NSF Engineering Research Center for
Revolutionizing Metallic Biomaterials
http://erc.ncat.edu
NC A&T State University
University of Pittsburgh
University of Cincinnati
Hannover Medical School
ISSUE 8

Table of Contents

Newsletter 2017

NSF ERC-REVOLUTIONIZING METALLIC BIOMATERIALS STUDENT ASSOCIATION

From the desk of Director Sankar

Welcome to the eighth student-generated newsletter of the Engineering Research Center for Revolutionizing Metallic Biomaterials (ERC-RMB). Our Gen 3 ERC's mission is to transform current medical and surgical treatments by creating "smart" implants to improve treatments for orthopedic, craniofacial and cardiovascular ailments coupled with the development of a vibrant, diverse workforce well-prepared for the multidisciplinary and global challenges and opportunities of the new millennium.

Our Student Leadership Council (SLC) and student members continue to excel on many fronts as they rally behind the Center philosophy "One Team, One Dream." This SLC report highlights the Center's outstanding accomplishments on multiple fronts. We are truly excited about the intellectual growth and leadership of these ERC students; our next-generation innovators and thinkers.

Our knowledge continues to grow in process innovations and the development of various Mg degradable alloy systems, driven by "materials by design" concepts. Coupled with detailed fine scale characterization methodologies, these are creating excitement and generating interest across industries and federal agencies. The novel alloys and our strengths in coating technologies, corrosion science, and testing techniques, are attracting additional interest from related and non-medical industries/agencies, leading to new, highly synergistic partnerships and opportunities. In Year 09, ERC continued to engage with industry and the global community through our routine Friday webinar series.

Once again, advances in ERC-RMB science have been matched by ERC-RMB milestones in education and outreach. In Year 09, the NCAT BMEN faculty successfully won ABET accreditation for their BS program, making NCAT the 1st HBCU in the nation with an ABET-accredited BS Bioengineering program.

As in other years, ERC students and staff have garnered multiple national and international recognition and citations. Their accomplishments and leadership achievements are proudly documented on our website http://erc.ncat.edu.

On behalf of the entire ERC team, I also take this opportunity to extend special appreciation to our Educational Advisory Board, Clinical and Scientific Advisory Board, and Industrial Advisory Board (EAB, CSAB and IAB) members for their incredible dedication and time.

Again, welcome to our Center. I look forward to your feedback and participation as we continuously strive to improve.

-Jag Sankar
ERC–RMB Center Director

Welcome to the 2016-2017 issue of the student-generated ERC-RMB newsletter. The ERC-RMB continued to enhance the scientific research progress while simultaneously impacting the local communities with STEM-related activities. The Student Leadership Council (SLC) is pleased to report our Year 8 progress revolving around research activities, education and outreach efforts and student accomplishments.

Featured articles include updates on student travel and knowledge gained from both national and international conferences. The SLC hosted a standardization workshop at this year student retreat exposing the students to the importance of the development of working standards for characterization of bioabsorbable metallic materials. Graduated students have been able to successfully transition into careers in industry as showcased through the alumni highlights. This year there was momentous advancement made in student research as seen in the abundance of papers we published, with some selections showcased in this newsletter. The talent in our dynamic center was put on display in a number of recognitions and strong showings in competitions on both research and entrepreneurship.

As always, we greatly appreciate and commend the effort put forth by our newsletter team, editor Dandan Hong, as well as the continued support and excellent guidance from the ERC leadership team.

SLC Co-Presidents:
Paul McGhee
North Carolina A&T (NC A&T)
Yonghai Zhang
University of Cincinnati (UC)
Jingyao Wu, Adam Chin
University of Pittsburgh (Pitt)

Events and Activities

ERC-SLC Alumni Seminar Series

The ERC has supported many excellent students whom continued to contribute to the scientific excellence upon graduation. Current ERC students have designated these alumni to be the role models and the light on the rugged graduation path. To enhance the light intensity, the ERC-RMB-SLC has decided to invite the alumni back, in an effort to enlighten the presently both excited and scared minds. Being always-hungry graduate students, the alumni talks are happily assigned during lunch time, served with pizzas and soda.

Danielle Minteer

Danielle was luckily selected to be our first trial in the ERC-SLC Alumni Seminar Series. During her time researching the biodegradable metals at Pitt, Danielle was also busy with many other roles, such as the chapter president of the BMES, project manager and chief human resources officer of the Fourth River Solution, a student-based consultant organization. Now after graduation, she becomes even busier: she's the translation architect in the biotechnology film sciVelo, data manager and clinical trial research coordinator at the University of Pittsburgh Medical Center, and a co-founder of the Strik3, a developing organization that helps STEM PhD students to find dream jobs (www.strik3.com).

Did you know that a job and a career are different? At least the audience did not. Danielle's talk, entitled "Find a career, not a job," was extremely helpful for students who would graduate soon. It provided invaluable tips on searching for a career that could greatly match an applicant's ability. Surely, for many students freshly graduated from school, the first thing we blindly rush into is to "find a job," so that we could continuously support our living. But as Danielle pointed out, we should get to know ourselves first, our strength (what we are good at) and passion (what we are interested in), in order to find our ideal career. Because, as what we knew but never realized until this seminar, what we are good at becomes what we love; what we suck at becomes what we avoid.

An important question Danielle suggested us to ask ourselves before targeting at any positions: where do we fit? Traditionally for PhD students, our career path is set to grow in the academia. With 70% of PhD students wish for a goal of tenure track professor, only 8% could be the final winner, not to mention the increasing difficulty in obtaining federal funding. Luckily for STEM PhD students, everyone could be fit into one of these three categories: science-dependent, mixed-dependent, and non-science dependent. Depending on the skills we acquired during our training, we could enjoy the heavy science by becoming an industry scientist to work for the research and development sector, or practice our soft skills, such as presentation, mentorship, and project management, to attempt in the field of consultant. In between, we have the choice of medical liaison, patent law officer, biotech equity analyst, and so on. During her talk, Danielle also helped us identify our personal values and professional aspirations, which could be used to further decipher our corresponding career/job types.

Once we set our target, understanding how the employers hire becomes the next important question. Worked as a HR herself, Danielle shared with us few helpful tips. For example, when talking with recruiters, be general and avoid getting deep into scientific terms. Losing their attention may not be a clever idea during an interview. The hiring managers could set filter to only include applicants within their radius. So to increase our chance of scoring a fitful career, it would be better to start from the city you are living in.

Danielle is presenting to the ERC students.

Danielle's talk included innumerous information for STEM PhD students who are ready to step into the real world. It definitely boosted our confidence and reduced our worries when searching for jobs after graduation. We were affirmed of our advantages in the job market, such as our deep expertise, transferable skills, and attractive backgrounds. Even more exciting, we learned that the job opportunities for PhDs are always abundant. Thanks for Danielle, we are now all relieved at last, looking forward to finding our great match to a lifetime career.

-Dandan Hong (Pitt)

ERC-SLC Alumni Seminar Series

Andrew Brown

Also part of the Alumni seminar series was Andrew Brown of the University of Pittsburgh. Dr. Brown graduated in 2015 with his PhD in Bioengineering and is currently a clinical assistant professor in the Depart of Periodontics and Preventative Dentistry in the Center for Craniofacial Regeneration (CCR) at the University of Pittsburgh where he focused on research of dental bone grafting devices. He has decided to continue that line of translational research and has raised $200,000 in translational-oriented research funding to support pivotal experiments with an eye towards spinout company formation in the next year.

Andrew is presenting to ERC-RMB students during ERC-SLC alumni seminar series.

At the seminar, Dr. Brown discussed his guided bone regeneration device, PerioMag, that incorporates magnesium to aid in the growth of new bone and gingival tissue for craniofacial applications. Within his talk, he discussed the specifics of the technology, while also talking about the process of commercialization which included market research and also the requirements to be met by the FDA. During the Q&A session, Andrew fielded questions on the process of getting such a new technology FDA-approved as well as the direction of his company and future pursuits. This was invaluable information for those willing to pursue a more entrepreneurial path after graduation.

- Adam Chin (Pitt)

A Dentist from China Gets Glimpses of the ERC Research

Dr. Elia Beniash is an associate professor in the Oral Biology Department of School of Dental Medicine of the University of Pittsburgh. Mr. Avinash J Patil is a PhD student in the Bioengineering Department of the University of Pittsburgh. They are both affiliated with the ERC project that falls under thrust areas #2: materials processing/characterization and modeling (chemical, physical, mechanical, modeling) (Blue Team).

Avinash's PhD work is related to the use of Alkylsilane coating to control the corrosion rate of Magnesium (Mg). Their work has been published recently in American Chemical Society's (ACS) Journal, Biomaterials Science & Engineering. The title of his publication is "Anticorrosive Self-Assembled Hybrid Alkylsilane Coatings for Resorbable Magnesium Metal Devices". He and Dr. Beniash have also received the patent based on their coating technology. The tile of his patent is "Self-Assembled Organosilane coating for resorbable metal medical devices," WO 2016/126773 A1, August 11, 2016.

After successfully developing the Alkylsilane coating technology to control the corrosion of Mg, they decided to add the new feature in their coating. The first clinical problem they investigated was infection. An implant-associated infection is a major challenge in the orthopedics field. Recently there is much attention to antimicrobial functionalization of the implant surface by antibiotics or other anti-infective agents. They encapsulated antimicrobial agent, Tetracycline (Tc), in the alkylsilane hybrid multilayered self-assembled coatings for drug release.

In this past spring semester, Dr Beniash's lab hosted Dr. Tao Jiang, a visiting scholar from Wuhan University, China. Dr. Tao has extensive experience in functionalization of biomaterials used in dentistry. Avinash and Dr. Tao studied the drug releasing kinetics of Tc from Alkylsilane coating in simulated body fluid (SBF). An incremental increase in the concentration of Tc in the SBF media in which the alkylsilane coated Mg discs were incubated was apparent. As a future study they have planned to conduct Zone of Inhibition Test for Antimicrobial Activity of Tc encapsulated Mg discs. They have added one more claim to above patent based on recent work of drug release from Alkylsilane coating.

Dr. Tao is impressed with the depth of research expertise in the ERC to develop degradable Mg as medical device material. He is planning to visit Pittsburgh in future. Apart from lab work, Dr. Tao also enjoyed the food and social activities in Pittsburgh. During his stay in the US, he travelled to Washington DC and New York to experience American culture. Avinash is planning to graduate in June 2017.

- Avinash Patil (Pitt)

From left to Right, Mr. Avinash Patil, Drs. Tao Jiang, Xu Yang, Ballav Borah, and Elia Beniash,

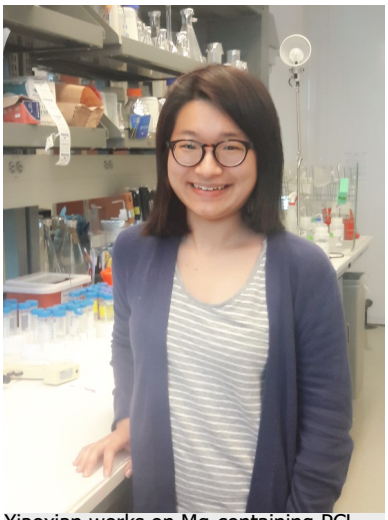
A closer look at projects within the ERC-RMB

Research Highlights

Mg Particle-Containing Electrospun Polycaprolactone Fabrics to Evaluate Nerve Repair & Regeneration

Provided by Dr. Bhattarai in NCAT, electrospun polycaprolactone (PCL) fabrics containing different percentages of Magnesium (Mg) particles (10%, 20%, 30%, 50%, Mg/PCL, w/w) were characterized in the lab led by **Dr. Pixley** in UC, which also includes **T. Hopkins and X. An**. Mg particles were released in the form of Mg^{2+} when the fabrics were immersed in the media supplemented with serum. Within 2 weeks, the fabrics showed steady release of Mg^{2+}, in which 10% Mg-PCL fabric plateaued on day 7. Later, neuronal-like PC12 cells were cultured in the extracts from 3-day immersion. Cell viabilities were all above 75% in different fabric extracts, indicating that the extracts were nontoxic to these cells. Same type of cells was also seeded directly on the fabrics, with SEM images showed that the cells were clustered and attached to PCL fibers. The amount of hydrogen released during immersion were measured by the amperometric hydrogen sensor in Dr. Heineman's lab, under instruction of Dr. Kuhlmann and Dr. Zhao. Small amount of hydrogen was detected in the media. Based on the previous research, this hydrogen concentration fell in the range of protecting PC12 cells in oxidative environment. A manuscript describing our findings was finished and ready to publish.

In vivo, pieces of fabric (PCL and 10% Mg-PCL) were implanted subcutaneously in mice to evaluate their biocompatibility. Based on the staining sections, Mg-containing fabric were significantly thicker than PCL fabric alone, as well as infiltrated with more macrophages at the same time point. Conduits rolled from these fabrics by U. Adhikari in Dr. Bhattarai's lab were also offered to Dr. Pixley. These conduits were sutured in sciatic nerve injured rats as nerve conduits to study Mg's potential in nerve repair and regeneration. Sensory nerve function, calf muscle perimeter, and rat walking behavior are being monitored every week before dissection in mid-June. Meanwhile, the corrosion rates of Mg pellet and stent samples brought by G Zhang from Dr. Shanov's lab are undergoing *in vitro* corrosion test with the help of X. An.

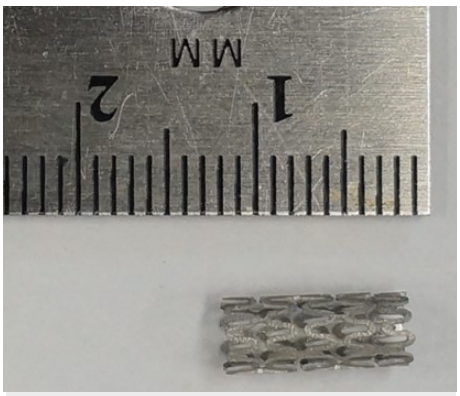


Xiaoxian works on Mg-containing PCL fabrics.

-Xiaoxian An (UC)

Pitt researchers developed novel ultra-high ductility (UHD) magnesium alloys for tracheal stent application

Tracheal obstruction is a relatively rare problem, but can be challenging to treat, particularly in pediatric patients. A common treatment for tracheal obstruction is surgical resection of the trachea with primary reconstruction. However, high anastomotic tension and ischemia can lead to a recurrence of tracheal obstruction. Tracheal stenting is another option with reasonable success. In adult patients, metallic stents are more successful than silicone stents, with better maintenance of airway patency leading to fewer complications. However, the stents are considered to be a permanent implant due to the difficulties of removal after the stents become covered with the mucosal tissue. The long-term presence of these stents can have adverse effects of stenosis due to encapsulation of the stent and tracheal perforation following abrasion by the stents. A more acceptable treatment option would be deployment of a degradable stent that can be functioned to temporarily maintain airway patency while gradually degrading with time as the trachea tissue regenerates.



Prototype tracheal stent made from ultra-high ductility magnesium alloy

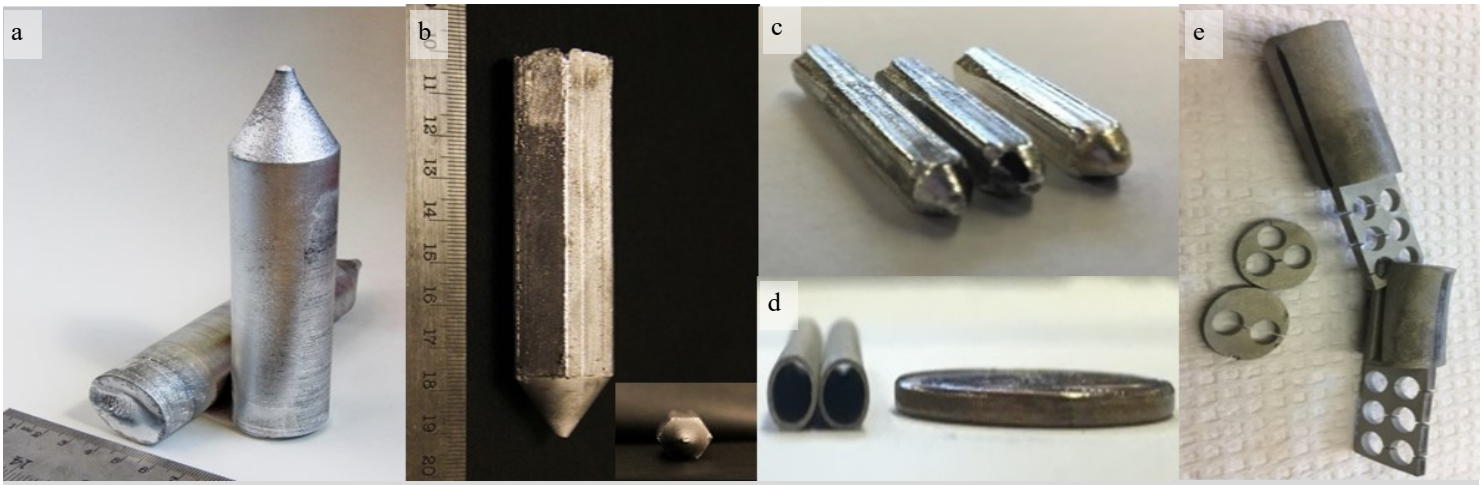
Over the past few years, **Dr. Kumta**'s group has been working on designing new magnesium alloys for tracheal stent application. **Jingyao Wu**, a graduate student from Dr. **Kumta**'s laboratory, has developed a new magnesium alloy system that exhibits ultra-high ductility. High ductility will allow the design and manufacture of the stents with the desired mechanical attributes thus potentially improving the clinical outcome. The material characterization and *in vitro* cytotoxicity assays showed that these new alloys have no noticeable cytotoxicity to human airway epithelium cells. With these demonstrated results, candidate alloys with the best overall performance were machined into stents with suitable dimension fitting the rabbit airway model. Moving forward, **Dr. Kumta**'s group has recently received seed funding from the Children's Hospital of Pittsburgh of the UPMC to support the preclinical animal study. In this study, the *in vivo* degradation, local tissue response and systemic toxicity will be systematically evaluated to demonstrate efficacy of this novel alloy system.

-Jingyao Wu (Pitt)

Scientists From UC Have Been Making Mg Single Crystals

After last year's successful synthesis of 20 mm diameter cylindrical Mg single crystal rod, the UC Mg single crystal team is pleased to announce the most recent achievements: 1) Growth of 30 mm diameter cylindrical Mg single crystal with around 140 mm in length, which represents an increase of 50% by mass compared to Year 8; 2) Grow of Mg single crystals with diverse physical shapes including hexagon and square cross sections. The creation of flat surfaces on the single crystal rods has significant meanings for our study. These shaped crystals allow easier XRD determination of the crystallographic orientation and enable performing cold work to tune the mechanical strength of the crystals along certain crystal planes. Further, square and cylindrical single crystals were synthesized for bone nail applications; 3) Fabricating the first Mg single crystal stent which utilizes the great ductility of this material; 4) In vivo testing of Mg single crystal discs extracted from three different crystallographic orientations of a main crystal rod. The discs along with controlled samples made of poly-crystalline Mg were subcutaneously implanted into SKH1-Elite immune competent mice by Dr. Dong from UC. The mice were sacrificed 6 weeks after implantation. No significant hydrogen gas generation and no apparent systemic toxicity was observed during the experiment. The discs from the Mg single crystal showed better corrosion resistance compare to poly- crystalline Mg samples.

-Guangqi Zhang (UC)

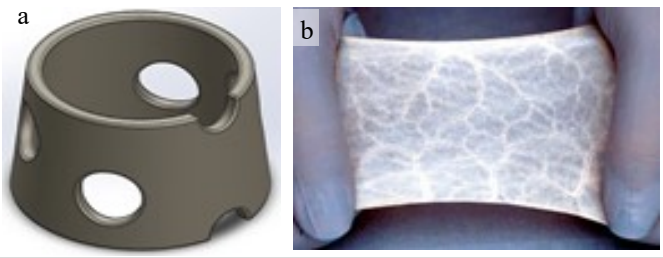


a) 30 mm-dia. Mg Single Crystal; b) 20 mm-dia. hexagonal Mg single crystal; c) square single crystals; d) EDM machined Mg single crystal tubes; and e) EDM machining of discs from different crystallographic orientations for in vivo testing.

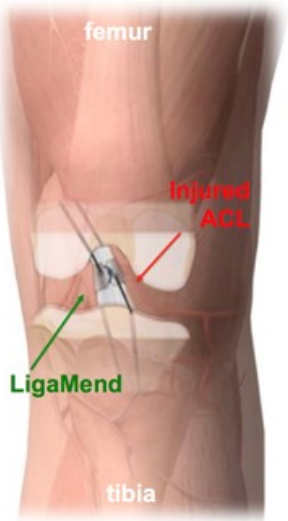
Pitt Group Developed LigaMend to Repair and Regenerate a Torn ACL

Anterior cruciate ligament (ACL) injury, a most common keen injury, affects about 200,000 Americans each year. The healing for ACL injury is so difficult that replacing the ACL with a graft using surgical reconstruction is usually the only treatment method.

Dr. Savio Woo's group has invented a device, LigaMend, which could help healing the ACL and eliminate the need for a graft replacement surgery. LigaMend consists of two crucial parts: a bioresorbable Magnesium ring device (Fig a) and an extracellular matrix (ECM) scaffold (Fig b). The Magnesium ring could be used to fix the torn ACL combining the suture technique, while the ECM scaffold could enhance and accelerate healing.



LigaMend consists of a) a bioresorbable Mg ring device; b) an extracellular matrix scaffold.



LigaMend applied to an injuried ACL.

Currently, Dr. Woo's group has finished the third pre-clinical study for LigaMend in a large animal model. Further testing are still ongoing, collaborating with their industry partner, the Naton Institute of Medical Technology. Studies have shown that the entire construct could degrade completely over the period of 6-12 weeks, leaving only the healed ACL.

No other ACL healing device is currently available in the market to compete with LigaMend, which means that this device could capture potentially a market of $3 billion. The scientists from Dr. Woo's group is also planning to expand the technology to address the healing of other soft tissue injuries, such as shoulder, elbow, ankle, and rotator cuff.

-Jonquil Mau and Dandan Hong (Pitt)

AWARDS & RECOGNITION

Celebrating achievements of our Center's members!

White House Initiative on HBCU's Names ERC-RMB Student to its Third Class of HBCU All-Stars

North Carolina A&T's doctoral engineering student, Paul McGhee, is among the 73 undergraduate, graduate and professional students chosen by the White House Initiative on Historically Black Colleges and Universities (WHIHBCU) for its third class of HBCU All-Stars for their accomplishments in academics, leadership and civic engagement.

McGhee, a recipient of a Title III, PhD Fellowship funded by a grant from the U.S. Department of Education, is a doctoral student majoring in mechanical engineering, and is also co-president of the ERC-RMB student leadership council.

Paul McGhee shaking hands with Executive Director of White House Initiative on HBCUs Kim Hunter Reed at the HBCU Week Conference in Arlington, VA.

Currently enrolled at 63 HBCUs, the All-Stars were selected from 300 students from 24 states, who submitted completed applications that included a transcript, resume, essay and recommendation. The All-Stars will serve as ambassadors of the White House Initiative by providing outreach and communication with their fellow students about the value of education and the Initiative as a networking resource.

Using social media, relationships with community-based organizations, and sessions with industry professionals, McGhee and all other HBCU All-Star ambassadors will share proven practices that support opportunities for all young people to achieve their educational and career potential. They will also participate in the White House HBCU Week Conference, national and regional events, and webinars with Initiative staff and other professionals on a range of disciplines that support a spirit of engagement and personal and professional development.

"During the course of one academic school year, the 73 All-Stars will distinguish themselves as exemplars of the talent that HBCUs cultivate and as noble ambassadors of their respective institutions," said U.S. Secretary of Education John B. King Jr. "The Initiative is looking forward to working with this third class of All-Stars and is confident this opportunity will allow the Initiative to meaningfully connect with HBCU students and advance academic excellence at their schools."

- Paul McGhee (NCA&T)

ERC-RMB Students Won $25K Pitt Innovation Challenge Award for Research

Jingyao Wu, an ERC-RMB students in Bioengineering at Pitt, won $25K for translational research of magnesium vascular stents. The Pitt Innovation Challenge (PInCh) competition is designed to generate innovative solutions to challenging health problems. The University of Pittsburgh Office of the Provost, Clinical and Translational Science Institute (CTSI), and Innovation Institute collaborated to create the PInCh competition in order to stimulate innovation in a fresh exciting way. This year's challenge is focused on bold solutions in health. The Clinical and Translational Science Institute sponsored the 4th Pitt Innovation Challenge. CTSI aims to move health-related research projects along the translational spectrum, not just to commercialization.

Pitt graduate student Jingyao Wu from Dr. Prashant Kumta's lab teamed up with Dr. Gorantla's group at University of Pittsburgh Medical Center proposed magnesium based stents as a new treatment solution for vascular disease.

Dr. Kumta's group has developed a novel ultra-ductile magnesium alloy specifically for stent application and the team has been using this new alloy for airway stenting.

PITT INNOVATION CHALLENGE

PInCh competition offered an opportunity to further explore the application of this new alloy for vascular stents application.

The PInCh competition consists of three rounds. Teams entering Round 1 submit a video describing their idea. Applications will be reviewed for Innovation, Impact, and Feasibility. In this year's competition, more than 40 teams submitted the video application and less than half of the participators moved to Round 2. Teams chosen for Round 2 submit a written document to expand on their idea including proposed research, potential impact, and commercialization strategy. Six teams were selected to compete for the final Round. Teams chosen for Round 3 submit a response to reviewers and revisions to their written document and pitch their idea to a panel of judges at the final event. Jingyao's project was selected as one of the six finalists and he delivered a six minutes elevator pitch in front of a panel from both academic and industry. Unfortunately, the team didn't won the highest 100K award, but the team still secured a $25K research award as a runner-up. This competition is not only a great experience for the ERC students as part of research training, but also a great opportunity to increase the awareness of the research at ERC-RMB.

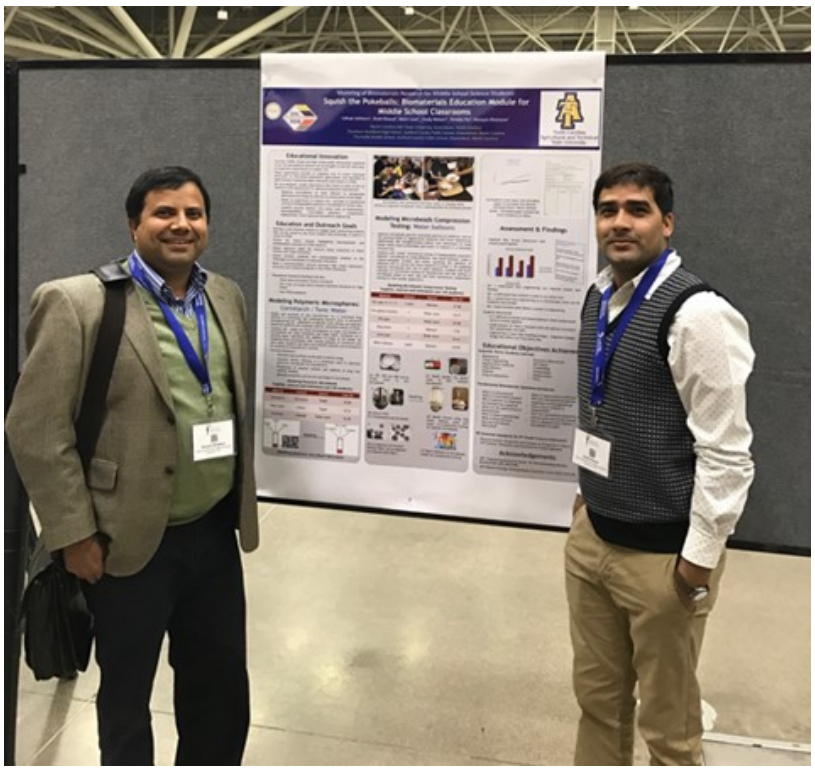
- Jingyao Wu (Pitt)

Team from NC A&T and Guildford County Public School Teachers Win Third Prize at the Biomaterials Education Challenge at SFB 2017

Graduate students from NC A&T (Udhab Adhikari and Shalil Khanal), Guildford County Public School teachers (Mark Case and Cindy Nelson) , and advisors Drs. Naryan Bhattarai and Devdas Pai won third place and a $500 prize at the "Biomaterials Education Challenge". The competition, part of the Society for Biomaterials (SFB) 2017 Annual Meeting and Exposition, tasked groups of students around the country to develop innovative and practical approaches to biomaterials education.

Students were challenged to develop hands-on educational modules for a middle school science class. The NCAT team's education module, "Squish the Pokeballs: Biomaterials Education Module for Middle School Classrooms" was designed to demonstrate fundamental biomaterials concepts suitable for a middle school audience with hands-on and easily obtained resources. The objective of this module was to engage middle school students by evolving the fields of tissue engineering and regenerative medicine. These experiments provided an exciting way to relate classroom instruction to real-world biomedical applications and were intended to spark interest in youth to pursue higher education and careers in STEM. The NC A&T team designed simple experiments that relate to state-of-the-art research in the manufacture and characterization of polymeric microsphere biomaterials which are ideal vehicles to encapsulate pharmaceutical drugs for delivery to various parts of the body. In this experiment, students synthesized microspheres by using cornstarch and tonic water. Cinnamon on a spinning plate represented the addition of drugs to the beads. Students were allowed to choose varying amounts of cornstarch and tonic water. This module also models the sorting of microbeads based on their size and their mechanical compression testing. Activities include sorting the water balloons by size using a custom-designed strainer and slowly squishing the balloons of different size to record the force required to break it.

Demonstration of slowly squishing the water balloons to record the force required to break it.



- Udhab Adhikari & Shalil Khanal (NC A&T)

FACULTY ACHIEVEMENT CORNER

The SLC would like to acknowledge some of the accomplishments of our outstanding faculty. It is through their leadership, encouragement, and guidance that we as a student body are able to always perform to our greatest potential.

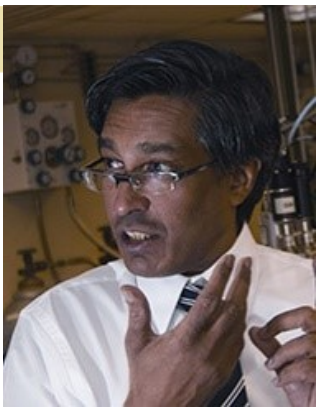
DR. HARVEY BOROVETZ

Review Panel, Whitaker International Fellows & Scholars Program

"Long-Term Mechanical Circulatory Support in Children"
Distinguished speaker series, Department of Bioengineering, UC Riverside

Clinical & Scientific Advisor - Executive Committee, FDA Consortium - Philadelphia Pediatric Medical Device Consortium

DR. JAGANNATHAN SANKAR



BEYA Innovation Award recipient (Black Engineer of the Year Award), Feb 2017, Washington, DC.

Invited keynote address for International conference on physics, ATINER, Greece, July 2016

Invited Panelist for the National Research Council, National Academy of Engineering and Academy of Sciences.

DR. WILLIAM WAGNER

Elected a Fellow of the National Academy of Inventors (NAI), the highest professional distinction

DR. DEVDAS PAI

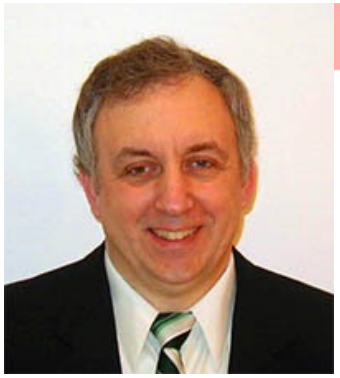
Inducted into the AIMBE College of Fellows for education and outreach contributions towards the establishment of the BMEN programs at NCAT.

DR. SARAH PIXLEY

Guest editor in the Journal of Nanomaterials entitled: "Nanostructured Biomaterials: Biomimetic Strategy to Design Next Generation Nerve Scaffolds"

President, University of Cincinnati Sigma Xi Chapter, 2016-2017.

Awarded Grant: from the University of Cincinnati LEAF NSF program.



DR. MARK SCHULZ

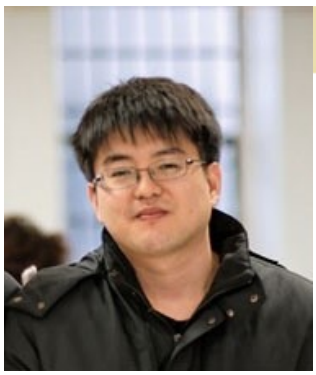
Co-Chairman of the Nanotechnology Materials and Devices Workshop, May 2016.

Selected as an American Institute for Medical and Biological Engineering (AIMBE) Class of 2017 Fellow

DR. PRASHANT KUMTA

Recipient of the 2016 Carnegie Science Award for advanced manufacturing and materials.

Recipient of DOE Grant for 1.2 M focused on novel energy storage platforms.



DR. YEOHEUNG YUN

First graduate coordinator for Bio Engineering Program

Received seral grants including NIH SC3 grant, NSF EAGER and DTRA grant

DR. WILLIAM HEINEMAN

Received the ACS Award in Analytical Chemistry at ACS National Meeting, 2016

Co-chairman, "Wearable and Point-of-Care Sensor Technologies for Biomonitoring", Pittcon Conference and Expo 2016.

Honored by Symposium on Electroanalytical Chemistry at the 47th Central Regional Meeting of the ACS in Covington, 2016.

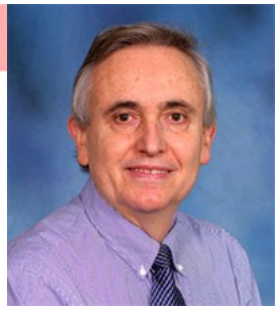
DR. SAVIO WOO

Appointed as the Bao Yu Gang Endowed Chair Professor (2016-2018) at Ningbo University in Zhejiang China

Recognized by the American Society of Mechanical Engineers (ASME) with the creation of the Savio L-Y. Woo Translational Biomechanics Medal

Honorary Professorship from Ningbo University and Zheijiang University in China

DR. VESSELIN SHANOV



New Grant from NIH STTR through INOVASC LLC.

Contributed to 16 journal papers, 9 conference presentations, 1 issued US patent, 2 US applications, and 1 provisional patent.

Education and Outreach

North Carolina Agricultural and Technical State University

NCA&T students were excited to interact with elementary students from the Claxton Elementary School for the Science Extravaganzas this year! The theme of this year was to use the engineering concept to design and test the marble maze.

Deer-Hitachi Engineer and NC A&T volunteers assisted students with their marble maze design.

Claxton Elementary School – Science Extravaganzas

NC A&T SLC members made their way to the Claxton Elementary school to volunteer at the 2017 Science Extravaganza on March 31, 2017. This event is supported by representatives from John Deer-Hitachi BME, SFB, ASME, and NC A&T undergraduate mechanical engineering and bioengineering students.

The focus of this year's Science Extravaganza was "Marvelous Marble Contraption", which involved students to used engineering design, team work, and testing to developed amazing marble maze. Claxton's students were exposed to using scientific methods, engineering design techniques, and how to utilize their initial working materials to accomplish their design goals. The outreach volunteers provided guidance throughout the maze design development process while also encouraging the future STEM leaders to think and perform like genuine engineers to meet their objectives. Students overcame the design flaws as they work on ensuring the ideal mobility of their marble as it travel through their design maze in order to achieve the longest travel time of fifteen seconds.

Deer-Hitachi Engineer and NC A&T volunteers assisted students with their marble maze design.

-Paul McGhee (NC A&T State University)

Conferences

ERC-RMB travels the world to present its discoveries

ERC-RMB Represented at the 2016 ASME IMECE Conference

The 2016 American Society of Mechanical Engineering (ASME) International Mechanical Engineering Congress and Exposition (IMECE) were held at Phoenix Convention Center in Phoenix, Arizona, USA from November 11-17, 2016. This conference brought together members of academia, industry, and government to discuss a broad range of Mechanical Engineering topics. The innovations in processing, characterization, and applications of bioengineered materials were represented by the ERC-RMB. Research accomplishments of the ERC-RMB were presented by graduate students Udhab Adhikari and Shalil Khanal. ERC student Shalil Khanal was also selected as an awardee of the 2016 ASME Track 19 NSF Student Poster Competition travel award. The conference opening keynote speaker was David Sandalow, MD, who is the Inaugural Fellow at Columbia University's Center on Global Energy Policy. The conference lasted 7 days filled with numerous social and scientific events. At the conclusion of each day, there were opportunities to explore various tourist sites and local restaurants in downtown Phoenix. This conference was an excellent opportunity for students to increase networking with industrial and academic pioneers.

- Udhab Adhikari & Shalil Khanal (NC A&T)

Udhab and Shalil presented at the 2016 ASME IMECE conference.

NC A&T Students Presented at BioEngineering 2017 Conference

The BioEngineering 2017: BioMEMS, 3D-Bioprinting, and Synthetic Conference was held at the Wyndham Boston Beacon Hill in Boston, Massachusetts from March 16 -17, 2017. This conference brought together researchers from academia and industry to present the latest advances and approaches in the field of BioMEMS Development, Microfluidic-based Devices in Various Application Areas, 3D-Bioprinting Technologies, Tissue Engineering Applications and Synthetic Biology leading to the development of bio-structures and applications. Ms. Lumei Lui, ERC-RMB student at NC A&T, presented her work titled "Biodegradability and Thrombosis Assessment of Magnesium-based Alloys using a Microfluidic System". Her research showed that microfluidic system can facilitate the controlled and reliable assessment of different biodegradable alloys and aid the development of the optimal degradation behavior and biocompatibility of Mg-based scaffolds.

-Paul McGhee & Lumei Liu (NC A&T)

ERC-RMB Shared Progress in Society for Biomaterials 2017 Conference

This year's Society for Biomaterials (SFB) Annual Meeting and Exposition was held in Minneapolis, MN from April 5-8 2017. The theme for this year's meeting was "**Where Materials Become Medicine**," a recognition that the Society For Biomaterials, perhaps more than any other in the world, works to translate findings in materials science to clinical application to improve human health and quality of life. This premier biomaterials international conference drew many members of ERC-RMB to share our progress with a broader scientific community. NCAT's SFB student chapter received travel grant to support its students to attend this meeting. The conference hosted more than 1,000 biomaterials experts from academia, industry, government and the international biomaterials society. There were dedicated tracks of interest to the SFB community, including Drug Delivery and Cell & Tissue Regeneration. In addition, for the first time, SFB had presented a series of "Thought Leader Symposia" that will allow thought leaders from across the breadth of disciplines represented in the Society to share their perspectives on current research and future directions of the field. The keynote speaker of this meeting was Ryan Egeland, MD, PHD, MBA, Senior Director of Business Development & Licensing at Medtronic, in the Early Technologies Group, where he is focused on strategic mergers and acquisitions. The young biomaterials scientist group had a number of activities including: happy hour networking event and student professional development luncheon. The SFB annual meeting was a rewarding experience for the students who attended. This conference was an excellent opportunity for students to increase industrial as well as academic networks.

NC A&T students Shalil and Udhab presented their work at the SFB conference 2017.

- Shalil Khanal & Udhab Adhikari (NC A&T)

VISIT US ON THE WEB!

http://erc.ncat.edu


ERC-RMB students at the Student Retreat.