingshan Wang, electrical and computer engineering.

The institute will help foster economic development, improve medical treatments and ensure a qualified workforce by collaborating with educational institutions to develop new training programs matched to specific biopharma skill needs. The announcement was made at the University of Delaware, which will coordinate the institute in partnership with the Commerce Department's National Institute of Standards and Technology (NIST). In addition to the federal funding, the new institute is supported by an initial private investment of at least $129 million from a consortium of 150 companies, educational institutions, research centers, coordinating bodies, nonprofits and manufacturing extension partnerships across the country. The consortium is establishing a new non-profit organization called USA Bio LLC to administer the cooperative agreement with NIST.

"In communities from coast to coast, the Manufacturing USA network is breaking down silos between the U.S. private sector and academia to take industry-relevant technologies from lab to market," said Pritzker. "The institute announced today is a resource that will spread the risks and share the benefits across the biopharmaceutical industry of developing and gaining approval for innovative processes.

"The innovations created here will make it easier for industry to scale up production and provide the most ground-breaking new therapies to more patients sooner."
- Penny Pritzker, Secretary of Commerce

This manufacturing innovation institute was awarded under the 2014 bipartisan Revitalize American Manufacturing Innovation Act. It is the first Manufacturing USA "open topic" competition, in which industry was invited to propose institutes dedicated to any advanced manufacturing area not already addressed by another institute. While government does not steer which new technologies get developed or how universities undertake research, the government does have a critical role to play as a catalyst and a convener. In recognition of this, the Commerce Department-funded institute was chosen from technology areas proposed by industry.

Traditional pharmaceutical production relies on chemistry to create medical treatments. Biopharmaceutical production relies on biology — living cells produce the treatments or their components — which requires a complex manufacturing process. Biomanufacturing is used to produce many widely used treatments for a growing number of health conditions, such as cancer, autoimmune disorders and infectious diseases — and generating billions of dollars in revenue worldwide. However, innovation is needed to allow more rapid and flexible production to meet healthcare demands and ensure U.S. leadership in the industry.

The institute will foster collaborative technology development to benefit the industry as a whole, reducing risk for individual companies and lowering barriers for small and medium-sized companies. Its programs will focus on advancing current manufacturing platforms as well as creating new ones for emerging products. The institute will also seek to develop flexible, rapid manufacturing capabilities that will help to ensure that manufacturers can quickly respond to pandemics and other biological threats. Beyond its research efforts, the institute will support the development of standards that enable advances in biopharmaceutical manufacturing. Collaborating colleges and universities will work with industry to provide education and training programs, curriculum development and certification standards that will ensure a pipeline of skilled workers.

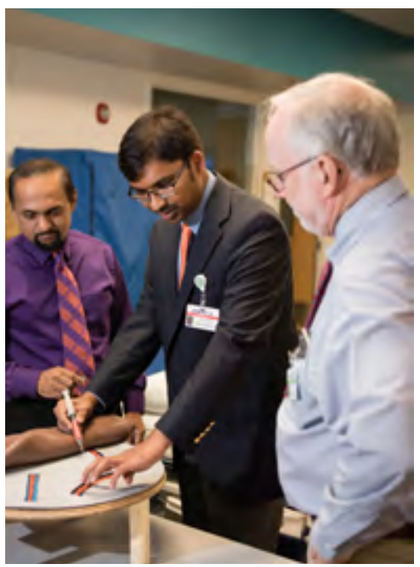
NIIMBL joins 11 other institutes in the Manufacturing USA network, which are addressing challenges and supporting workforce development in important advanced manufacturing industries. Like all of the institutes in the network, NIIMBL will continue to seek new members and to increase its industry investments.

Dr. Dan Simionescu Awarded NIH R56 Grant for Tissue Engineering and Regeneration of the Aortic Root

Dr. Dan Simionescu, the Harriet and Jerry Dempsey Professor of Bioengineering, was recently awarded an R56 grant from the National Institutes of Health. This $410k, "High Priority, Short Term Project Award" from the National Heart, Lung, and Blood Institute will support efforts to regenerate heart valves using scaffolds, stem cells and bioreactors. The research team is comprised of Dr. Jeffrey Gimble and Dr. Bruce Bunnell of Tulane University and LaCell LLC, Dr. Leslie Sierad of Aptus LLC in Clemson, Dr. Jun Liao of Mississippi State University and Dr. Chris Wright, thoracic surgeon at the Greenville Health System.

In Project Led by Dr. Joseph Singapogu, Simulator Could Help Improve Treatment for Dialysis Patients

One of the biggest risks that patients face when they undergo dialysis is coming into focus with the start of a five-year project aimed at building and testing a simulator that could revolutionize how nurses and technicians are trained.



The $717,000 project is led by Joseph Singapogu, a Clemson University research assistant professor of bioengineering who learned of the need for a simulator while shadowing David Cull of Greenville Health System. Funding is provided by the National Institutes of Health. The simulator will be designed to teach students to find the fistulas that serve as lifelines for patients whose kidneys have failed and need dialysis to survive. It's a critical skill because missing the mark with the needle can cause serious complications.

Just as important as developing the simulator, researchers will be studying how effective it is in teaching nurses and technicians the skills they need to serve patients, Singapogu said. "If our validation studies show that performance on the simulator improves outcomes on patients, then this could be adopted widely," he said. "That means that hundreds of thousands of patients' lives will potentially be impacted."

Patients typically need dialysis three times per week. Most patients are connected to the dialysis machine through a fistula, which is a vein and artery that have been surgically connected. Finding a fistula can be a challenge when it's buried deep in the flesh. The needle that goes into the fistula is large, which enhances the risk for complications. Going all the way through the vein or off to the side can cause a lot of bleeding. The arm might swell. If the fistula clots, the patient might have to be connected to the dialysis machine through a catheter that is inserted into the jugular, raising the risk of blood infection.

The idea behind the study is to help find new ways of avoiding complications by better training nurses and technicians. When they use the simulator, nurses and technicians will learn to feel for vibrations in the fistula and then map out its direction, all with their sense of touch. The prototype simulator that the team has developed is round and about the width of a car tire. A sheet of cured silicone that simulates the flesh is laid over several tubes that are spaced out on a platform and simulate fistulas. The same kind of motor that makes cell phones buzz creates the vibration. Later versions of the simulator will measure the needle's motion, force, angle and location. The simulator will be connected to a virtual mentoring system that will give trainees feedback on how they are doing.

Singapogu said that he has seen other simulators in the shape of an arm, but theirs is round to help nurses and technicians hone their abilities. "We want to isolate the skill," he said. "The skill is tactile. Being round, there's no way they can orient themselves as to where these fistulas are. They have to put their fingers on the vibration and map out the direction of where the fistula is going. Once they get a tactile sense of where it is, they can put in the needle at the right orientation."

The grant that Singapogu received is a K01 Mentored Research Scientist Career Development Award. Collaborators involved are at Tufts University, the University of Alabama and the University of Arizona in addition to those at Clemson and GHS. Martine LaBerge, chair of Clemson's Department of Bioengineering, said, "I congratulate Dr. Singapogu and his team on the grant. It is a testament to the quality and creativity of the research they are doing in a cutting-edge field."

Dabo Swinney Dabo's All In Foundation® Supports Dr. Brian Booth's Breast Cancer Research

Recently appointed assistant professor of bioengineering Dr. Brian Booth received another vote of confidence on October 17, 2016. For the third time, Tiger football coach Dabo Swinney's All In Team Foundation funded Booth's proposed breast cancer research. The foundation has been behind Booth from his first studies showing that tannic acid, a naturally occurring anticancer agent, kills ER+ and HER2+ breast cancer cells at a greater rate than normal breast cells.

According to Booth, "We are working to develop an injectable matrix of small collagen beads and tannic acid that will facilitate tissue regeneration following a lumpectomy. When a patient's own cells grow on the matrix of beads, the anticancer agent will be released, killing any residual cancer cells and inhibiting tumor recurrence." The first year of the new grant will allow the Booth lab to perform laboratory experiments to refine the matrix. In the grant's second year, Booth's lab will translate the results into preliminary animal experiments.

Booth describes graduate Lauren Jordan, who finished her M.S. degree in bioengineering working on this project with the support of Dabo's All-In Team Foundation, with pride. "We have been able to present the research at international scientific conferences including the American Association for Cancer Research Annual Meeting and the Biomedical Engineering Society Annual Meeting. We have published two scientific papers about our results so far, have another accepted for publication, and a fourth is currently being prepared for submission." He added, "Potentially, this research could translate to other soft tissue cancers such as melanoma. The matrix will also be applicable to soft tissue regeneration such as after injury or trauma."

Dr. Jeremy Gilbert named Hansjörg Wyss Endowed Chair for Regenerative Medicine

One of the Charleston area's newest engineers is an internationally renowned researcher who takes an unconventional approach to studying how metal interacts with the body, a field that affects millions of implant patients each year.

Jeremy Gilbert will begin 2017 as the Hansjörg Wyss Endowed Chair for Regenerative Medicine at Clemson University. His appointment signals that Clemson is investing a spectacular amount of intellectual muscle in its engineering programs in the Charleston area, one of the fastest growing areas on the East Coast. Gilbert will be the third endowed chair in six months added to the university's Charleston-based faculty. Two of the positions, including Gilbert, are part of a program that brings together bioengineers, scientists and clinicians to do research together at the Medical University of South Carolina. Endowed chairs are among the most esteemed positions on the Clemson faculty and were created to attract and support the world's most eminent scholars. Gilbert's new position was made possible in part by Hansjörg Wyss, who Forbes magazine called "among the most philanthropic people in the world." He built Synthes into a leading medical-device manufacturer before selling to Johnson & Johnson in 2012. Matching funds for Gilbert's position were provided by South Carolina's lottery-funded SmartState program.

"The biomedical industry is growing fast and strategically important to South Carolina. We welcome Dr. Gilbert to the team. Top-flight professors like him are key to enhancing the state's knowledge-based economy, which ultimately leads to higher paying jobs."
- Robert Jones, Executive VP for Academic Affairs & Provost

Gilbert comes to Clemson from Syracuse University, where he was a faculty member for 18 years. He has maintained a focus on metals at a time when many of his colleagues in the biomaterials field have opted to study polymers and ceramics.

Gilbert said almost all medical devices that end up in patients' bodies, from hips to dental implants, have a metal complement to them. The body can create chemicals, such as bleach and hydrogen peroxide, when it's trying to rid itself of invading bacteria or a foreign object, but those chemicals also accelerate metal corrosion. "Corrosion may be stimulating the body to react, but then the body releases chemicals that enhance the corrosion process," Gilbert said. "That feedback is a new idea, something that people have understood could be possible. We're the first group to bring this idea forward and look carefully at what these cells make, how much of it and what impact that has on the corrosion process for these alloys." The work could lead to new technical advancements that prevent infection in implant patients.

Gilbert will be part of the Clemson-MUSC Bioengineering Program, a 14-year-old collaboration that pairs Clemson bioengineers with MUSC scientists and clinicians. He will have a joint appointment with MUSC's Department of Orthopaedics and plans to work closely with its chair, Vincent Pellegrini Jr. "I'm excited about being at both institutions," Gilbert said. "Clemson is my home, but I'm living at MUSC. I feel like if I can make both of those institutions feel good about the interaction, I've succeeded, and that's my goal."

The director of the Clemson-MUSC program, Hai Yao, was elevated in August to the Ernest R. Norville Endowed Chair in Biomedical Engineering. Another recent addition to Clemson's Charleston-based faculty was Johan Enslin, the new Duke Energy Endowed Chair in Smart Grid Technology and director of the Zucker Family Graduate Education Center. Robert Jones, executive vice president for academic affairs and provost at Clemson, said that Gilbert's arrival will help the state create a pipeline of talent to the state's biomedical industry and conduct job-creating research. "The biomedical industry is growing fast and strategically important to South Carolina," Jones said. "We welcome Dr. Gilbert to the team. Top-flight professors like him are key to enhancing the state's knowledge-based economy, which ultimately leads to higher paying jobs."

MUSC Interim Provost Lisa K. Saladin said the Clemson-MUSC Bioengineering Program has been a great partnership that is beneficial to both universities. "This collaborative relationship enables us to strengthen the educational experience for our graduate students and to enhance the quality of our research," she said. "This unique partnership between a medical school and an engineering program should serve as a model for other universities. I am excited to welcome Dr. Gilbert to Charleston and to MUSC as he is an excellent addition to the team. I anticipate that he will serve as a great leader for this joint initiative." Martine LaBerge, chair of the bioengineering department, said that Gilbert is an eminent scholar. "His cutting-edge research is breaking new ground in the biomaterials field," she said. "Dr. Gilbert is an excellent fit to widen the talent pipeline and generate the technologies that will directly benefit the state's companies."

Gilbert is editor-in-chief of the Journal of Biomaterials Research. He was elected Fellow of the American Institute for Medical and Biological Engineers in 2004 and was inducted in 2012 as Fellow of the International Union of Societies of Biomaterials Science and Engineering. Gilbert is founder of the Syracuse Biomaterials Institute at Syracuse University and was appointed in 2013 to the Medical Devices Committee of the Food and Drug Administration. He has been a consultant for numerous medical device companies and has published more than 160 peer-reviewed manuscripts or book chapters, 250 conference transactions and 10 patents.

Congratulations on Gilbert's appointment also came from Anand Gramopadhye, dean of the College of Engineering, Computing and Applied Sciences. "He comes to Clemson with impeccable credentials," Gramopadhye said. "His experience in academia, government and the private sector is a testament to his leadership in the field of biomaterials. I welcome him to South Carolina."

Miller Gift Establishes Endowed Chair in Medical Physics at Clemson

Cardiologist Waenard L. Miller and his wife, Sheila, of Frisco, Texas, have given $2 million to Clemson University to establish the Dr. Waenard L. Miller, Jr. '69 and Sheila M. Miller Endowed Chair in Medical Physics.

"My vision of the medical physics program is a multidisciplinary collaborative endeavor associated with excellence in research, exponential growth in innovation, and outstanding educational opportunities for students," Miller said.

Miller earned his physics degree from Clemson in 1969. He received his medical degree from the Medical University of South Carolina and completed his internal medicine residency and a fellowship in cardiology at the University of Texas Southwestern Medical School. He also holds master's degrees in nuclear physics, biology and medical management. "My career started with my experience in physics at Clemson, with the faculty there, who instilled in me an excitement for learning about the wonders of the physical world," Miller said. "I was like a sponge. I absorbed it all and was just fascinated by physics. That desire for continual learning and inquiry has lasted throughout my entire career."

The Millers met when they were in high school in Greenville, S.C. Sheila's father, Bernyrd C. McLawhorn, was a Greenville physician with a degree in physics from Furman and a medical degree from Duke. McLawhorn encouraged and mentored Waenard in his medical career. "We had a common language in physics, but I was equally inspired by his knowledge of medicine and his commitment to his patients," Miller said. "My father-in-law was clearly the role model for my eventual choice of medicine as my vocation."

Miller was in the Air Force Reserve Officers' Training Corps at Clemson and was commissioned as a second lieutenant upon graduation. The Air Force sent him to graduate school at the University of Tennessee in nuclear physics, and then stationed him at Wright-Patterson Air Force Base in Ohio, assigning him to the foreign technology division as a physicist. He later transferred to the Aerospace Medical Research Laboratory, and there became intrigued with the combined concept of physics and biology. Miller began practicing medicine near Dallas in 1983 and co-founded the Legacy Heart Center (LHC) in 1995. Under his leadership, LHC became renowned for leading-edge cardiovascular care. Texas Monthly magazine named him a "Texas Super Doctor" for eight consecutive years – a designation determined by a poll of doctors and nurses across the state of Texas as well as through independent research.

Clemson University President James P. Clements described Miller as one of the university's most accomplished alumni, and thanked him and his wife for being so engaged and generous. "Waenard and Sheila already have established a significant legacy. We are so honored that they have decided to partner with Clemson to enhance their legacy even further," Clements said. "This wonderful gift will allow us to expand our internationally acclaimed biomedical research program and help meet the demand for medical physicists in the health care industry."

The endowed position will be a joint appointment in Clemson's departments of physics and astronomy and bioengineering. While collaborating with medical partners of Clemson University, the research conducted by the endowed chair holder will be at the interface of science and engineering with clinical translation as the outcome.

Mark Leising, former chair of Clemson's physics and astronomy department and interim dean of the College of Science, said the endowment will most certainly achieve the Millers' goals and more. "Dr. and Mrs. Miller's gift will invigorate our medical physics education and research programs," Leising said. "Bringing more physicists and physical science techniques to medicine will continue to improve patient care and fill an important need of our state." Martine LaBerge, chair of Clemson's bioengineering department, noted that Miller has spent his career on the cutting edge of medicine, raising the level of care higher and higher for patients, and the endowment will ensure future generations of Clemson graduates can do the same. "Medical physics research is at the forefront of patient care," said LaBerge. "With this generous gift, Clemson University will continue to lead the field of medical diagnostics and will make a significant impact in basic and applied research to improve patient outcomes."

The Millers' gift is a part of Clemson University's $1 billion "The Will to Lead" capital campaign to support faculty and students with scholarships, professorships, facilities and technology.

2016-2017 Seminar Speakers

Page Morton Hunter Distinguished Seminar Series

08-25-2016 Dr. Yuehuei An, Northwell Health
09-08-2016 Drew Green, CorMatrix Inc.
09-29-2016 Dr. Jeff Karp, Harvard Medical School
10-27-2016 Dr. Elizabeth Cosgriff-Hernandez, Texas A&M University
12-08-2016 Dr. Vladimir Muzykantov, MD, PhD, University of Pennsylvania
02-16-2017 Horst A. von Recum, Case Western Reserve University
03-09-2017 Dr. David Odde, University of Minnesota
03-16-2017 Dr. Kristin Billiar, Worcester Polytechnic Institute
04-06-2017 Dr. Andrew McCulloch, University of California San Diego
04-20-2017 Dr. Joseph Sangers, Syracuse University

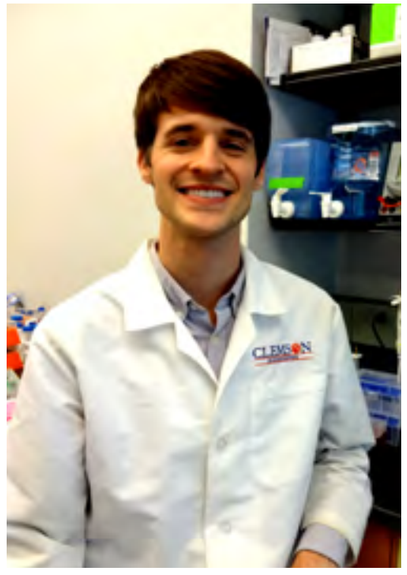
C. Dayton Riddle Biomedical Entrepreneurship Seminar Series

09-08-2016 Dr. George Magrath, MD, Medical University of South Carolina
11-03-2016 Pete Stegagno, Sanuwave Health Inc.
01-19-2017 Dr. Robert Hitchcock, University of Utah
03-02-2017 Dr. Venkat Krovi, CU-ICAR
04-20-2017 Dr. Raghu Yammani, Wake Forest University

Dylan Richards Awarded National Institutes of Health T32 Fellowship

In 2014, Dylan was awarded two years of support through Medical University of South Carolina's National Heart, Lung, and Blood Institute T32, "Training to Improve Cardiovascular Therapies." He re-applied for an additional year, and in 2017 was awarded a 3rd year on the training grant.

Asked about his research, Dylan, a student of Dr. Ying Mei of the Clemson-MUSC Bioengineering Program, said: "My PhD research has focused on engineering human induced pluripotent stem cell-derived cardiomyocyte (hiPSC-CM) microtissues to address the major challenges in cardiac-tissue engineering solutions for heart failure. I have addressed advancing the maturation of hiPSC-CMs and creating a more biomimetic model using cardiac organoids that incorporate cell-cell, cell-matrix, and structural (e.g., vessels) components in the heart."
Dylan enjoys collaborating with his lab mates and others. "Two minds are better than one, especially in the field of bioengineering. In the end, the freedom I have in Dr. Mei's lab to work across projects/field has encouraged me to strengthen my own capabilities to better contribute to the next project." Outside the lab, Dylan likewise enjoys spending time with friends and volunteering. "When I'm not working, I enjoy helping others, whether it's helping someone move (there's always somebody moving in Charleston), helping out homeless friends, and most recently using my French minor from college to help translate/teach English for a local Congolese refugee family. I also really enjoy being in the ocean, playing strategy board games (Killer Bunnies=best game), playing percussion/piano in jam bands, growing vegetables, and a million other things."



According to the NIH, the T32 award helps ensure a diverse, highly trained workforce to meet the Nation's biomedical, behavioral, and clinical research needs. The T32 provides a strong foundation in research design, methods, and analytic techniques; training to conceptualize research problems; experience in research, presentation, and publication; interaction with the scientific community; and enhanced understanding of the health-related sciences.

Undergraduate Clemson Bioengineering Society and Clemson Bioengineering Society Create Mentoring Relationships

This semester, the department's student organizations have focused on increasing collaboration to broaden their impact on the department and its students. The clubs have created a Mentor Game based on a Nickelodeon Game Show, Legends of the Hidden Temple: Groups of undergraduates and graduates formed teams according to their interest in one of four areas, biomaterials, biomechanics, bioelectrical, and regenerative medicine. The collaboration's aim is to promote natural interpersonal relationships that will lead to students having mentor/mentee figures in their lives. Teams compete to win pendants by participating in
mentoring activities, professional development activities and group challenges that involve specific team members (at least one graduate and one undergraduate student).

According to UCBS President Anna Lu Carter, "At the end of the semester teams will meet for a winner-take-all competition to gain prizes and most importantly, bragging rights!"

Because of this mentorship program, increased collaboration has been seen in external events, such as the annual engineering expo, an event where students teach 2nd graders bioengineering concepts, and the CBS and Carolina Biotech Group joint event on improving networking skills.

Mentorship hasn't just taken place between the graduate students and the undergraduates. In February the organizations hosted a night for freshman general engineering students to come visit the bioengineeirng department and learn about what life is like as a bioengineering undergraduate. In addition to tours visiting the classrooms and teaching labs, 10 research labs were represented with presentations and demonstrations to show the potential students what research is possible in bioengineering.

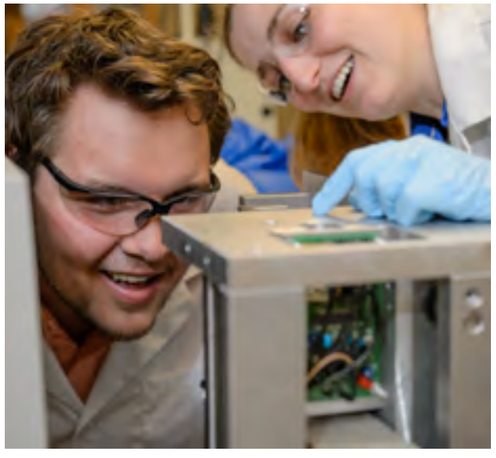
Ryan Borem Awarded National Science Foundation Graduate Research Fellowship

A United States Army combat veteran and current bioengineering Ph.D. student, Ryan's research focuses on the development of a tissue engineering scaffold to assist in the repair and regeneration of intervertebral discs in people suffering from back pain. He describes his life and work:

By supporting me in pursuit of a doctorate in bioengineering, The National Science Foundation Graduate Research Fellowship Program (NSF GRFP) has allowed me to continue my research. I have the opportunity to work for an advisor, Dr. Jeremy Mercuri, who ensures that our research always has a translational aspect to it; never losing sight that at the end of the day we are trying to help patients through basic science studies and the development of biomaterials and stem cell technologies. Combined with Dr. Mercuri's mentorship and guidance, my wife's on-going love and support, and the NSF GRFP I am able to focus on research, which will one day improve the quality of life for future generations.

Joey Wilson Named Schwarzman Scholar, Will Study in China with 128 Other Scholars

Clemson University senior Joey Wilson of Duncan has been named a Schwarzman Scholar. This prestigious scholarship will send 129 men and women from 30 countries to study for one year at Tsinghua University in Beijing. Wilson, a member of the Honors College who is majoring in bioengineering and global studies, is president of Clemson's Undergraduate Student Government.



Wilson was named an Astronaut Scholar for 2016-17. He was also a finalist for the British Marshall Scholarship this year.

"I'm honored to be part of this amazing program," Wilson said. "I believe that the vision of Mr. Schwarzman matches that of Thomas Green Clemson: to empower students to change the world through leadership, scholarship and philanthropy. My Clemson experience has shaped me to be the person I am today and I'll carry Clemson with me for the rest of my life." The scholarship is fully funded for all participants, including travel costs and a personal stipend, which is supported by the program's endowment. Scholars will live and study at Schwarzman College, the state-of-the-art academic and residential building built exclusively for the program.

"The Honors College is very proud of Joey's accomplishments," said Ricki Shine, associate director of the Calhoun Honors College at Clemson. "Being named a Schwarzman Scholar is a well-deserved honor for Joey, who took great advantage of Honors College offerings such as the EUREKA! Research Program, Educational Enrichment Travel Grants and the Dixon Global Policy Scholars Program to enrich his undergraduate education and best prepare for his future."

BloodSurf 2017: Blood-Biomaterial Interactions

Abstract Submission Deadline: March 31, 2017

September 17 – 20, 2017
Madren Conference Center, Clemson, SC

Organizers:

Ilya Reviakine (U Washington/Seattle, WA)

Robert Latour (Clemson University, SC).

Blood-biomaterial interface: where medicine and biology meet physical sciences and engineering.

Limited understanding of the mechanisms underlying adverse reactions to foreign materials upon contact with blood continues to hinder the development of new clinical devices and advanced treatment options for cardiovascular disorders. Addressing the problem will require the efforts of practitioners from diverse fields – clinicians and engineers, biologists and physicists. The goal of this, second, *BloodSurf* meeting in a series is to bring them together. Platelets will form the central theme of this meeting in view of their key role in defining blood response to biomaterials.

Confirmed Invited Speakers:

John Brash (McMaster, Canada)
Lawrence "Skip" Brass (U. Penn, PA, USA)
Steffen Braune (Helmholtz-Zentrum Geesthacht, Teltow, Germany)
Scott L. Diamond (U. Penn, PA, USA)
Larry Frelinger (Harvard Medical School, MA, USA)
Lara Gamble (U. Washington, WA, USA)
Maud Gorbet (U. Waterloo, Canada)
Hitesh Handa (U. Georgia, GA, USA)
Lisa Jennings (U. Tennessee, TN, USA)
Gene Langan (Greenville Health System, SC, USA)
Thomas Lindahl (Linköping, Sweden)
Qijin Lu (FDA, MD, USA)
Buddy Ratner (U. Washington, WA, USA)
Chris Siedlecki (PennState, PA, USA)
Mike Wolf (Medtronic, MN, USA)

Location: Madren Conference Center, Clemson, SC

SPONSORS

NIH National Heart, Lung and Blood Institute

CLEMSON College of ENGINEERING AND SCIENCE BIOENGINEERING

The meeting is endorsed by the International Society on Thrombosis and Haemostasis (ISTH) and the American Vacuum Society (AVS).

Conference Webstie: **www.ireviakine.net/Bloodsurf**

Dr. Guigen Zhang Elected President of Institute of Biological Engineering

Dr. Guigen Zhang's term as president of Institute of Biological Interfaces of Engineering began January 1, 2017. Here is an excerpt from his vision on the possibility of a biological revolution and his belief in solving worldwide problems through convergence.

"As president, I plan to energize the IBE leadership team and members and forge coalitions with sister societies to make a dent in bringing on the much anticipated Biological Revolution for the 21st century (in reference to the Industrial Revolution and Digital Revolution of the past two centuries). I plan to use IBE as a professional platform to bring awareness of the increasing importance of transdisciplinary integration of life sciences, physical sciences and engineering for developing deeper understanding of complex living systems and for engineering novel solutions to address the grand challenges of our times--sustainable food, energy, and environmental systems and quality health in the spirit of seeking convergence.

In my mind, the most important challenge facing today's biological engineers is the same one facing all other engineers, that is, to break away from the disciplinary confinement of learning, exploring and innovating. In a textbook to be published in March 2017, I devote the first chapter to laying out my arguments and suggestions for promoting a transdisciplinary way of engineering and innovating. Biological engineering actually is well positioned to overcome this challenge. I strongly believe that we can be much more effective and productive in tackling the biggest problems of our time if we pay attention to the common threads and hidden interdependencies among food, energy, the environment and health.

Some of the new frontiers of biological engineering involve synthetic biology and genetic engineering. The knowledge made in these fields will offer groundbreaking opportunities to advance the fields of tissue engineering and regenerative medicine, among others. Take the scaffolds needed in tissue engineering and regenerative medicine, for example: If they no longer have to be constructed using synthetic materials or demineralized tissues, but can be made of biological and/or genetic materials instead, many of the difficulties hindering realization of the bounteous promises of tissue engineering and regenerative medicine could be eliminated. Along the way, imagine how many new possibilities and paradigms the field of biological engineering could offer for solving health, food, energy and environmental problems with the fewest unintended consequences."

- Dr. Guigen Zhang

Samuel F. Hulbert

April 12, 1936 – January 29, 2016

Clemson University associate dean, engineering research and interdisciplinary studies; director, materials engineering and bioengineering; head of the division of interdisciplinary studies, and professor of materials and bioengineering.

Clemson University Department of Bioengineering
301 Rhodes Research Center
Clemson, SC 29634